

# SEACAR Continuous Water Quality Analysis: SE Region for Water Temperature

Last compiled on 16 July, 2023

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## Important Notes

The purpose of this script is to create monitoring location statistics, perform seasonal Kendall Tau analysis, generate summary plots, and create reports in pdf and Word document form for each parameter in WC Continuous.

These scripts were created by [J.E. Panzik \(jepanzik@usf.edu\)](mailto:jepanzik@usf.edu) for SEACAR.

All scripts and outputs can be found on the SEACAR GitHub repository:

[https://github.com/FloridaSEACAR/SEACAR\\_Trend\\_Analyses](https://github.com/FloridaSEACAR/SEACAR_Trend_Analyses)

This markdown file is designed to be compiled by [SEACAR\\_WC\\_Continuous\\_ReportRender.R](#) ([https://github.com/FloridaSEACAR/SEACAR\\_Trend\\_Analyses/blob/main/WQ\\_Continuous/SEACAR\\_WC\\_Continuous\\_ReportRender.R](https://github.com/FloridaSEACAR/SEACAR_Trend_Analyses/blob/main/WQ_Continuous/SEACAR_WC_Continuous_ReportRender.R)).

Note: The top 2% of data is excluded when computing mean and standard deviations in plotting sections solely for the purpose of getting y-axis scales. The exclusion of the top 2% is not used in any statistics that are exported.

## Libraries and Settings

Loads libraries used in the script. The inclusion of `scipen` option limits how frequently R defaults to scientific notation. Sets default settings for displaying warning and messages in created document, and sets figure dpi.

```
library(knitr)
library(data.table)
library(dplyr)
library(lubridate)
library(ggplot2)
library(ggpubr)
library(scales)
library(EnvStats)
library(tidyr)
library(kableExtra)
options(scipen=999)
knitr:::opts_chunk$set(
  warning=FALSE,
  message=FALSE,
  dpi=200
)
```

## File Import

Imports file that is determined in the SEACAR\_WC\_Continuous\_ReportRender.R script.

The command `fread` is used because of its improved speed while handling large data files. Only columns that are used by the script are imported from the file, and are designated in the `select` input.

The script then gets the name of the parameter as it appears in the data file and units of the parameter.

The latest version of WC Continuous data is available at: <https://usf.box.com/s/7ocbmmdsm5bgfz6535t8btrnj3r73ysch>

The file being used for the analysis is: **Combined\_WQ\_WC\_NUT\_cont\_Water\_Temperature\_SE-2023-Jul-14.txt**

```
data <- fread(file_in, sep="|", header=TRUE, stringsAsFactors=FALSE,
  select=c("ManagedAreaName", "ProgramID", "ProgramName",
    "ProgramLocationID", "SampleDate", "Year", "Month",
    "RelativeDepth", "ActivityType", "ParameterName",
    "ResultValue", "ParameterUnits", "ValueQualifier",
    "SEACAR_QAQCFlagCode", "Include"),
  na.strings=c("NULL", "", "NA"))
parameter <- unique(data$ParameterName)
unit <- unique(data$ParameterUnits)
cat(paste("The data file(s) used:", file_short, sep="\n"))

## The data file(s) used:
## Combined_WQ_WC_NUT_cont_Water_Temperature_SE-2023-Jul-14.txt
```

## Data Filtering

Most data filtering is performed on export from the database, and is indicated by the `Include` variable. `Include` values of 1 indicate the data should be used for analysis, values of 0 indicate the data should not be used for analysis. Documentation on the database filtering is provided here: [SEACAR Documentation-Analysis Filters and Calculations.pdf](#)

The filtering that is performed by the script at this point removes rows that are missing values for `ResultValue` and `RelativeDepth`, and removes any activity type that has “Blank” in the description. Data passes the filtering the process if it is has an `Include` value of 1.

Creates a variable for each `MonitoringID` which is defined as a unique combination of `ManagedAreaName`, `ProgramID`, `ProgramAreaName`, and `ProgramLocationID`.

After the initial filtering, a second filter variable is created to determine whether enough time is represented in the monitoring location, which is that each monitoring location has 5 year or more of unique year entries and have at least 2 consecutive years of observations with at least 2 repeating months for observations that pass the initial filter. If data passes the first set of filtering criteria and the time criteria, they are used in the analysis.

The function that determines whether a monitoring location has at least 2 consecutive years of observations with at least 2 repeating months takes the data, creates a list of the monitoring IDs and cycles through each monitoring ID. For each monitoring ID cycle:

1. List the unique years and put them in ascending order
2. If there are fewer than 2 unique years, skip to the next area
3. If there are 2 or more unique years, start a loop that compares adjacent year entries for the area
  - Start with the first two year entries
4. See if the year entries are subsequent years (1 year apart)
  - If not, skip to next pair of years
5. For the two years being compared, get the list of months for each
6. Compare the two lists of months to see what months are the same
  - If there are two or more months that are the same, the location passes the criteria and is stored in a variable
7. The list of IDs that pass the 2 consecutive years with at least 2 repeating months is returned and used to determine if there is sufficient data for analysis.

A data frame is created that stores summary information for each monitoring location. This information is stored and combined with the results of the Seasonal Kendall Tau analysis and export to a data file once combined.

The sufficient data qualifier is merged with the original data, and a variable `Use_In_Analysis` is created to indicate what data should be used.

A variable with the monitoring IDs that pass all criteria is created and stored.

```
# Converts Include to be a logical either TRUE or FALSE
data$Include <- as.logical(data$Include)
# Removes any data rows that do not have Include set to TRUE
data <- data[data$Include==TRUE,]
# Removes rows that have missing ResultValues
data <- data[!is.na(data$ResultValue),]
# Removes rows that have missing RelativeDepth
```

```

data <- data[!is.na(data$RelativeDepth),]
# Removes rows that have an ActivityType with Blank
data <- data[!grep("Blank", data$ActivityType),]

# Removes any data below threshold value of 0, or 5 for Water Temperature
if(param_name=="Water_Temperature"){
  data <- data[data$ResultValue>=-5,]
} else{
  data <- data[data$ResultValue>=0,]
}

# Gets list of managed areas for the specific region being looked at
MA_All_Region <- MA_All[MA_All$Region==region,]

# Gets AreaID for data by merging data with the managed area list for the region
data <- merge.data.frame(MA_All_Region[,c("AreaID", "ManagedAreaName")],
                         data, by="ManagedAreaName", all=TRUE)

# Creates MonitoringID to more easily cycle through monitoring locations
data <- data %>%
  group_by(AreaID, ManagedAreaName, ProgramID, ProgramName,
           ProgramLocationID) %>%
  mutate(MonitoringID=cur_group_id())

# Creates function to checks monitoring location for at least 2 years of
# continuous consecutive data
ContinuousConsecutiveCheck <- function(con_data){
  # Gets MonitoringIDs
  IDs <- unique(con_data$MonitoringID[con_data$Include==TRUE &
                                         !is.na(con_data$Include)])
  # Loops through each MonitoringID
  for(i in 1:length(IDs)) {
    # Gets list of Years for MonitoringID
    Years <- unique(con_data$Year[con_data$MonitoringID==IDs[i] &
                                    con_data$Include==TRUE &
                                    !is.na(con_data$Include)])
    # Puts Years in order
    Years <- Years[order(Years)]
    # If there are fewer than 2 years, skip to next MonitoringID
    if(length(Years)<2) {
      next
    }
    # Starts loop to make sure there are at least 2 consecutive years with
    # consecutive months of data
    for(j in 2:length(Years)) {
      # If adjacent year entries are not 1 year apart, skip to the next set
      # of year entries
      if(Years[j]-Years[j-1] !=1) {
        next
      }
      # Gets the list of months from the first year
      Months1 <- unique(con_data$Month[con_data$MonitoringID==IDs[i] &
                                         con_data$Year==Years[j-1] &
                                         con_data$Include==TRUE &

```

```

                !is.na(con_data$Include)])
# Gets list of months for the second year
Months2 <- unique(con_data$Month[con_data$MonitoringID==IDs[i] &
                           con_data$Year==Years[j] &
                           con_data$Include==TRUE &
                           !is.na(con_data$Include)])
# If there are more than 2 months shared between the two years, the
# MonitoringID passes the check and is stored
if(length(intersect(Months1, Months2))>=2) {
  # Creates variable for stored MonitoringID if it doesn't exist
  if(exists("consecutive")==FALSE){
    consecutive <- IDs[i]
    break
  } else{
    # Adds to variable for storing MonitoringID if does exist
    consecutive <- append(consecutive, IDs[i])
    break
  }
}
# After going through all MonitoringID, return variable with list of all
# that pass
return(consecutive)
}

# Stores the MonitoringID that pass the consecutive year check
consMonthIDs <- ContinuousConsecutiveCheck(data)

# Creates data frame with summary for each monitoring location.
Mon_Summ <- data %>%
  group_by(MonitoringID, AreaID, ManagedAreaName, ProgramID, ProgramName,
           ProgramLocationID) %>%
  summarize(ParameterName=parameter,
            RelativeDepth=unique(RelativeDepth),
            N_Data=length(ResultValue[Include==TRUE & !is.na(ResultValue)]),
            N_Years=length(unique(Year[Include==TRUE & !is.na(Year)])),
            EarliestYear=min(Year[Include==TRUE]),
            LatestYear=max(Year[Include==TRUE]),
            EarliestSampleDate=min(SampleDate[Include==TRUE]),
            LastSampleDate=max(SampleDate[Include==TRUE]),
            ConsecutiveMonths=ifelse(unique(MonitoringID) %in%
                                      consMonthIDs==TRUE, TRUE, FALSE),
            # Determines if monitoring location is sufficient for analysis
            # based on having more than 0 data entries, more than the
            # sufficient number of year, and the consecutive month criteria
            SufficientData=ifelse(N_Data>0 & N_Years>=suff_years &
                                     ConsecutiveMonths==TRUE, TRUE, FALSE),
            Median=median(ResultValue, na.rm=TRUE))
Mon_Summ$consecutiveMonths <- NULL

# Puts summary data in order based on MonitoringID
Mon_Summ <- as.data.table(Mon_Summ[order(Mon_Summ$MonitoringID), ])

```

```

# Creates column in data that determines how many years from the start for each
# Monitoring location
data <- data %>%
  group_by(MonitoringID) %>%
  mutate(YearFromStart=Year-min(Year))
# Adds SufficientData column to data table based on MonitoringID
data <- merge.data.frame(data, Mon_Summ[,c("MonitoringID", "SufficientData")],
                         by="MonitoringID")
# Creates Use_In_Analysis column for data that is determined if the row has
# Include value of TRUE and SufficientData value of TRUE
data$Use_In_Analysis <- ifelse(data$Include==TRUE & data$SufficientData==TRUE,
                                 TRUE, FALSE)
# Get list of and number of MonitoringID that are to be used in analysis
Mon_IDs <- unique(data$MonitoringID[data$Use_In_Analysis==TRUE])
Mon_IDs <- Mon_IDs[order(Mon_IDs)]
n <- length(Mon_IDs)

```

## Monitoring Location Statistics

Gets summary statistics for each monitoring location. Excluded monitoring locations are not included into whether the data should be used or not. Uses piping from dplyr package to feed into subsequent steps. The following steps are performed:

1. Take the `data` variable and only include rows that have a `Use_In_Analysis` value of TRUE
2. Group data that have the same `ManagedAreaName`, `ProgramID`, `ProgramName`, `ProgramLocationID`, `Year`, and `Month`.
  - Second summary statistics consider the monitoring location grouping and `Year`.
  - Third summary statistics consider the monitoring location grouping and `Month`.
3. For each group, provide the following information: Earliest Sample Date (`EarliestSampleDate`), Latest Sample Date (`LastSampleDate`), Number of Entries (`N`), Lowest Value (`Min`), Largest Value (`Max`), Median, Mean, Standard Deviation, and a list of all Program IDs included in these measurements.
4. Sort the data in ascending (A to Z and 0 to 9) order based on `ManagedAreaName`, `ProgramID`, `ProgramName`, `ProgramLocationID`, `Year`, and `Month` in that order.
5. Write summary stats to a pipe-delimited .txt file in the output directory
  - WC Continuous Output Files in SEACAR GitHub ([https://github.com/FloridaSEACAR/SEACAR\\_Trend\\_Analyses/tree/main/WQ\\_Continuous/output](https://github.com/FloridaSEACAR/SEACAR_Trend_Analyses/tree/main/WQ_Continuous/output))

Because the continuous data is extensive and most measurements are taken every 15 minutes, a daily average is determined and used based on grouping `ManagedAreaName`, `ProgramID`, `ProgramName`, `ProgramLocationID`, and `SampleDate`. The new `ResultValue` is the mean of all values on that date from that specific monitoring location. Sets the `SampleDate` as a date object, and creates various scales of the date to be used by plotting functions.

```

# Create summary statistics for each monitoring location based on Year and Month
# intervals.
Mon_YM_Stats <- data[data$Use_In_Analysis==TRUE, ] %>%
  group_by(MonitoringID, AreaID, ManagedAreaName, ProgramID, ProgramName,
           ProgramLocationID, Year, Month) %>%
  summarize(ParameterName=parameter,

```

```

RelativeDepth=unique(RelativeDepth),
EarliestSampleDate=min(SampleDate),
LastSampleDate=max(SampleDate),
N_Data=length(ResultValue),
Min=min(ResultValue), Max=max(ResultValue),
Median=median(ResultValue), Mean=mean(ResultValue),
StandardDeviation=sd(ResultValue))
# Puts the data in order based on ManagedAreaName, ProgramID, ProgramName,
# ProgramLocationID, Year, then Month
Mon_YM_Stats <- as.data.table(Mon_YM_Stats[order(Mon_YM_Stats$ManagedAreaName,
                                                 Mon_YM_Stats$ProgramID,
                                                 Mon_YM_Stats$ProgramName,
                                                 Mon_YM_Stats$ProgramLocationID,
                                                 Mon_YM_Stats$Year,
                                                 Mon_YM_Stats$Month), ])
# Writes summary statistics to file without MonitoringID
fwrite(select(Mon_YM_Stats, -MonitoringID),
       paste0(out_dir_param, "/WC_Continuous_", param_abrev, "_",
              region, "_MonLoc_MMYY_Stats.txt"), sep="|")
# Get year from start for each monitoring location
Mon_YM_Stats <- Mon_YM_Stats %>%
  group_by(MonitoringID) %>%
  mutate(YearFromStart=Year-min(Year))
# Create decimal value of year and month values
Mon_YM_Stats$YearMonthDec <- Mon_YM_Stats$Year + ((Mon_YM_Stats$Month-0.5) / 12)

# Create summary statistics for each monitoring location based on Year
# intervals.
Mon_Y_Stats <- data[data$Use_In_Analysis==TRUE, ] %>%
  group_by(AreaID, ManagedAreaName, ProgramID, ProgramName, ProgramLocationID,
           Year) %>%
  summarize(ParameterName=parameter,
            RelativeDepth=unique(RelativeDepth),
            EarliestSampleDate=min(SampleDate),
            LastSampleDate=max(SampleDate), N_Data=length(ResultValue),
            Min=min(ResultValue), Max=max(ResultValue),
            Median=median(ResultValue), Mean=mean(ResultValue),
            StandardDeviation=sd(ResultValue))
# Puts the data in order based on ManagedAreaName, ProgramID, ProgramName,
# ProgramLocationID, then Year
Mon_Y_Stats <- as.data.table(Mon_Y_Stats[order(Mon_Y_Stats$ManagedAreaName,
                                                Mon_Y_Stats$ProgramID,
                                                Mon_Y_Stats$ProgramName,
                                                Mon_Y_Stats$ProgramLocationID,
                                                Mon_Y_Stats$Year), ])
# Writes summary statistics to file
fwrite(Mon_Y_Stats, paste0(out_dir_param, "/WC_Continuous_", param_abrev, "_",
                           region, "_MonLoc_Yr_Stats.txt"), sep="|")

# Create summary statistics for each monitoring location based on Month
# intervals.
Mon_M_Stats <- data[data$Use_In_Analysis==TRUE, ] %>%
  group_by(AreaID, ManagedAreaName, ProgramID, ProgramName, ProgramLocationID,

```

```

    Month) %>%
summarize(ParameterName=parameter,
          RelativeDepth=unique(RelativeDepth),
          EarliestSampleDate=min(SampleDate),
          LastSampleDate=max(SampleDate), N_Data=length(ResultValue),
          Min=min(ResultValue), Max=max(ResultValue),
          Median=median(ResultValue), Mean=mean(ResultValue),
          StandardDeviation=sd(ResultValue))
# Puts the data in order based on ManagedAreaName, ProgramID, ProgramName,
# ProgramLocationID, then Month
Mon_M_Stats <- as.data.table(Mon_M_Stats[order(Mon_M_Stats$ManagedAreaName,
                                                Mon_M_Stats$ProgramID,
                                                Mon_M_Stats$ProgramName,
                                                Mon_M_Stats$ProgramLocationID,
                                                Mon_M_Stats$Month), ])
# Writes summary statistics to file
fwrite(Mon_M_Stats, paste0(out_dir_param,"/WC_Continuous_", param_abrev, "_",
                           region, "_MonLoc_Mo_Stats.txt"), sep="|")
# Reduces size of data by getting a daily average
data <- data %>%
  group_by(MonitoringID, AreaID, ManagedAreaName, ProgramID, ProgramName,
           ProgramLocationID, SampleDate) %>%
  summarise(Year=unique(Year), Month=unique(Month),
            RelativeDepth=unique(RelativeDepth),
            ResultValue=mean(ResultValue), Include=unique(Include),
            Use_In_Analysis=unique(Use_In_Analysis))
# Sets column formats to appropriate types
data$SampleDate <- as.Date(data$SampleDate)
data$YearMonth <- format(data$SampleDate, format = "%m-%Y")
data$YearMonthDec <- data$Year + ((data$Month-0.5) / 12)
data$DecDate <- decimal_date(data$SampleDate)

```

## Seasonal Kendall Tau Analysis

Gets seasonal Kendall Tau statistics using the `kendallSeasonalTrendTest` from the `EnvStats` package. The Trend parameter is determined from a user-defined function based on the median, Senn slope, and p values from the data. Analysis modified from that performed at The Water Atlas: <https://sarasota.wateratlas.usf.edu/water-quality-trends/#analysis-overview>

The following steps are performed:

1. Set the column names for the variable holding the SKT stat values
2. Create a data frame with the same number of columns as column names, and the same number of rows as the number of monitoring locations being analyzed.
3. Starts a loop that goes through each monitoring location (MonitoringID)
4. Gets data for that MonitoringID and the number of data rows.
5. Gets basic statistics for the MonitoringID from the Mon\_Summ variable.
6. Performs a seasonal Kendall Tau trend test with the assumption that data is not serially correlated (independent.obs=TRUE)

- If analysis returns NULL, performs SKT assuming data is serially auto-correlated (independent.obs=FALSE)
7. Store the SKT result values in the skt\_stats data frame created.
  8. Determines the Trend of the slope based on the statistics and SKT parameters.
  9. Merge data frames together to create a cumulative data frame with all statistics and round values to appropriate decimal points.
  10. Write summary stats to a pipe-delimited .txt file in the output directory
- WC Continuous Output Files in SEACAR GitHub ([https://github.com/FloridaSEACAR/SEACAR\\_Trend\\_Analyses/tree/main/WQ\\_Continuous/output](https://github.com/FloridaSEACAR/SEACAR_Trend_Analyses/tree/main/WQ_Continuous/output))

After the analysis is performed, a variable is created that stores the x & y coordinates of the SKT trend line to be used for plotting

```
# List for column names
c_names <- c("MonitoringID", "Independent", "tau", "p",
           "SennSlope", "SennIntercept", "ChiSquared", "pChiSquared", "Trend")

skt_stats <- data.frame(matrix(ncol = length(c_names), nrow = n))

colnames(skt_stats) <- c_names
# Determines if there are any monitoring locations to analyze
if(n==0){
  print("There are no monitoring locations that qualify.")
} else{
  # Starts cycling through Monitoring locations to determine seasonal
  # Kendall Tau
  for (i in 1:n) {
    # Gets the number of rows of data for the monitoring location
    data_SKT <- Mon_YM_Stats[Mon_YM_Stats$MonitoringID==Mon_IDs[i], ]
    x <- nrow(data_SKT)
    # Perform analysis if there is more than 1 row
    if (x>0) {
      # Store the monitoring location summary statistics to be used in
      # trend analysis
      SKT.med <- Mon_Summ$Median[Mon_Summ$MonitoringID==Mon_IDs[i]]
      SKT.minYr <- Mon_Summ$EarliestYear[Mon_Summ$MonitoringID==Mon_IDs[i]]
      SKT.maxYr <- Mon_Summ$LatestYear[Mon_Summ$MonitoringID==Mon_IDs[i]]
      SKT.ind <- TRUE
      SKT <- kendallSeasonalTrendTest(y=data_SKT$Mean,
                                         season=data_SKT$Month,
                                         year=data_SKT$YearFromStart,
                                         independent.obs=SKT.ind)
      if(is.na(SKT$estimate[1])==TRUE){
        SKT.ind <- FALSE
        SKT <- kendallSeasonalTrendTest(y=data_SKT$Mean,
                                         season=data_SKT$Month,
                                         year=data_SKT$YearFromStart,
                                         independent.obs=SKT.ind)
      }
      skt_stats$MonitoringID[i] <- Mon_IDs[i]
    }
  }
}
```

```

skt_stats$Independent[i] <- SKT.ind
skt_stats$tau[i] <- SKT$estimate[1]
skt_stats$p[i] <- SKT$p.value[2]
skt_stats$SennSlope[i] <- SKT$estimate[2]
skt_stats$SennIntercept[i] <- SKT$estimate[3]
skt_stats$ChiSquared[i] <- SKT$statistic[1]
skt_stats$pChiSquared[i] <- SKT$p.value[1]
# If the p value is less than 5% and the slope is greater than 10% of the
# median value, the trend is large (2).
if (skt_stats$p[i] < .05 & abs(skt_stats$SennSlope[i]) >
    abs(SK.T.med) / 10.) {
  skt_stats$Trend[i] <- 2

# If the p value is less than 5% and the slope is less than 10% of the
# median value, there is a trend (1).
} else if (skt_stats$p[i] < .05 & abs(skt_stats$SennSlope[i]) <
           abs(SK.T.med) / 10.) {
  skt_stats$Trend[i] <- 1

# Otherwise, there is no trend (0)
} else {
  skt_stats$Trend[i] <- 0
}
# Sets the sign of the trend based on Senn Slope direction
if (skt_stats$SennSlope[i] <= 0) {
  skt_stats$Trend[i] <- -skt_stats$Trend[i]
}
}
}

# Stores as data frame
skt_stats <- as.data.frame(skt_stats)

}

# Clears unused variables
rm(SK.T, data_SKT, x, SKT.med, SKT.minYr, SKT.maxYr, SKT.ind)
# Combines the skt_stats with Mon_Summ
skt_stats <- merge.data.frame(Mon_Summ, skt_stats,
                             by=c("MonitoringID"), all=TRUE)

skt_stats <- as.data.table(skt_stats[order(skt_stats$MonitoringID), ])

# Sets variables to proper format and rounds values if necessary
skt_stats$tau <- round(as.numeric(skt_stats$tau), digits=4)
skt_stats$p <- format(round(as.numeric(skt_stats$p), digits=4),
                      scientific=FALSE)
skt_stats$SennSlope <- as.numeric(skt_stats$SennSlope)
skt_stats$SennIntercept <- as.numeric(skt_stats$SennIntercept)
skt_stats$ChiSquared <- round(as.numeric(skt_stats$ChiSquared), digits=4)
skt_stats$pChiSquared <- round(as.numeric(skt_stats$pChiSquared), digits=4)
skt_stats$Trend <- as.integer(skt_stats$Trend)

# Writes combined statistics to file

```

```

fwrite(select(skt_stats, -c(MonitoringID, EarliestSampleDate)),
       paste0(out_dir_param, "/WC_Continuous_", param_abrev, "_", region,
              "_KendallTau_Stats.txt"),
       sep=" | ")

# Removes data rows with no ResultValue (created by merging with MA_All)
data <- data[!is.na(data$ResultValue),]

# Gets x and y values for starting point for trendline
KT.Plot <- skt_stats %>%
  group_by(MonitoringID) %>%
  summarize(x=decimal_date(EarliestSampleDate),
            y=(x-EarliestYear)*SennSlope+SennIntercept)
# Gets x and y values for ending point for trendline
KT.Plot2 <- skt_stats %>%
  group_by(MonitoringID) %>%
  summarize(x=decimal_date(LastSampleDate),
            y=(x-EarliestYear)*SennSlope+SennIntercept)
# Combines the starting and endpoints for plotting the trendline
KT.Plot <- bind_rows(KT.Plot, KT.Plot2)
rm(KT.Plot2)
KT.Plot <- as.data.table(KT.Plot[order(KT.Plot$MonitoringID), ])
KT.Plot <- KT.Plot[!is.na(KT.Plot$y),]

```

## Appendix I: Dataset Summary Box Plots

Box plots are created by using the entire data set and excludes any data that has been previously filtered out. The scripts that create plots follow this format

1. Use the data set that only has `Use_In_Analysis` of TRUE
2. Set what values are to be used for the x-axis, y-axis, and the variable that should determine groups for the box plots
3. Set the plot type as a box plot with the size of the outlier points
4. Create the title, x-axis, y-axis, and color fill labels
5. Set the y and x limits
6. Make the axis labels bold
7. Plot the arrangement as a set of panels

This set of box plots are grouped by year.

```

# Defines standard plot theme: black and white, no major or minor grid lines,
# Arial font. Title is centered, size 12, and blue (hex coded). Subtitle is
# centered, size 10, and blue (hex coded). Legend title is size 10 and the
# legend is left-justified. X-axis title is size 10 and the margins are padded
# at the top and bottom to give more space for angled axis labels. Y-axis title
# is size 10 and margins are padded on the right side to give more space for
# axis labels. Axis labels are size 10 and the x-axis labels are rotated -45
# degrees with a horizontal justification that aligns them with the tick mark
plot_theme <- theme_bw() +
  theme(panel.grid.major = element_blank(),
        panel.grid.minor = element_blank(),

```

```

text=element_text(family="Arial"),
plot.title=element_text(hjust=0.5, size=12, color="#314963"),
plot.subtitle=element_text(hjust=0.5, size=10, color="#314963"),
legend.title=element_text(size=10),
legend.text.align = 0,
axis.title.x = element_text(size=10, margin = margin(t = 5, r = 0,
                                                 b = 10, l = 0)),
axis.title.y = element_text(size=10, margin = margin(t = 0, r = 10,
                                                 b = 0, l = 0)),
axis.text=element_text(size=10),
axis.text.x=element_text(angle = 60, hjust = 1))
# Get minimum, mean, and standard deviation of the data
min_RV <- min(data$ResultValue[data$Include==TRUE])
mn_RV <- mean(data$ResultValue[data$Include==TRUE &
                                 data$ResultValue <
                                 quantile(data$ResultValue, 0.98)])
sd_RV <- sd(data$ResultValue[data$Include==TRUE &
                               data$ResultValue <
                               quantile(data$ResultValue, 0.98)])
# Sets y scale based on data
y_scale <- mn_RV + 4 * sd_RV

# Create plot object for auto-scaled y-axis plot
p1 <- ggplot(data=data[data$Include==TRUE], ),
  aes(x=SampleDate, y=ResultValue, group=Year)) +
  geom_boxplot(color="#333333", fill="#cccccc", outlier.shape=21,
               outlier.size=3, outlier.color="#333333",
               outlier.fill="#cccccc", outlier.alpha=0.75) +
  labs(subtitle="Autoscale", x="Year",
       y=paste0("Values (", unit, ")")) +
  plot_theme
# Create plot object for y-axis scaled plot
p2 <- ggplot(data=data[data$Include==TRUE], ,
  aes(x=SampleDate, y=ResultValue, group=Year)) +
  geom_boxplot(color="#333333", fill="#cccccc", outlier.shape=21,
               outlier.size=3, outlier.color="#333333",
               outlier.fill="#cccccc", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation", x="Year",
       y=paste0("Values (", unit, ")")) +
  ylim(0, y_scale) +
  plot_theme
# Create plot object for y-axis scaled plot for past 10 years
p3 <- ggplot(data=data[data$Include==TRUE], ,
  aes(x=Year, y=ResultValue, group=Year)) +
  geom_boxplot(color="#333333", fill="#cccccc", outlier.shape=21,
               outlier.size=3, outlier.color="#333333",
               outlier.fill="#cccccc", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation, Last 10 Years",
       x="Year", y=paste0("Values (", unit, ")")) +
  ylim(0, y_scale) +
  scale_x_continuous(limits=c(max(data$Year) - 10.5, max(data$Year)+0.5),
                     breaks=seq(max(data$Year) - 10, max(data$Year), 2)) +
  plot_theme

```

```

# Arrange plot objects
set <- ggarrange(p1, p2, p3, ncol=1)

# Create title object for plots
p0 <- ggplot() + labs(title="Summary Box Plots for Entire Data",
                      subtitle="By Year") + plot_theme +
  theme(panel.border=element_blank(), panel.grid.major=element_blank(),
        panel.grid.minor=element_blank(), axis.line=element_blank())

# Arrange title on plots
Yset <- ggarrange(p0, set, ncol=1, heights=c(0.07, 1))

```

This set of box plots are grouped by year and month with the color being related to the month.

```

# Create plot object for auto-scaled y-axis plot
p1 <- ggplot(data=data[data$Include==TRUE, ],
              aes(x=YearMonthDec, y=ResultValue,
                  group=YearMonth, color=as.factor(Month))) +
  geom_boxplot(fill="#cccccc", outlier.size=1.5, outlier.alpha=0.75) +
  labs(subtitle="Autoscale", x="Year",
       y=paste0("Values (", unit, ")"), color="Month") +
  plot_theme +
  theme(legend.position="top", legend.box="horizontal") +
  guides(color=guide_legend(nrow=1))

# Create plot object for y-axis scaled plot
p2 <- ggplot(data=data[data$Include==TRUE, ],
              aes(x=YearMonthDec, y=ResultValue,
                  group=YearMonth, color=as.factor(Month))) +
  geom_boxplot(fill="#cccccc", outlier.size=1.5, outlier.alpha=0.75) +
  labs(subtitle="Scaled to 5x Standard Deviation",
       x="Year", y=paste0("Values (", unit, ")")) +
  ylim(0, y_scale) +
  plot_theme +
  theme(legend.position="none")

# Create plot object for y-axis scaled plot for past 10 years
p3 <- ggplot(data=data[data$Include==TRUE, ],
              aes(x=YearMonthDec, y=ResultValue,
                  group=YearMonth, color=as.factor(Month))) +
  geom_boxplot(fill="#cccccc", outlier.size=1.5, outlier.alpha=0.75) +
  labs(subtitle="Scaled to 5x Standard Deviation, Last 10 Years",
       x="Year", y=paste0("Values (", unit, ")")) +
  ylim(0, y_scale) +
  scale_x_continuous(limits=c(max(data$Year) - 10.5, max(data$Year)+0.5),
                     breaks=seq(max(data$Year) - 10, max(data$Year), 2)) +
  plot_theme +
  theme(legend.position="none")

# Create legend item
leg <- get_legend(p1)

# Arrange plots and legend
set <- ggarrange(leg, p1 + theme(legend.position="none"), p2, p3, ncol=1,
                 heights=c(0.1, 1, 1, 1))

# Create plot title object
p0 <- ggplot() + labs(title="Summary Box Plots for Entire Data",

```

```

        subtitle="By Year & Month") + plot_theme +
theme(panel.border=element_blank(), panel.grid.major=element_blank(),
      panel.grid.minor=element_blank(), axis.line=element_blank())
# Arrange plots and title
YMset <- ggarrange(p0, set, ncol=1, heights=c(0.07, 1))

```

The following box plots are grouped by month with fill color being related to the month. This is designed to view potential seasonal trends.

```

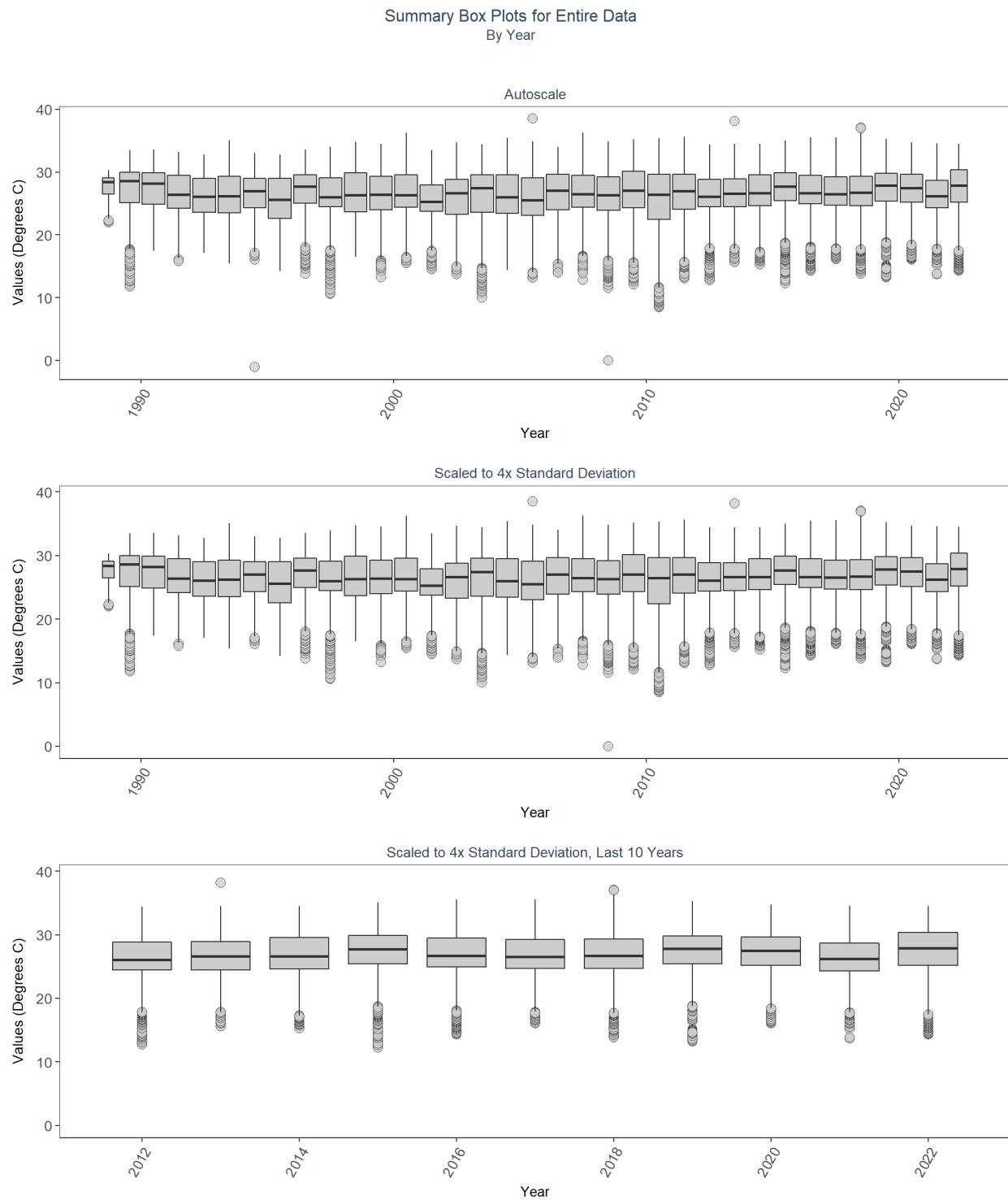
# Create plot object for auto-scaled y-axis plot
p1 <- ggplot(data=data[data$Include==TRUE, ],
              aes(x=Month, y=ResultValue,
                  group=Month, fill=as.factor(Month))) +
  geom_boxplot(color="#333333", outlier.shape=21, outlier.size=3,
               outlier.color="#333333", outlier.alpha=0.75) +
  labs(subtitle="Autoscale", x="Month",
       y=paste0("Values (", unit, ")"), fill="Month") +
  scale_x_continuous(limits=c(0, 13), breaks=seq(3, 12, 3)) +
  plot_theme +
  theme(legend.position="top", legend.box="horizontal") +
  guides(fill=guide_legend(nrow=1))
# Create plot object for y-axis scaled plot
p2 <- ggplot(data=data[data$Include==TRUE, ],
              aes(x=Month, y=ResultValue,
                  group=Month, fill=as.factor(Month))) +
  geom_boxplot(color="#333333", outlier.shape=21, outlier.size=3,
               outlier.color="#333333", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 5x Standard Deviation",
       x="Month", y=paste0("Values (", unit, ")")) +
  ylim(0, y_scale) +
  scale_x_continuous(limits=c(0, 13), breaks=seq(3, 12, 3)) +
  plot_theme +
  theme(legend.position="none")
# Create plot object for y-axis scaled plot for past 10 years
p3 <- ggplot(data=data[data$Include==TRUE &
                           data$Year >= max(data$Year) - 10, ],
              aes(x=Month, y=ResultValue,
                  group=Month, fill=as.factor(Month))) +
  geom_boxplot(color="#333333", outlier.shape=21, outlier.size=3,
               outlier.color="#333333", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 5x Standard Deviation, Last 10 Years",
       x="Month", y=paste0("Values (", unit, ")")) +
  ylim(0, y_scale) +
  scale_x_continuous(limits=c(0, 13), breaks=seq(3, 12, 3)) +
  plot_theme +
  theme(legend.position="none")
# Create legend object
leg <- get_legend(p1)
# Arrange plots and legend
set <- ggarrange(leg, p1 + theme(legend.position="none"), p2, p3, ncol=1,
                 heights=c(0.1, 1, 1, 1))
# Create title object for plots
p0 <- ggplot() + labs(title="Summary Box Plots for Entire Data",

```

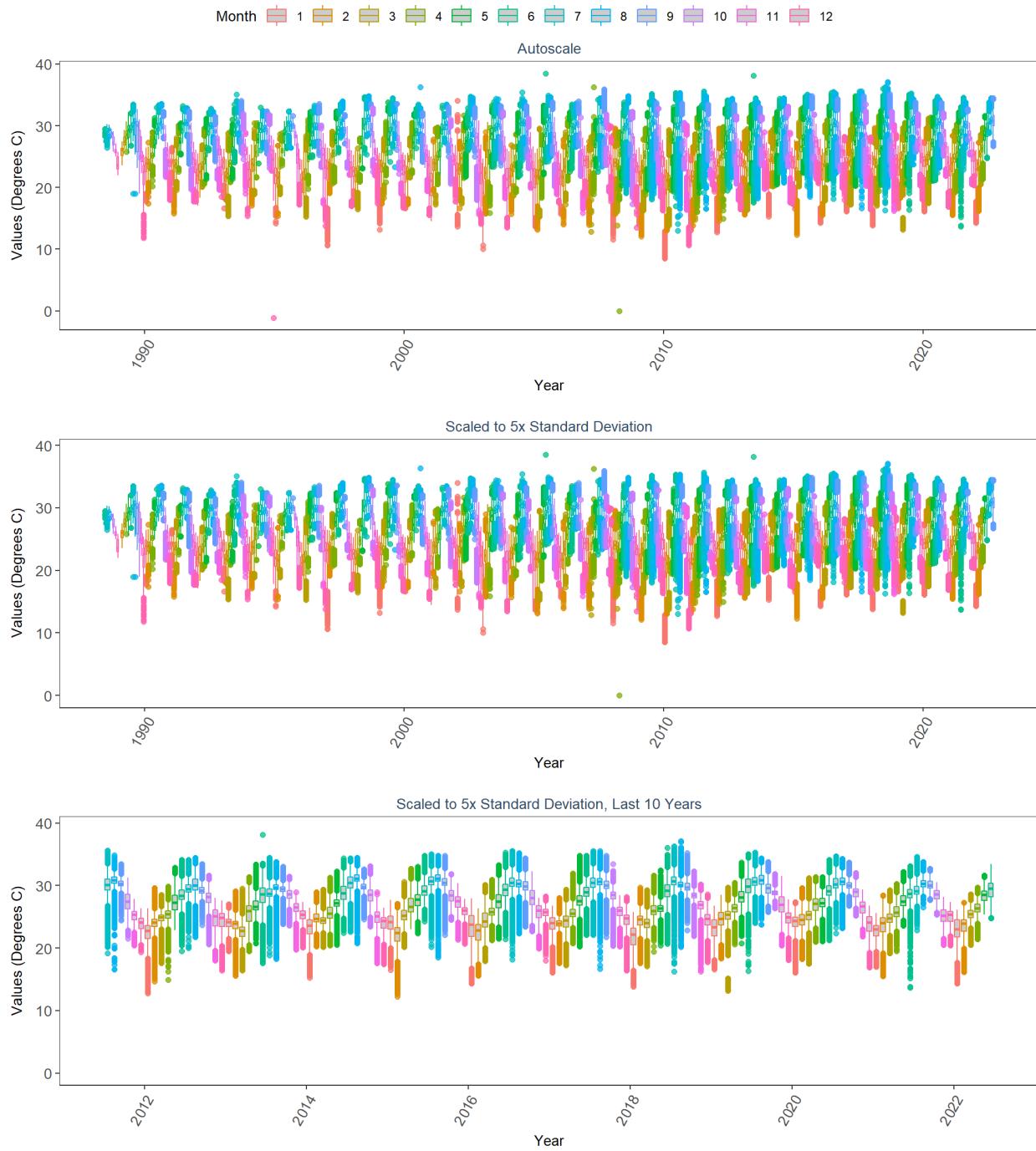
```

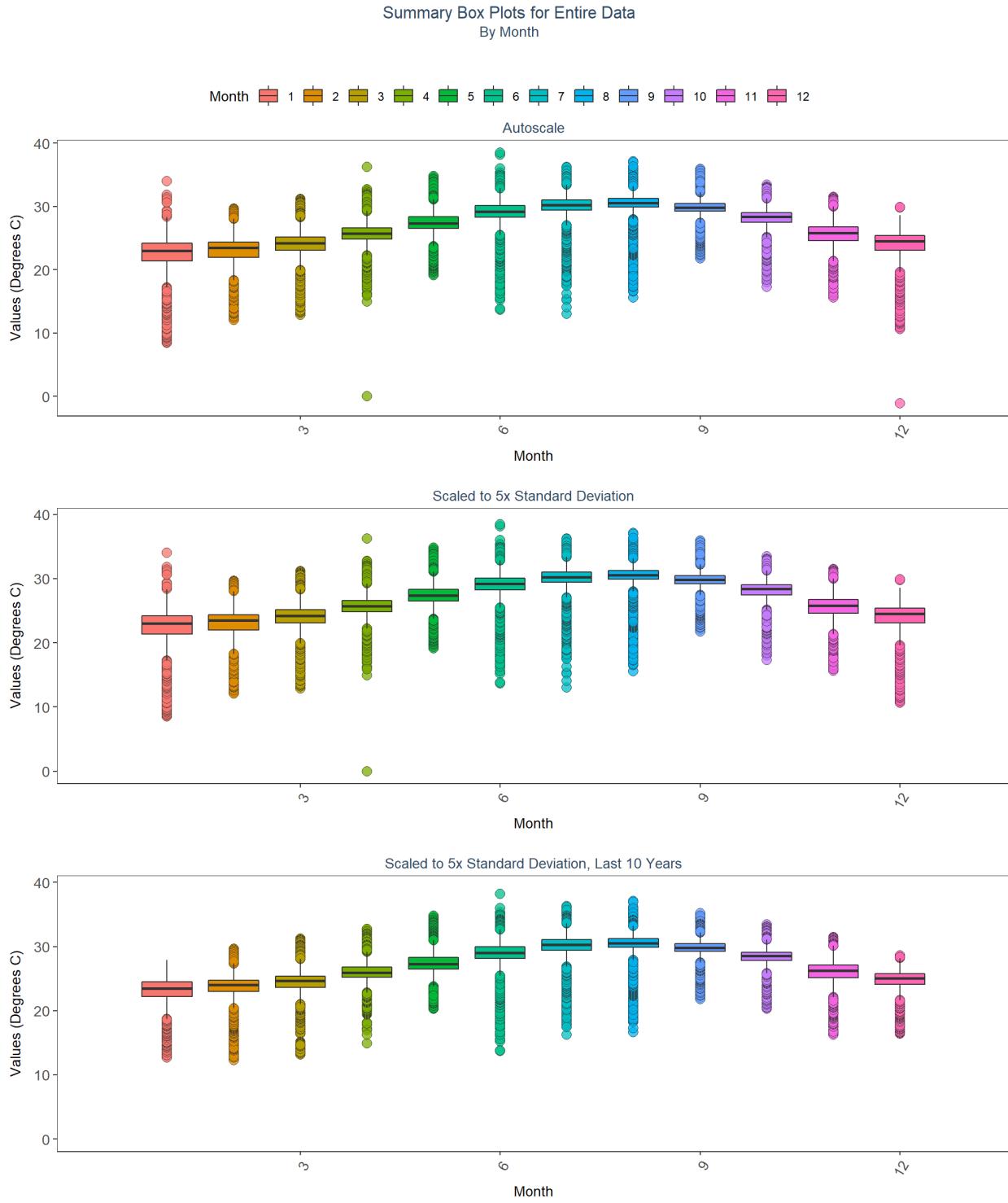
    subtitle="By Month") + plot_theme +
  theme(panel.border=element_blank(), panel.grid.major=element_blank(),
        panel.grid.minor=element_blank(), axis.line=element_blank())
# Arrange plots and title
Mset <- ggarrange(p0, set, ncol=1, heights=c(0.07, 1))

```



Summary Box Plots for Entire Data  
By Year & Month





## Appendix II: Monitoring Location Trendlines

The plots created in this section are designed to show the general trend of the data. Data is taken and grouped by **MonitoringID**. The trendlines on the plots are created using the Senn slope and intercept from

the seasonal Kendall Tau analysis. The scripts that create plots follow this format

1. Use the averages that have been aggregated by year and month for the desired monitoring location
2. Determine the earliest and latest year of the data to create x-axis scale and intervals
3. Determine the x-axis scale
4. Set the plot type as a line and point plot with the specifics of each
5. Add the linear trend determined from the seasonal Kendall Tau slope and intercept
6. Create the title, x-axis, y-axis, and labels
7. Set the y and x limits
8. Apply the plot theme
9. Set the SKT analysis results as a table figure
10. Combine the plot and table to be displayed together

```
# Determines whether analyzed monitoring locations exist. If they do, begins
# looping through them
if(n==0){
  print("There are no monitoring locations that qualify.")
} else {
  # Begins looping through each monitoring location
  for (i in 1:n) {
    # Gets data to be used in plot for monitoring location
    plot_data <- Mon_YM_Stats[Mon_YM_Stats$MonitoringID==Mon_IDs[i],]
    # Gets trendline data for monitoring location
    KT.plot_data <- KT.Plot[KT.Plot$MonitoringID==Mon_IDs[i],]
    #Determine max and min time (Year) for plot x-axis
    t_min <- min(plot_data$Year)
    t_max <- max(plot_data$YearMonthDec)
    t_max_brk <- as.integer(round(t_max, 0))
    t <- t_max-t_min
    min_RV <- min(plot_data$Mean)
    # Creates break intervals for plots based on number of years of data
    if(t>=30){
      # Set breaks to every 10 years if more than 30 years of data
      brk <- -10
    }else if(t<30 & t>=10){
      # Set breaks to every 5 years if between 30 and 10 years of data
      brk <- -5
    }else if(t<10 & t>=4){
      # Set breaks to every 2 years if between 10 and 4 years of data
      brk <- -2
    }else if(t<4 & t>=2){
      # Set breaks to every year if between 4 and 2 years of data
      brk <- -1
    }else if(t<2){
      # Set breaks to every year if less than 2 years of data
      brk <- -1
      # Sets t_max to be 1 year greater and t_min to be 1 year lower
      # Forces graph to have at least 3 tick marks
      t_max <- t_max+1
      t_min <- t_min-1
    }
    # Get name of managed area
    MA_name <- skt_stats$ManagedAreaName[skt_stats$MonitoringID==Mon_IDs[i]]
    # Get program location name
```

```

Mon_name <- paste0(skt_stats$ProgramID[skt_stats$MonitoringID==Mon_IDs[i]], 
  "\n", skt_stats$ProgramName[skt_stats$MonitoringID==Mon_IDs[i]], "\n",
  skt_stats$ProgramLocationID[skt_stats$MonitoringID==Mon_IDs[i]])

# Create plot object with data and trendline
p1 <- ggplot(data=plot_data,
  aes(x=YearMonthDec, y=Mean)) +
  geom_line(size=0.75, color="#333333", alpha=0.6) +
  geom_point(shape=21, size=3, color="#333333", fill="#cccccc",
    alpha=0.75) +
  geom_line(data=KT.plot_data, aes(x=x, y=y),
    color="#000099", size=1.2, alpha=0.7) +
  labs(title=paste0(MA_name, "\n", Mon_name),
    subtitle=parameter,
    x="Year", y=paste0("Values (", unit, ")")) +
  scale_x_continuous(limits=c(t_min-0.25, t_max+0.25),
    breaks=seq(t_max_brk, t_min, brk)) +
  plot_theme

# Creates ResultTable to display statistics below plot
ResultTable <- skt_stats[skt_stats$MonitoringID==Mon_IDs[i], ] %>%
  select(RelativeDepth, N_Data, N_Years, Median, Independent, tau, p,
    SennSlope, SennIntercept, ChiSquared, pChiSquared, Trend)

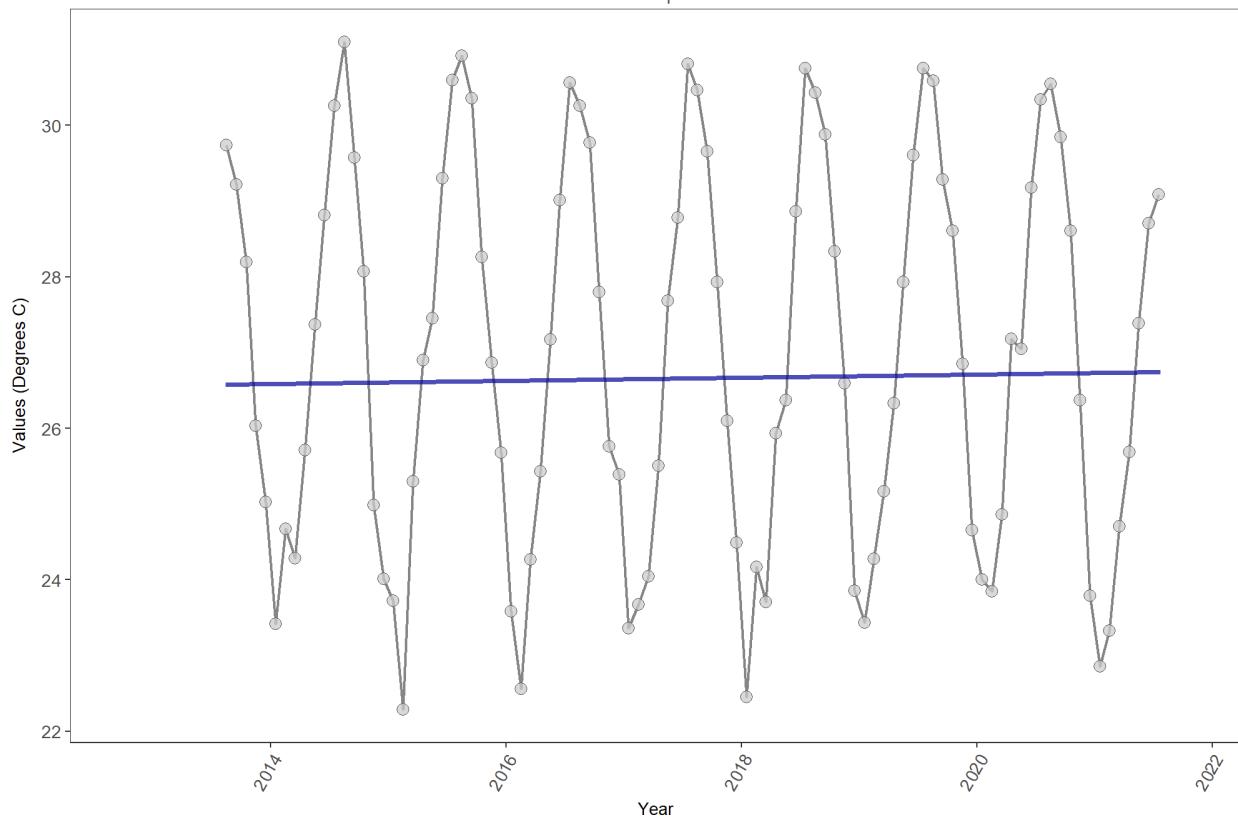
# Create table object
t1 <- ggtexttable(ResultTable, rows=NULL,
  theme=ttheme(base_size=10)) %>%
  tab_add_footnote(text="p < 0.00005 appear as 0 due to rounding.\n
    SennIntercept is intercept value at beginning of
    record for monitoring location",
    size=10, face="italic")

# Arrange and display plot and statistic table
print(ggarrange(p1, t1, ncol=1, heights=c(0.85, 0.15)))
# Add extra space at the end to prevent the next figure from being too
# close. Does not add space after last plot
if(i!=n){
  cat("\n \n \n")
}
rm(plot_data)
rm(KTset, leg)
rm(plot_data)
rm(KTset, leg)
}

}

```

Biscayne Bay-Cape Florida to Monroe County Line Aquatic Preserve  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 6  
 Water Temperature

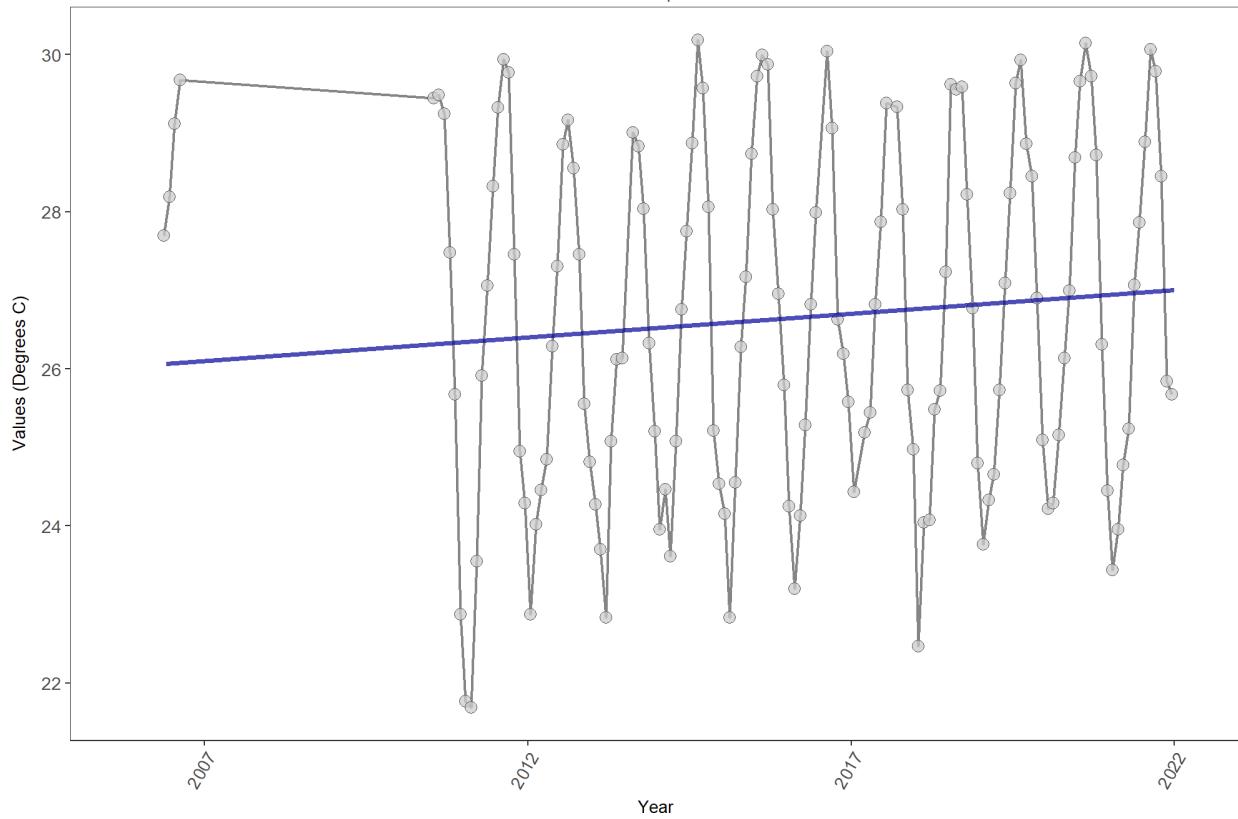


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	55288	9	26.74	TRUE	0.0476	0.5922	0.02127766	26.56409	8.2449	0.6912	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 5  
 National Data Buoy Center  
 LKWF1  
 Water Temperature

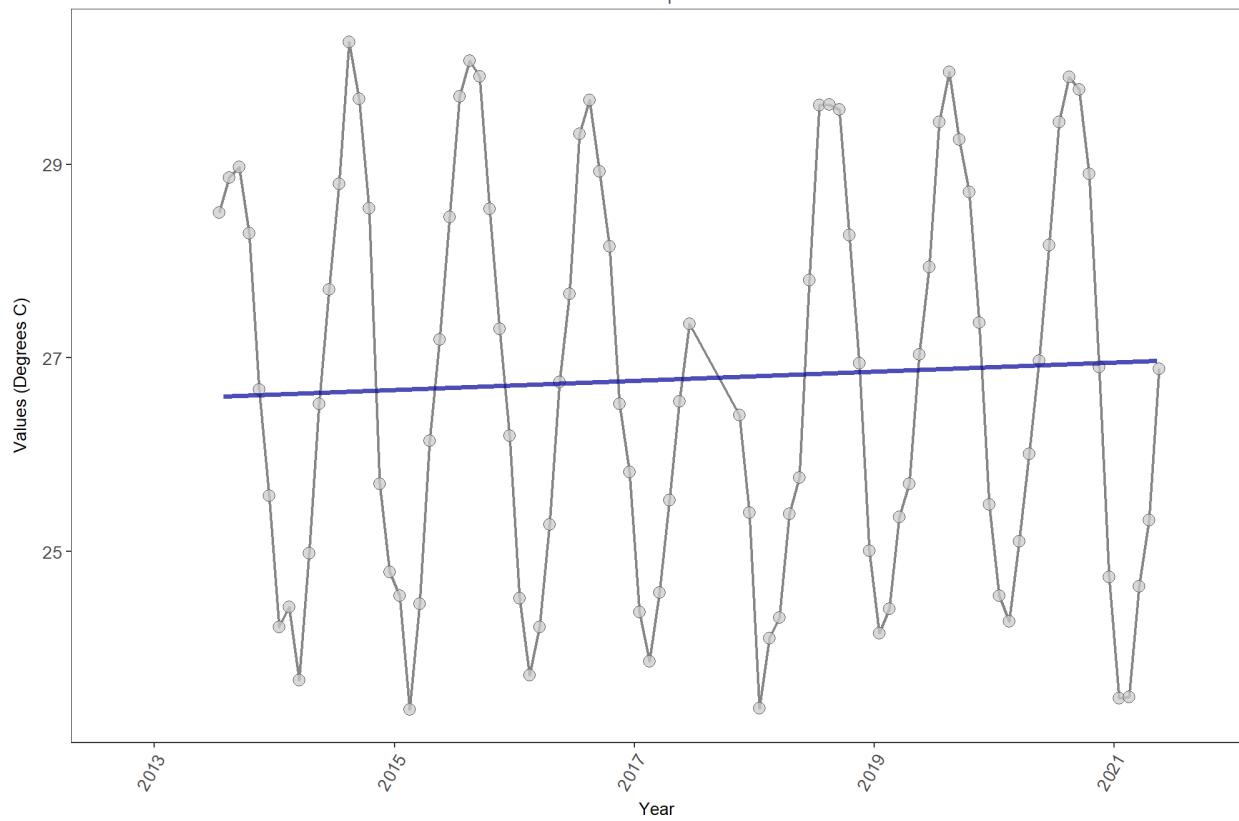


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	891506	13	26.4	TRUE	0.2829	0.0000	0.06026849	26.04078	6.0334	0.8711	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 1  
 Water Temperature

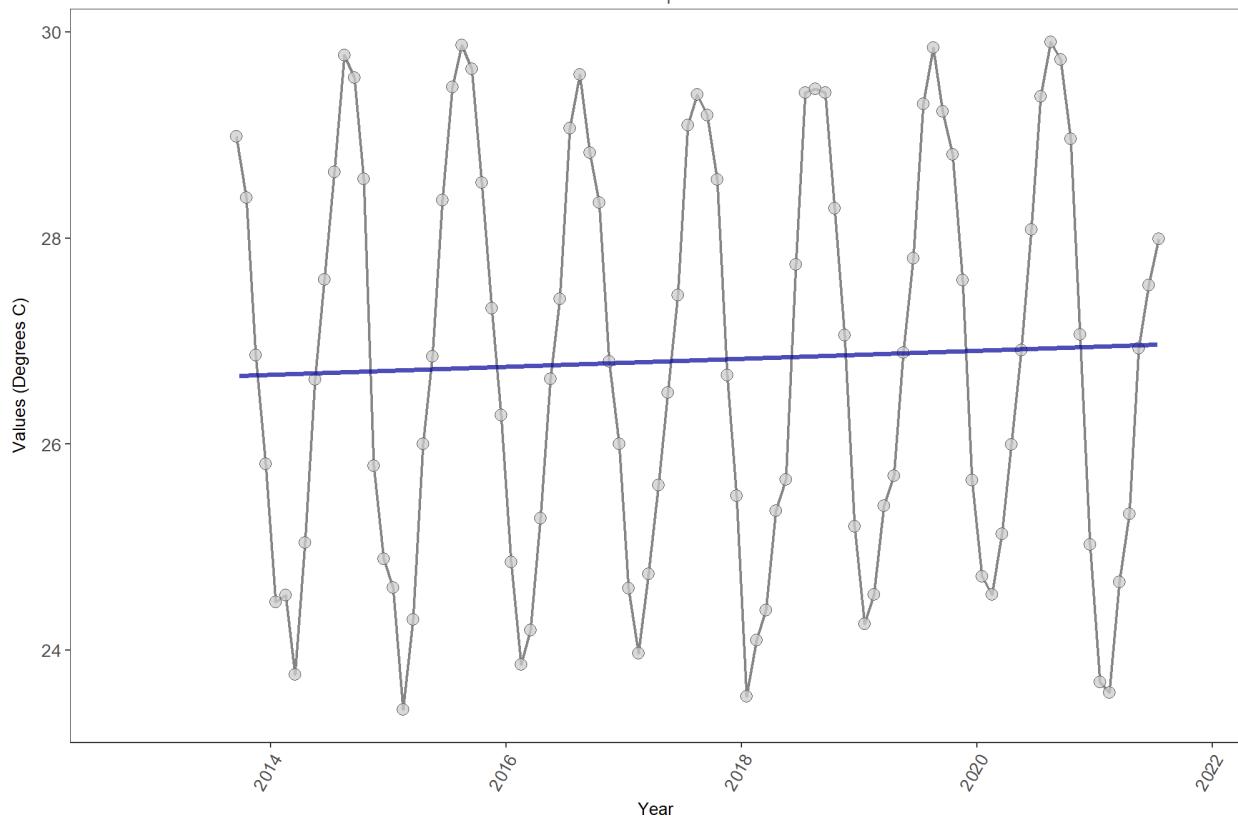


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	56348	9	26.37	TRUE	0.1408	0.1248	0.04717633	26.5769	8.6852	0.6509	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 2  
 Water Temperature

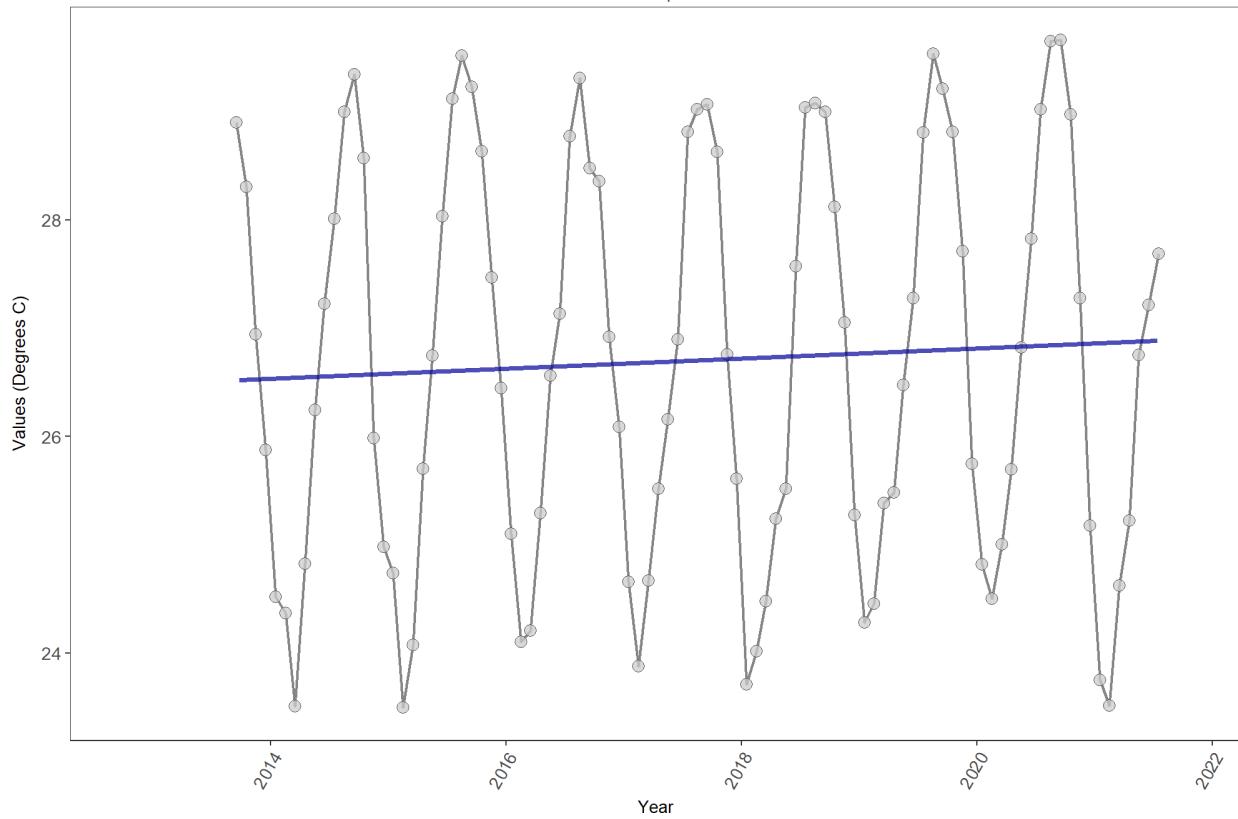


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	54773	9	26.62	TRUE	0.185	0.0298	0.03843723	26.63527	8.2748	0.6885	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 3  
 Water Temperature

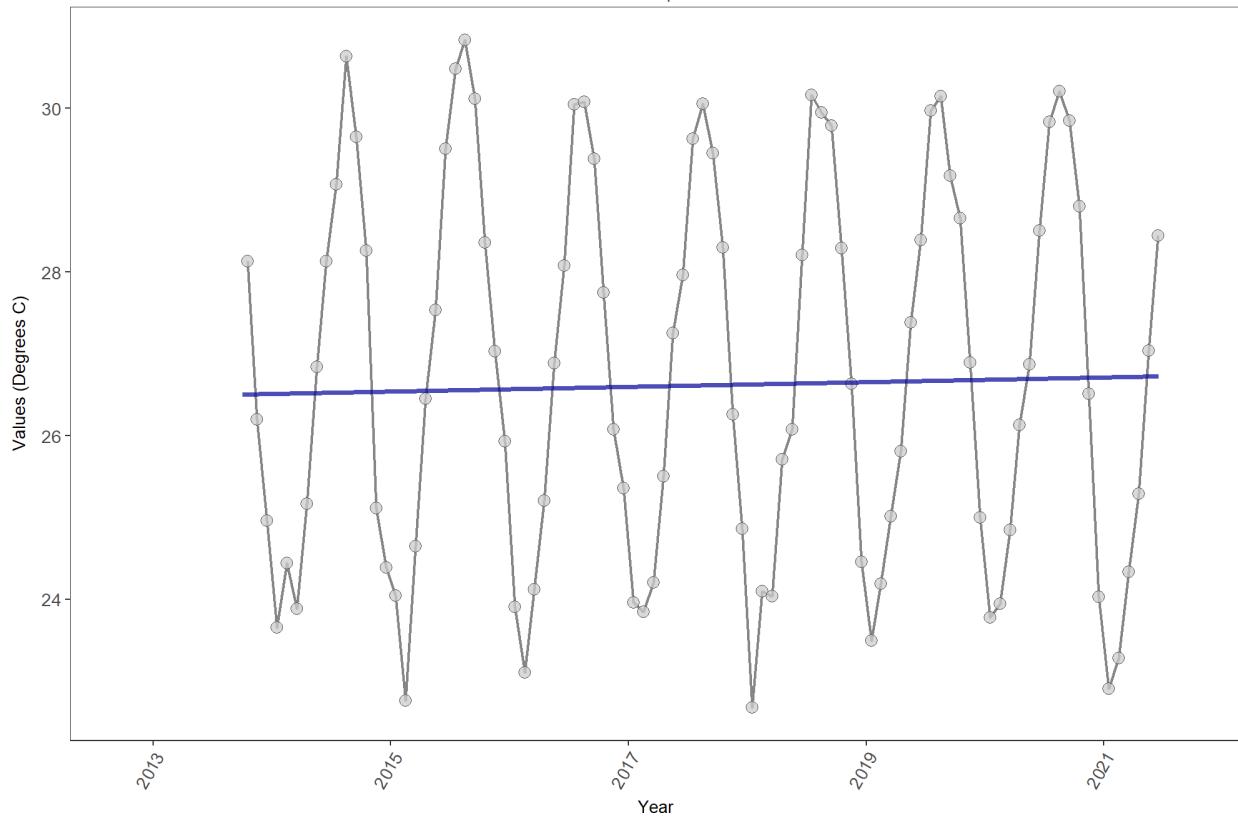


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	56027	9	26.62	TRUE	0.1589	0.0703	0.04648819	26.48665	10.7311	0.4661	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 4  
 Water Temperature

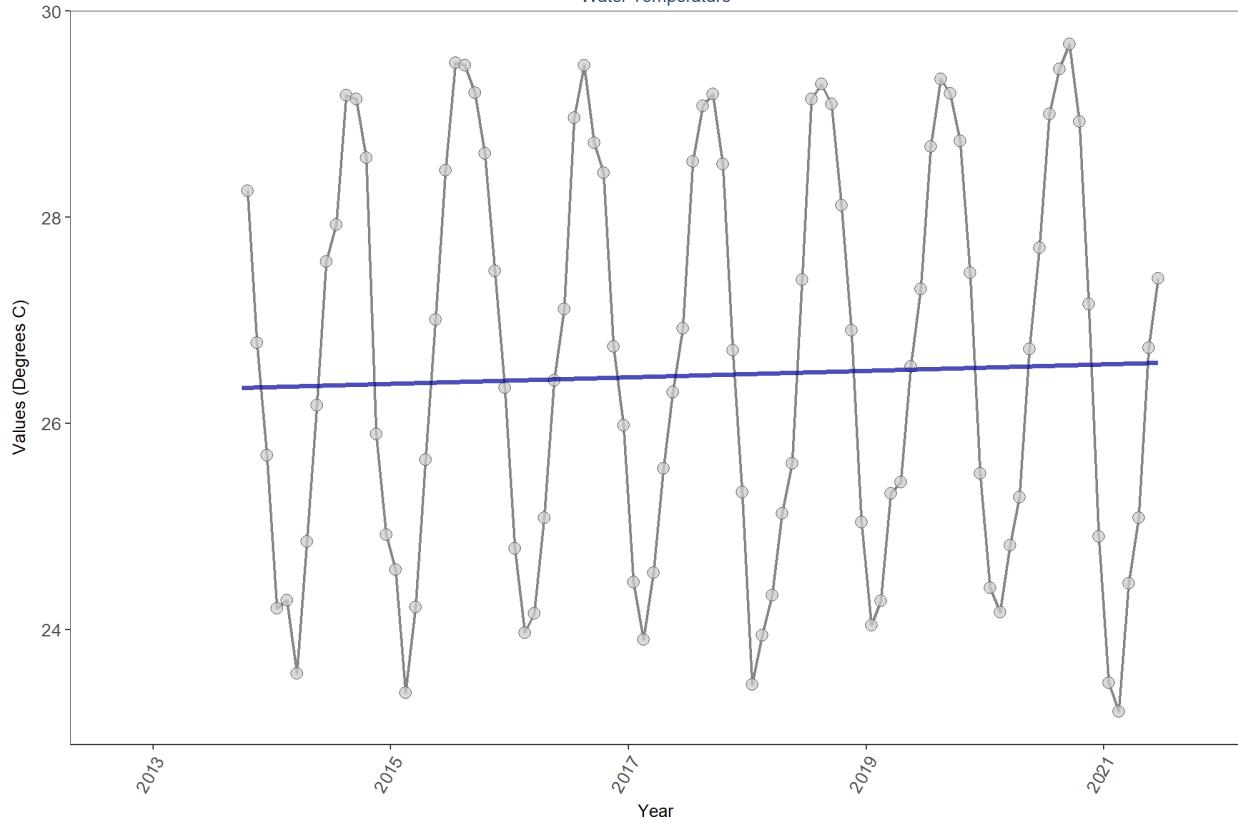


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	60154	9	26.5	TRUE	0.0855	0.2971	0.02890549	26.48012	11.1545	0.4304	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 5  
 Water Temperature

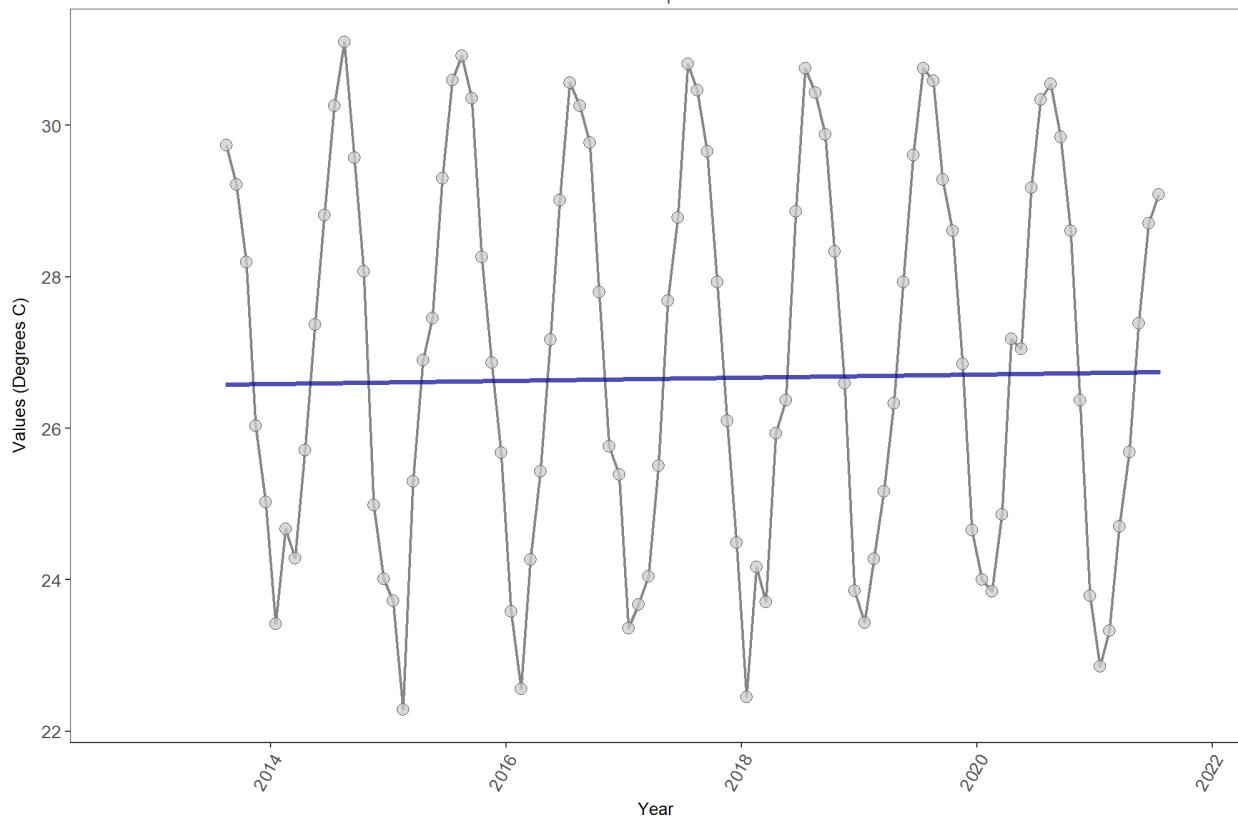


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	46781	9	26.54	TRUE	0.0958	0.2971	0.03185847	26.32023	10.9984	0.4434	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 6  
 Water Temperature

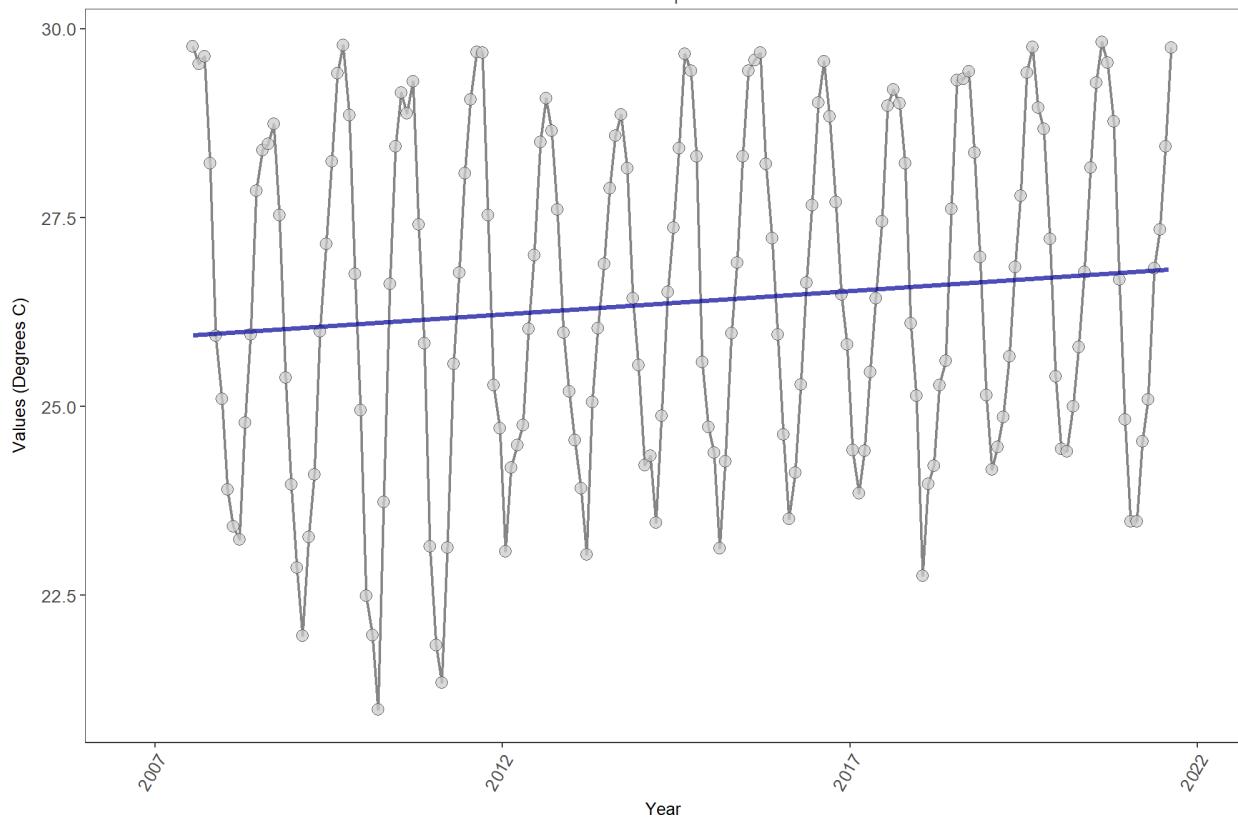


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	55288	9	26.74	TRUE	0.0476	0.5922	0.02127766	26.56409	8.2449	0.6912	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 84  
 Water Temperature

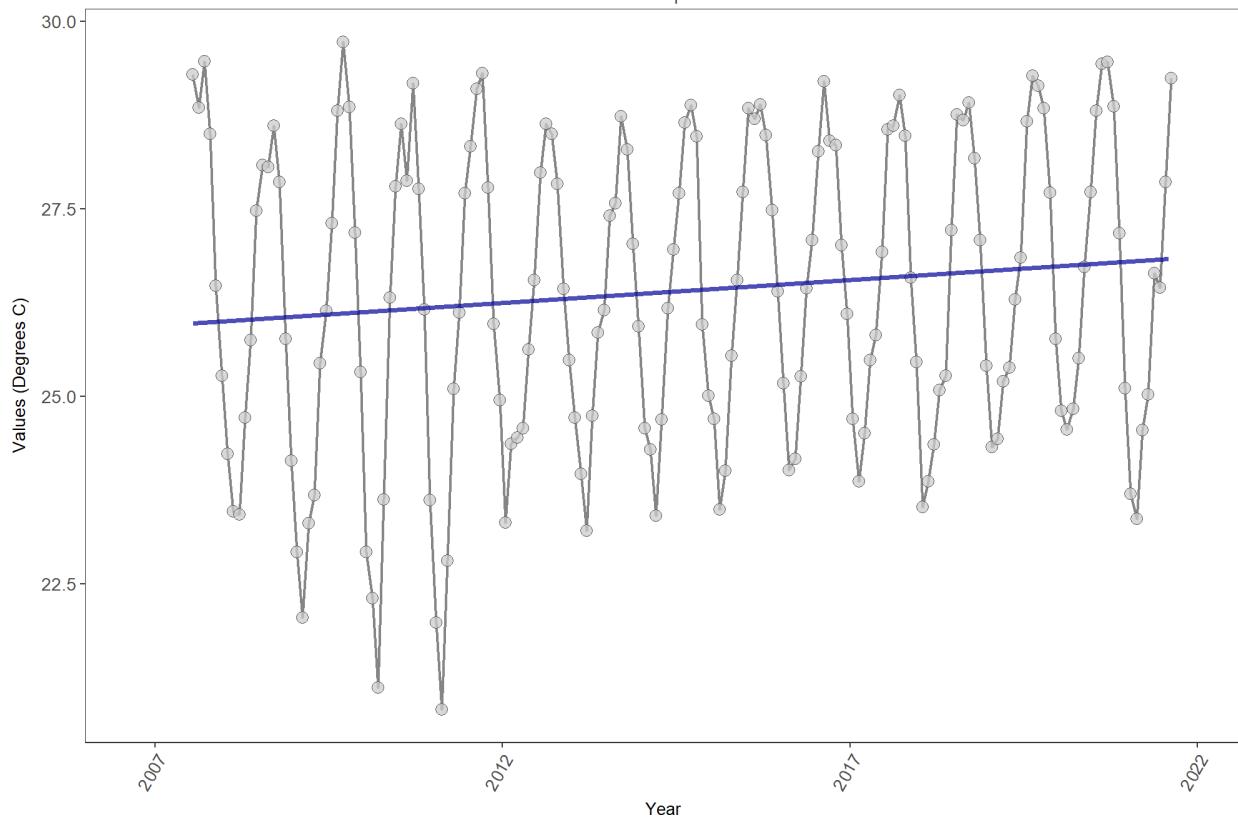


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	102574	15	26.3	TRUE	0.3116	0.0000	0.06197196	25.91381	10.3039	0.5033	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 85  
 Water Temperature

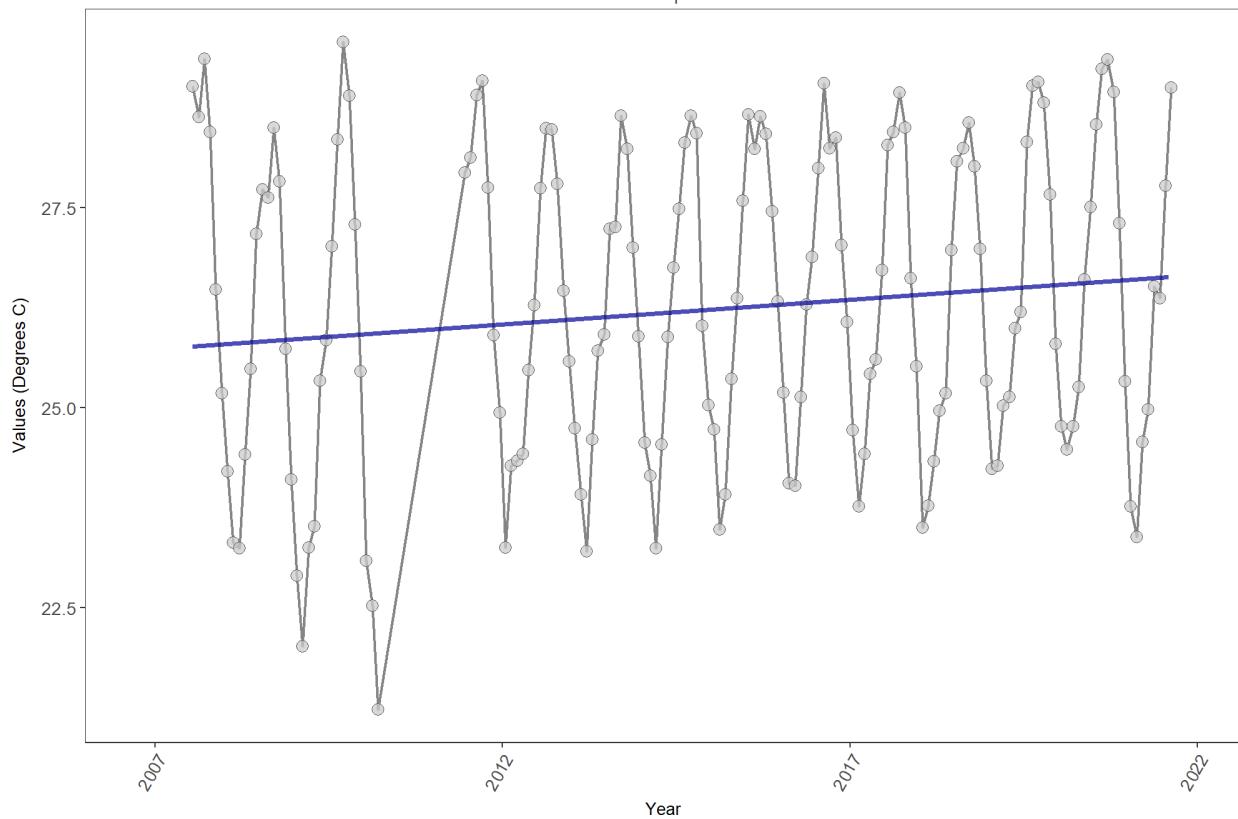


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	105599	15	26.23	TRUE	0.2936	0.0000	0.06126885	25.9398	10.0041	0.53	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 86  
 Water Temperature

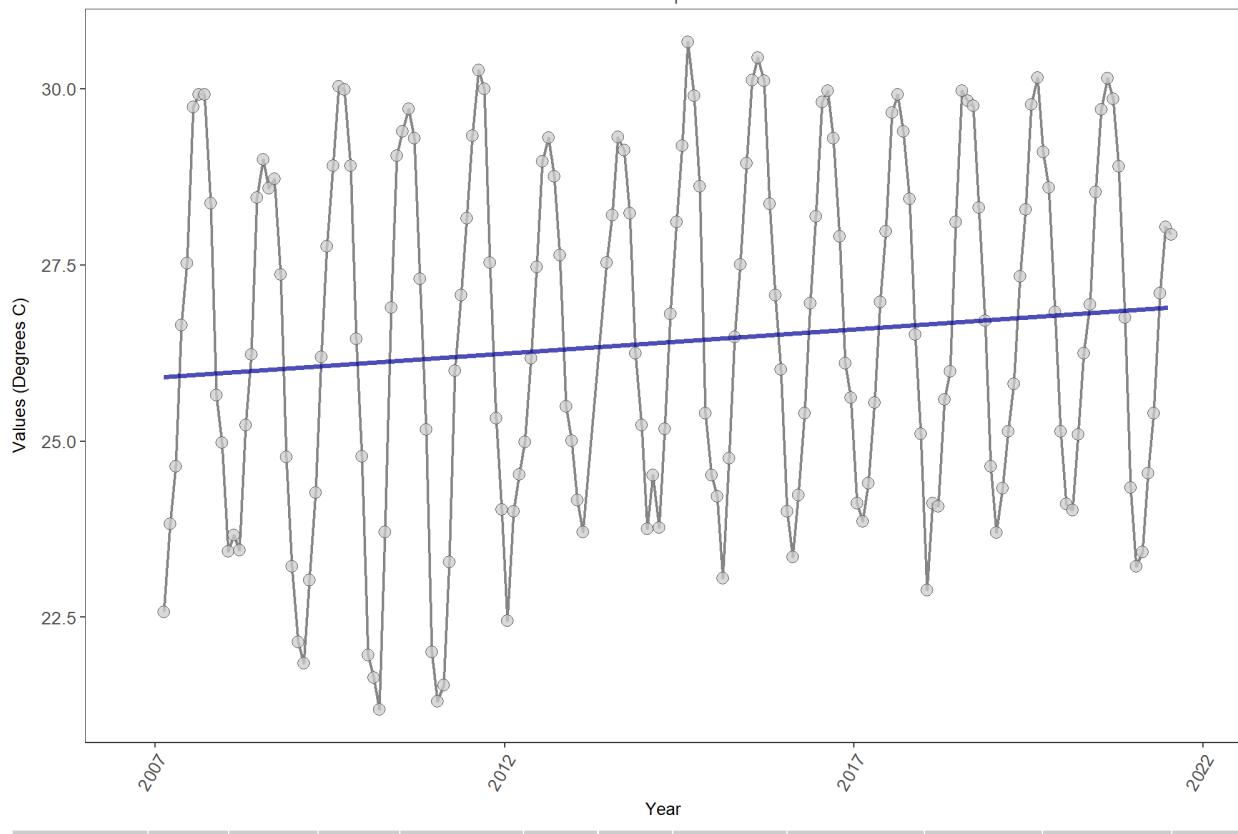


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	96223	15	26.13	TRUE	0.3062	0.0000	0.06211076	25.73083	9.2466	0.5991	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 87  
 Water Temperature

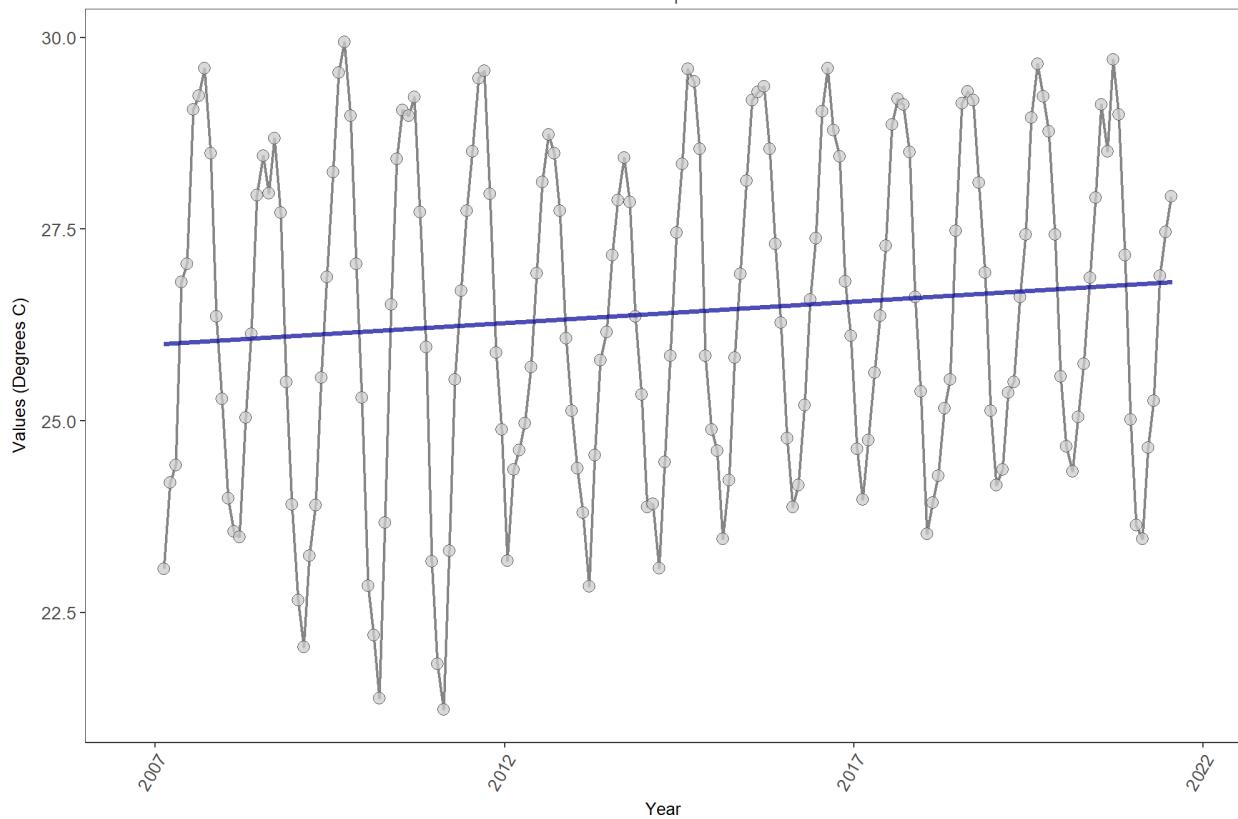


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	100174	15	26.44	TRUE	0.2961	0.0000	0.06834156	25.90513	6.9981	0.7992	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 88  
 Water Temperature

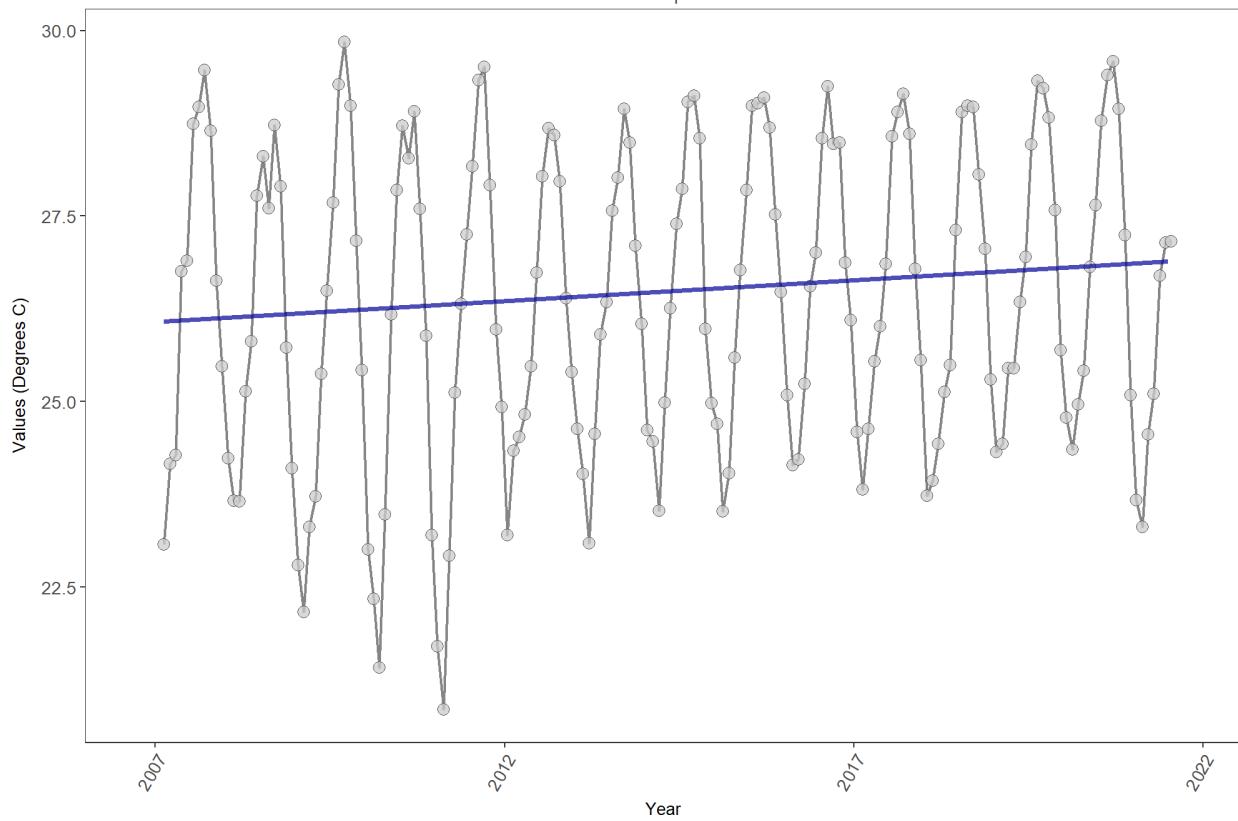


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	108002	15	26.29	TRUE	0.2789	0.0000	0.05636102	25.99256	8.7002	0.6495	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 89  
 Water Temperature

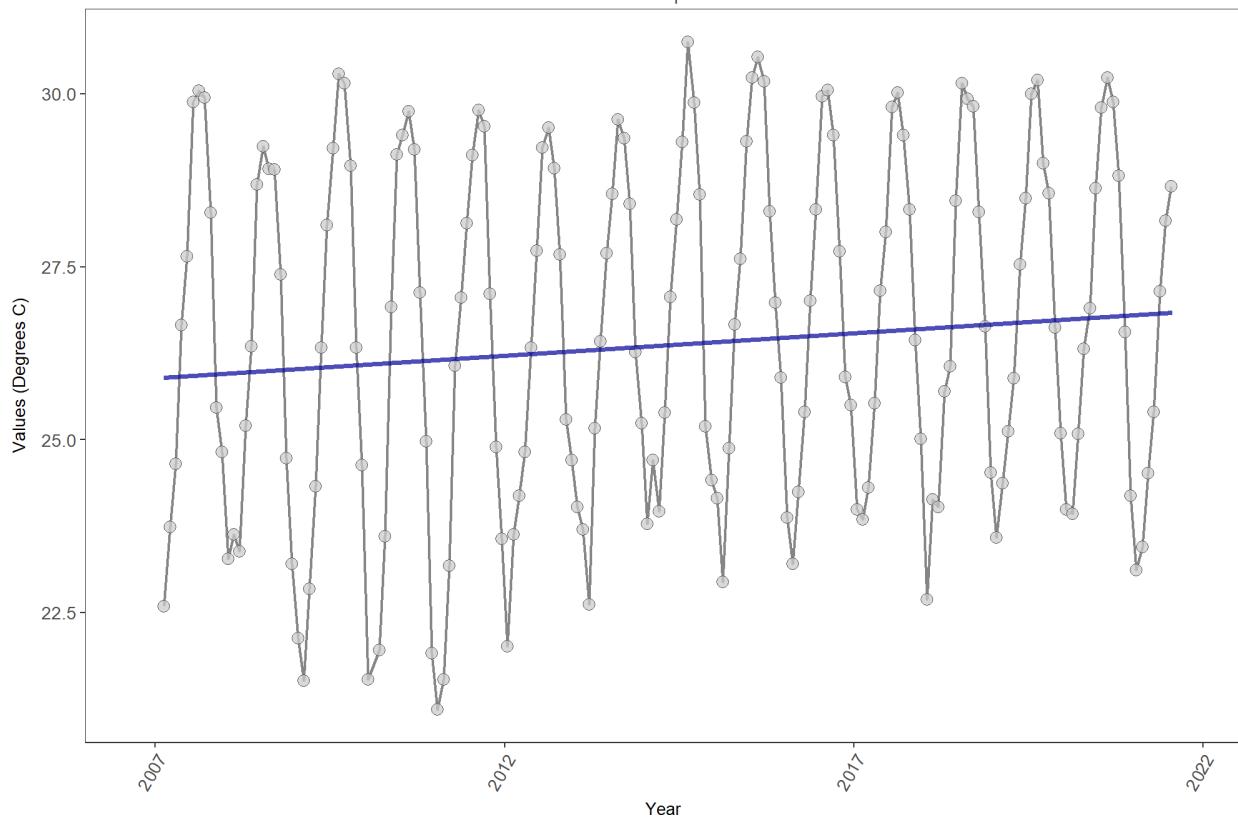


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	108985	15	26.23	TRUE	0.2794	0.0000	0.05620001	26.0713	7.1491	0.7869	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 90  
 Water Temperature

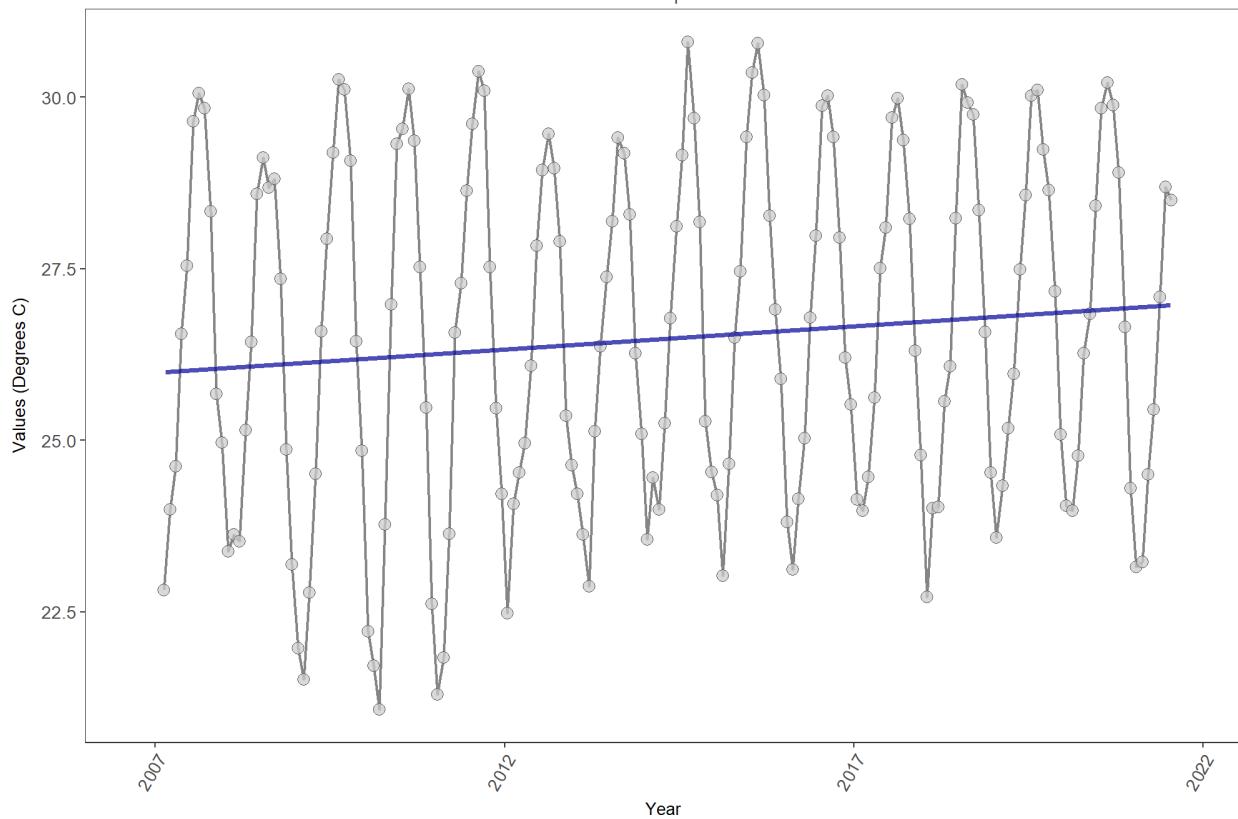


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	89309	15	26.44	TRUE	0.314	0.0000	0.06511425	25.88441	6.6634	0.8257	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 91  
 Water Temperature

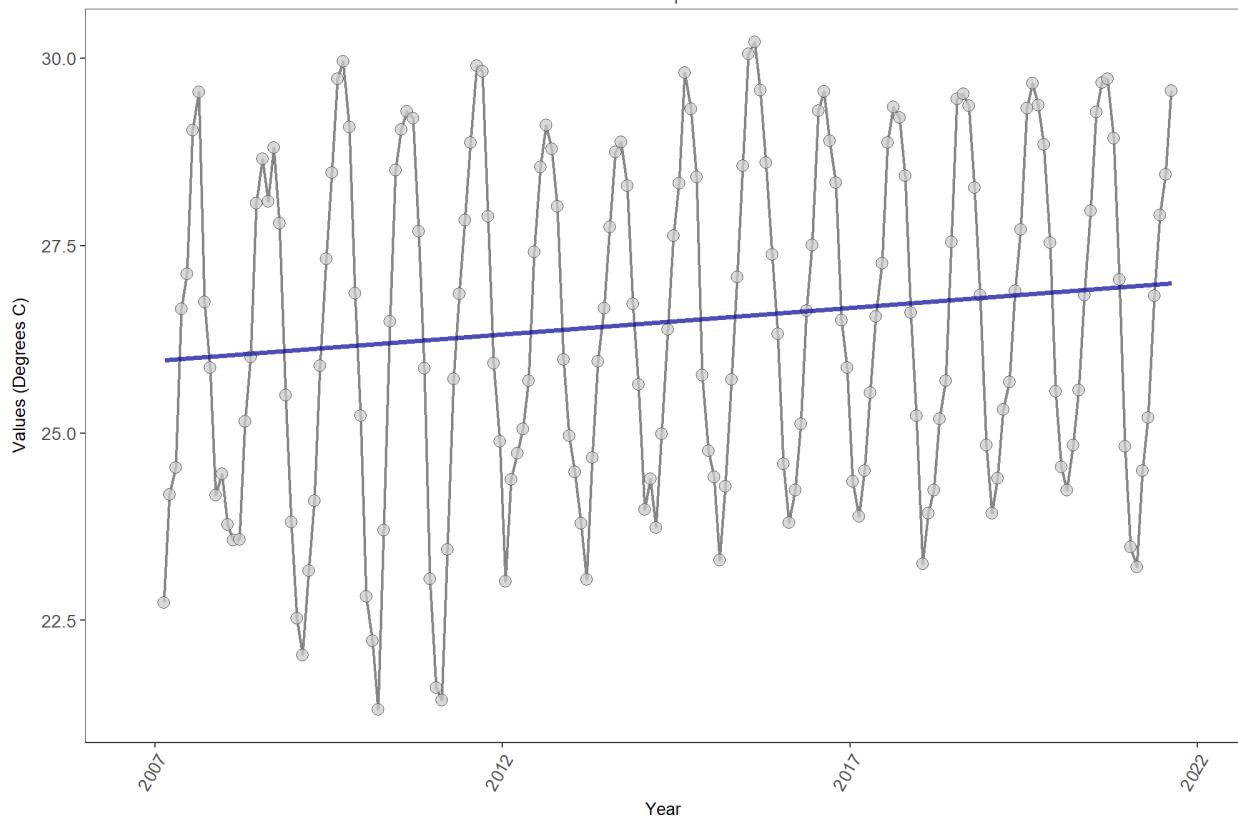


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	92917	15	26.47	TRUE	0.2836	0.0000	0.06798058	25.98298	6.8923	0.8077	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 92  
 Water Temperature

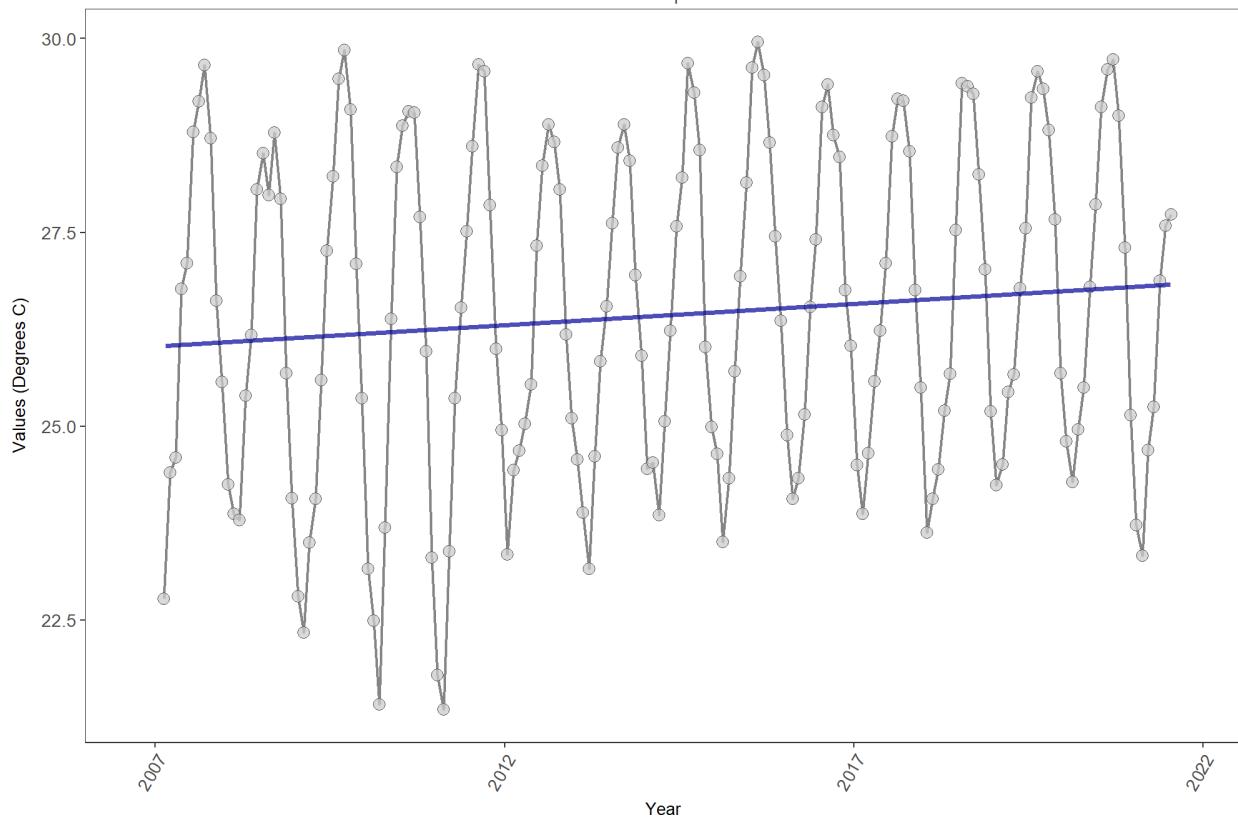


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	104243	15	26.42	TRUE	0.3317	0.0000	0.07032883	25.96539	6.4849	0.8391	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 93  
 Water Temperature

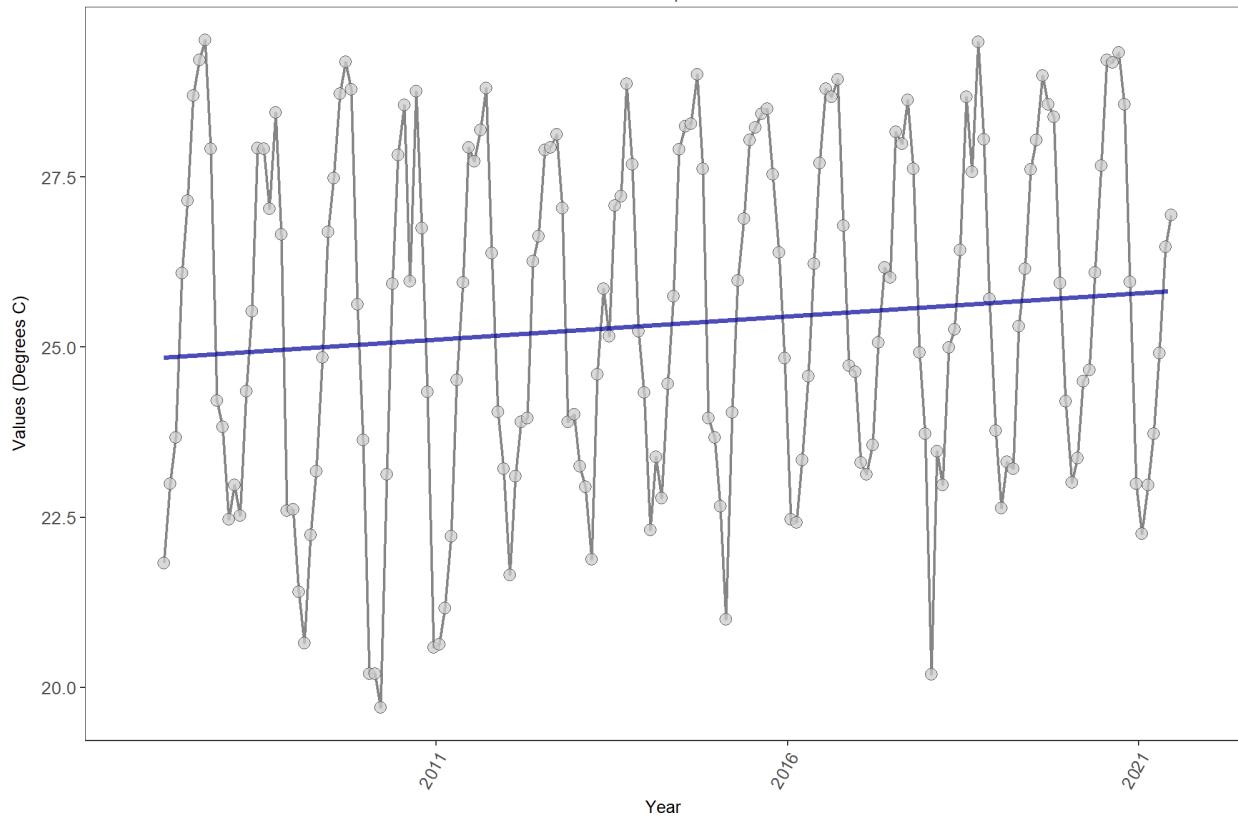


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	97446	15	26.42	TRUE	0.2923	0.0000	0.05490936	26.02629	5.2765	0.917	1

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 94  
 Water Temperature

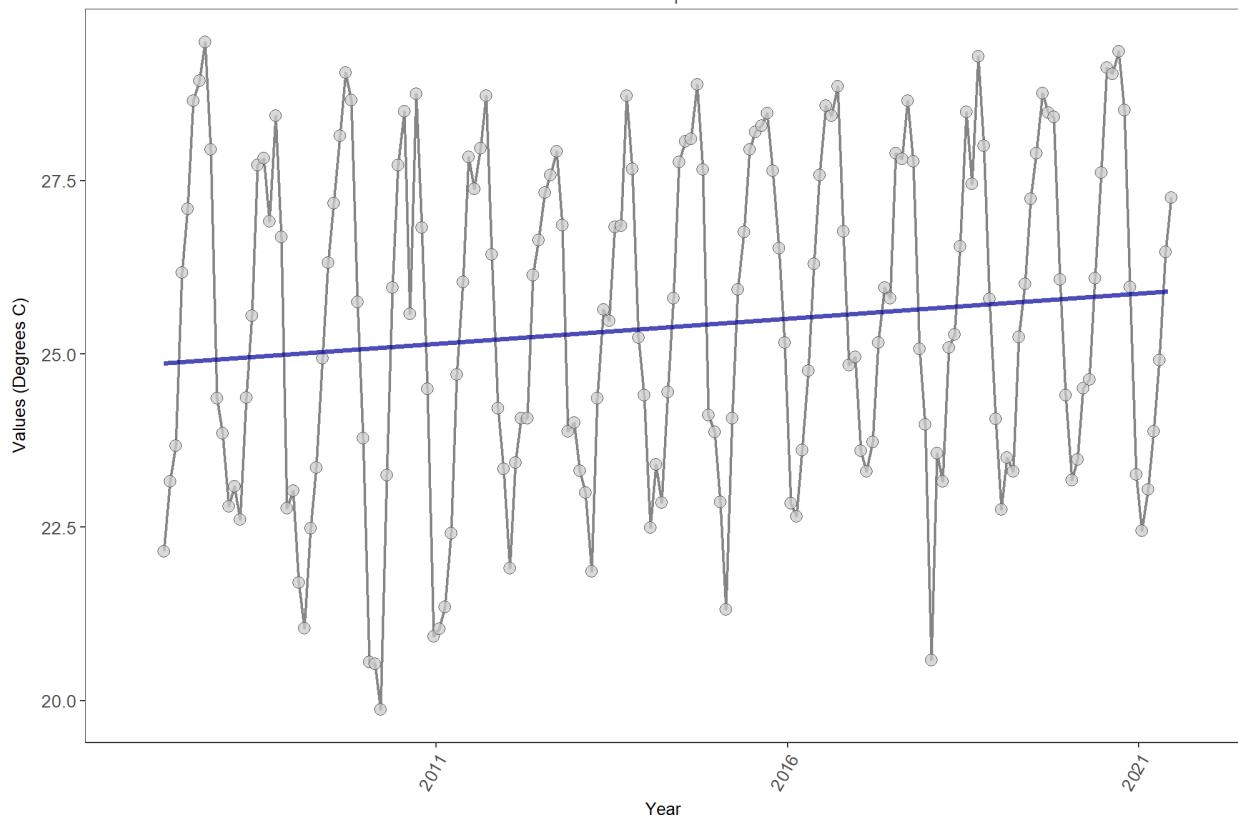


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	85742	15	25.5	TRUE	0.2746	0.0000	0.06802362	24.84157	10.5233	0.484	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 95  
 Water Temperature

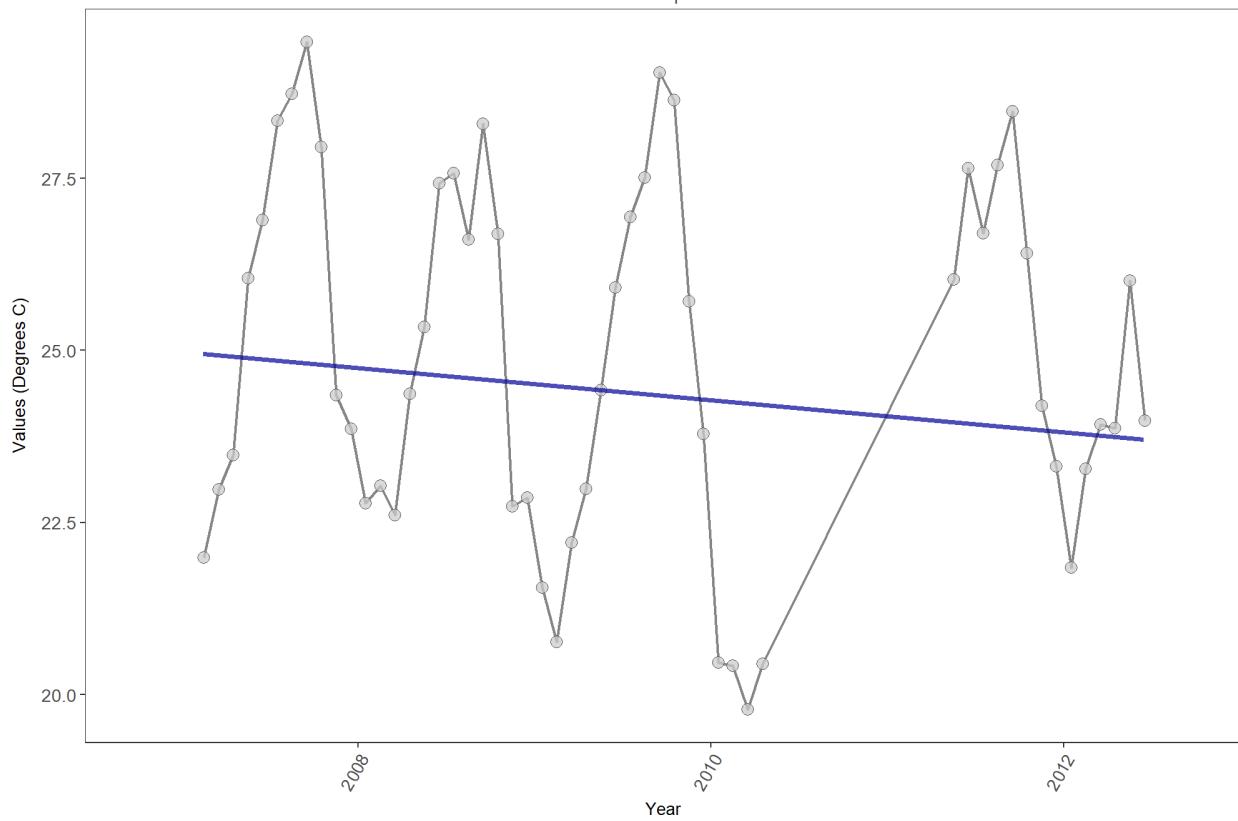


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	93569	15	25.52	TRUE	0.2813	0.0000	0.07204081	24.86054	7.795	0.7315	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 96  
 Water Temperature

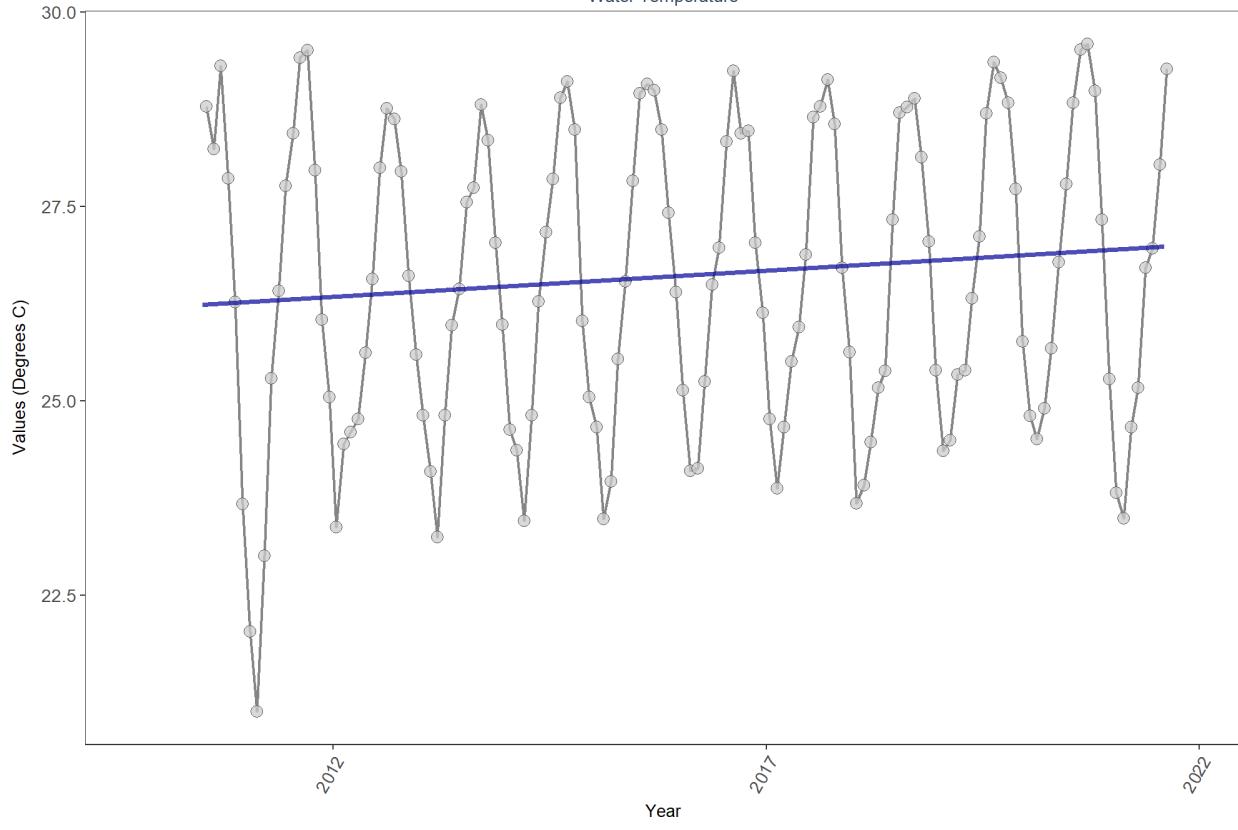


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	25550	6	24.87	TRUE	-0.2516	0.0801	-0.2336878	24.98051	3.2022	0.9878	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 97  
 Water Temperature

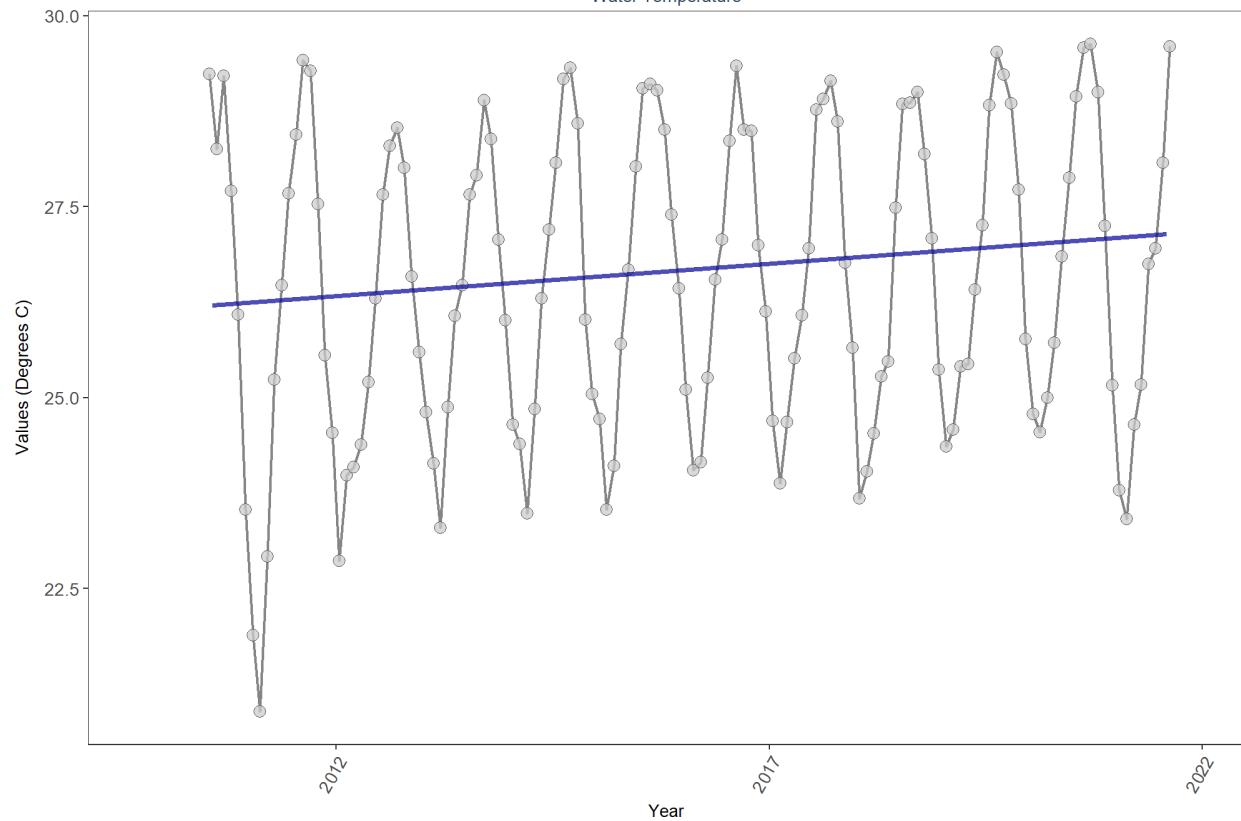


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	89132	12	26.45	TRUE	0.3115	0.0000	0.06684606	26.20531	8.829	0.6377	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 98  
 Water Temperature

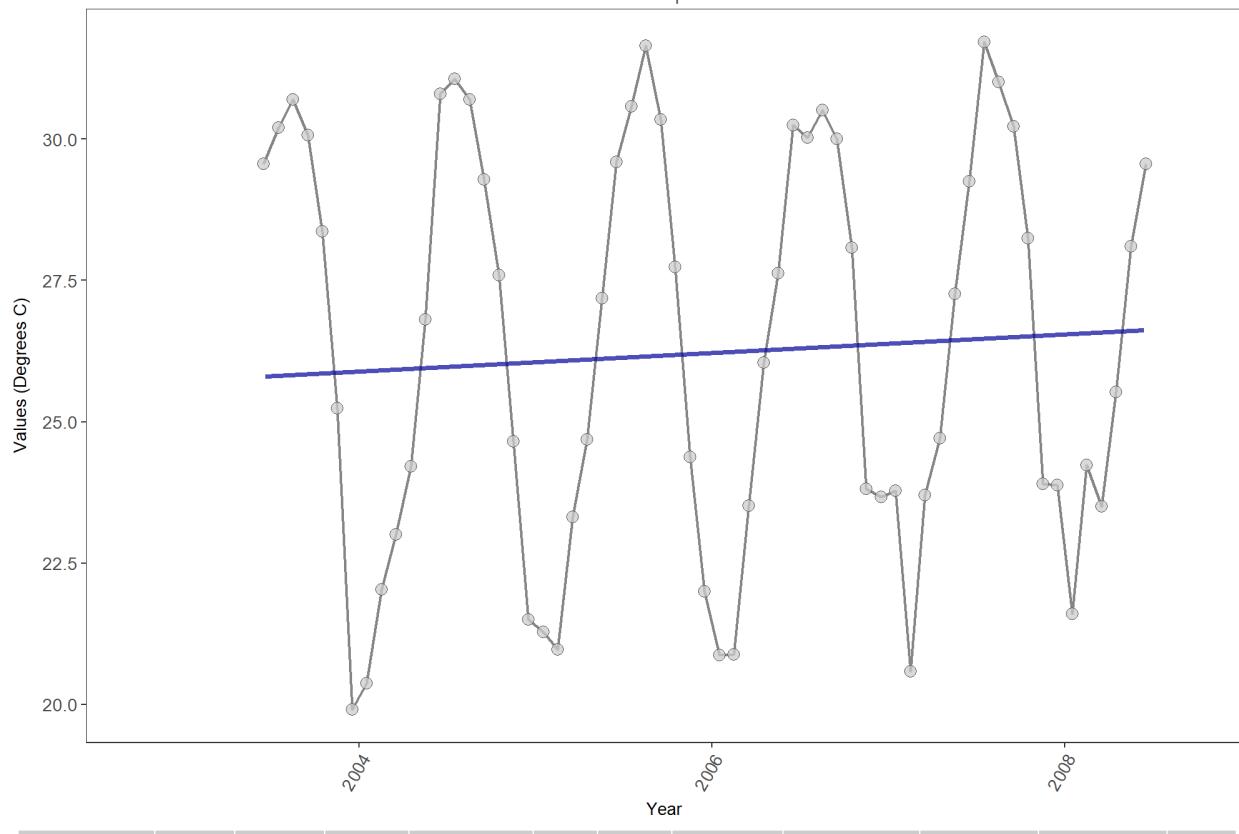


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	79860	12	26.37	TRUE	0.3441	0.0000	0.08494045	26.15856	10.4019	0.4946	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 2  
 Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Moored Instrument Array  
 1B  
 Water Temperature

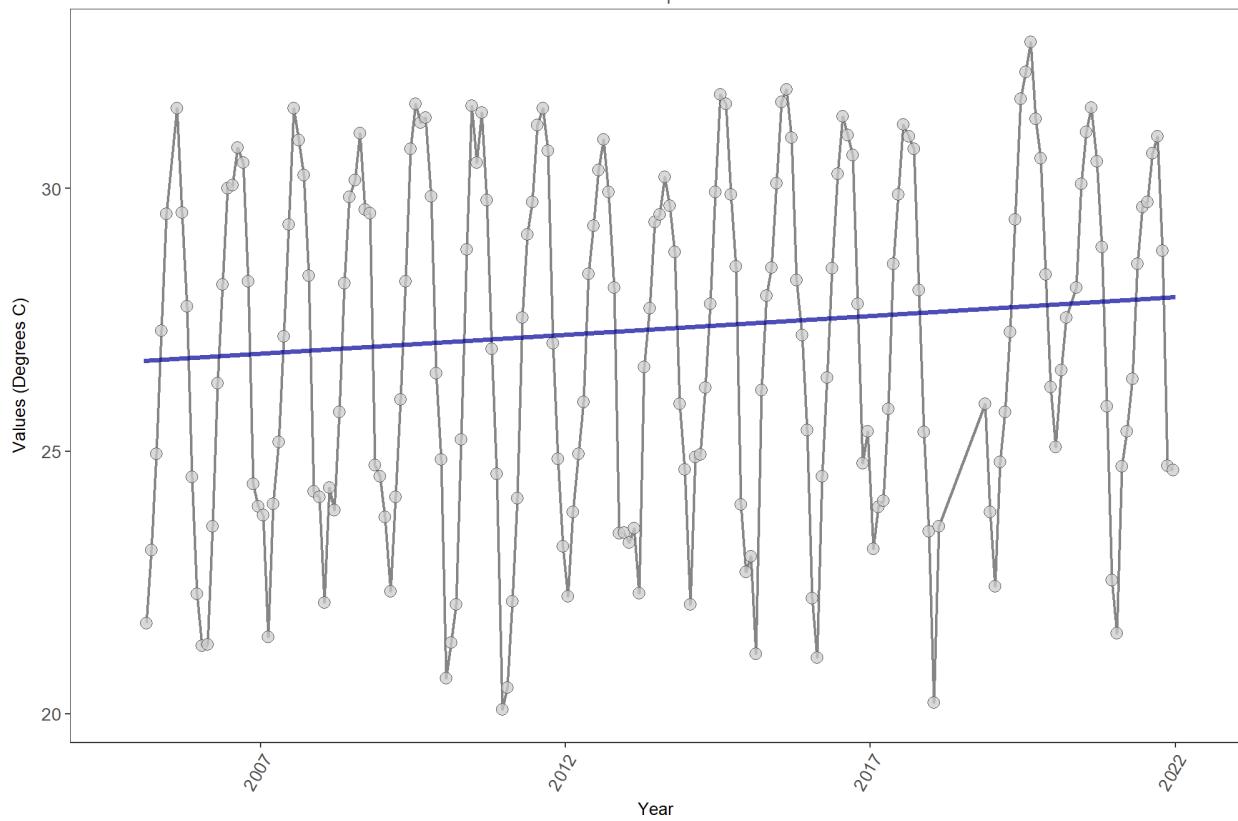


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	86204	6	26.3845	TRUE	0.259	0.0392	0.1627929	25.72826	16.6535	0.1186	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 5  
 National Data Buoy Center  
 KYWF1  
 Water Temperature

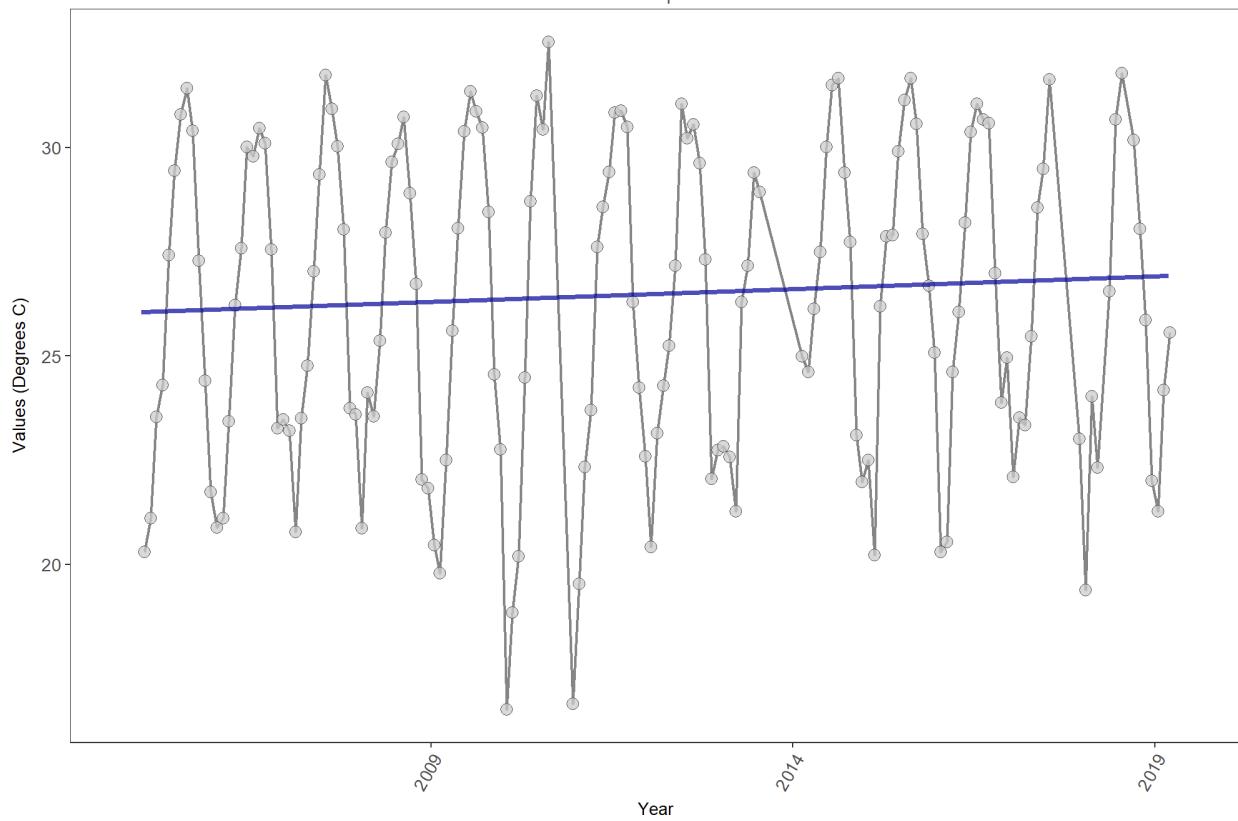


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	1225747	17	27.5	TRUE	0.2724	0.0000	0.07180951	26.71699	7.1785	0.7844	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
5  
National Data Buoy Center  
LONF1  
Water Temperature

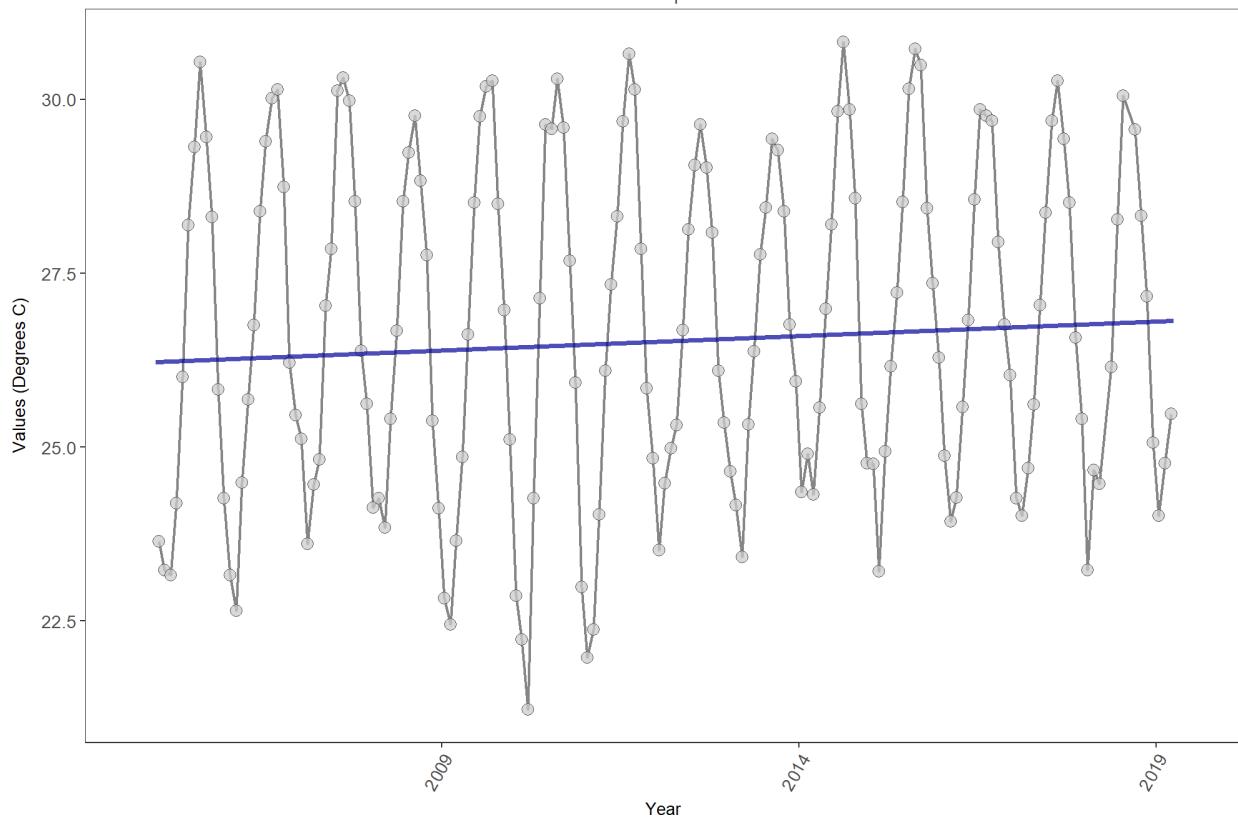


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	107173	15	26.3	TRUE	0.1852	0.0022	0.0606754	26.05832	3.2552	0.9869	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 5  
 National Data Buoy Center  
 MLRF1  
 Water Temperature

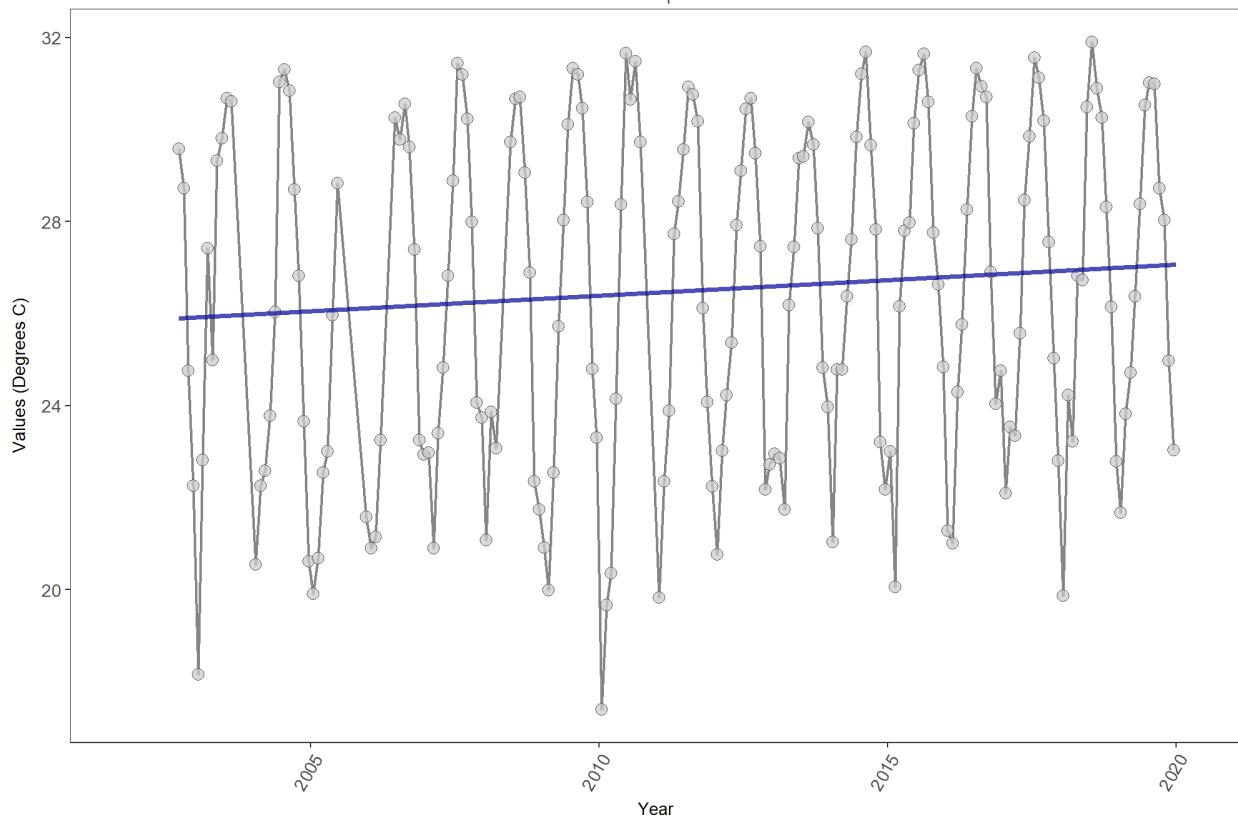


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
surface	111537	15	26.5	TRUE	0.1913	0.0009	0.04159201	26.22273	7.5875	0.7497	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 214  
 Water Temperature

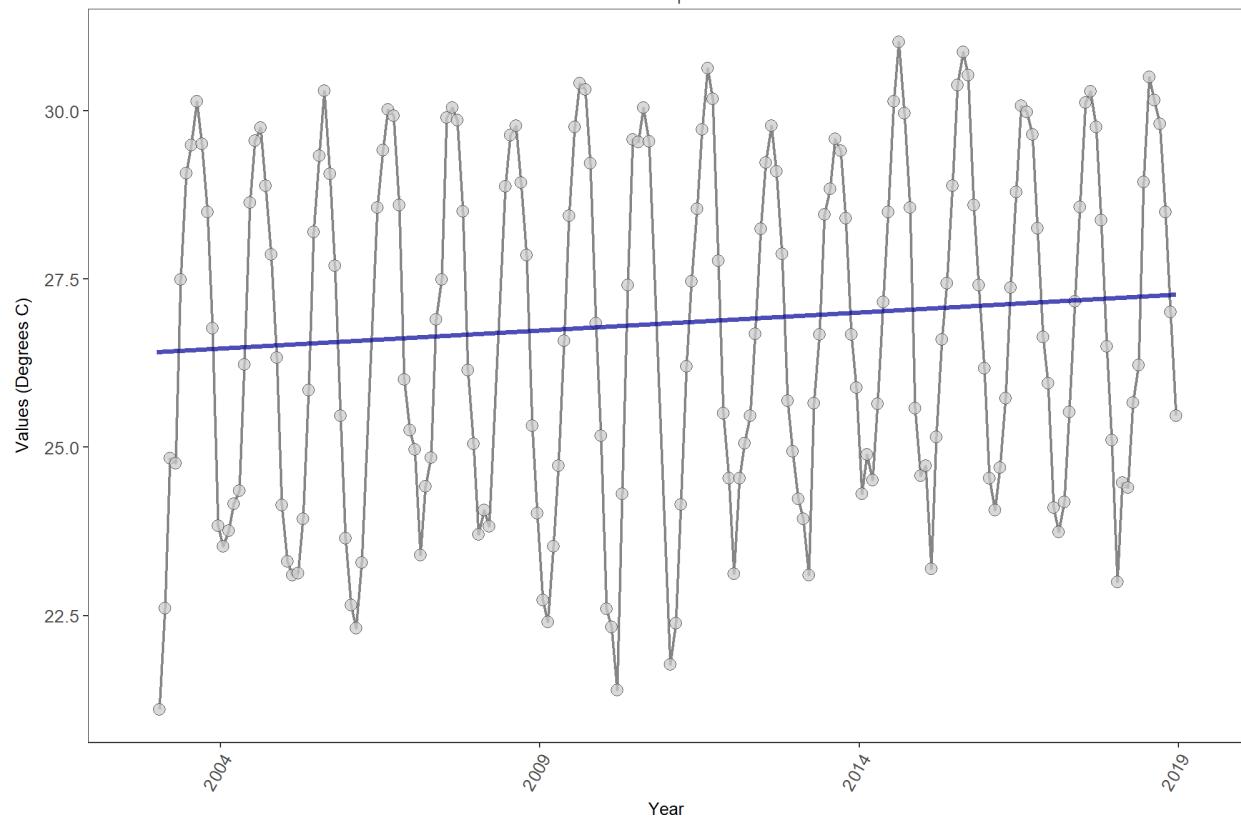


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	136333	18	26.524	TRUE	0.2651	0.0000	0.06790575	25.84188	3.192	0.9879	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 215  
 Water Temperature

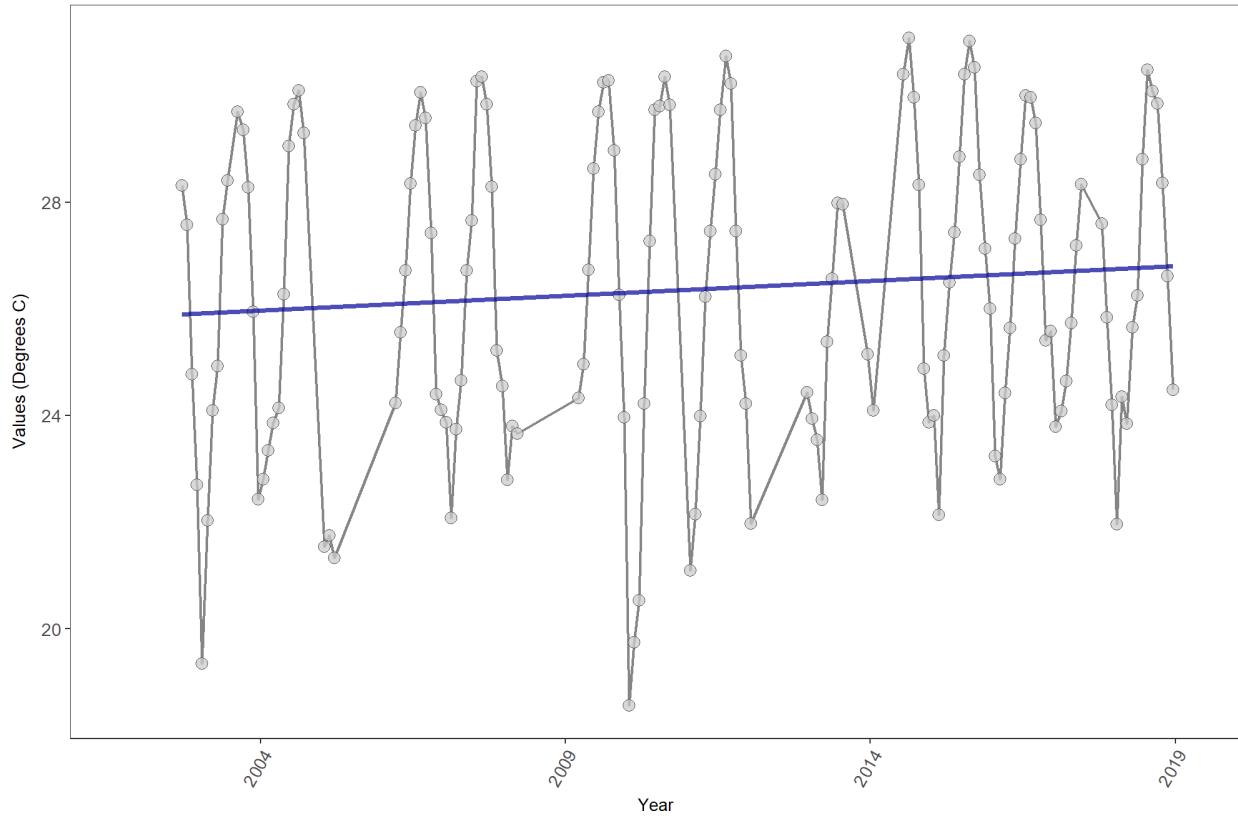


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133286	16	26.74	TRUE	0.2618	0.0000	0.0534747	26.41753	6.0363	0.8709	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 216  
 Water Temperature

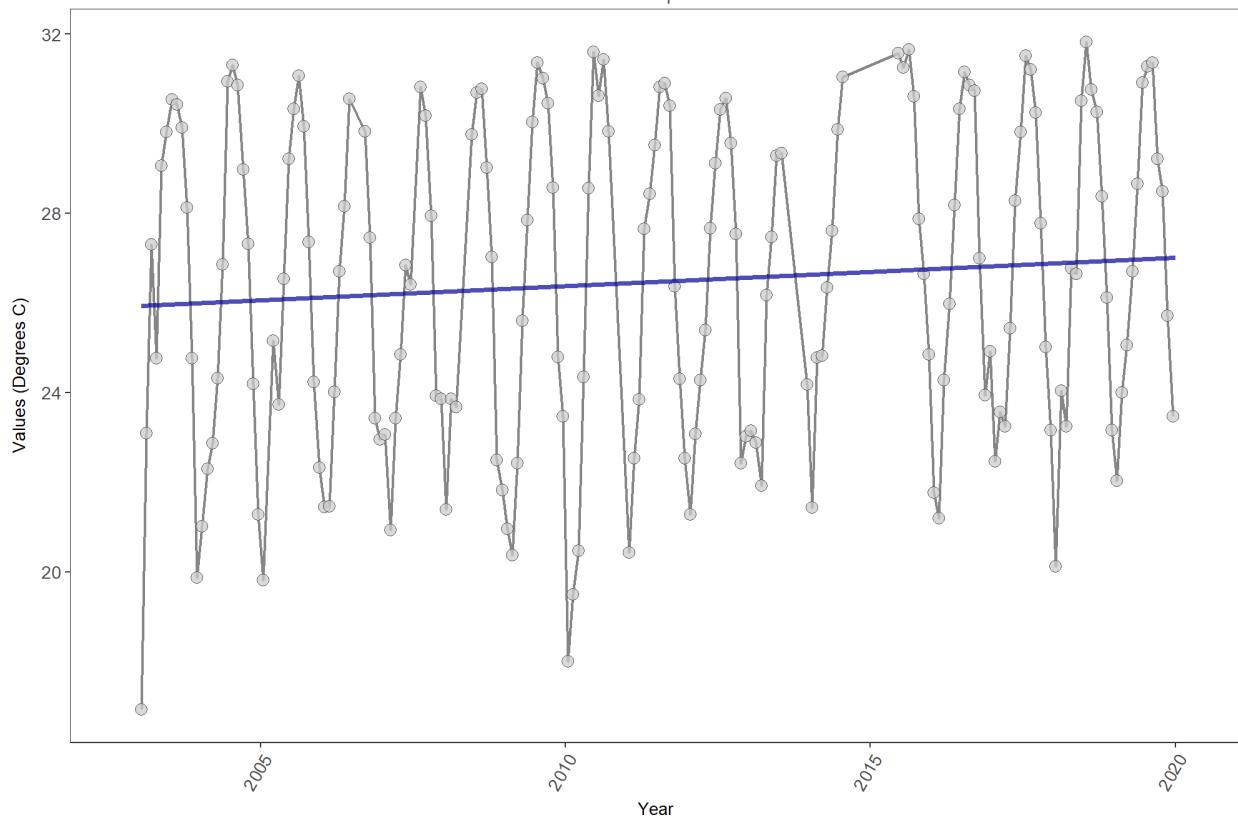


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	98535	17	26.256	TRUE	0.3058	0.0000	0.05565638	25.8586	5.8143	0.8855	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 220  
 Water Temperature

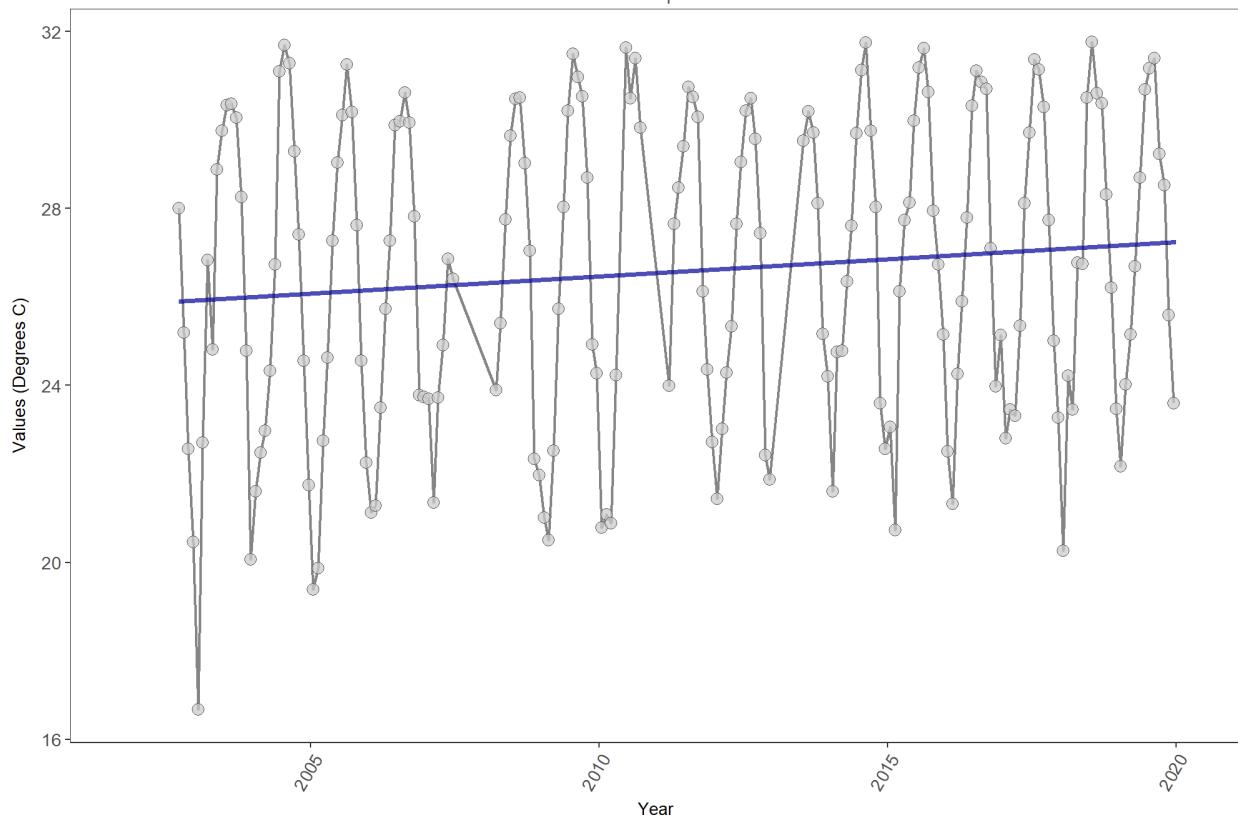


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	126033	17	26.52	TRUE	0.2548	0.0000	0.06288452	25.93605	7.3706	0.7683	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 223  
 Water Temperature

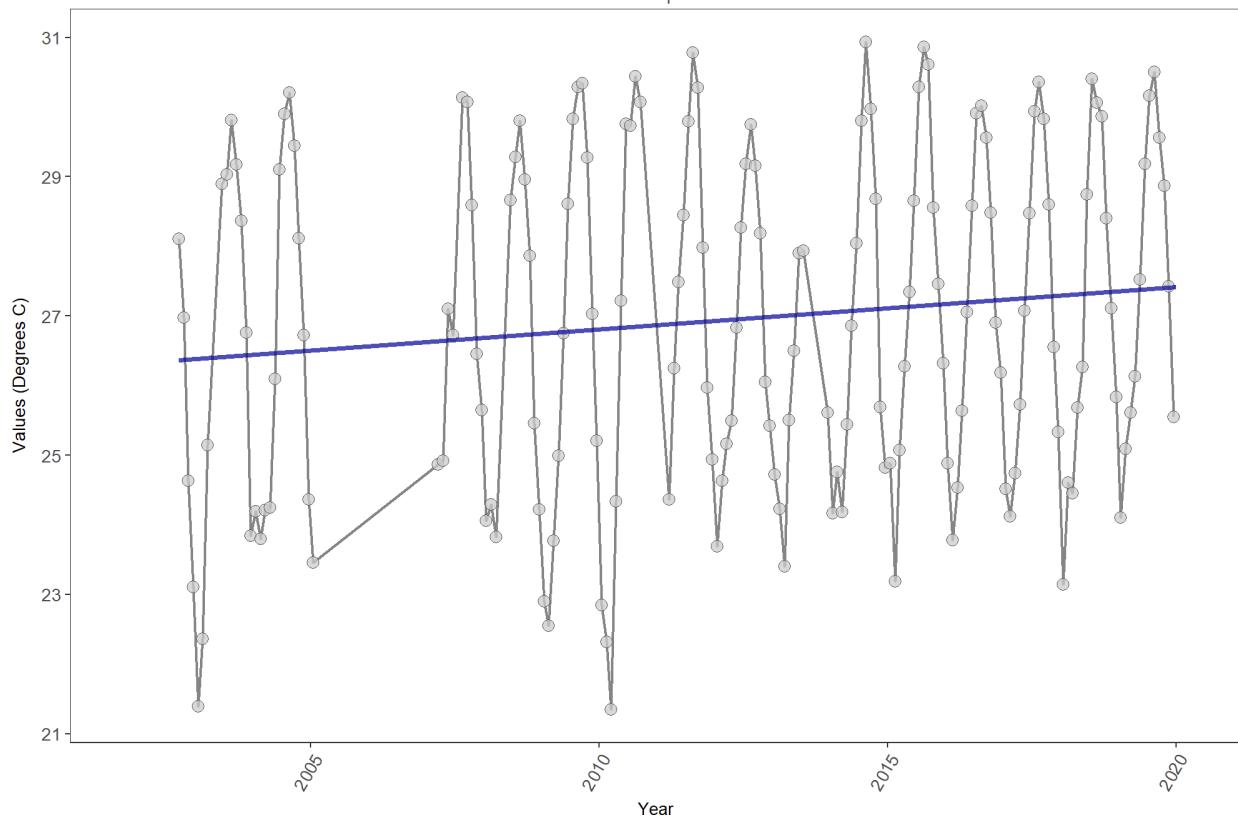


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133082	18	26.891	TRUE	0.2974	0.0000	0.07737063	25.84244	3.2998	0.9861	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 225  
 Water Temperature

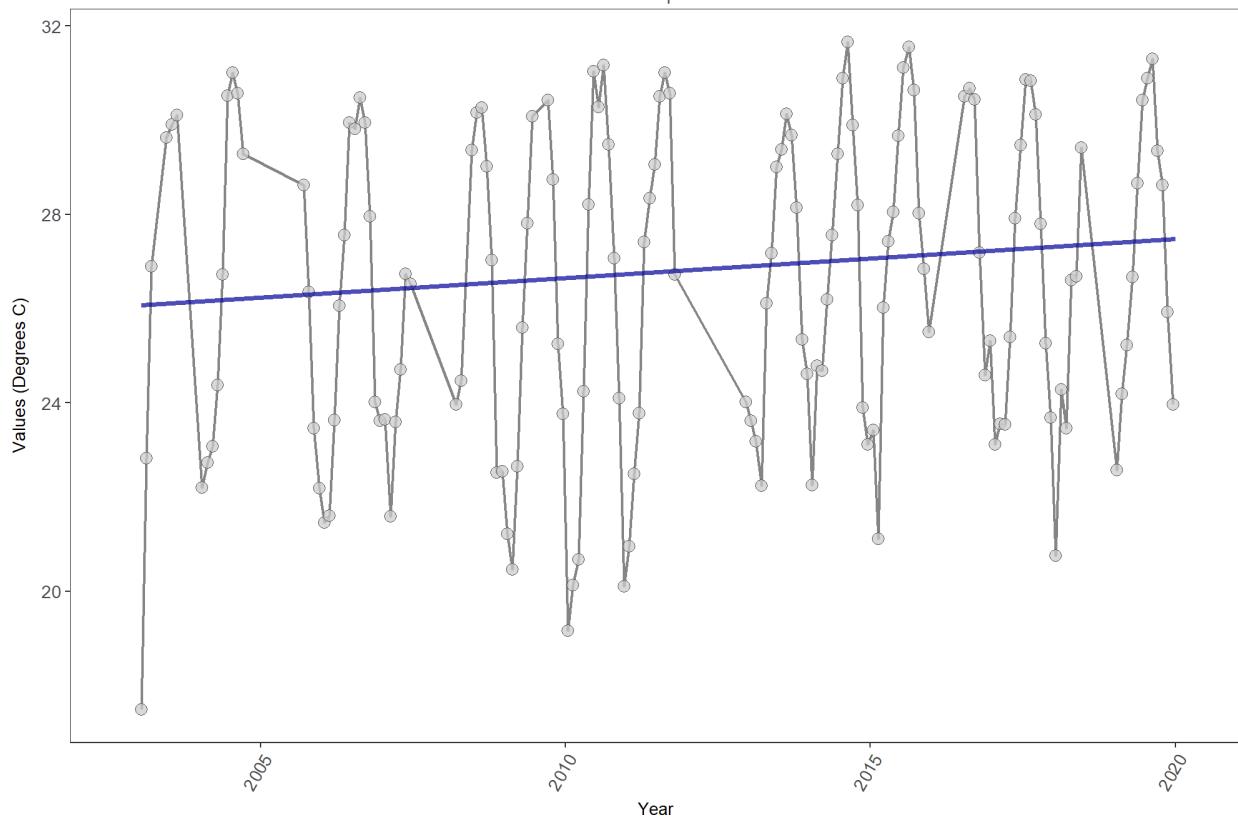


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	117692	17	26.818	TRUE	0.3151	0.0000	0.06079033	26.32495	7.6051	0.7482	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 227  
 Water Temperature

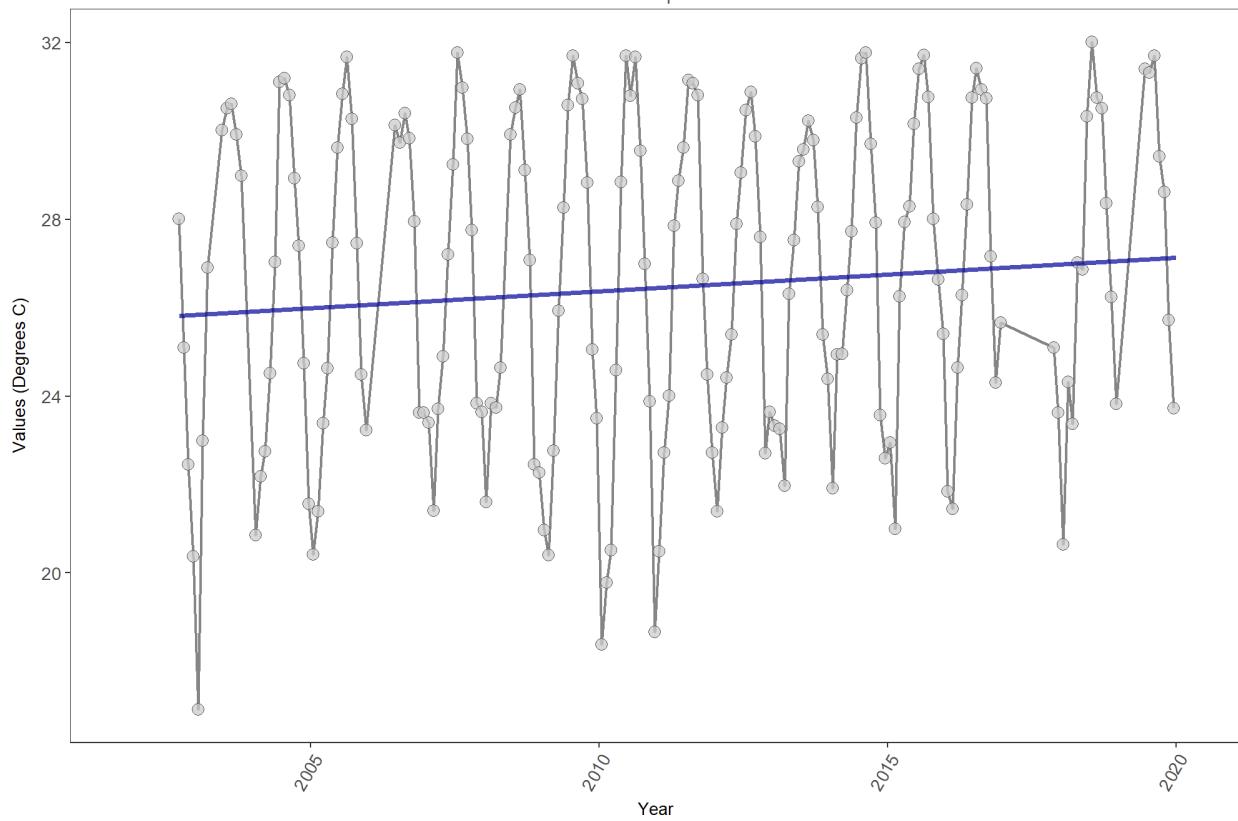


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	105351	17	26.671	TRUE	0.2885	0.0000	0.08291935	26.06209	5.9567	0.8762	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 235  
 Water Temperature

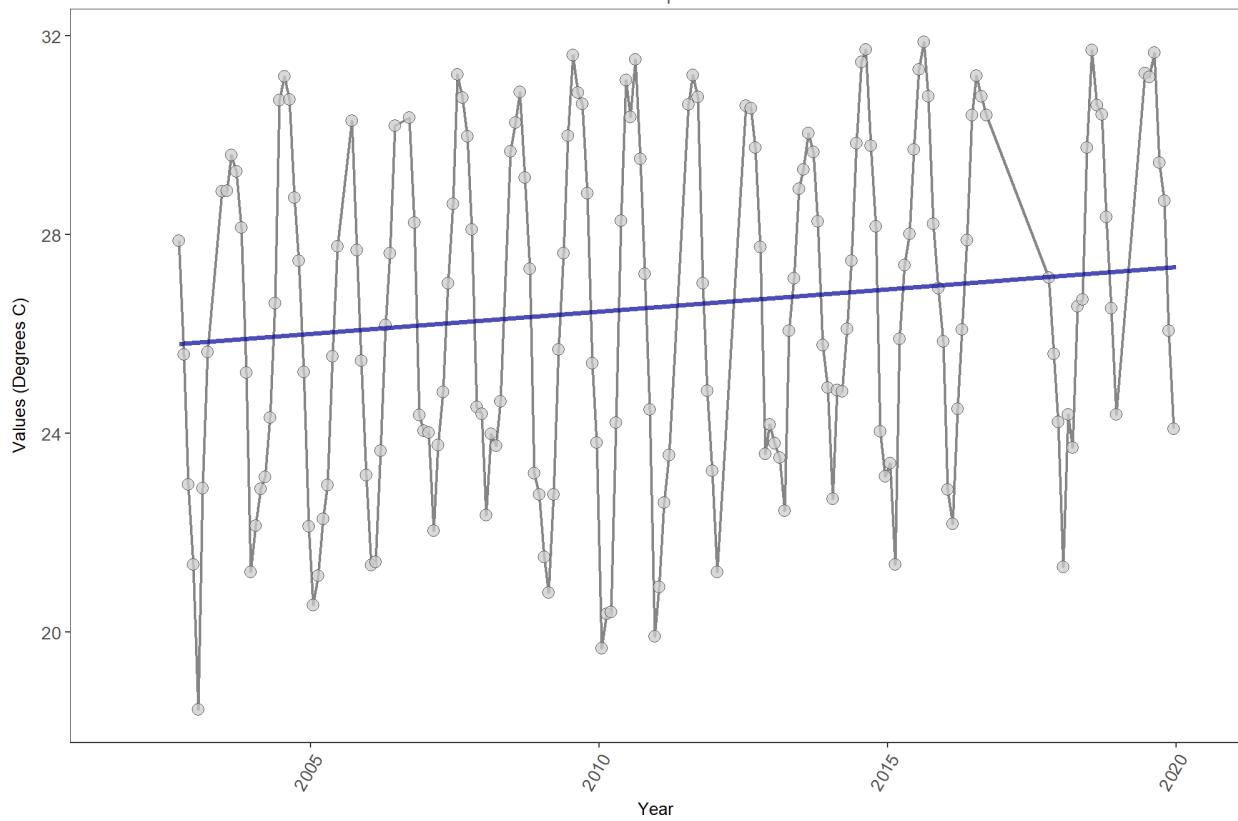


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	128499	18	27.136	TRUE	0.276	0.0000	0.07602072	25.76626	5.9659	0.8756	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 237  
 Water Temperature

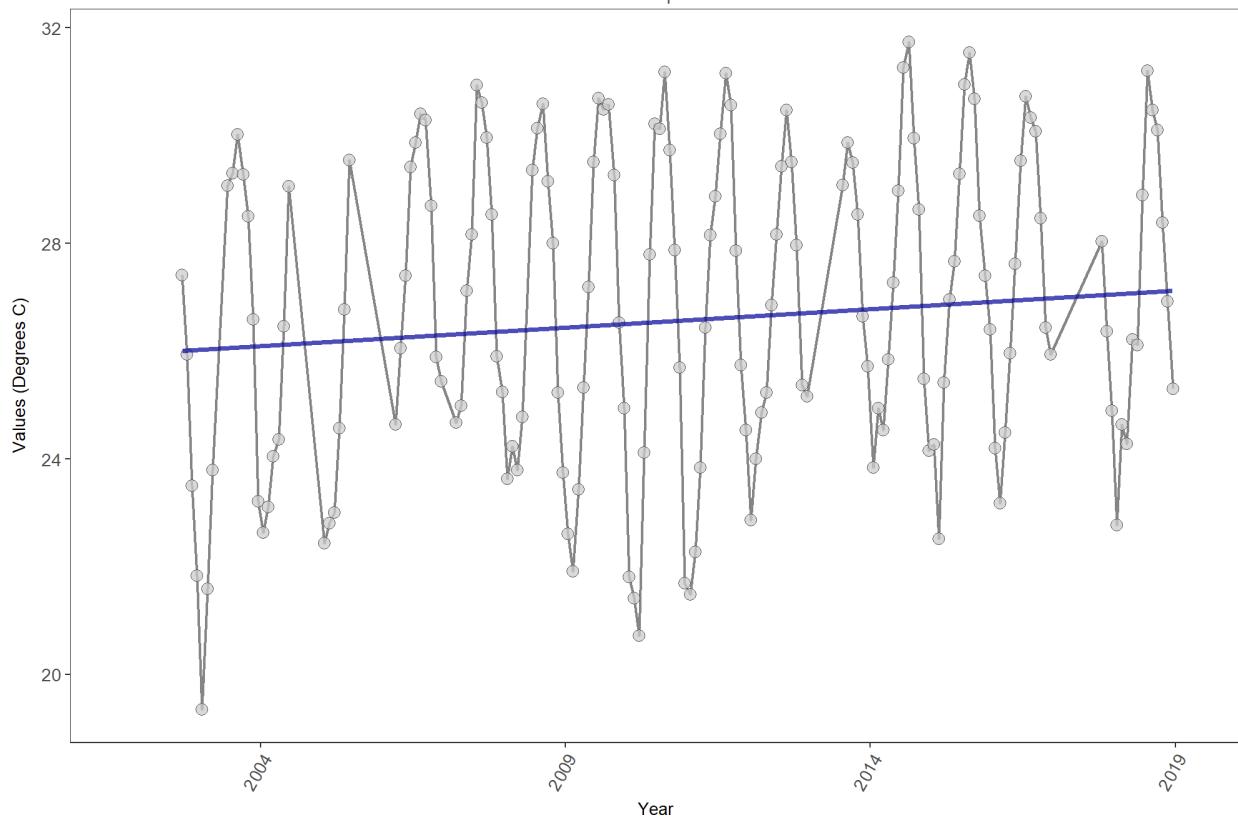


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	122250	18	26.378	TRUE	0.3056	0.0000	0.08940128	25.73751	3.738	0.977	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 239  
 Water Temperature

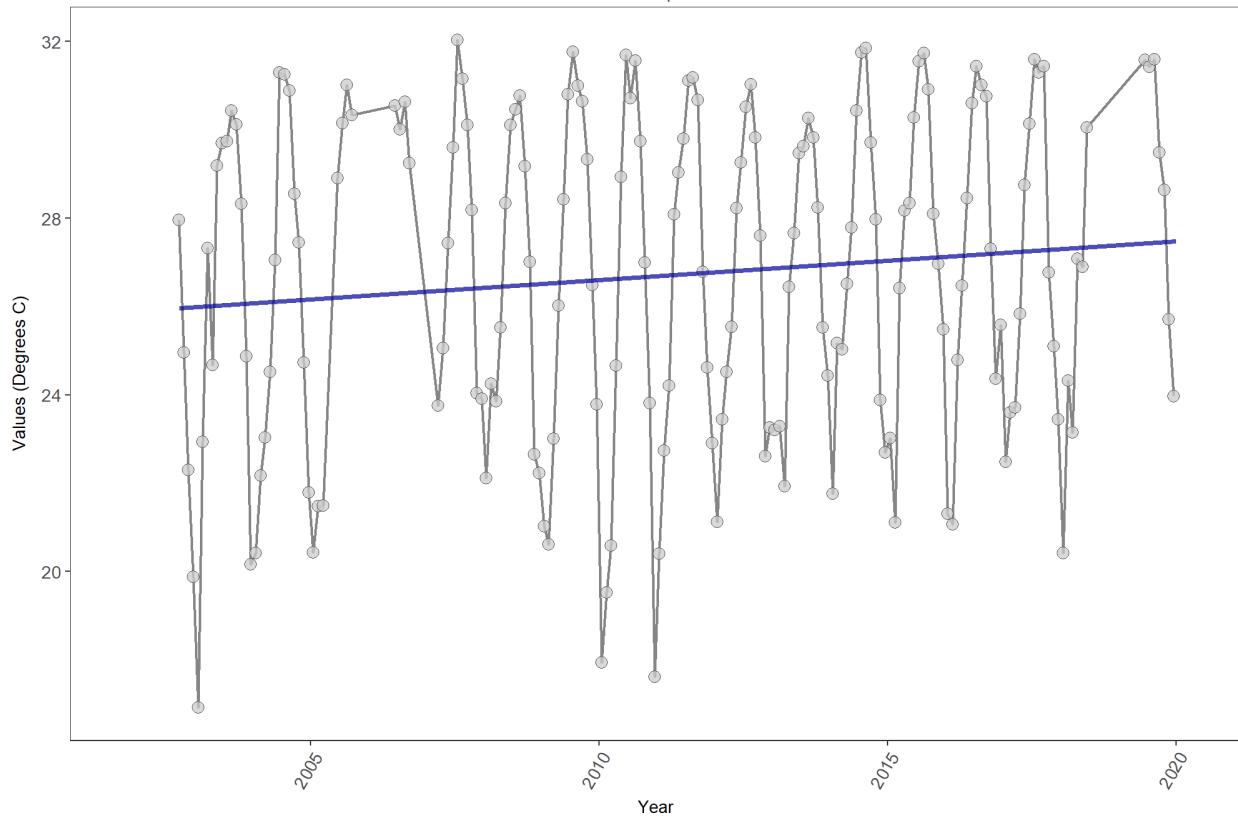


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	111523	17	26.916	TRUE	0.2436	0.0001	0.06853495	25.95916	7.1798	0.7843	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 241  
 Water Temperature

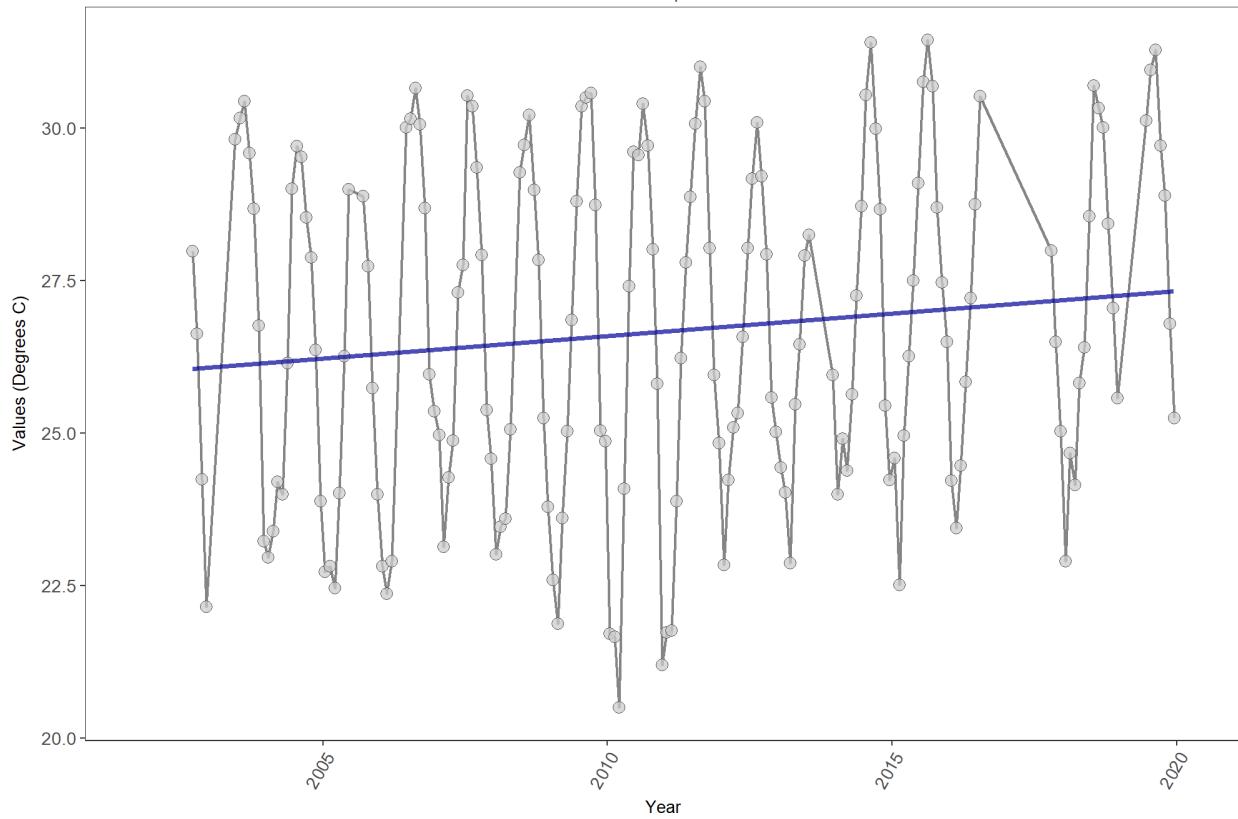


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	127914	18	27.259	TRUE	0.2701	0.0000	0.08731964	25.90535	9.8316	0.5456	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 243  
 Water Temperature

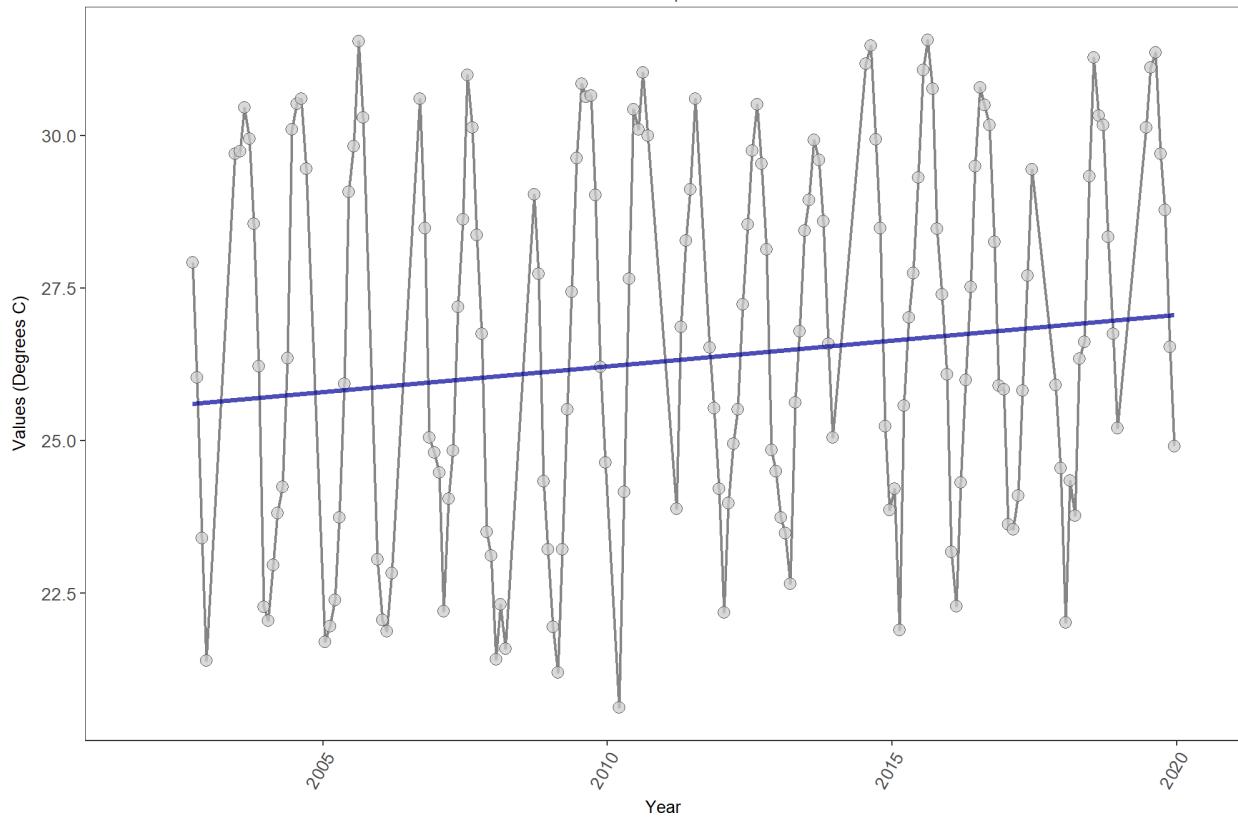


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	121593	18	26.622	TRUE	0.3046	0.0000	0.07387276	26.0011	13.7133	0.2493	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 248  
 Water Temperature

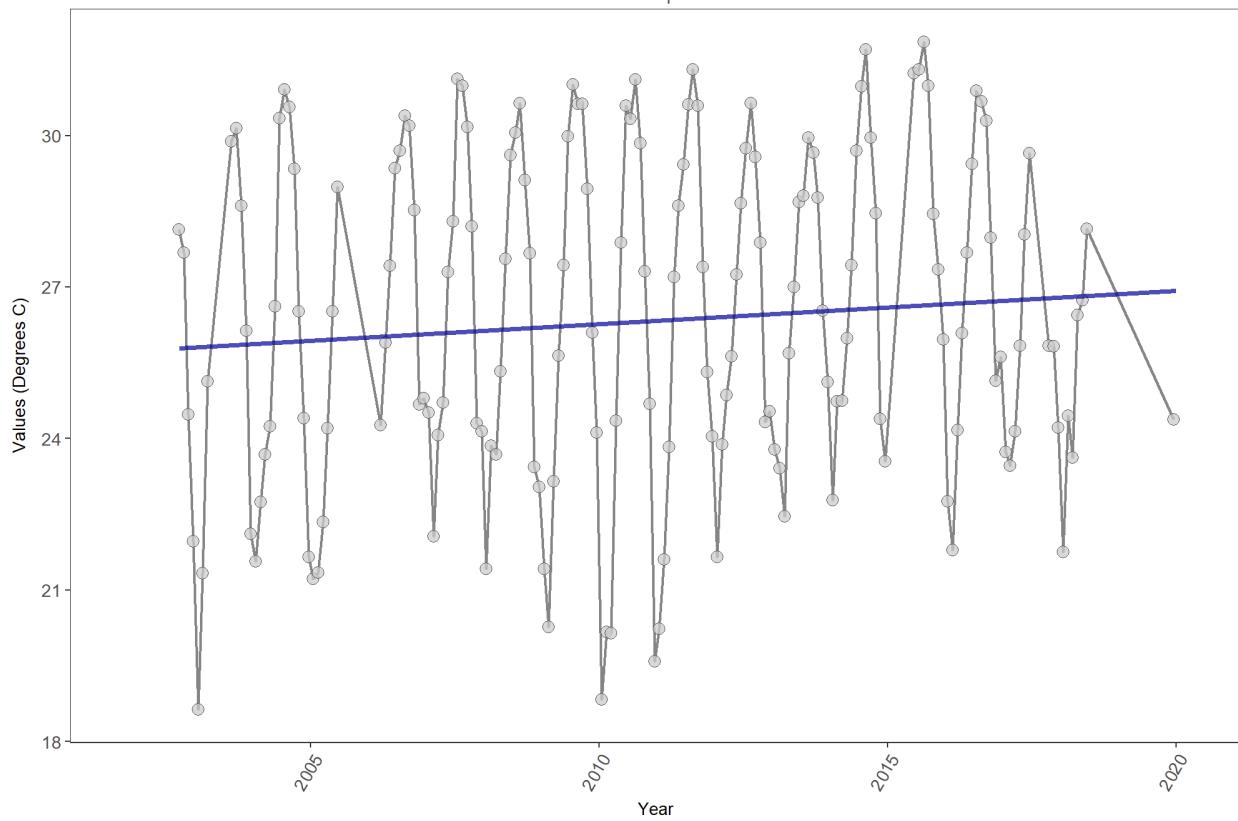


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	111702	18	26.793	TRUE	0.3129	0.0000	0.08462514	25.53841	9.7659	0.5516	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 255  
 Water Temperature

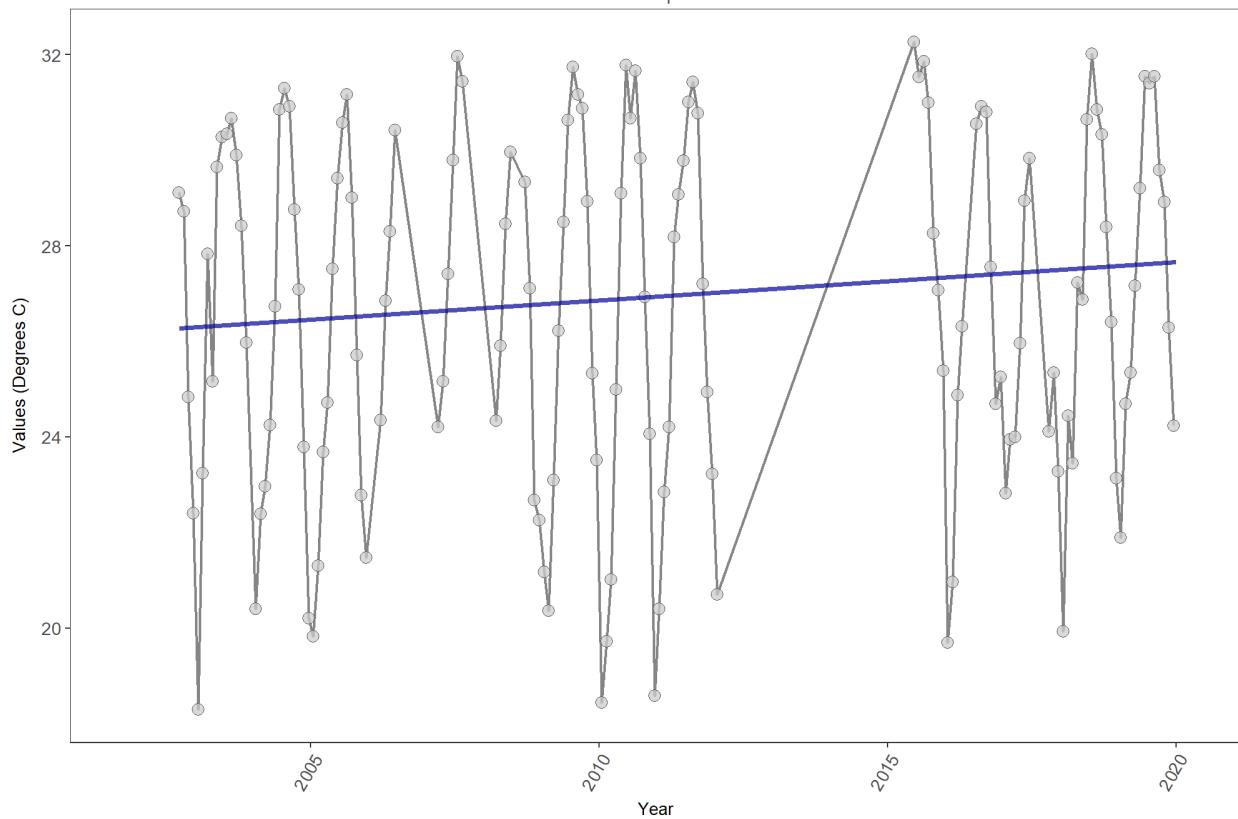


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	119939	18	26.353	TRUE	0.2422	0.0000	0.06615269	25.7331	12.2917	0.3421	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 260  
 Water Temperature

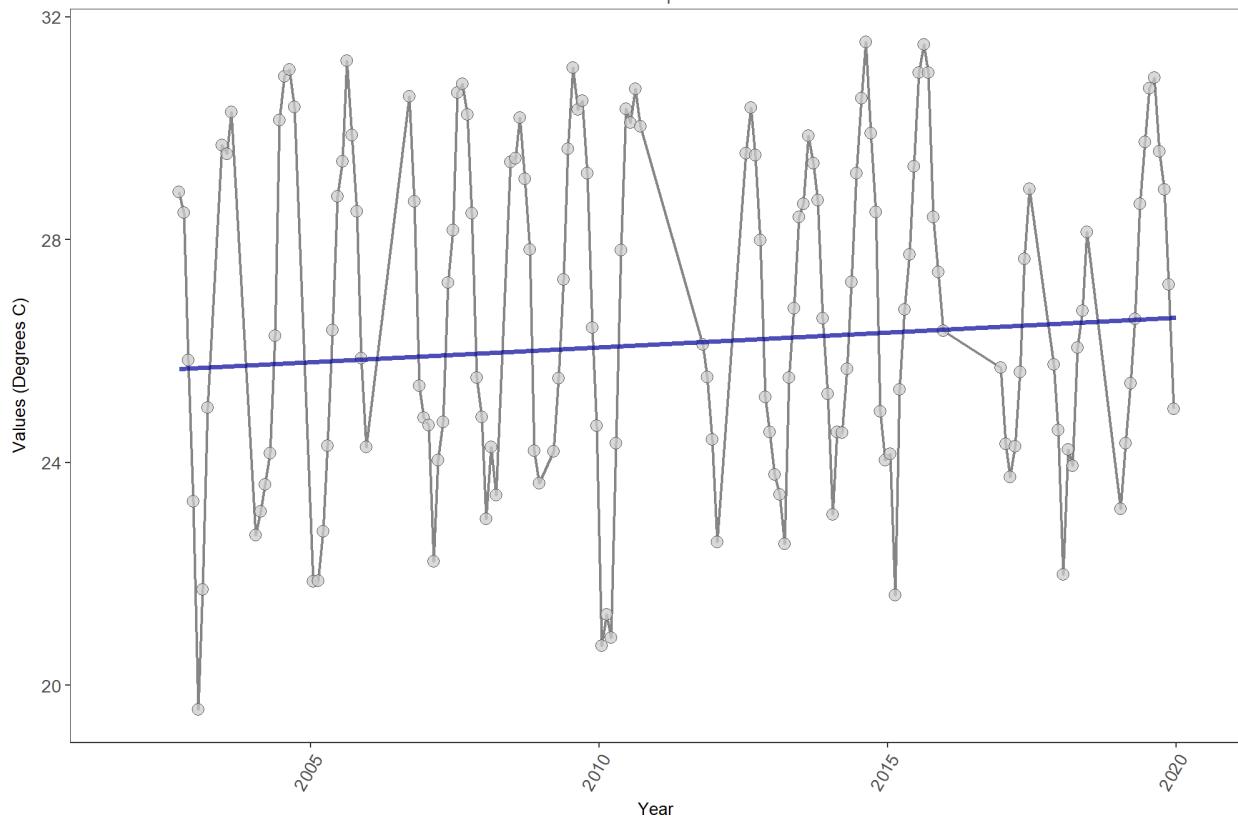


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	97832	16	27.07	TRUE	0.2835	0.0000	0.07969436	26.22474	4.7505	0.9426	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 267  
 Water Temperature

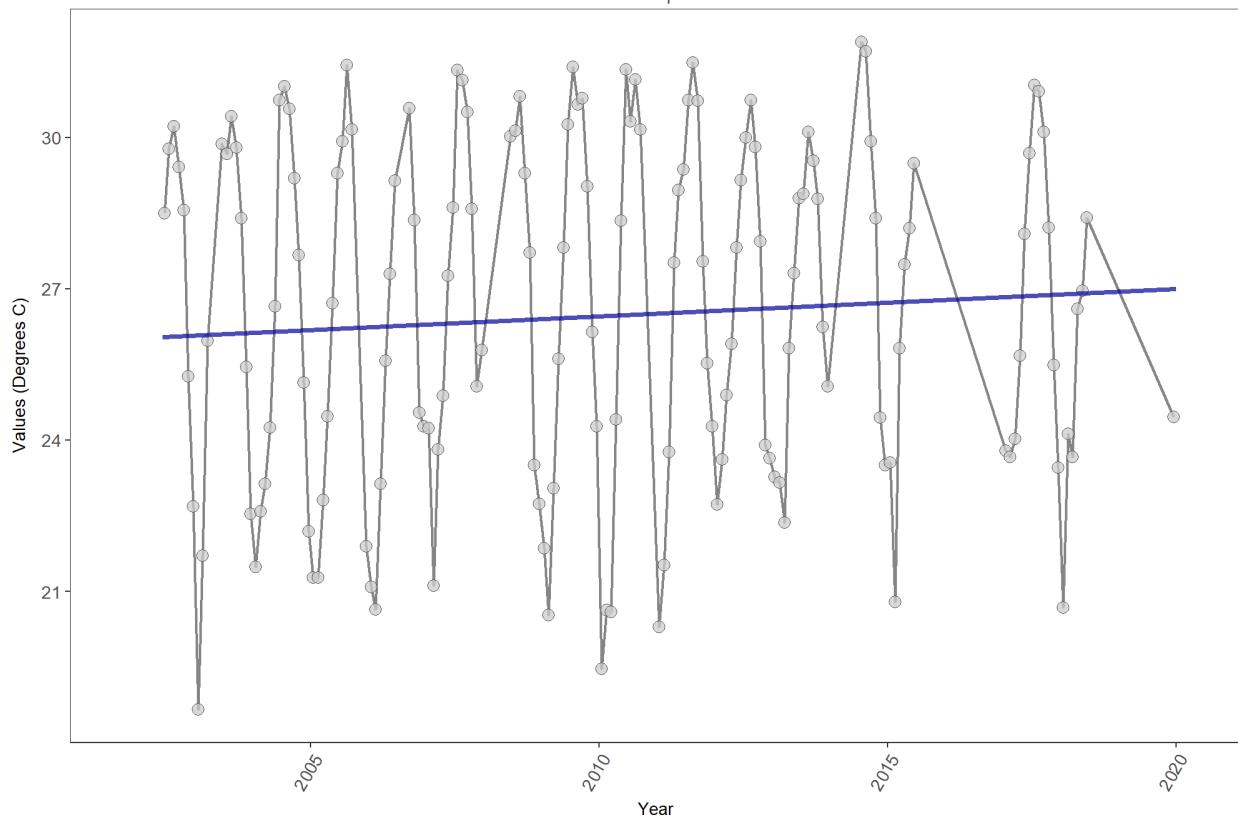


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	99735	18	26.573	TRUE	0.2419	0.0002	0.05338467	25.64436	12.6119	0.3194	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 269  
 Water Temperature

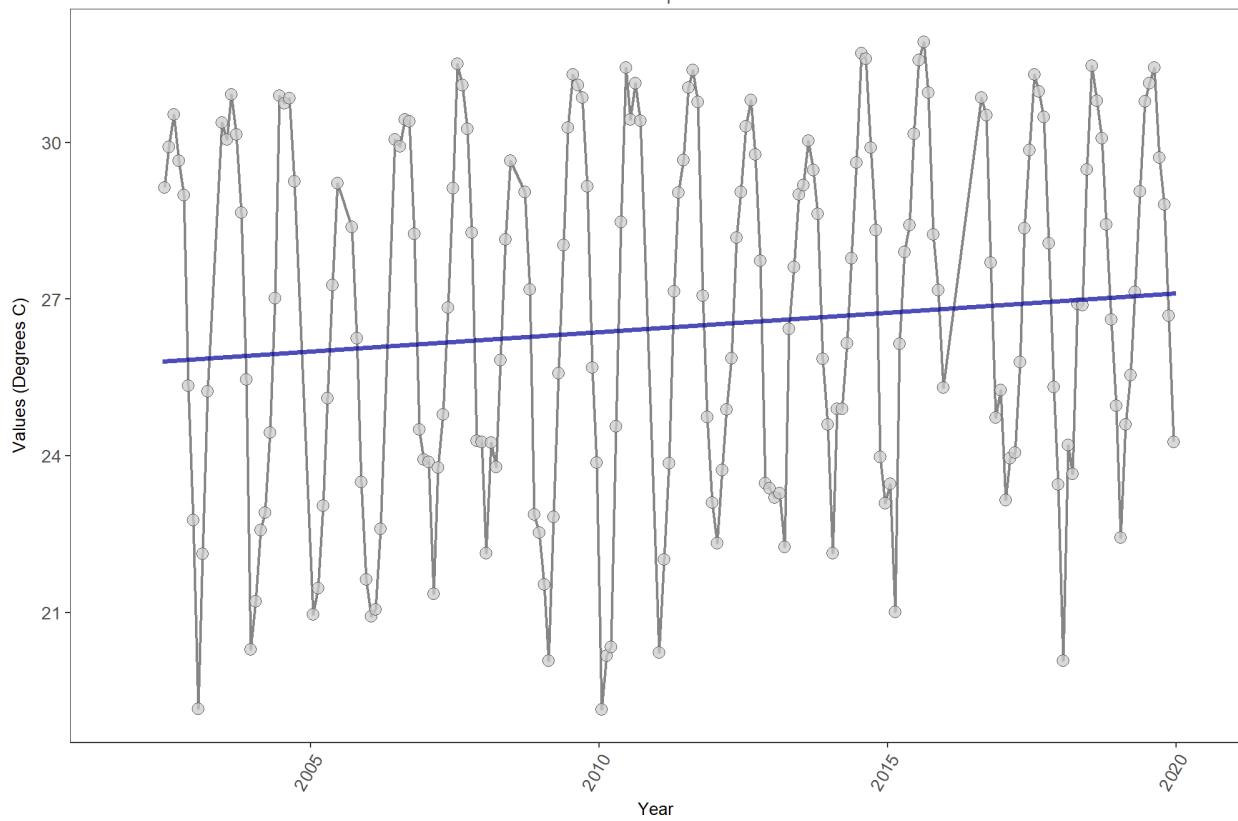


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	106458	17	26.744	TRUE	0.205	0.0010	0.05415323	26.02084	7.807	0.7305	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 271  
 Water Temperature

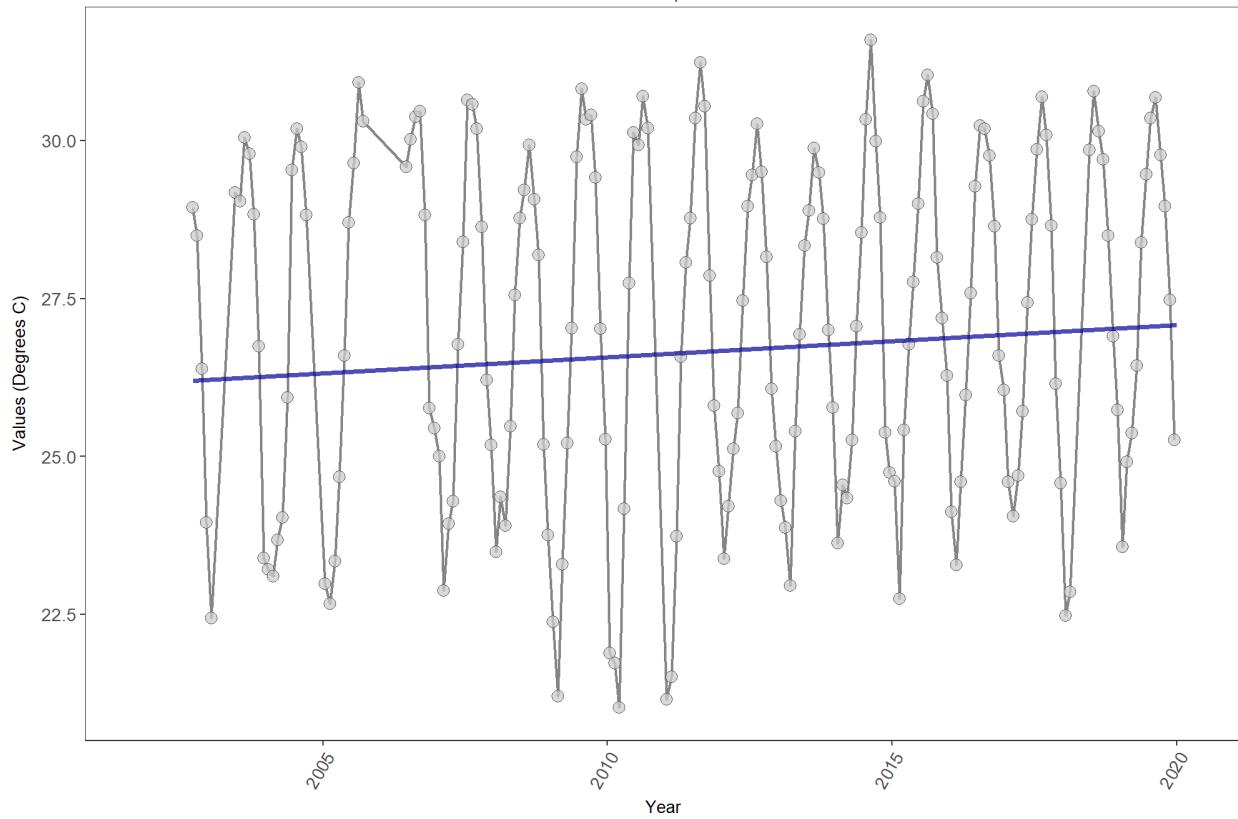


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133627	18	26.92	TRUE	0.2648	0.0000	0.07425617	25.77095	7.2658	0.7772	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 273  
 Water Temperature

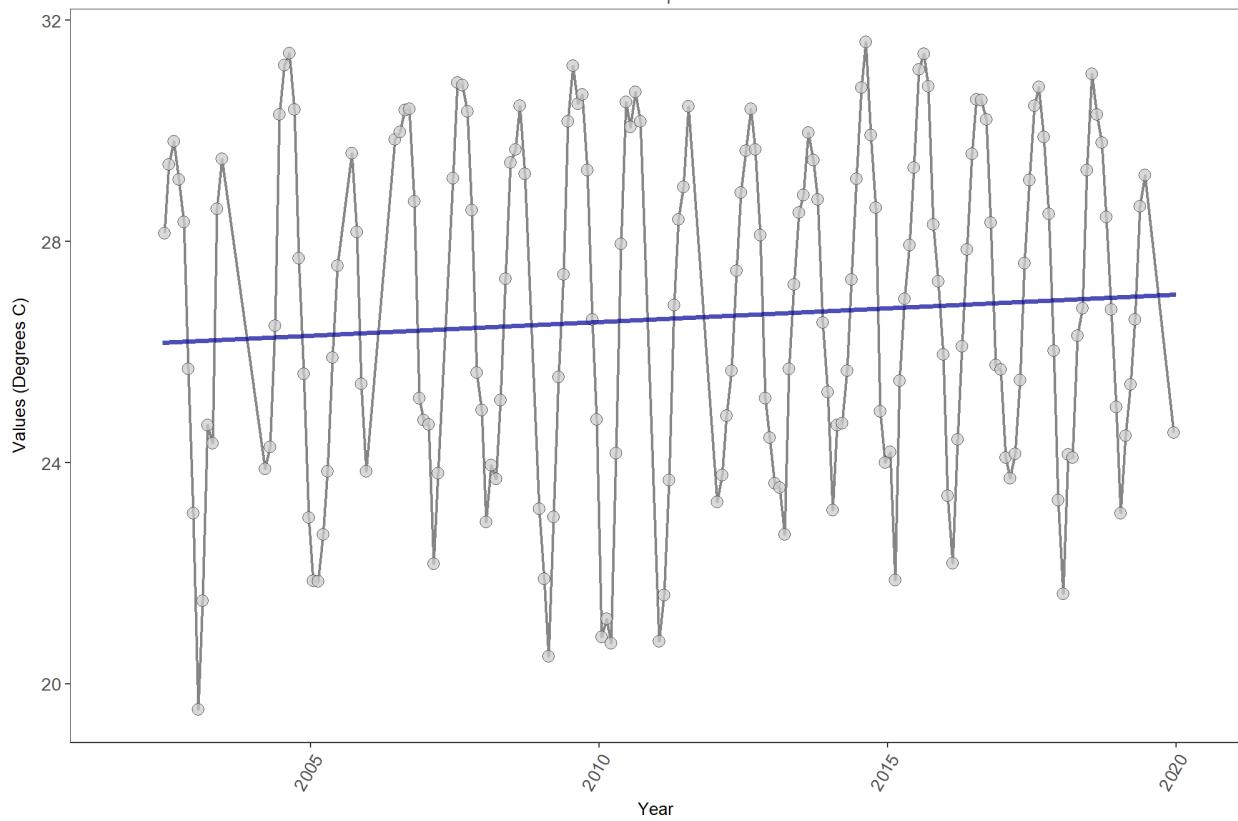


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	129817	18	27.161	TRUE	0.2352	0.0000	0.05125701	26.16077	7.9713	0.7159	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 276  
 Water Temperature

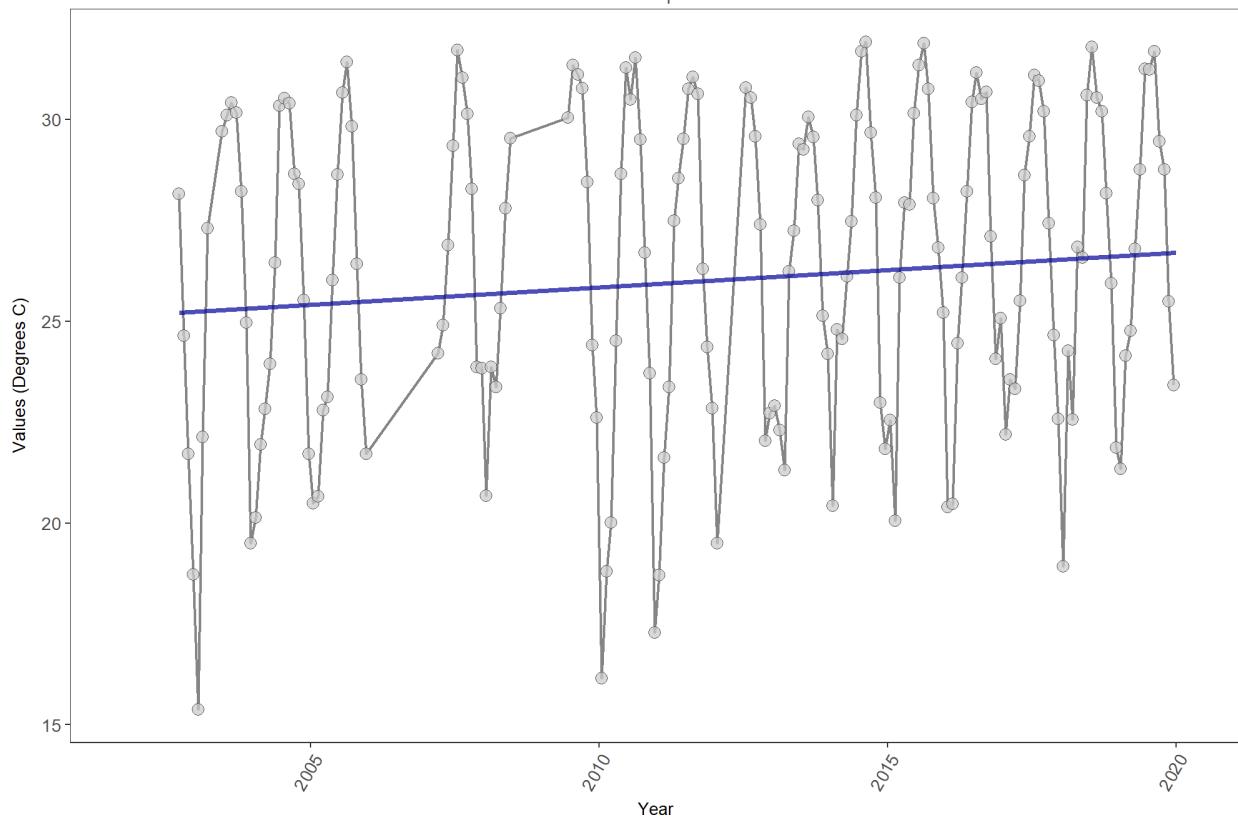


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	123833	18	26.867	TRUE	0.2119	0.0002	0.04940267	26.14803	9.2227	0.6013	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 284  
 Water Temperature

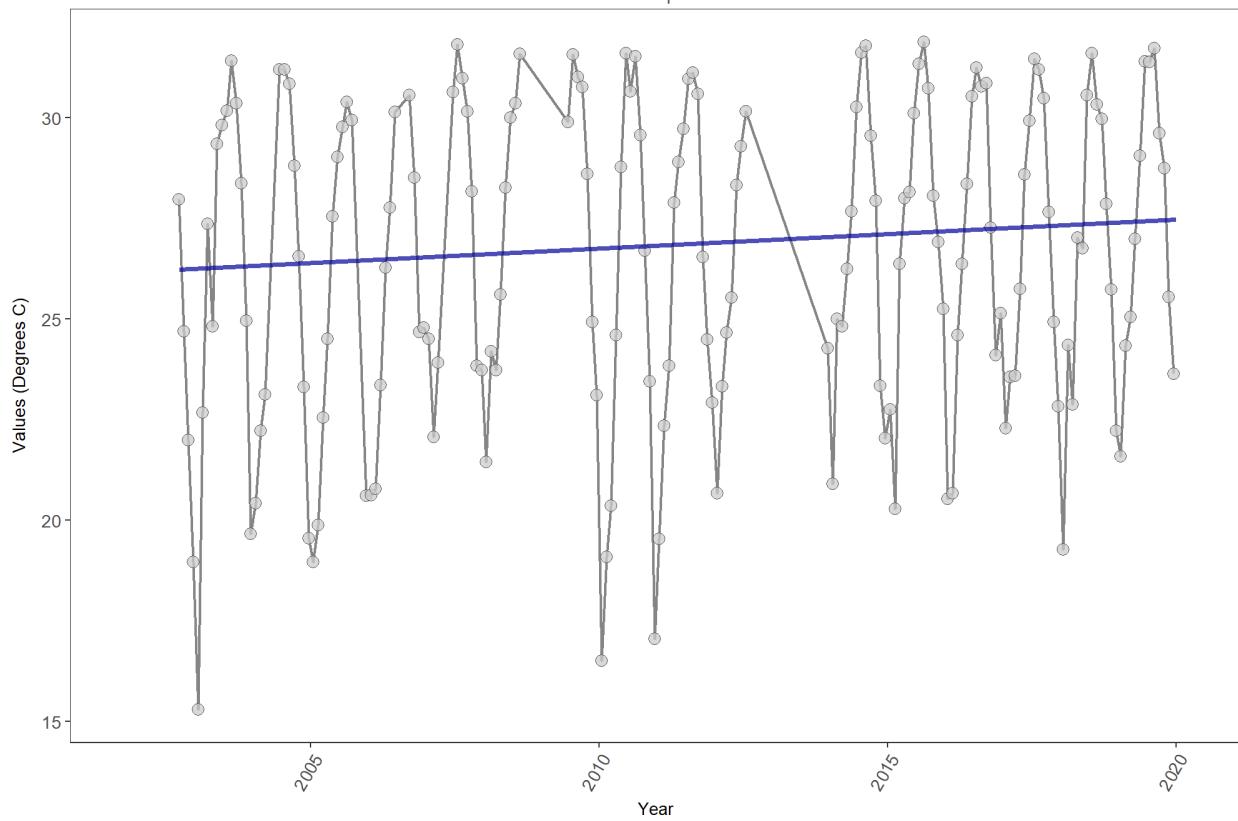


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	123977	17	26.86	TRUE	0.2841	0.0000	0.08647849	25.1442	4.5665	0.9503	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 285  
 Water Temperature

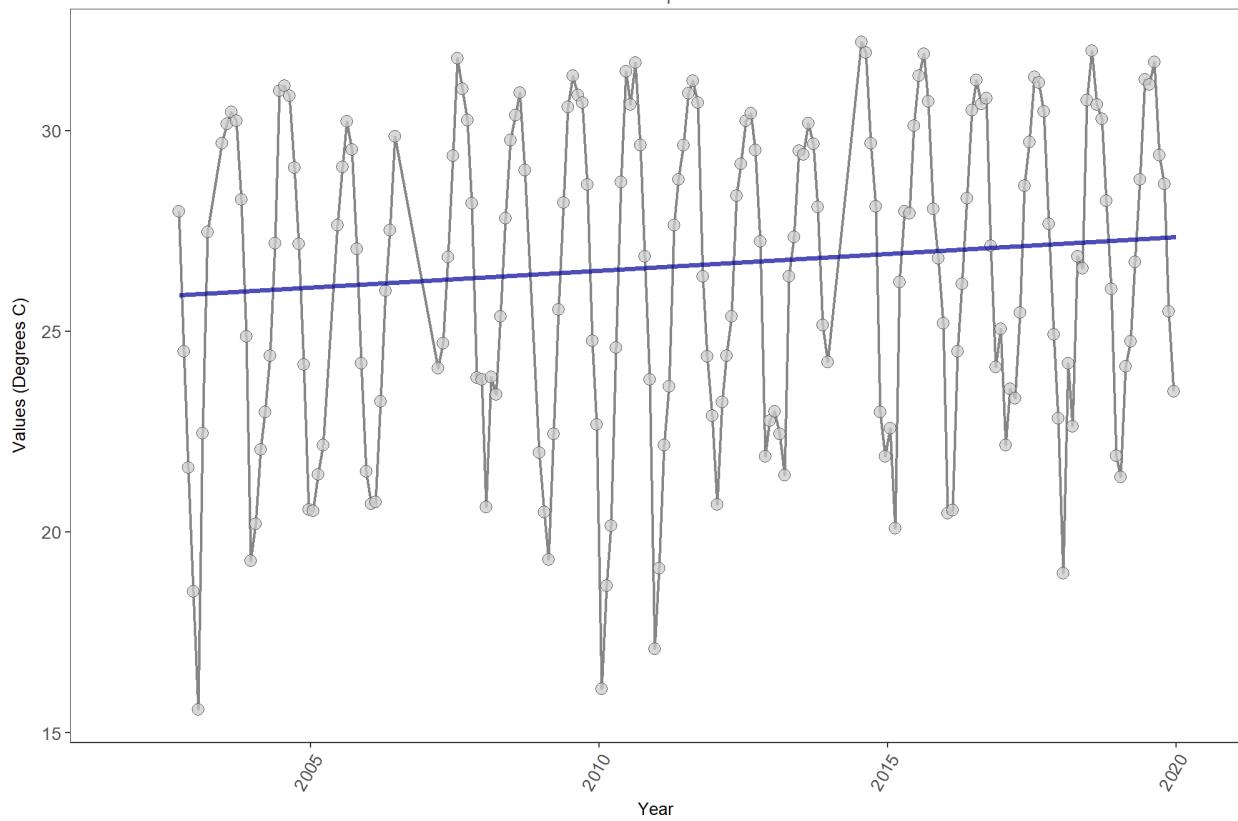


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	121423	18	26.86	TRUE	0.2491	0.0000	0.07226265	26.17465	3.3	0.9861	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 287  
 Water Temperature

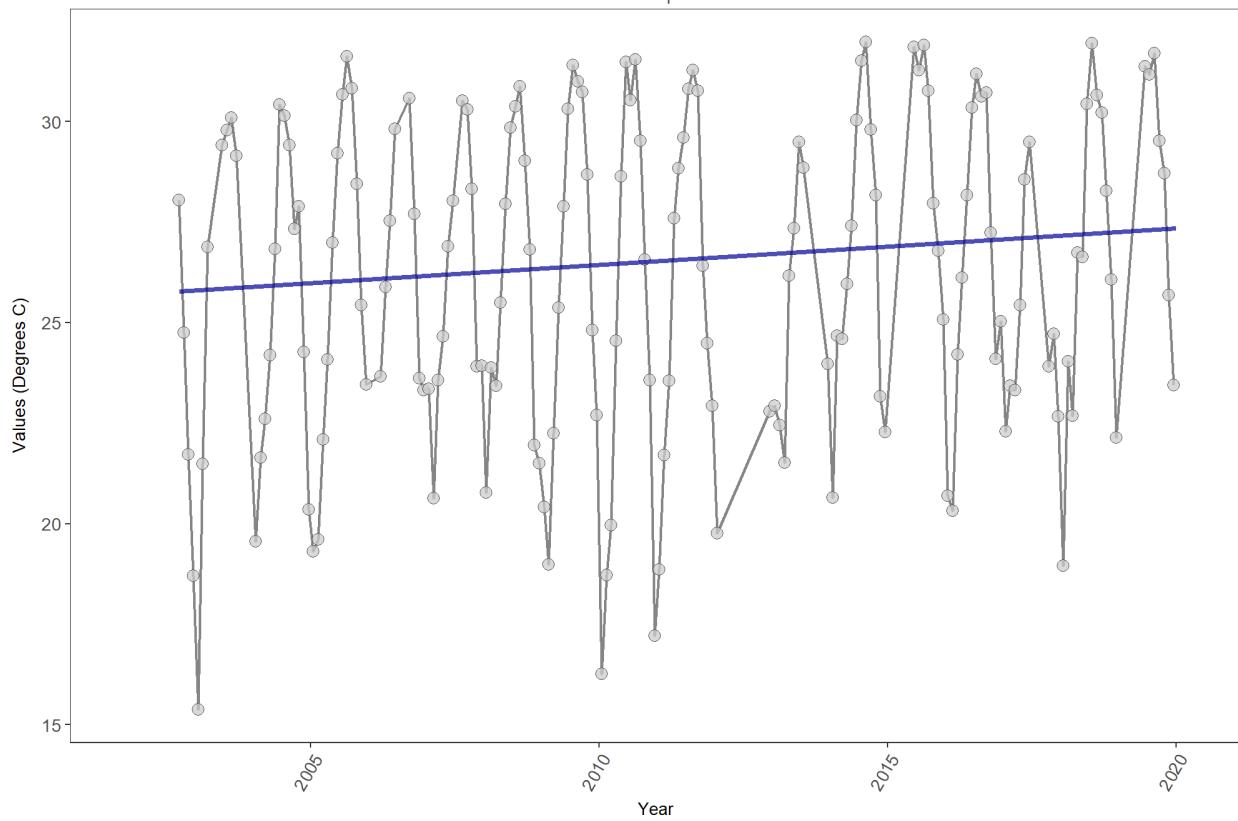


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	133008	18	26.867	TRUE	0.2861	0.0000	0.08370537	25.84179	2.8052	0.9931	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 291  
 Water Temperature

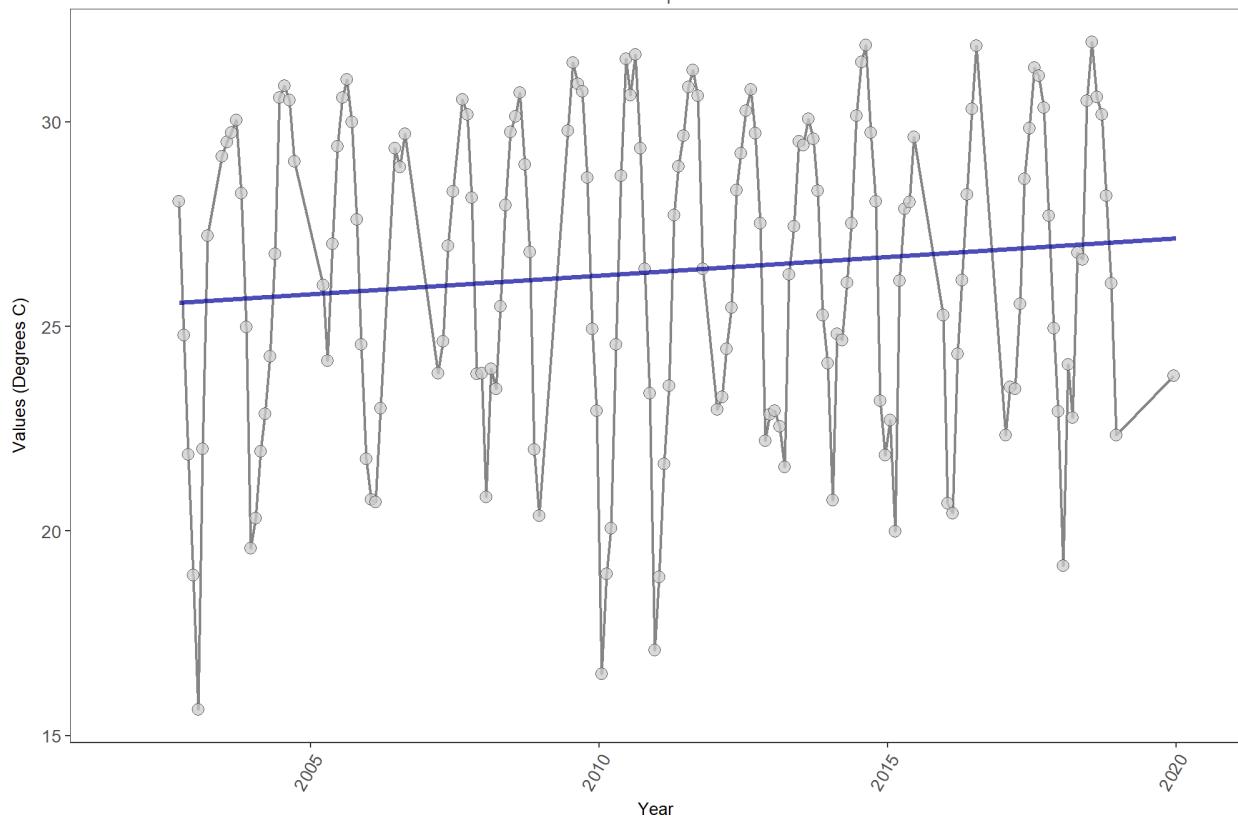


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	116240	18	26.378	TRUE	0.2605	0.0000	0.09038371	25.71649	6.787	0.8161	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 294  
 Water Temperature

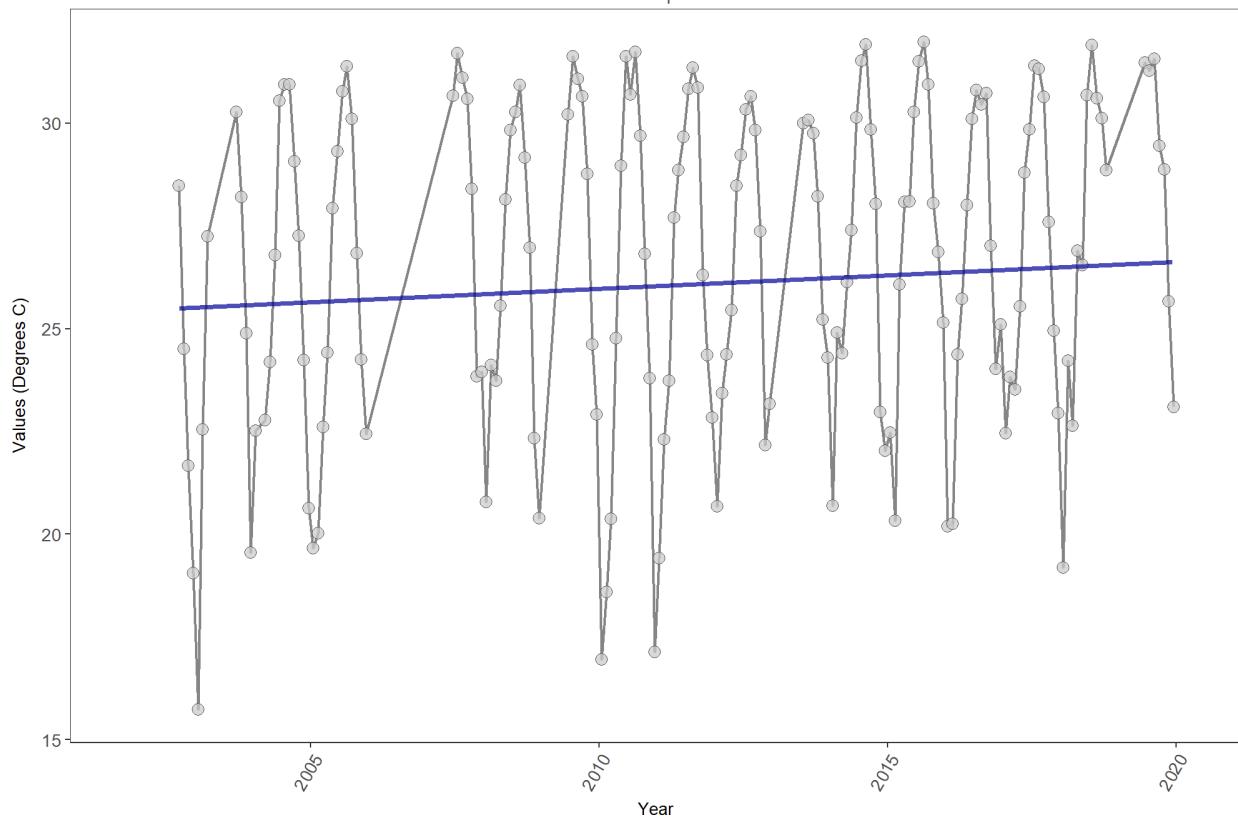


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	112348	18	26.916	TRUE	0.2683	0.0000	0.09058535	25.52317	6.4438	0.8422	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 296  
 Water Temperature

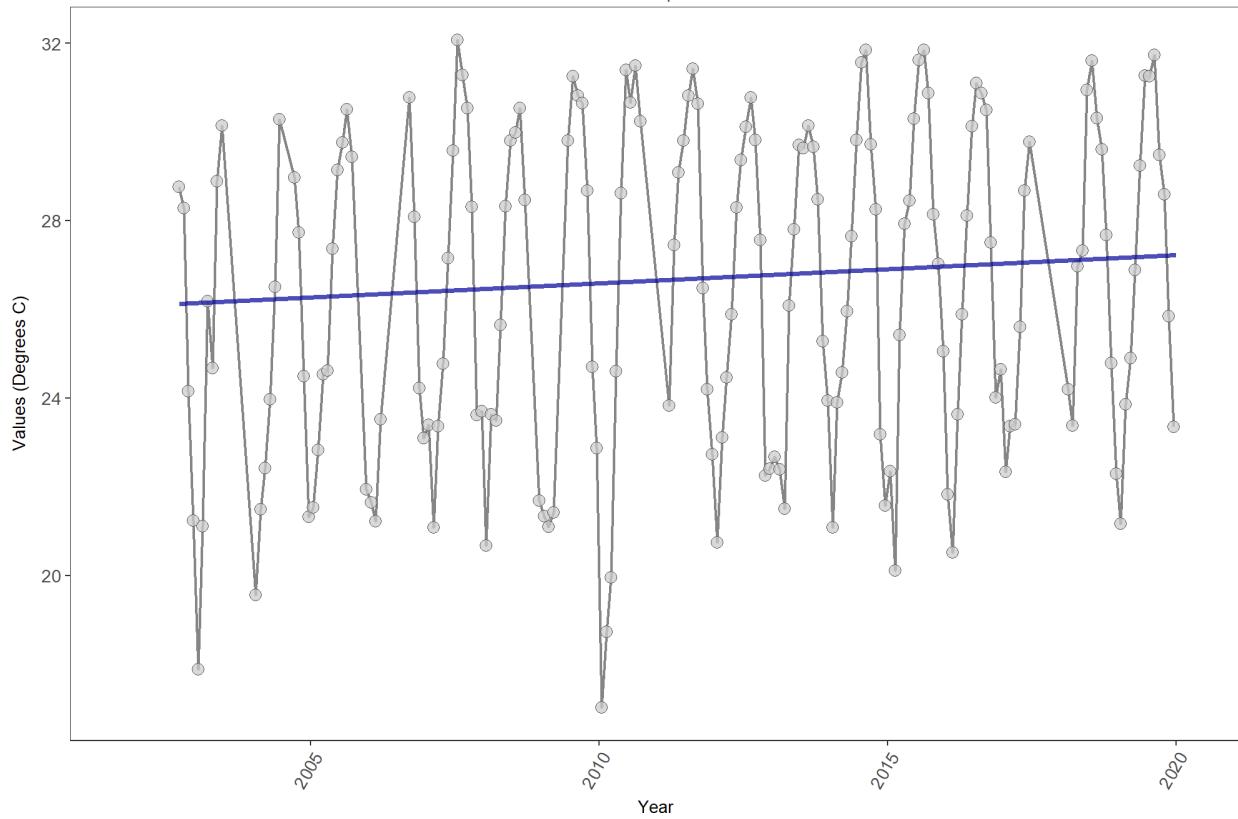


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	114497	17	27.358	TRUE	0.2115	0.0002	0.06523774	25.45089	8.3483	0.6818	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 305  
 Water Temperature

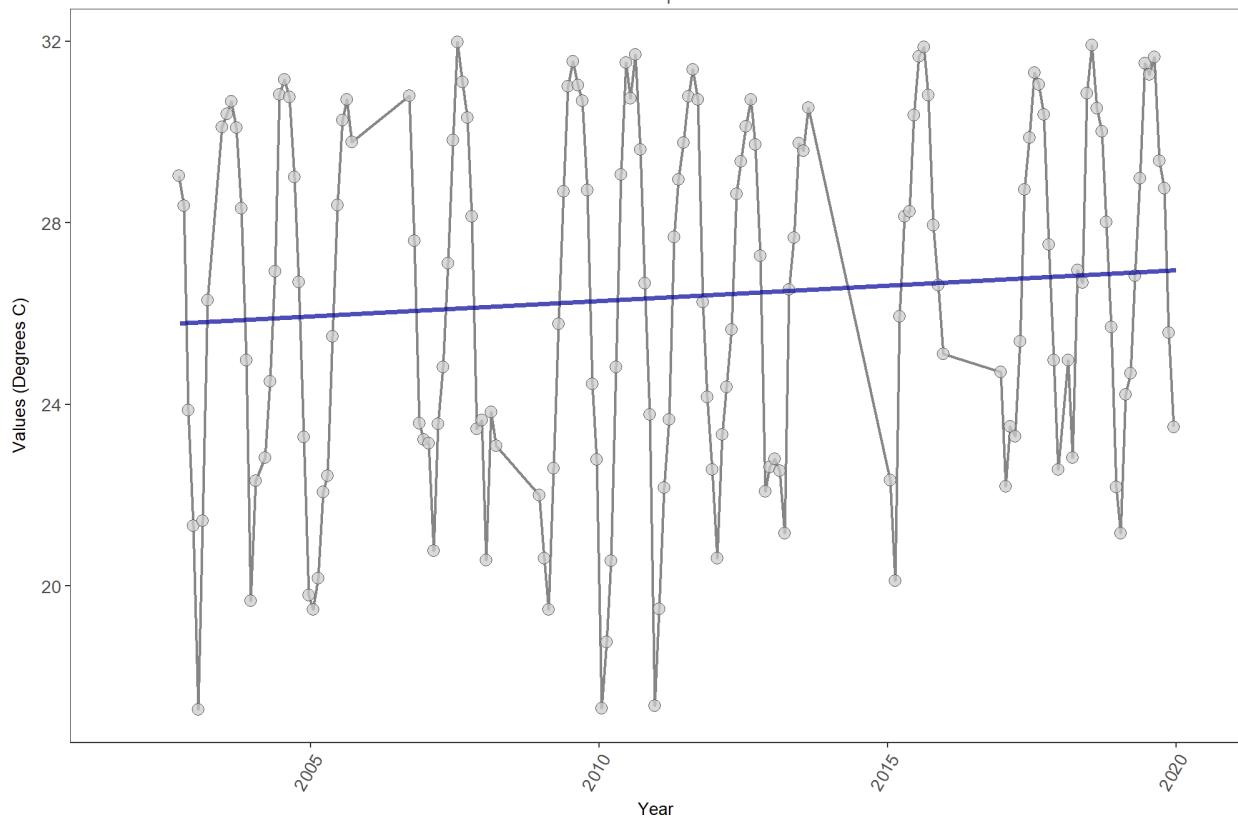


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	122296	18	26.426	TRUE	0.2157	0.0001	0.06350584	26.07423	5.6788	0.8939	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 307  
 Water Temperature

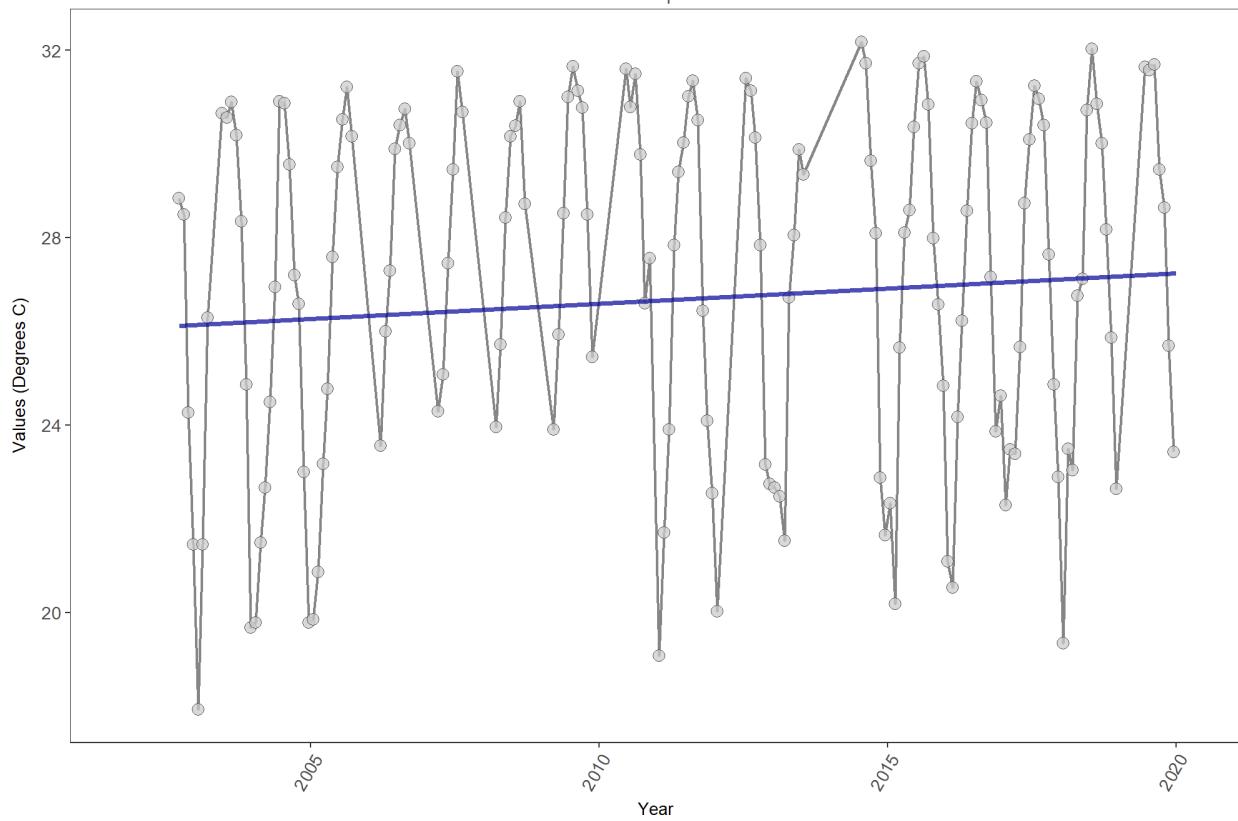


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	110802	17	26.744	TRUE	0.2233	0.0003	0.06796571	25.7301	4.7198	0.944	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 309  
 Water Temperature

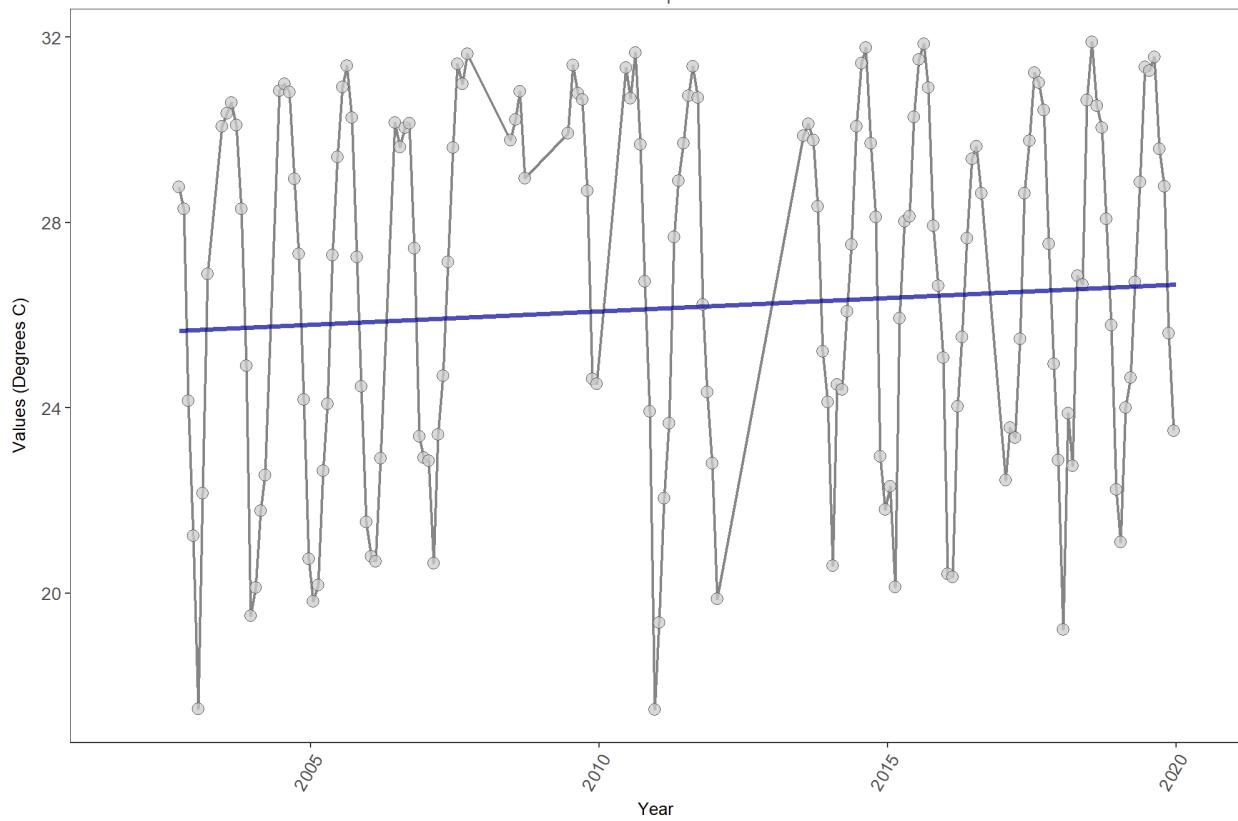


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	107410	18	27.85	TRUE	0.2706	0.0000	0.06498387	26.07065	8.1097	0.7034	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 314  
 Water Temperature

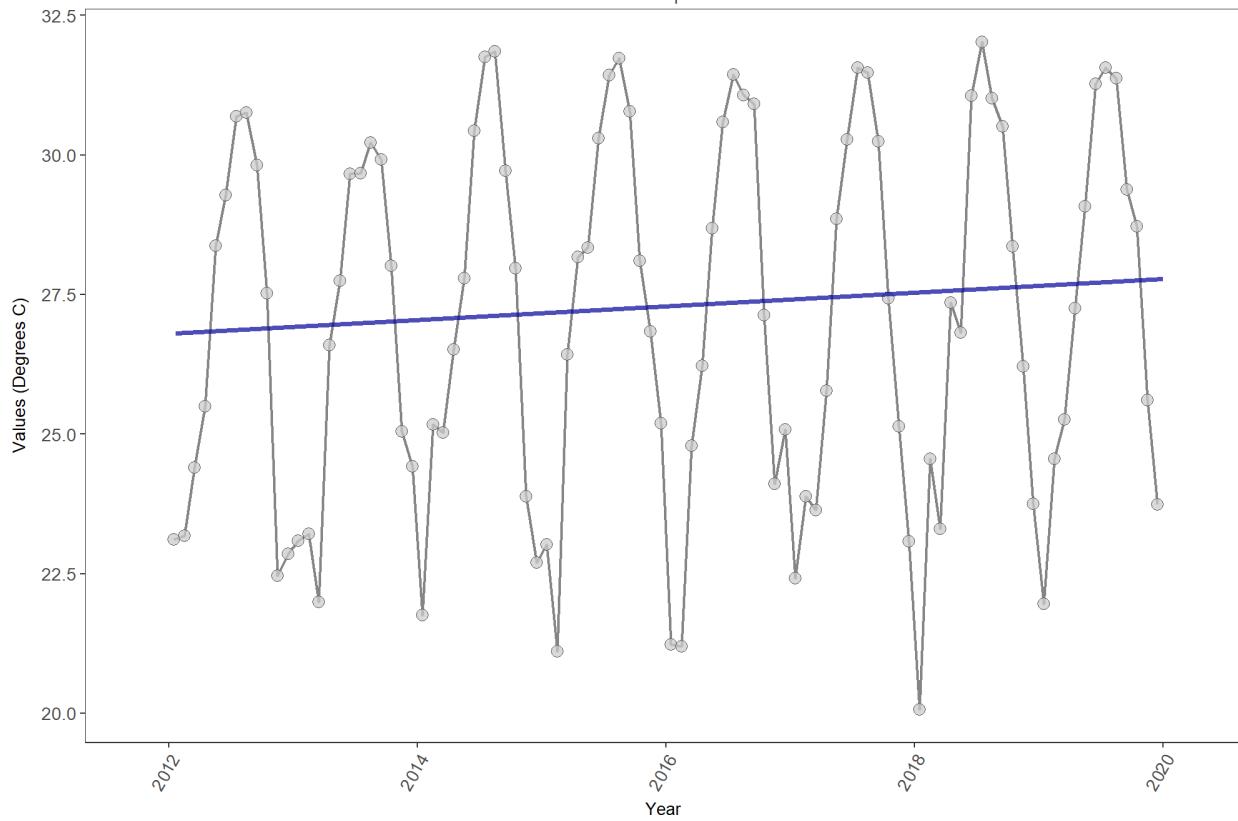


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	110686	18	27.407	TRUE	0.2273	0.0002	0.05769968	25.62588	1.9396	0.9987	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 500  
 Water Temperature

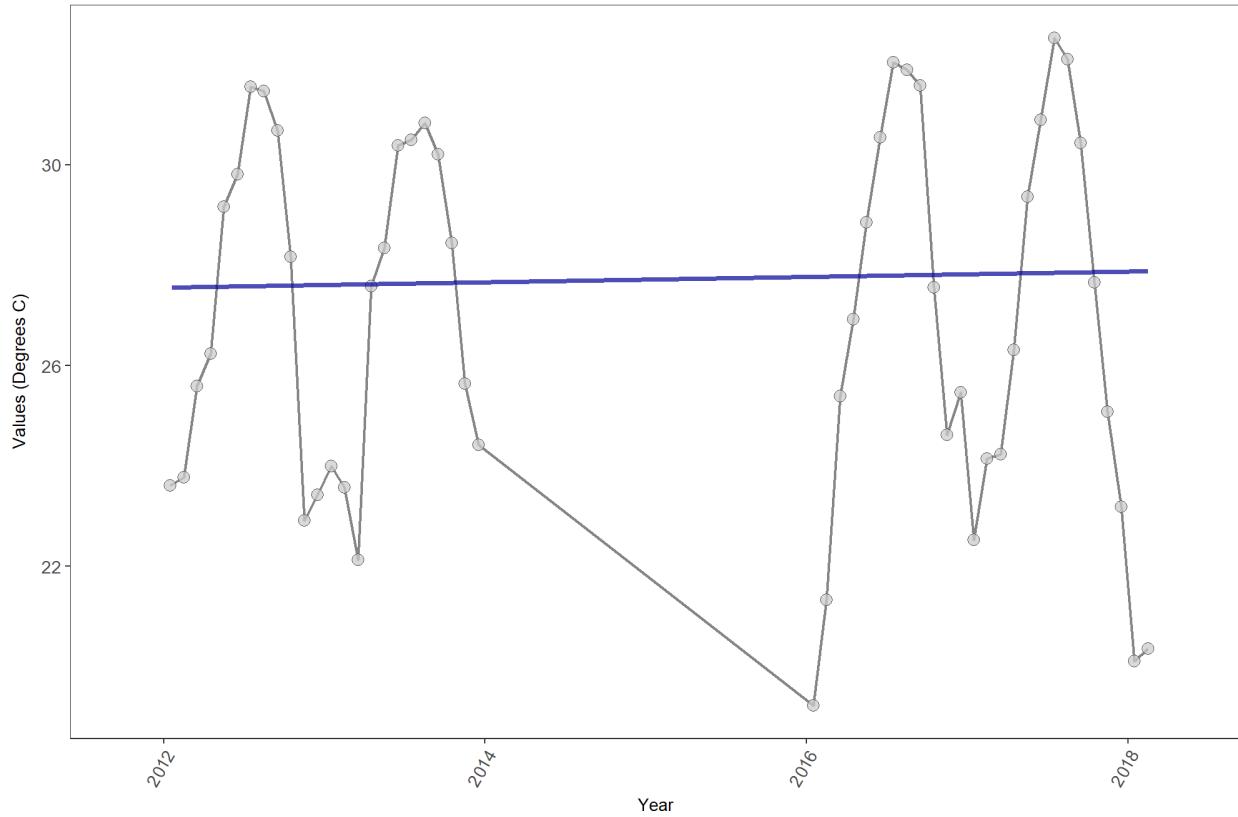


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	69048	8	27.333	TRUE	0.2262	0.0074	0.1235079	26.79371	14.0612	0.2296	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 501  
 Water Temperature

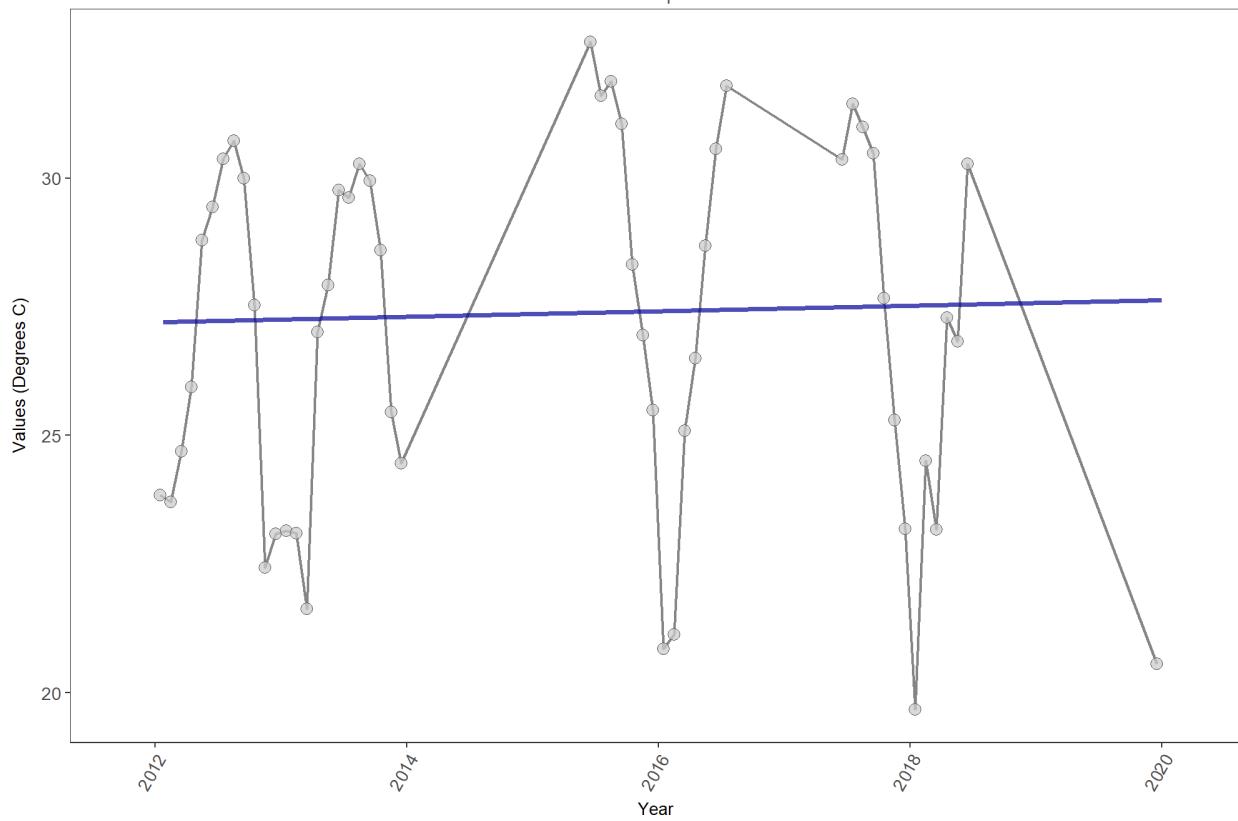


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	34805	5	27.481	TRUE	0.1067	0.6481	0.05455266	27.54878	10.9609	0.4465	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 506  
 Water Temperature

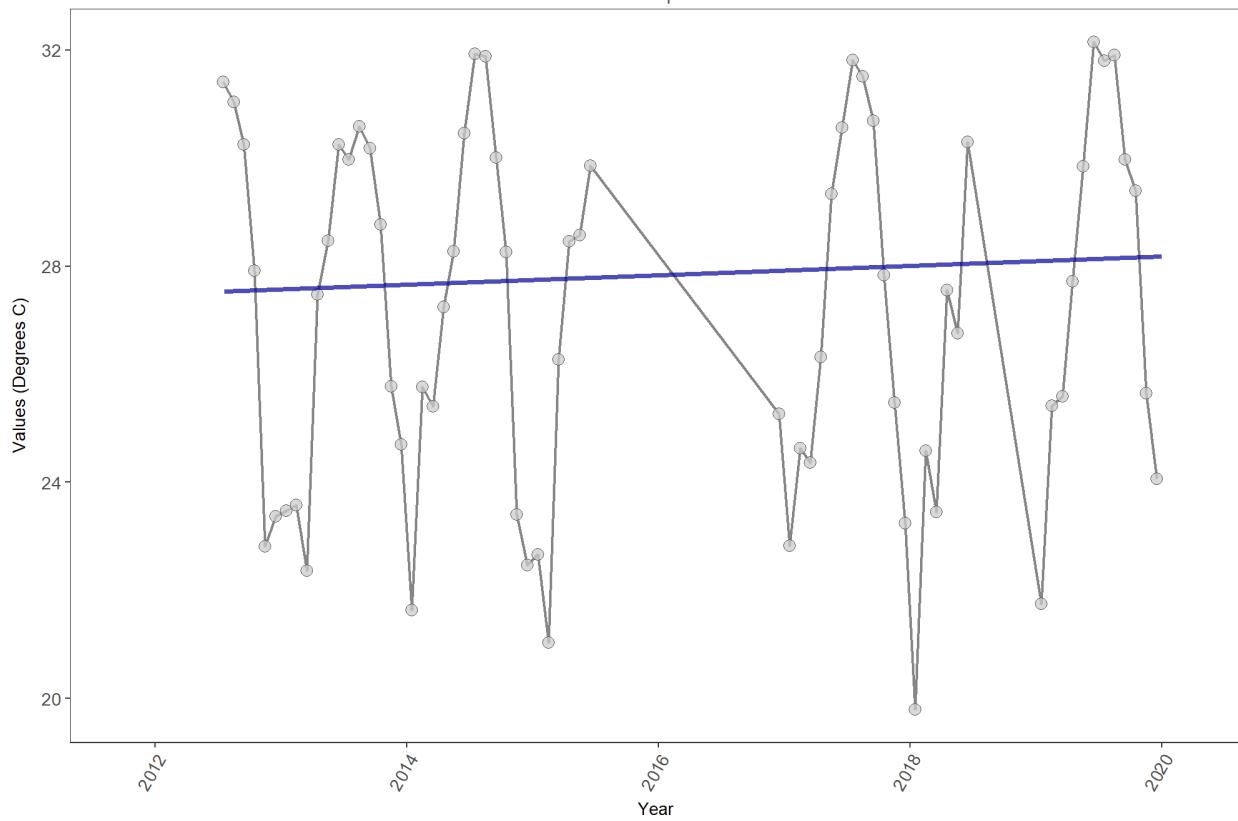


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	35198	7	27.407	TRUE	0.0423	0.7350	0.05413737	27.20107	10.6559	0.4725	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 507  
 Water Temperature

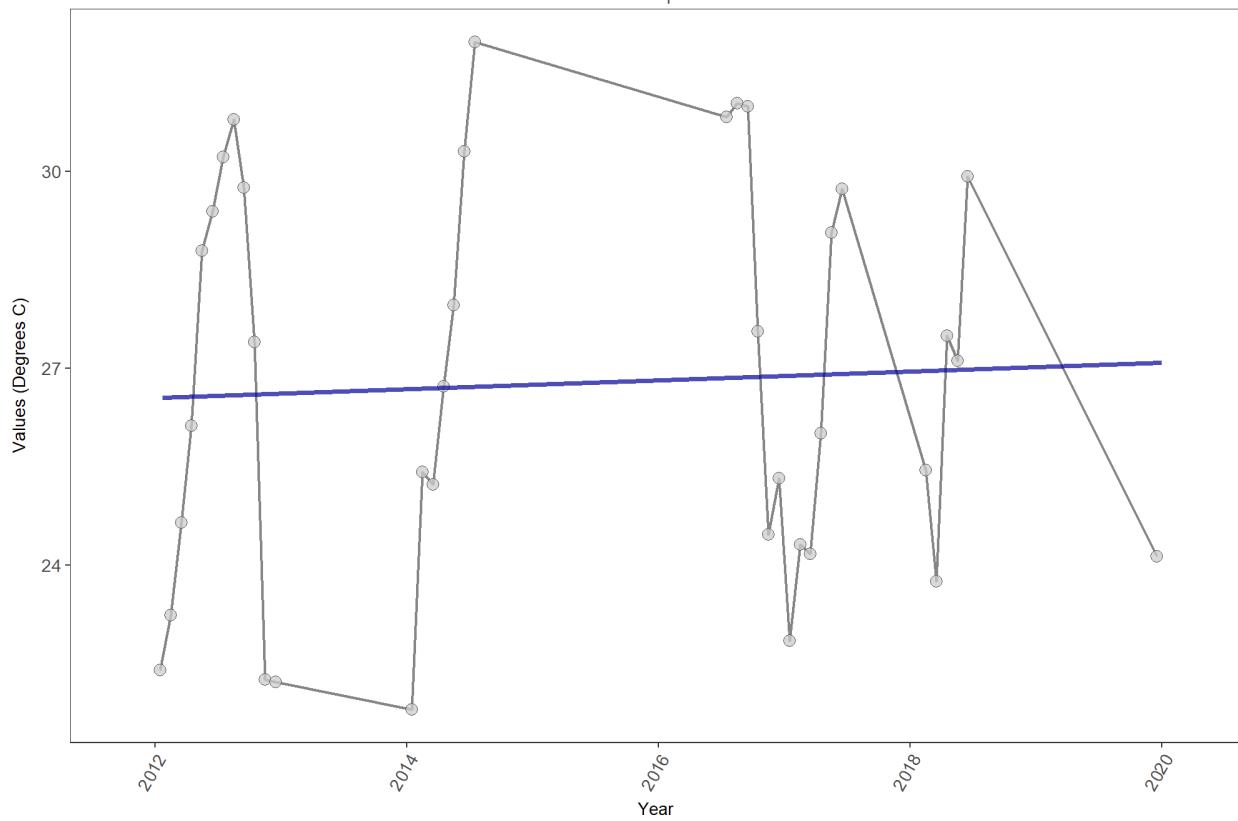


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	47517	8	27.358	TRUE	0.1761	0.1213	0.08753056	27.48215	6.3885	0.8462	0

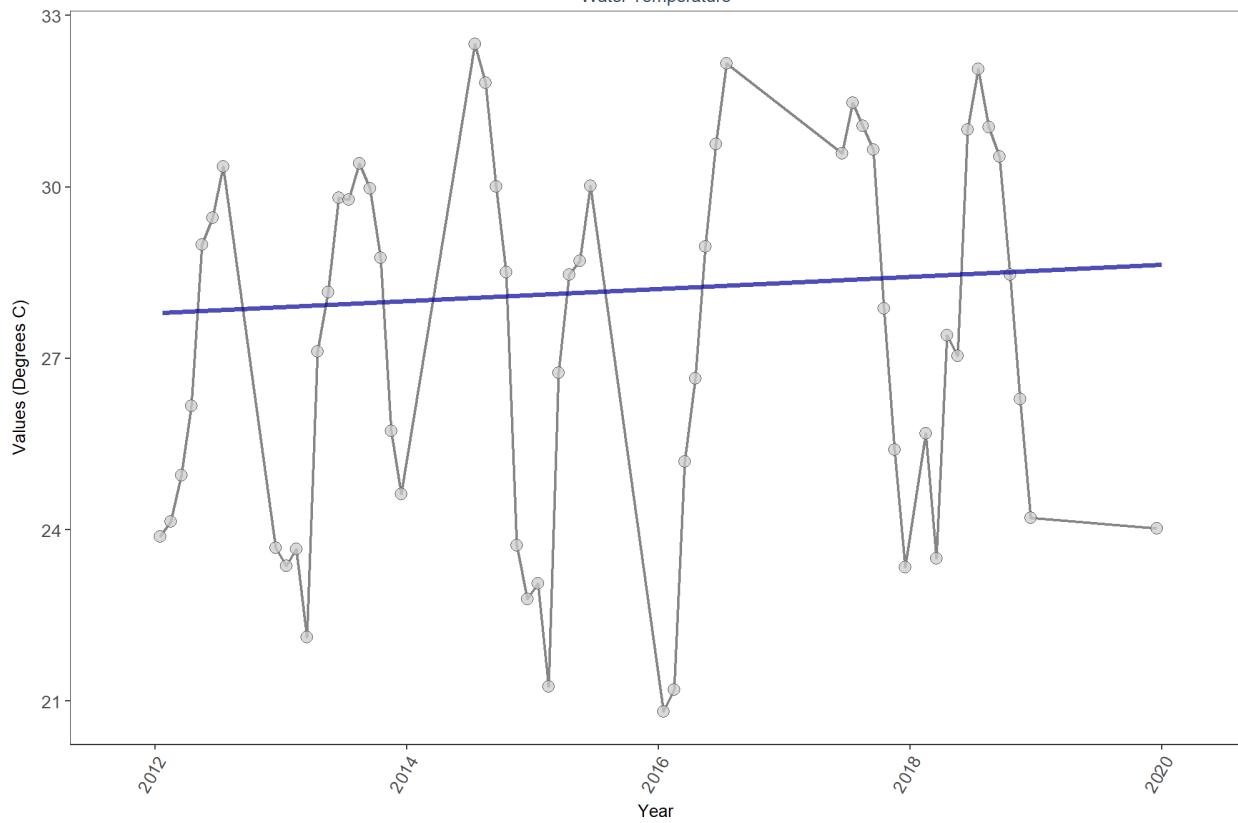
*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 508  
 Water Temperature



Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 509  
 Water Temperature

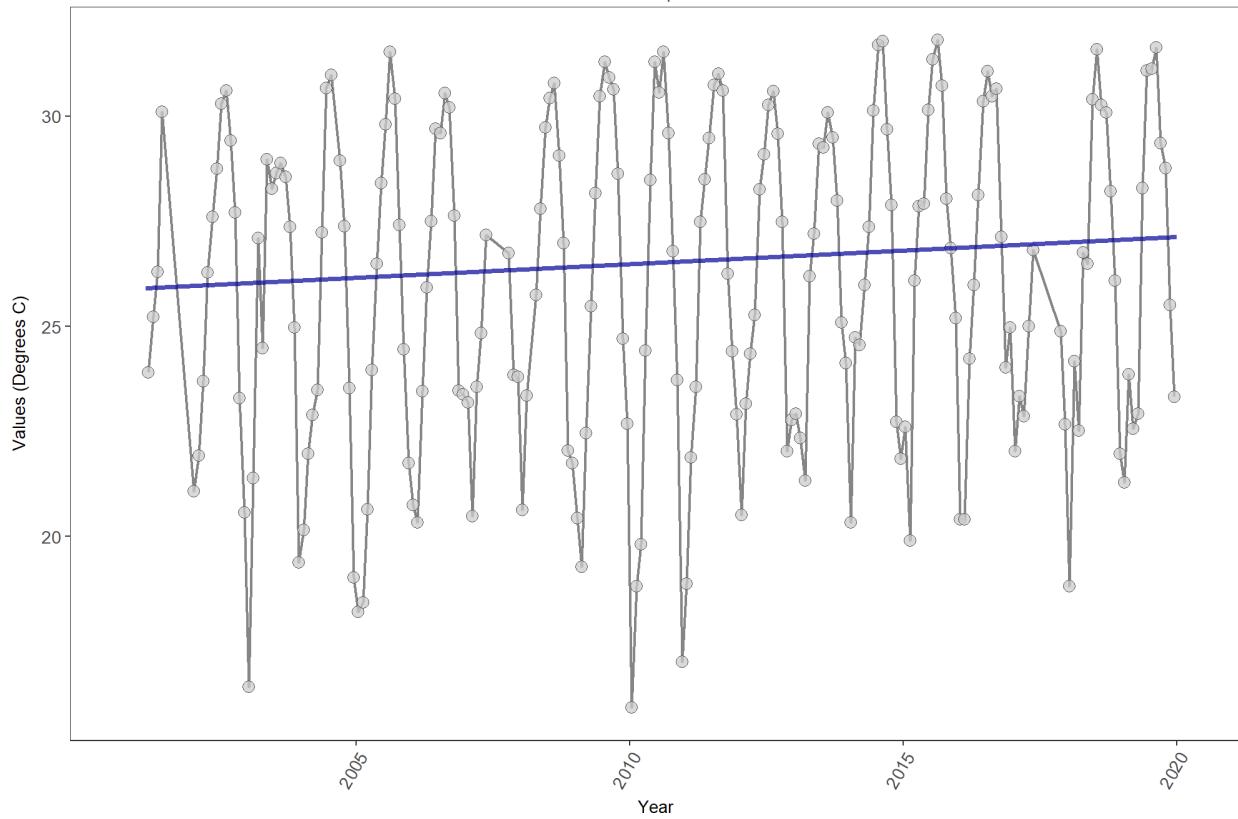


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	38607	8	27.702	TRUE	0.054	0.4739	0.1050424	27.79451	16.6346	0.1192	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 296  
 Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
 SB  
 Water Temperature

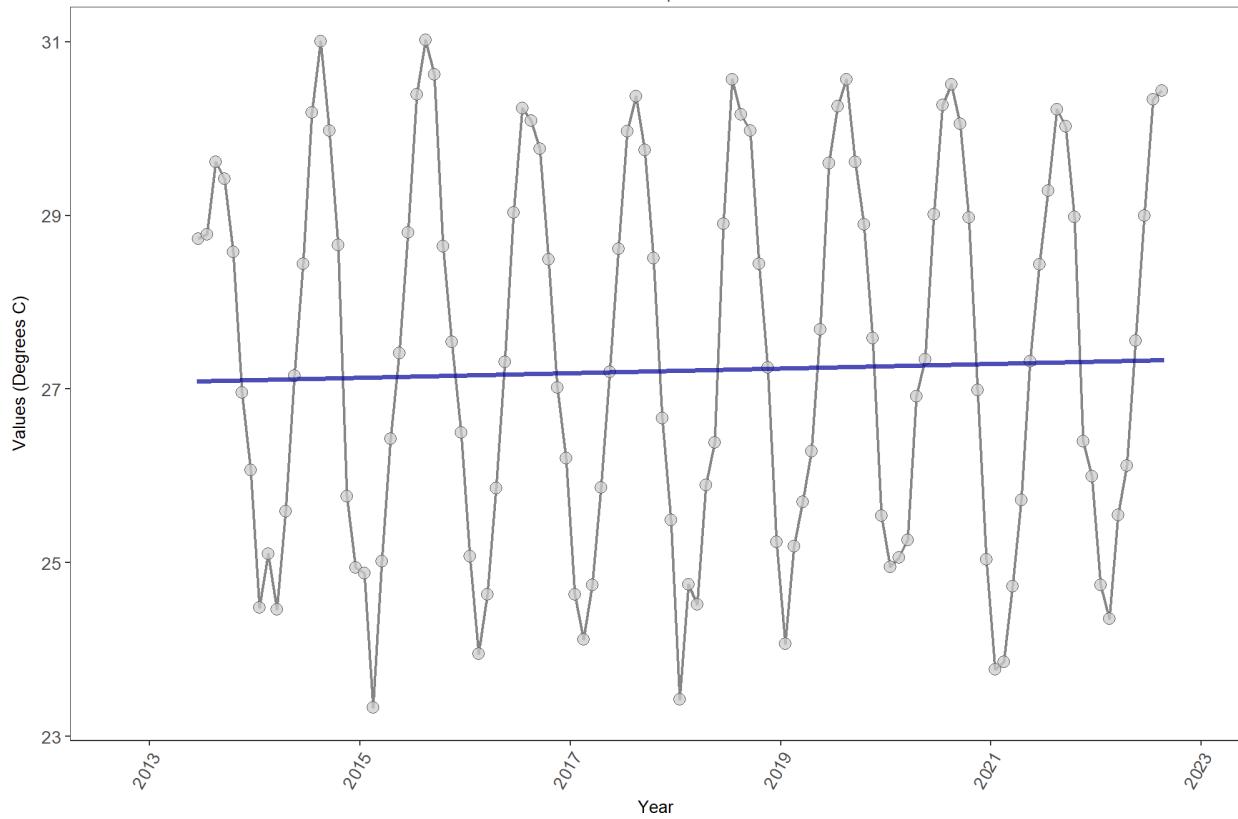


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	145514	19	26.34	TRUE	0.2279	0.0000	0.06446022	25.89885	6.6728	0.8249	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 899  
 USGS Coral Reef Ecosystem Studies (CREST) Project  
 Crocker  
 Water Temperature

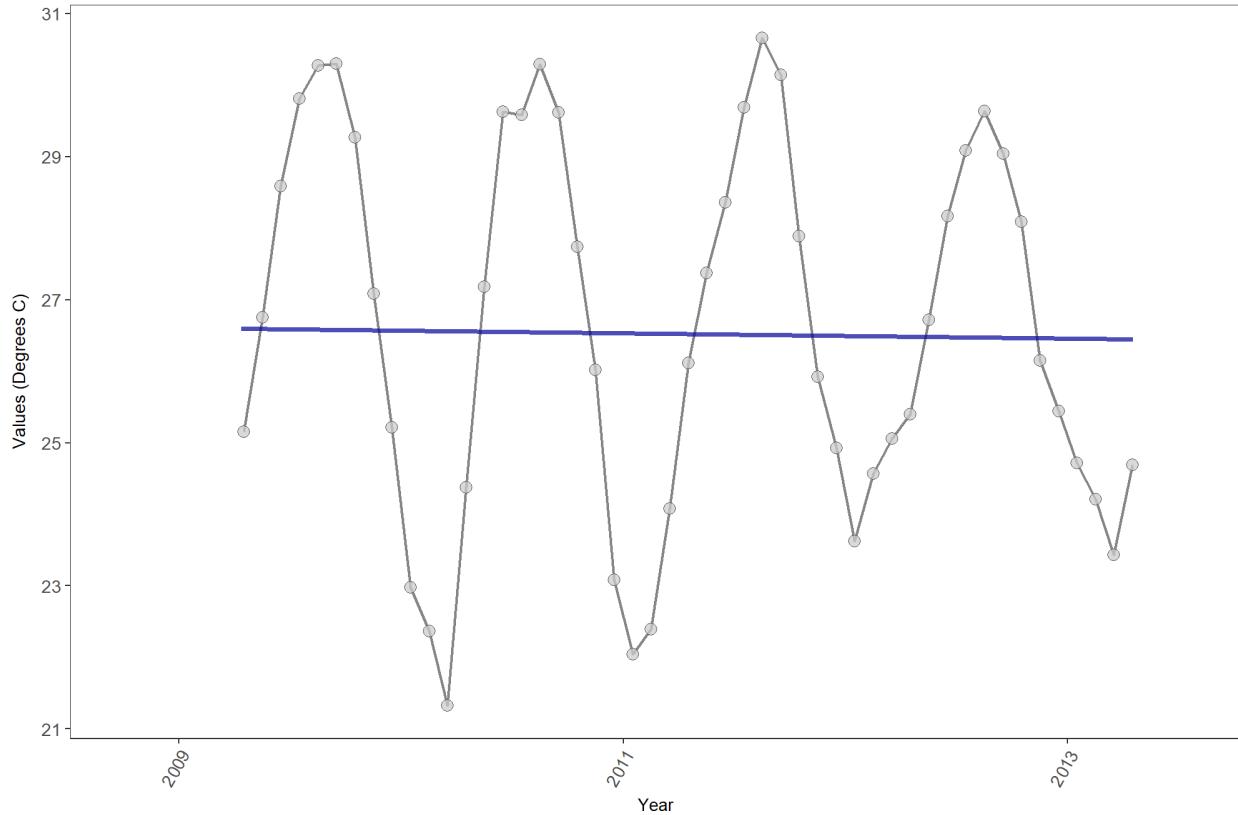


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	322670	10	27.321	TRUE	0.1542	0.0436	0.02690323	27.07413	4.576	0.95	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

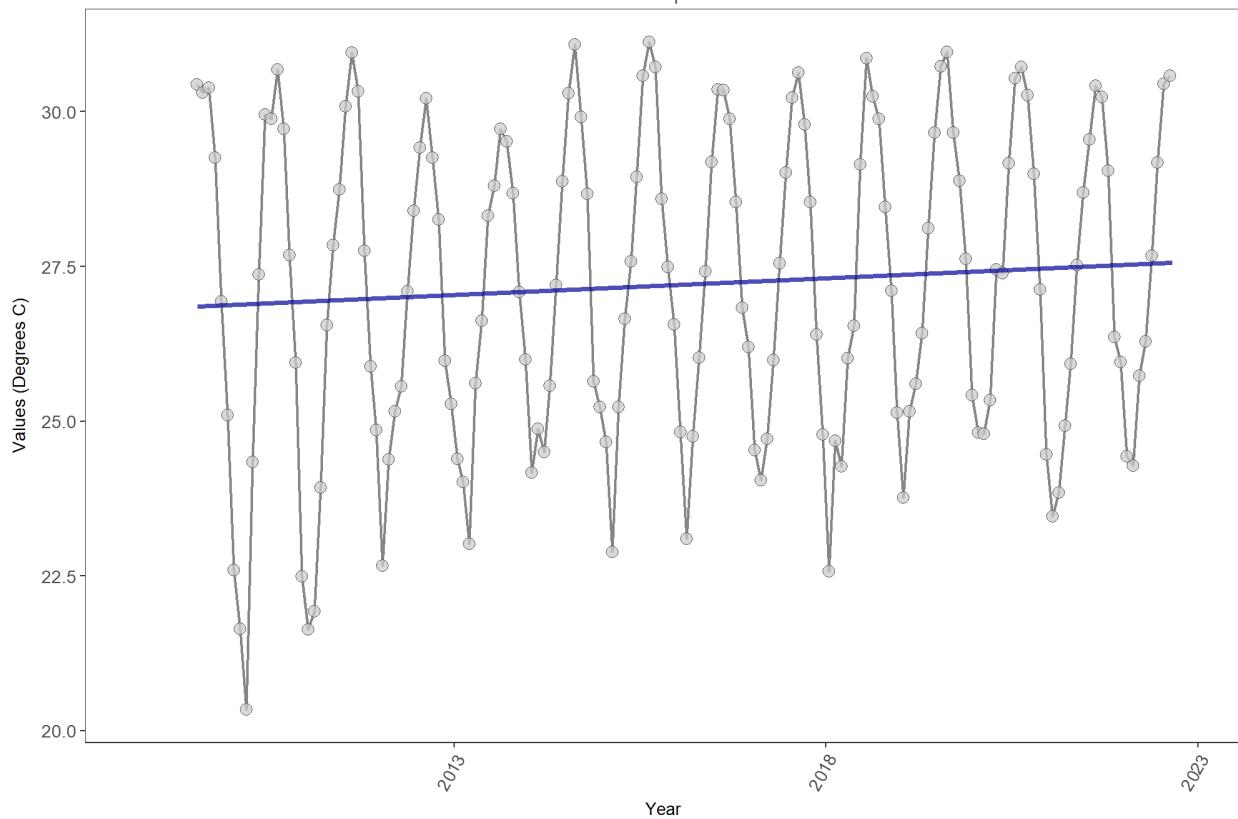
Florida Keys National Marine Sanctuary  
 899  
 USGS Coral Reef Ecosystem Studies (CREST) Project  
 Molasses  
 Water Temperature



*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 899  
 USGS Coral Reef Ecosystem Studies (CREST) Project  
 Sombrero  
 Water Temperature

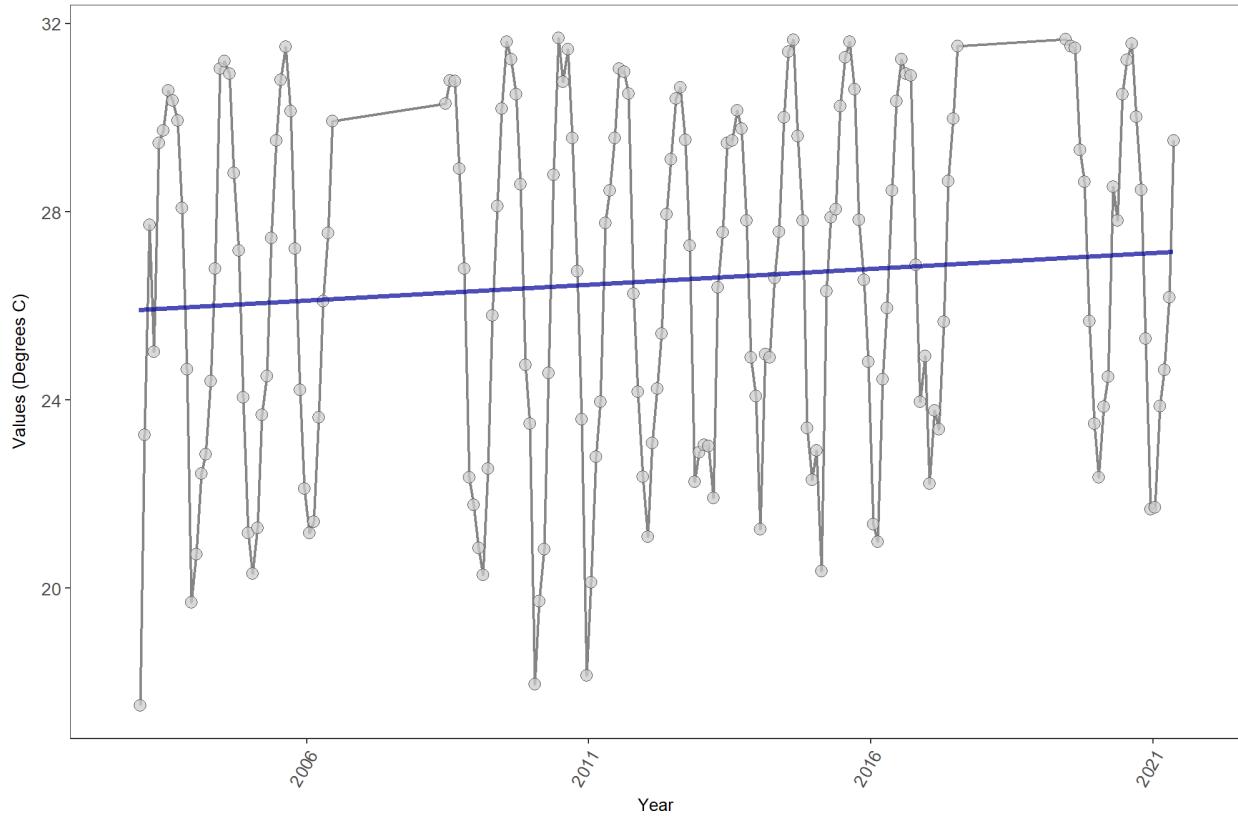


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Bottom	459354	14	27.161	TRUE	0.2634	0.0000	0.05372142	26.82637	4.8014	0.9404	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 11  
 Water Temperature

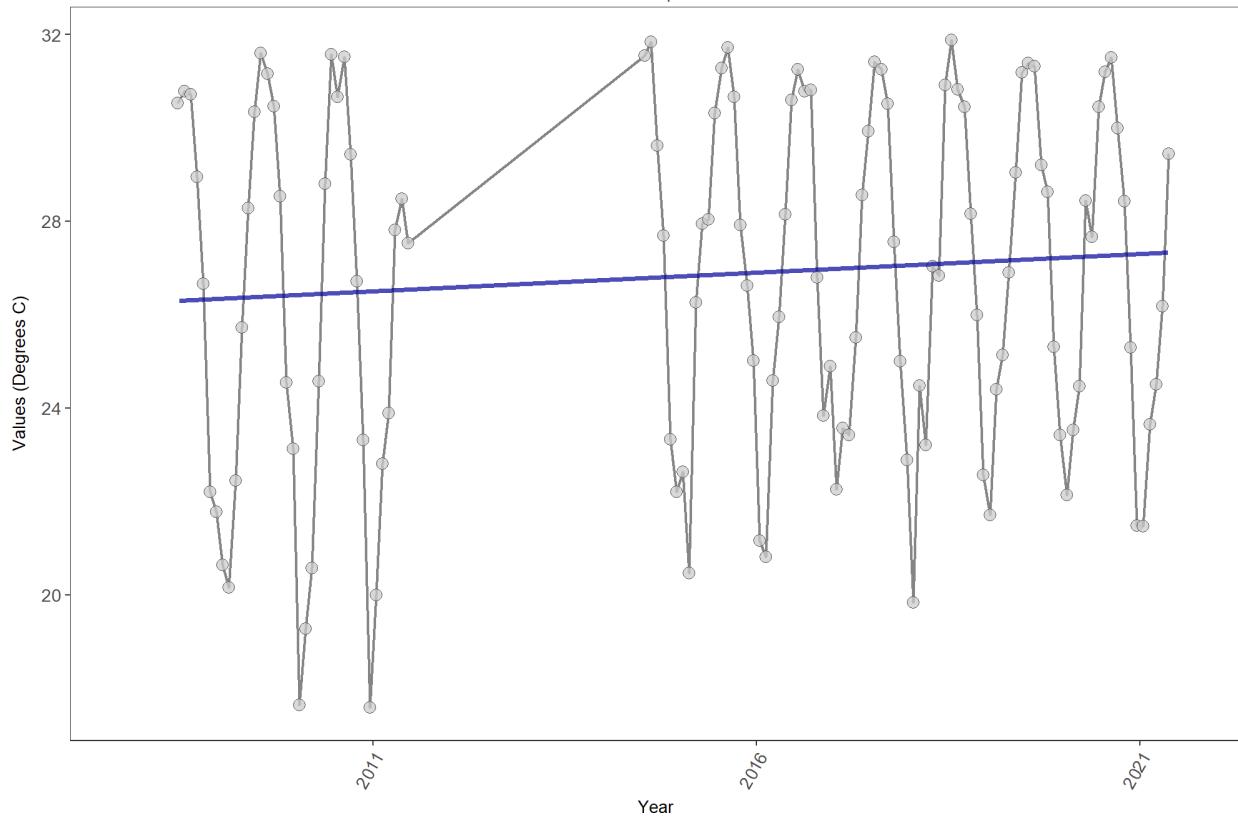


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	218391	17	26.744	TRUE	0.3094	0.0000	0.06702255	25.92034	4.1264	0.9661	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 12  
 Water Temperature

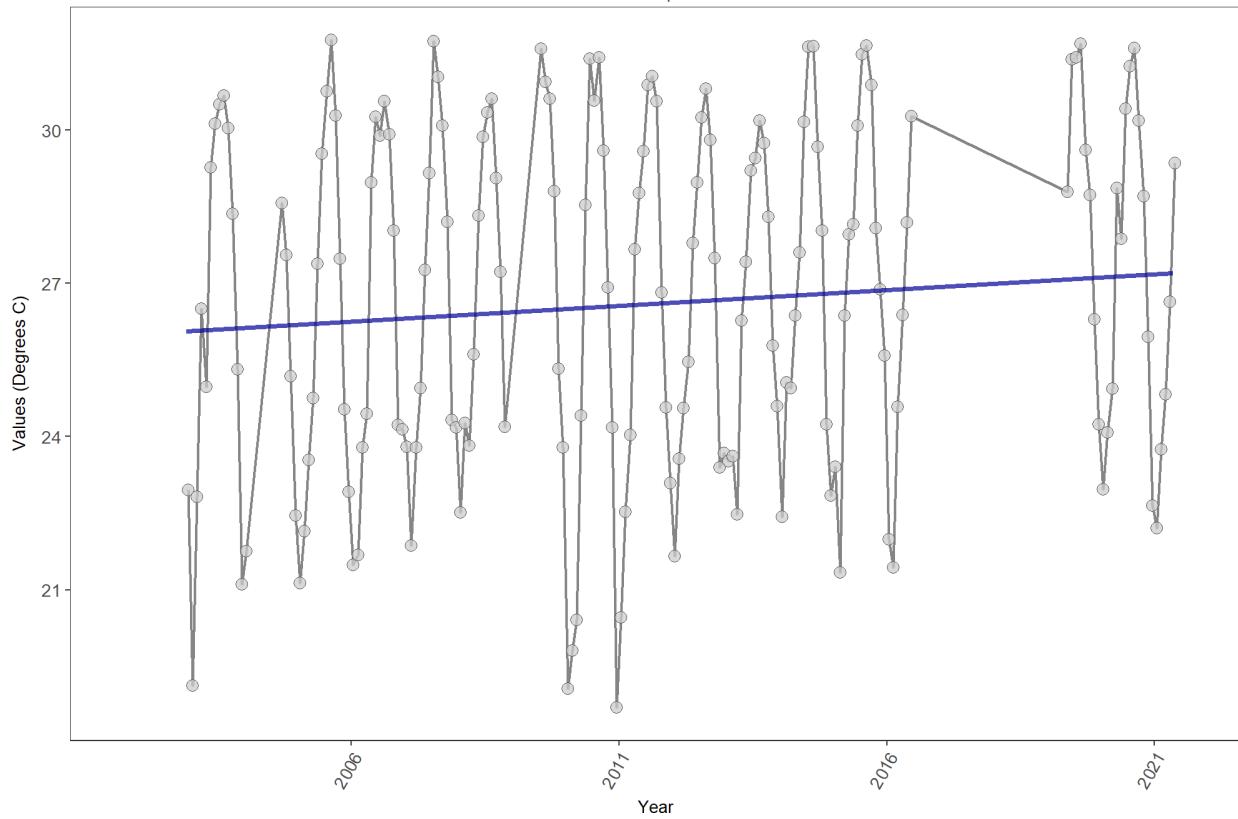


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	127791	12	27.06	TRUE	0.2444	0.0007	0.07923582	26.26821	6.272	0.8546	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 14  
 Water Temperature

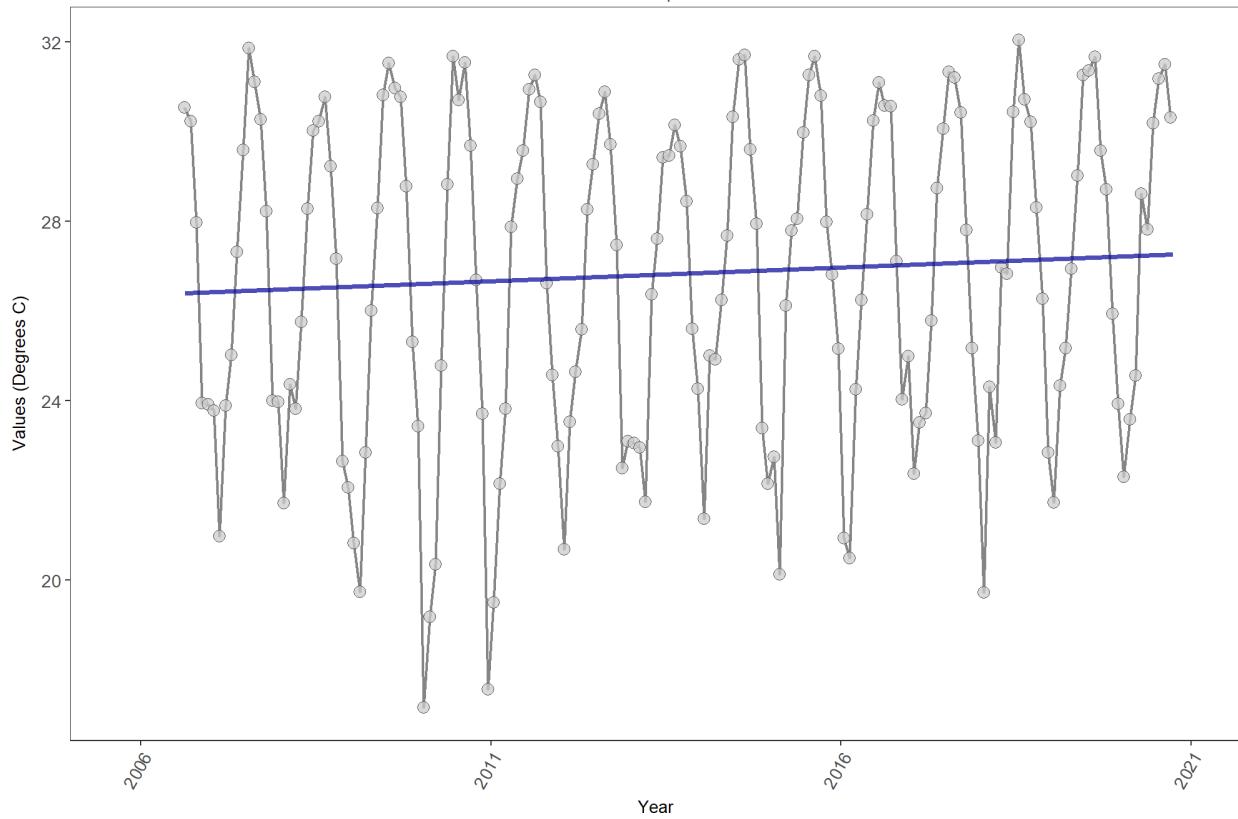


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	214859	18	26.81	TRUE	0.2371	0.0000	0.06153697	26.00622	5.6853	0.8935	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 15  
 Water Temperature

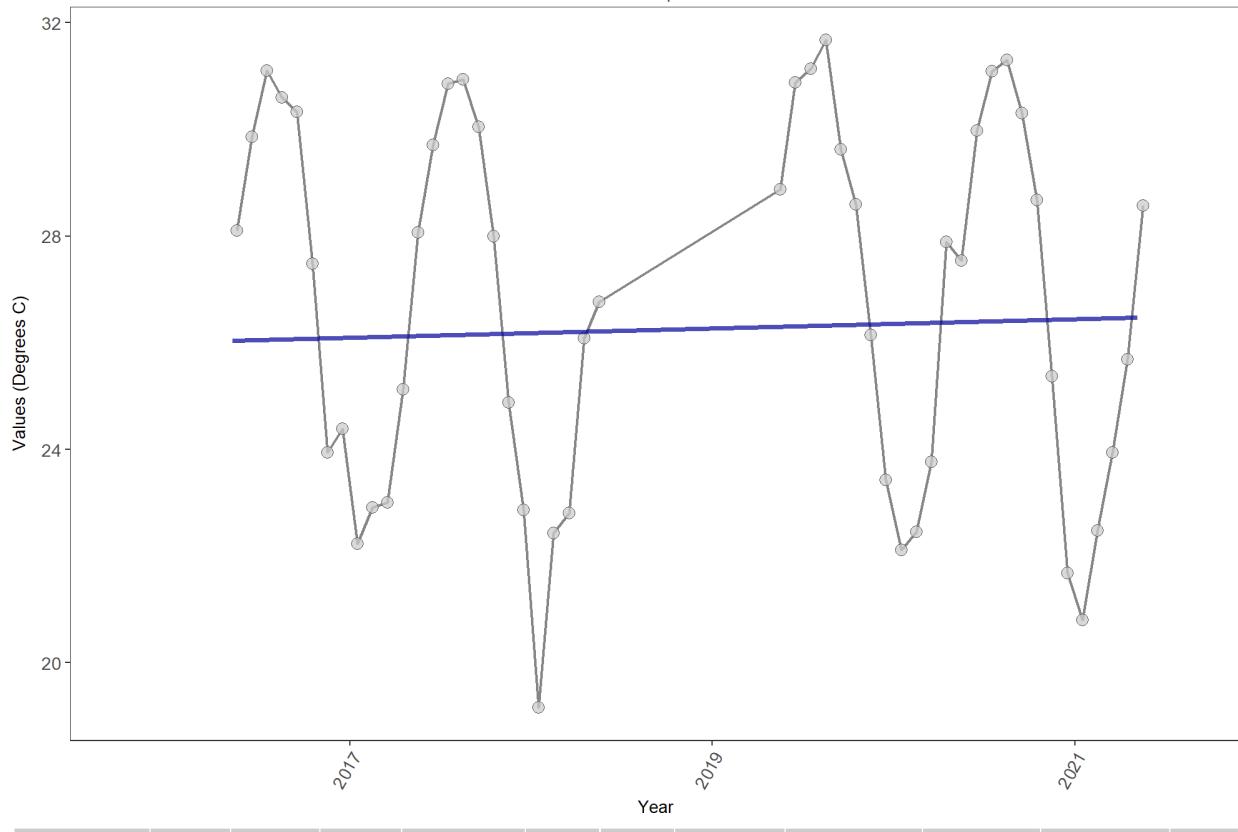


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	203688	15	26.965	TRUE	0.1835	0.0016	0.06102195	26.36201	5.8029	0.8862	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 18  
 Water Temperature

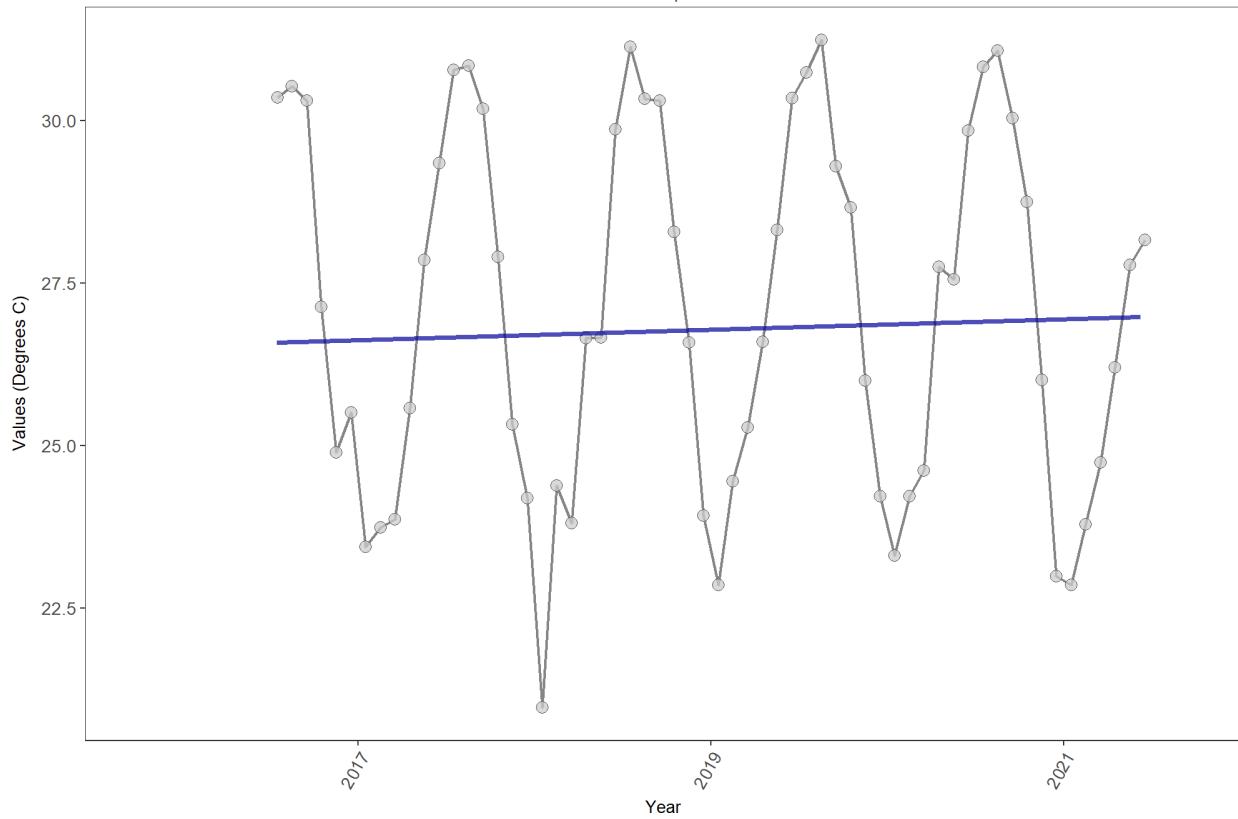


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	35145	6	27.03	TRUE	0.1947	0.2081	0.085	26.01417	11.3835	0.4117	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

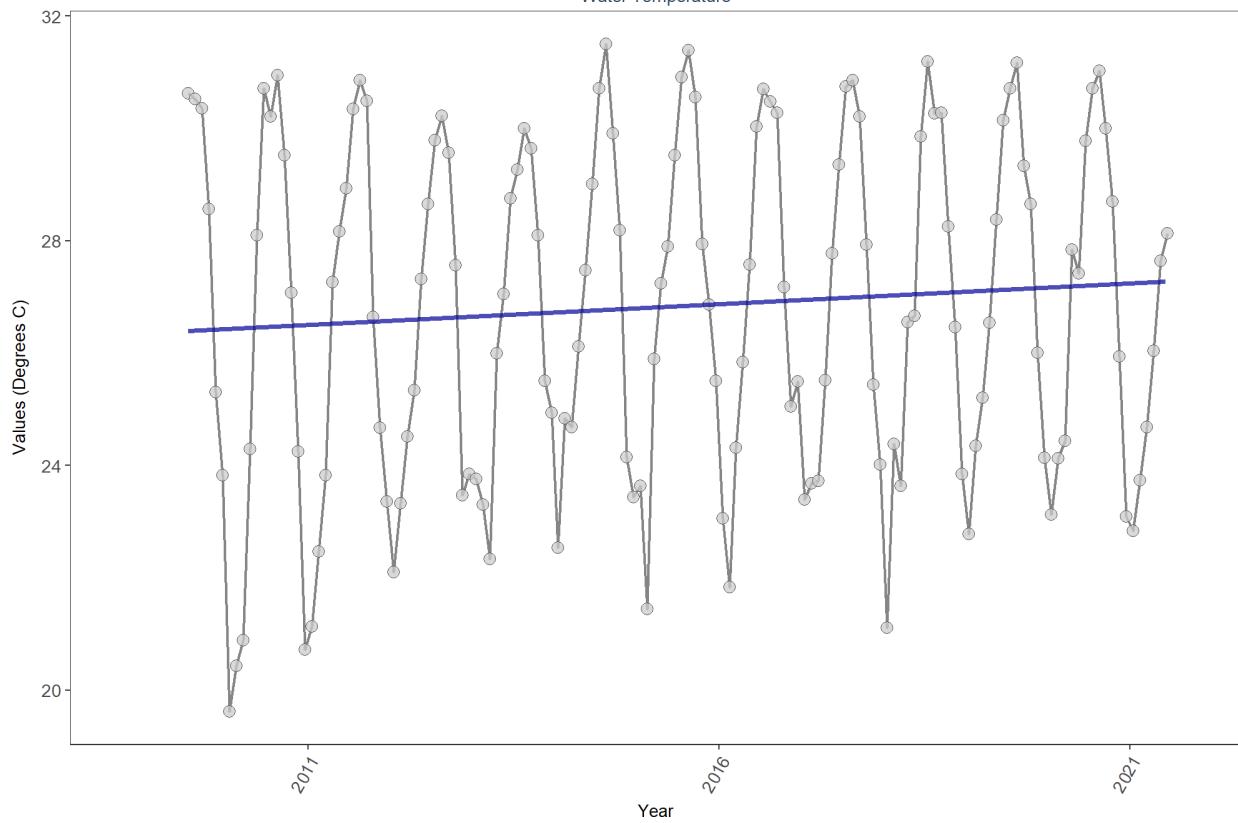
Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 21  
 Water Temperature



*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 22  
 Water Temperature

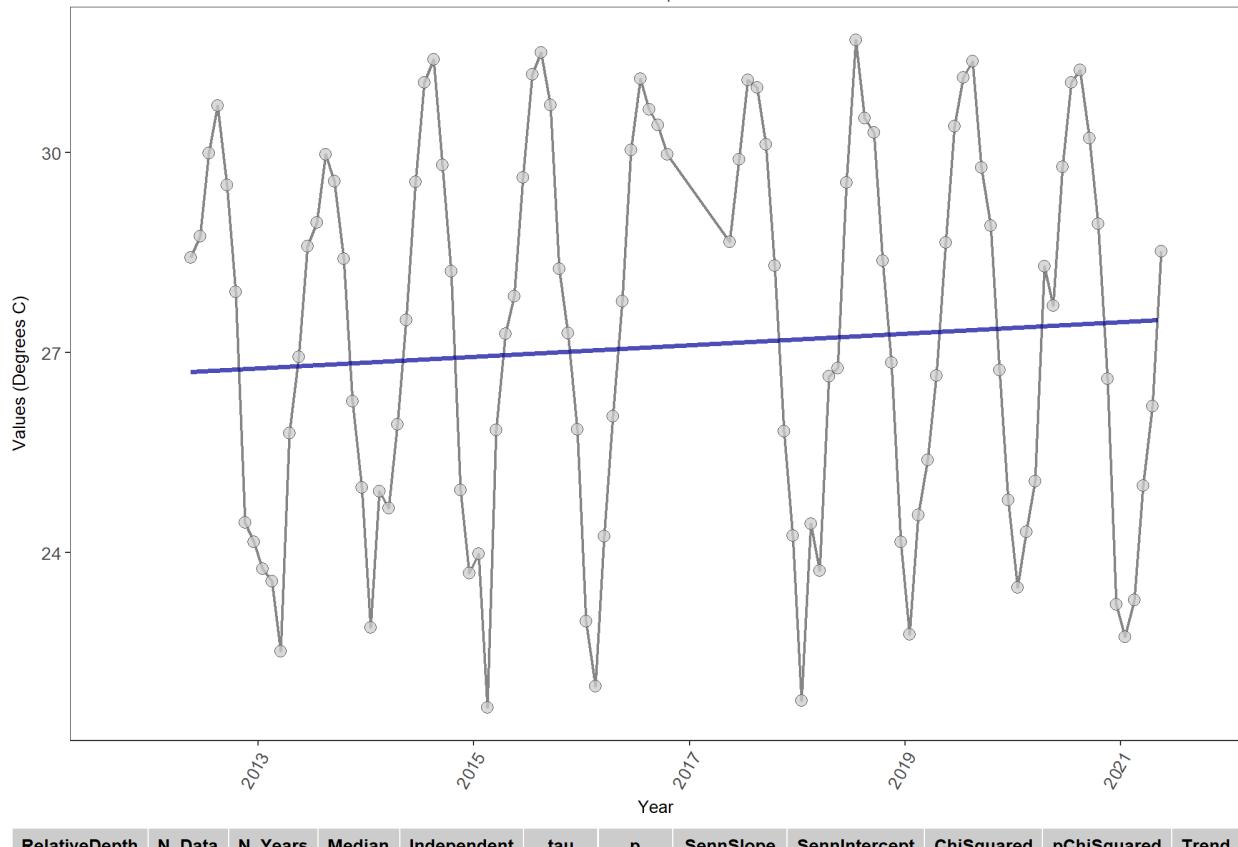


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	161906	13	26.842	TRUE	0.2323	0.0003	0.07307622	26.36122	5.9185	0.8787	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 23  
 Water Temperature

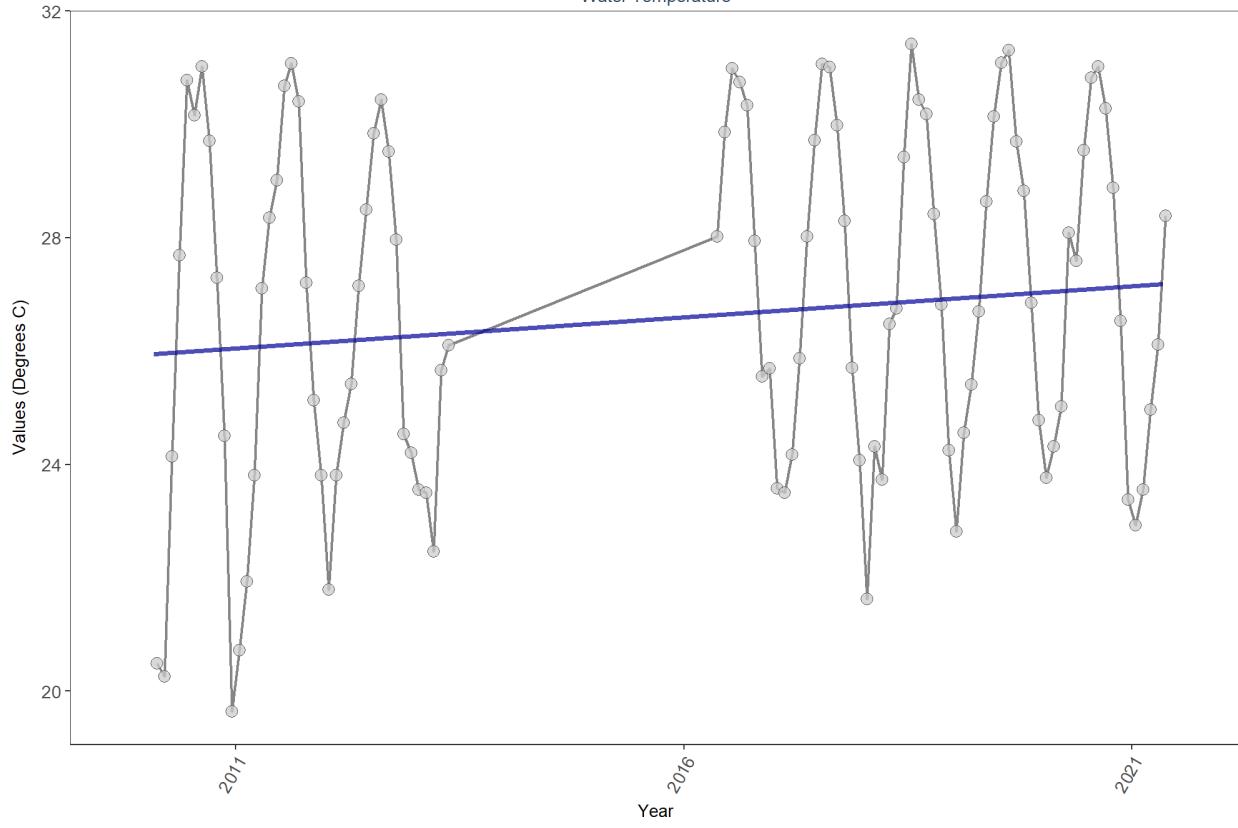


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	104253	10	27.333	TRUE	0.2148	0.0059	0.08664875	26.67486	10.7713	0.4626	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 24  
 Water Temperature

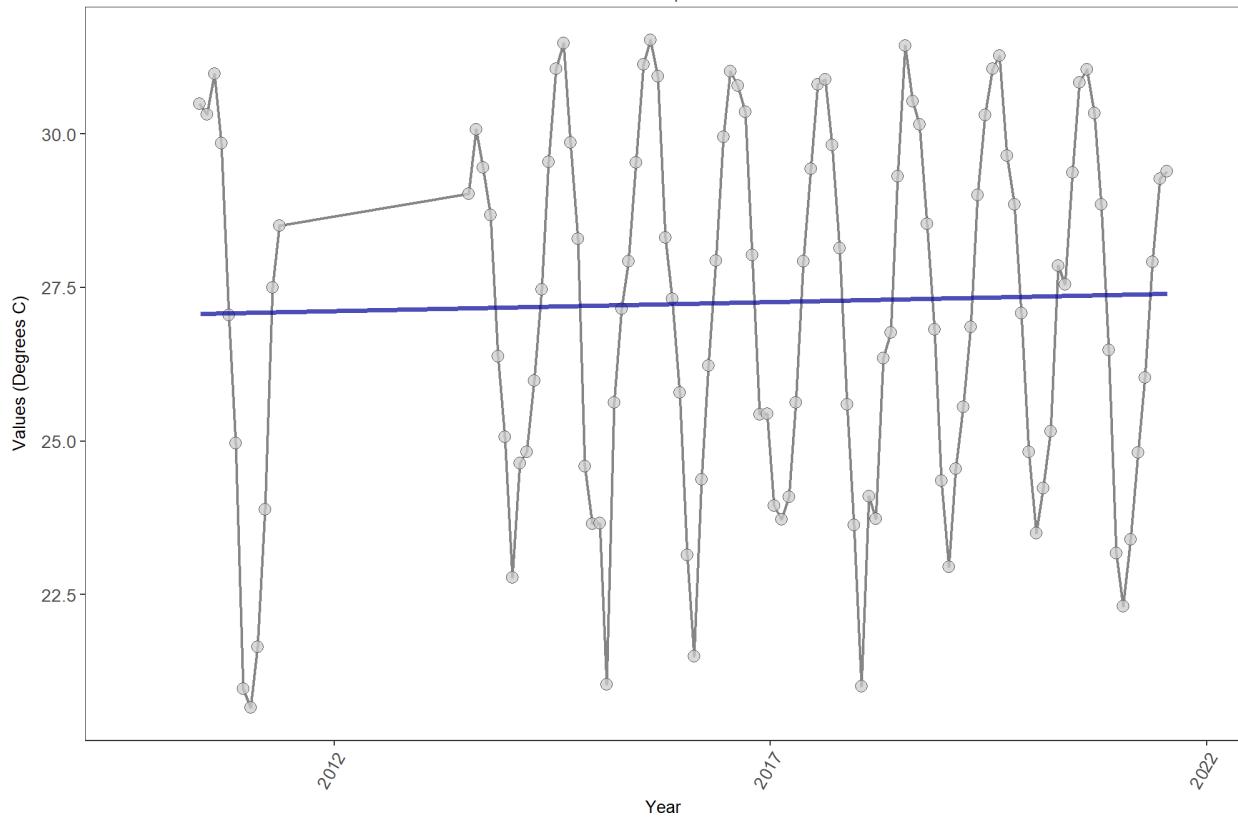


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	102435	10	26.867	TRUE	0.3798	0.0000	0.1094549	25.94205	11.3927	0.411	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 25  
 Water Temperature

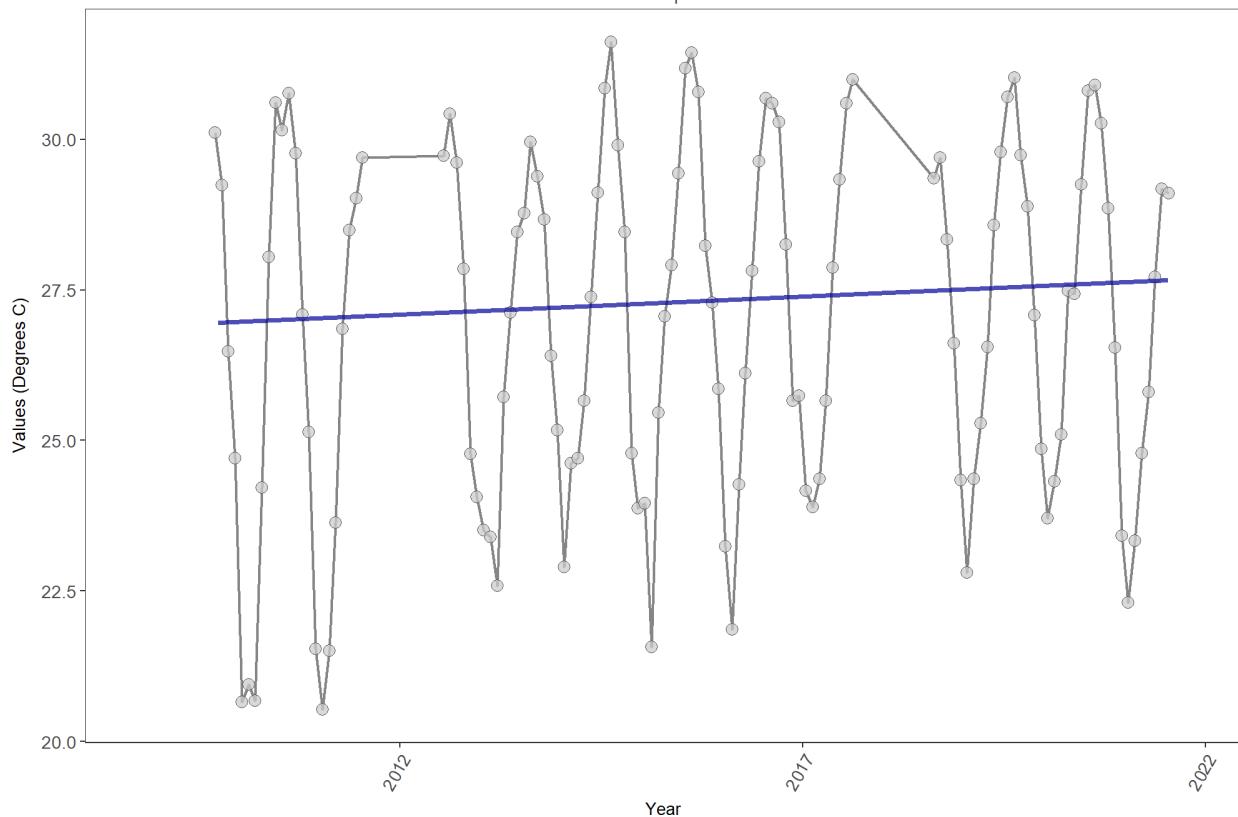


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	109474	11	27.235	TRUE	0.0657	0.4063	0.02975694	27.05543	10.6803	0.4704	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 26  
 Water Temperature

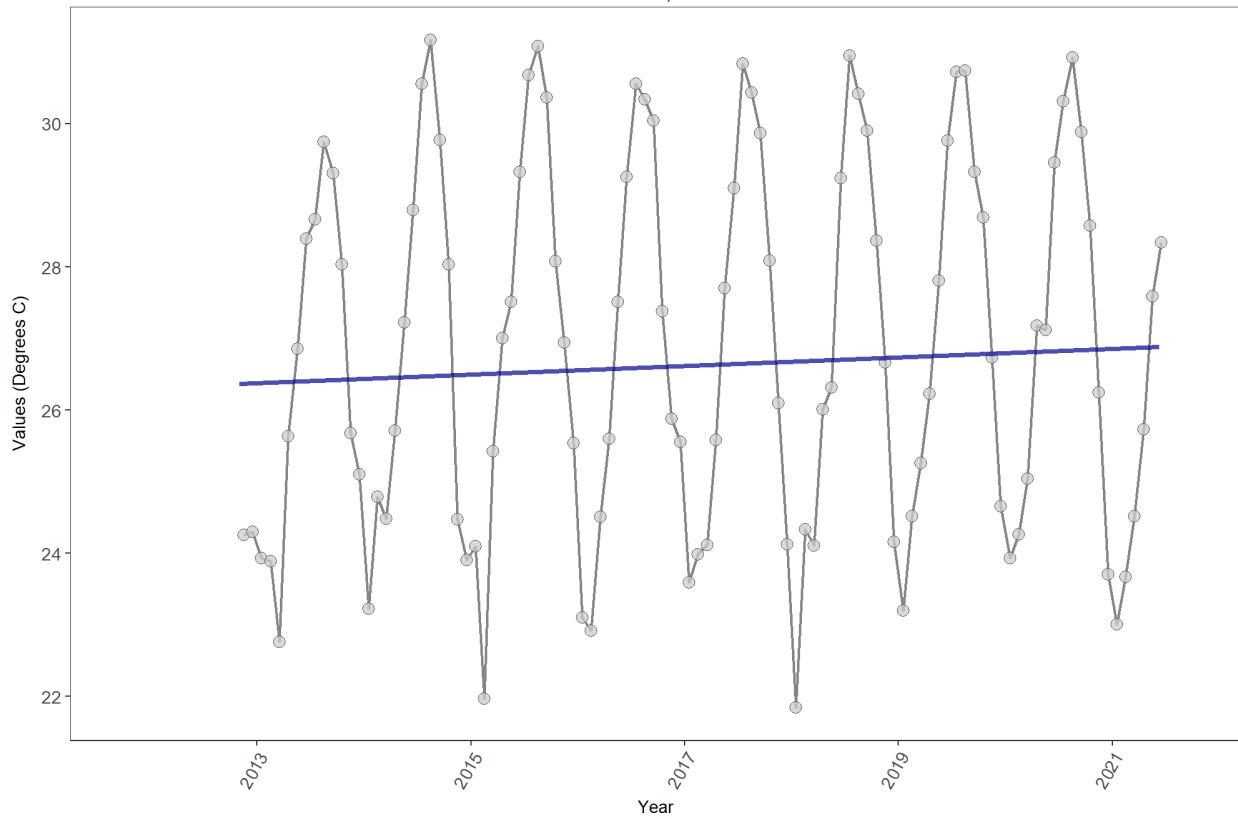


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	133997	13	26.98	TRUE	0.1967	0.0064	0.06011357	26.91013	5.194	0.9214	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 30  
 Water Temperature

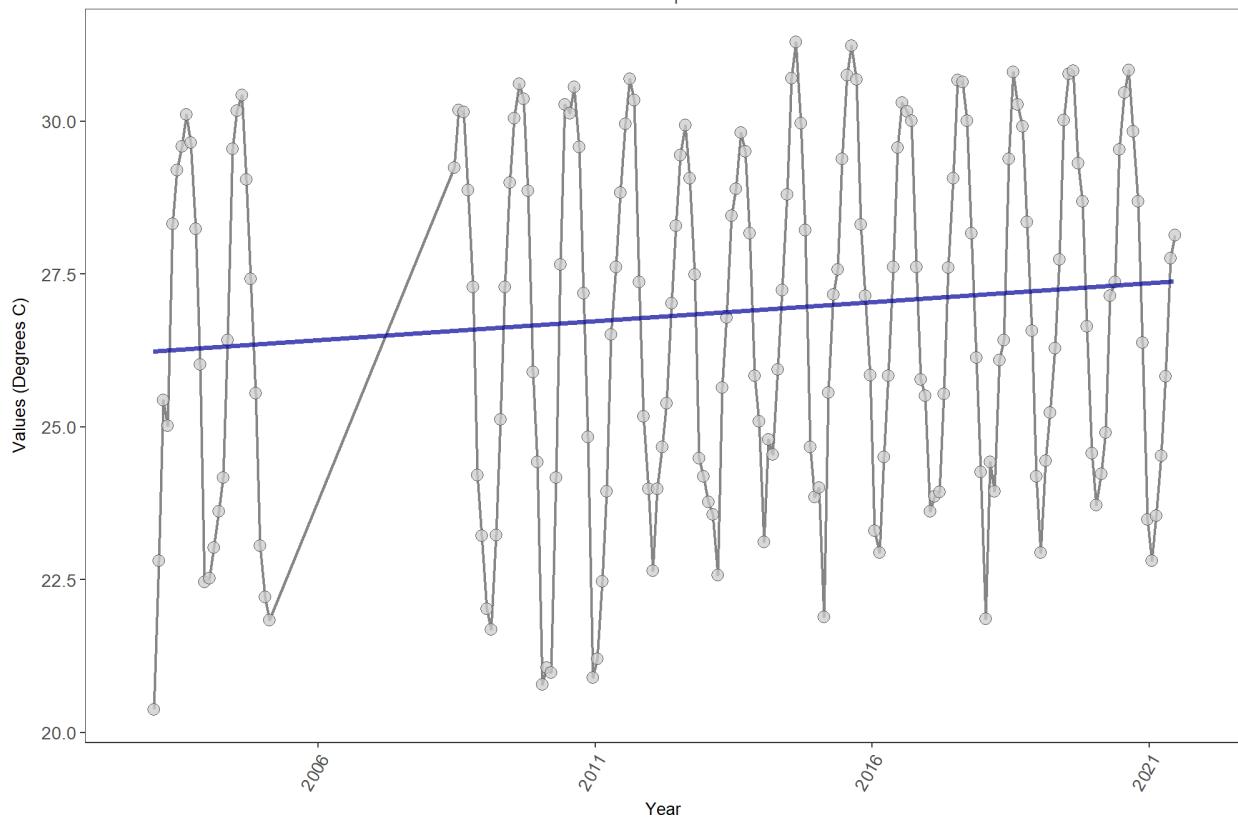


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	107029	10	26.54	TRUE	0.1999	0.0148	0.05948701	26.31795	11.5014	0.4023	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 32  
 Water Temperature

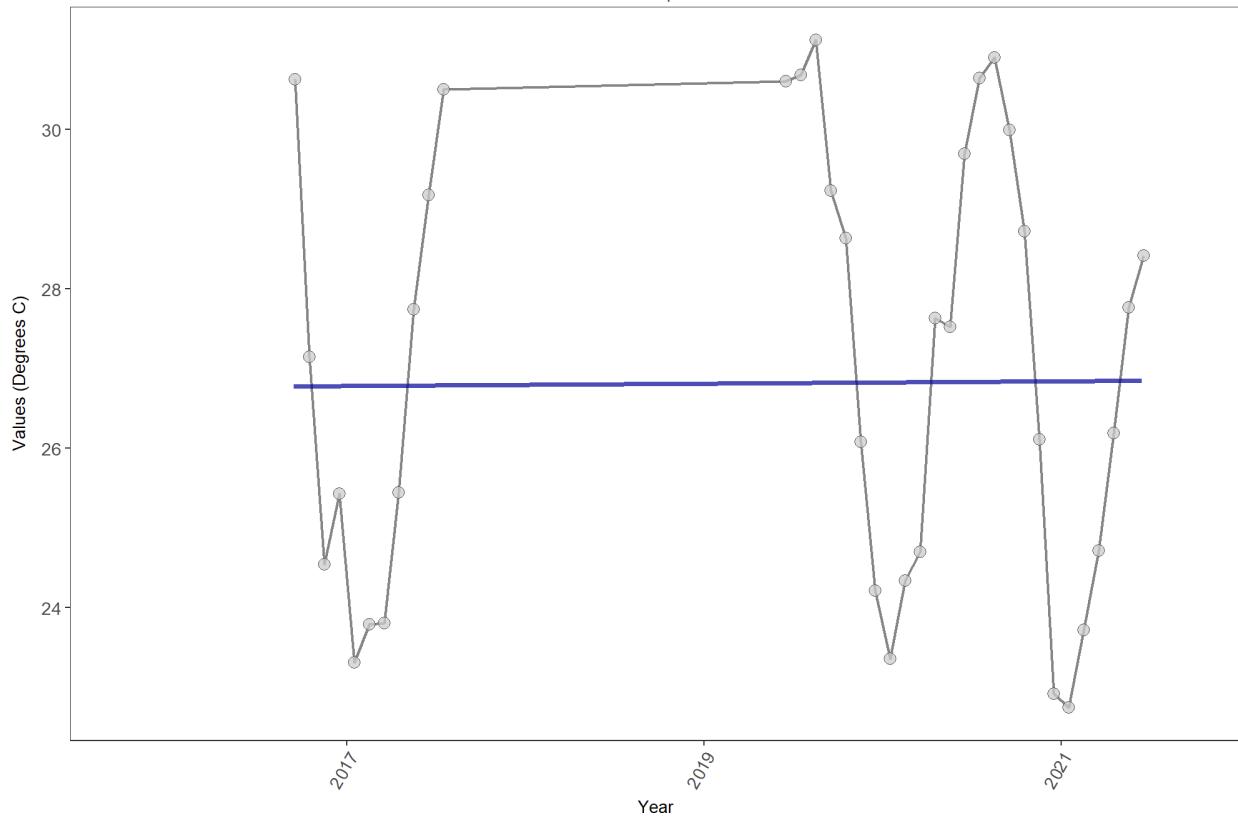


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	213529	17	26.64	TRUE	0.3018	0.0000	0.06218592	26.22876	6.703	0.8226	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

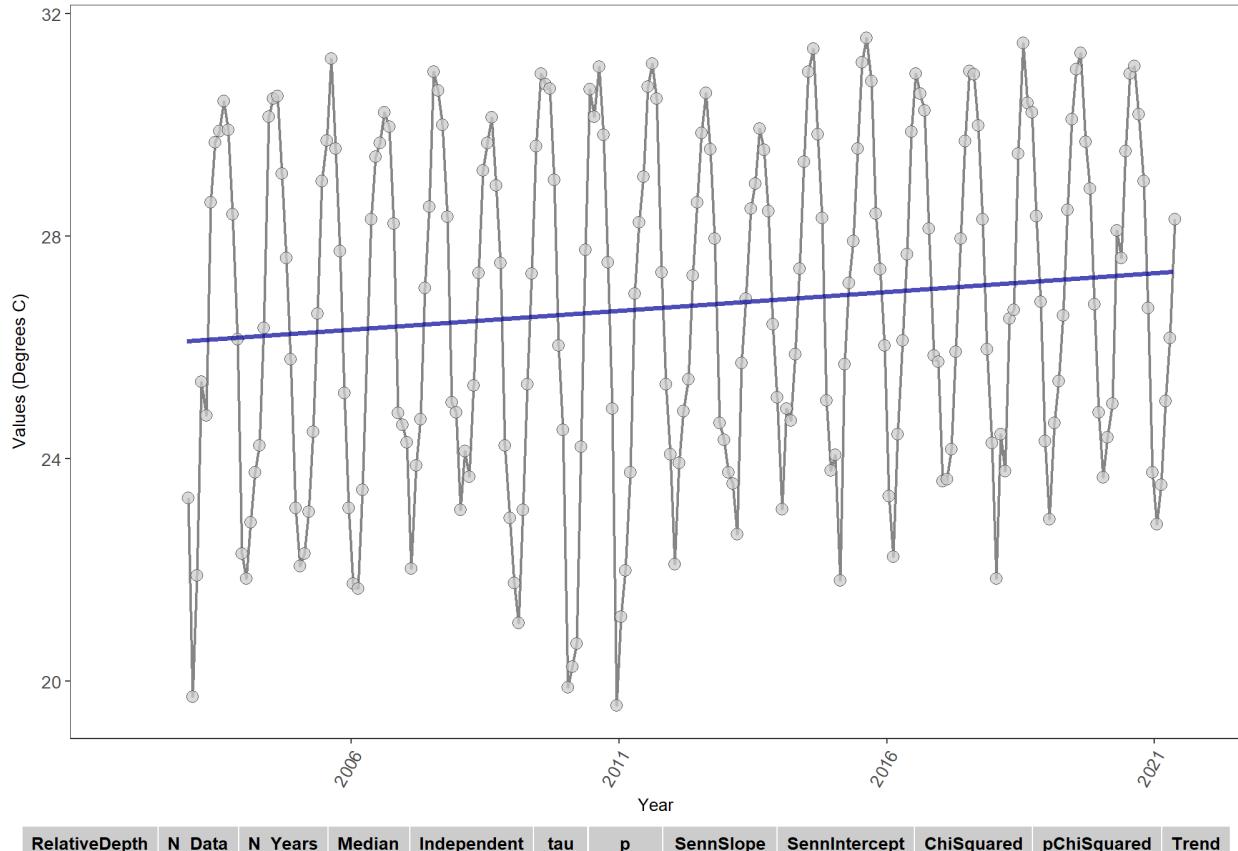
Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 33  
 Water Temperature



*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 34  
 Water Temperature

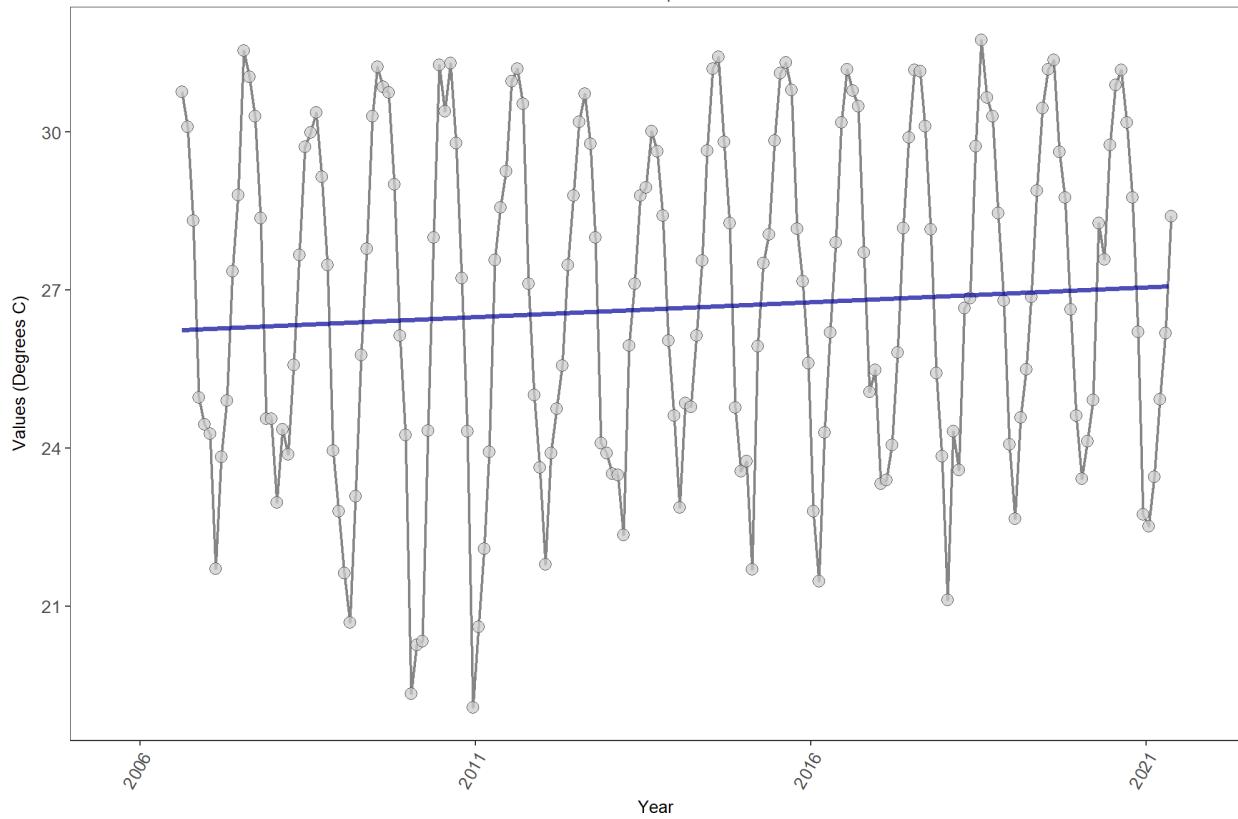


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	265056	20	26.695	TRUE	0.31	0.0000	0.06820049	26.04688	6.9029	0.8069	1

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 35  
 Water Temperature

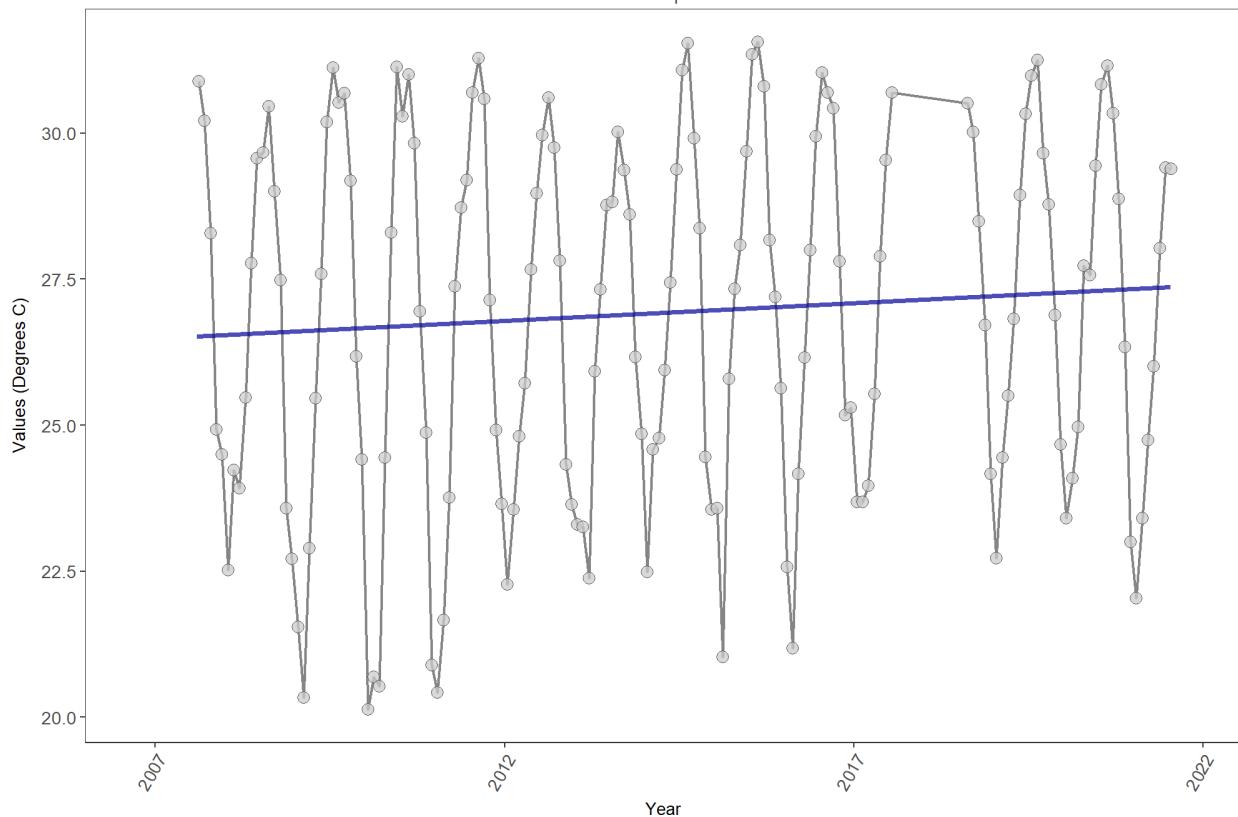


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	208736	16	26.84	TRUE	0.2199	0.0001	0.05631794	26.20334	8.612	0.6577	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 36  
 Water Temperature

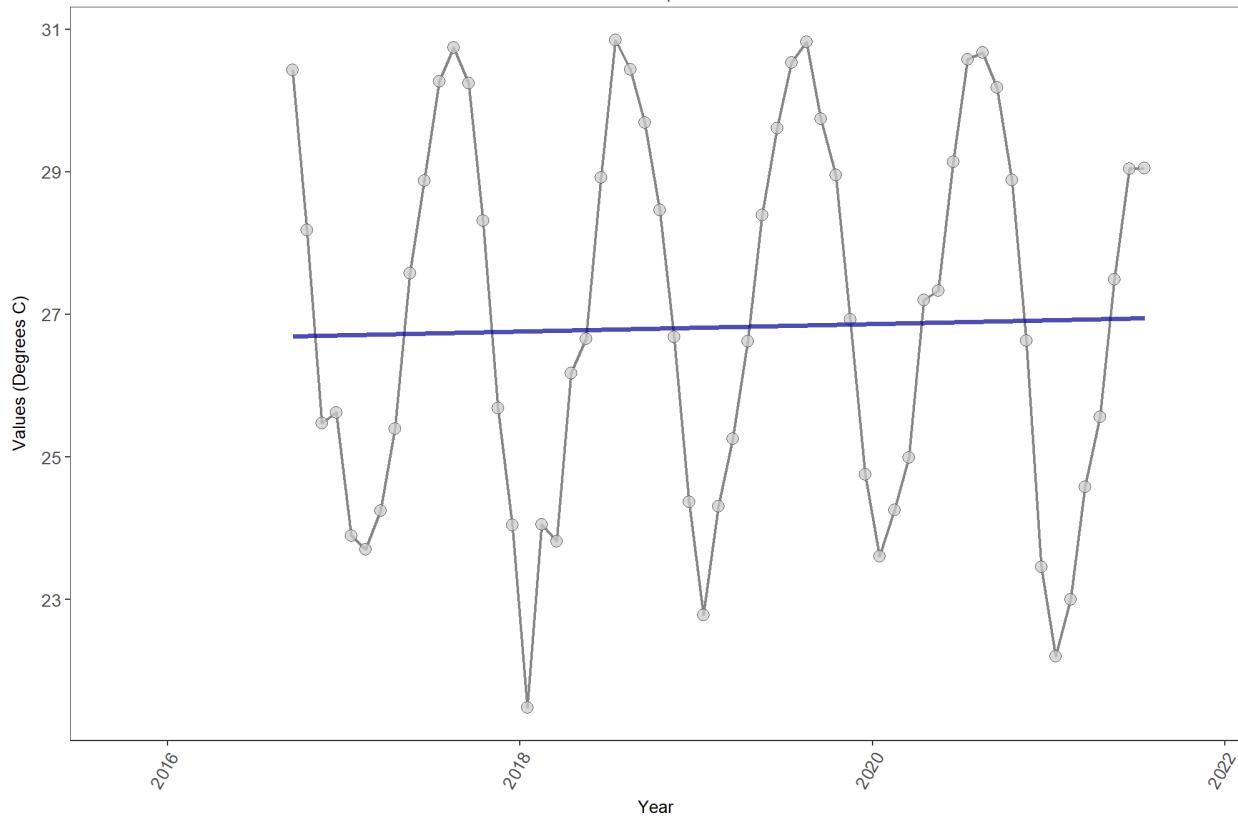


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	184903	15	26.91	TRUE	0.2244	0.0002	0.06080839	26.48316	7.0012	0.799	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 37  
 Water Temperature

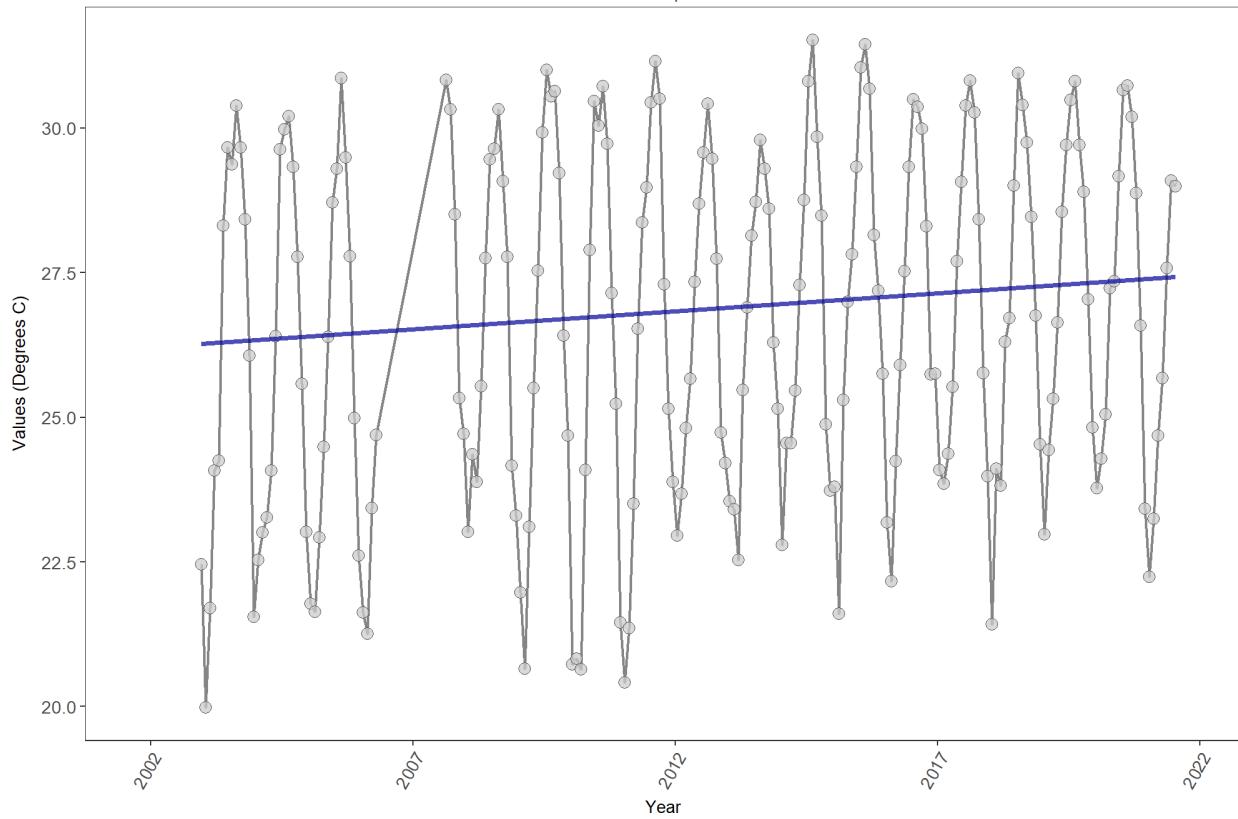


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	44575	6	26.79	TRUE	0.1017	0.4273	0.05200067	26.65445	9.84	0.5448	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 38  
 Water Temperature

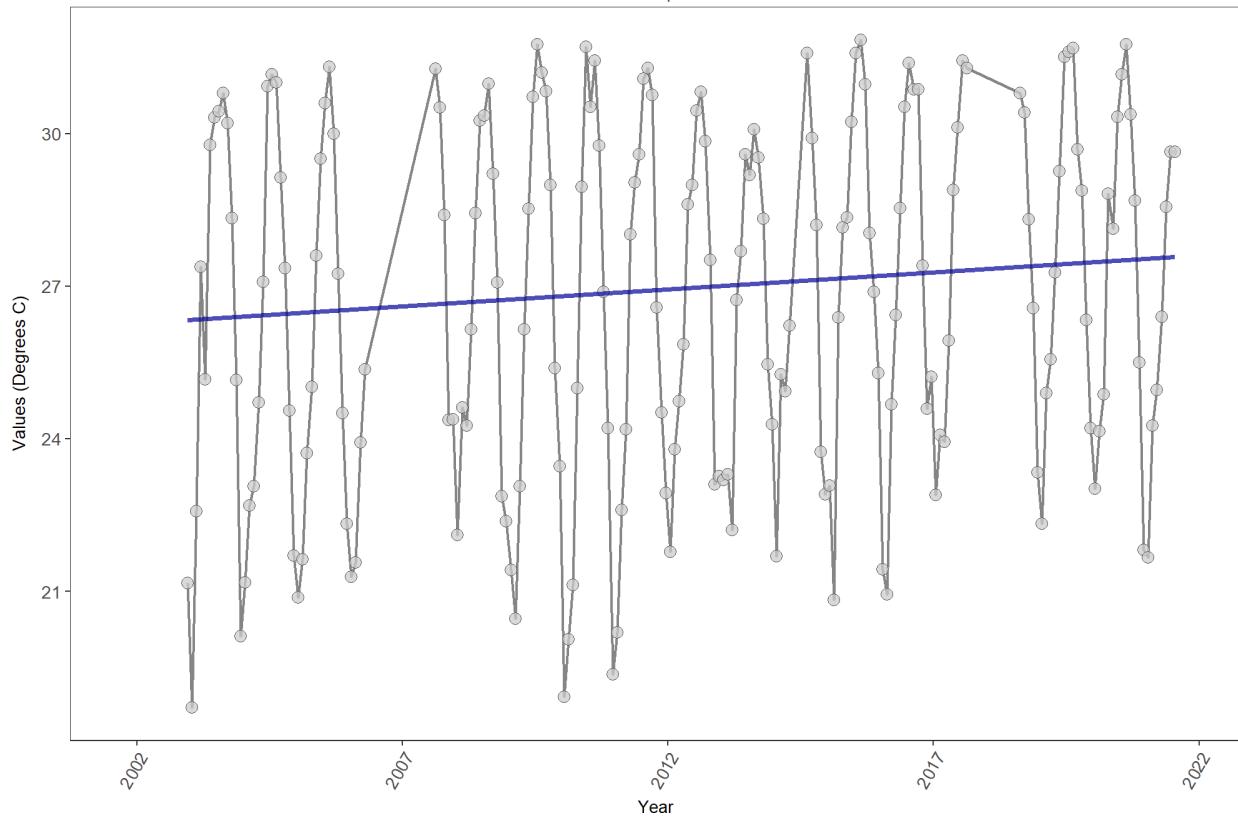


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	248375	20	26.451	TRUE	0.2634	0.0000	0.06201253	26.21361	12.0758	0.358	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 40  
 Water Temperature

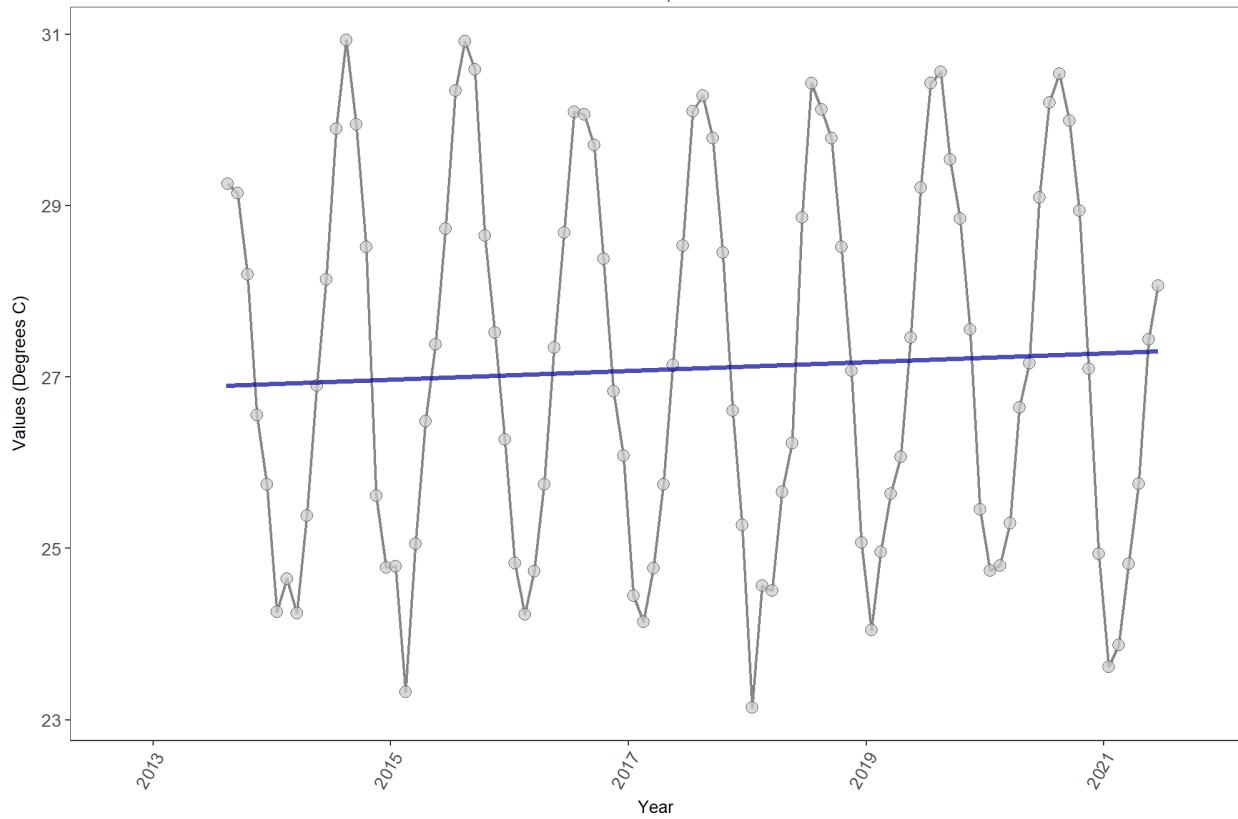


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	236342	20	26.79	TRUE	0.2653	0.0000	0.06703101	26.26851	8.3032	0.6859	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 50  
 Water Temperature

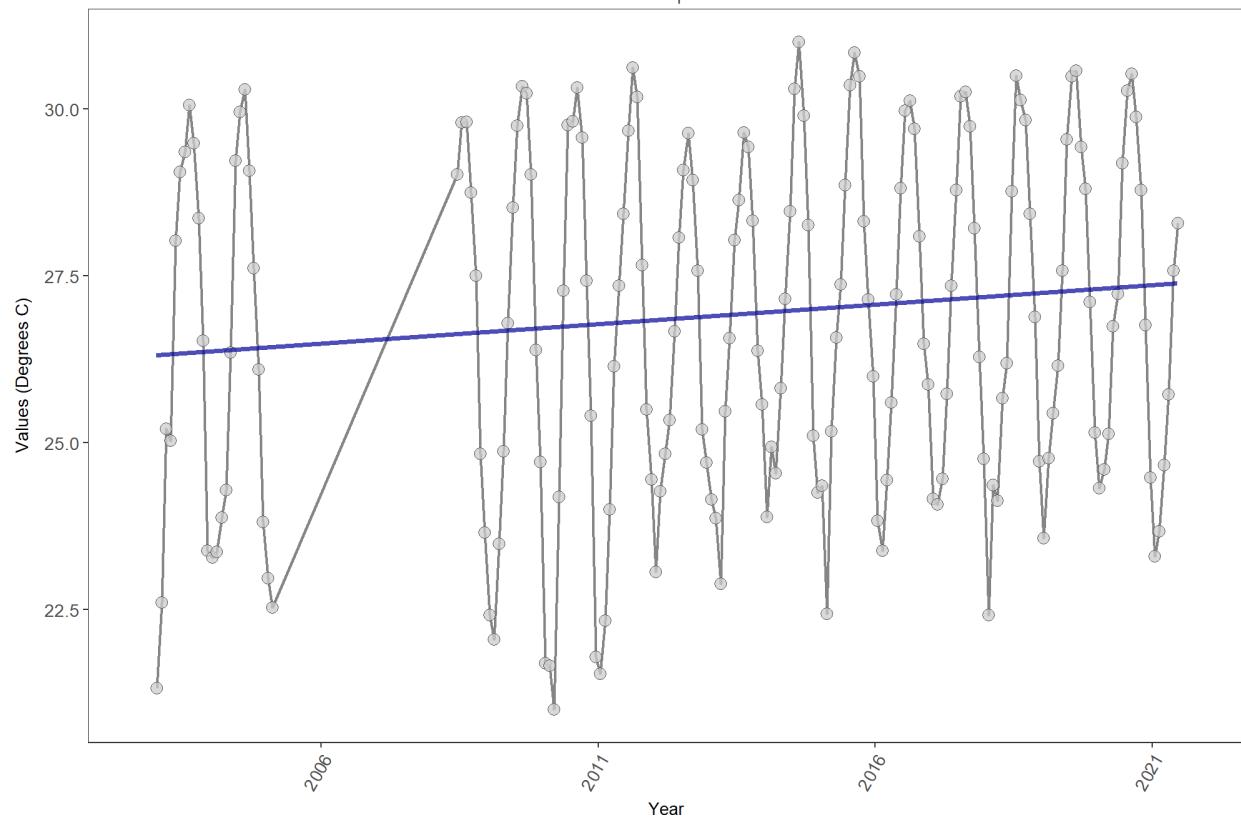


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	94567	9	26.98	TRUE	0.207	0.0169	0.05155652	26.86371	10.6759	0.4708	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 51  
 Water Temperature

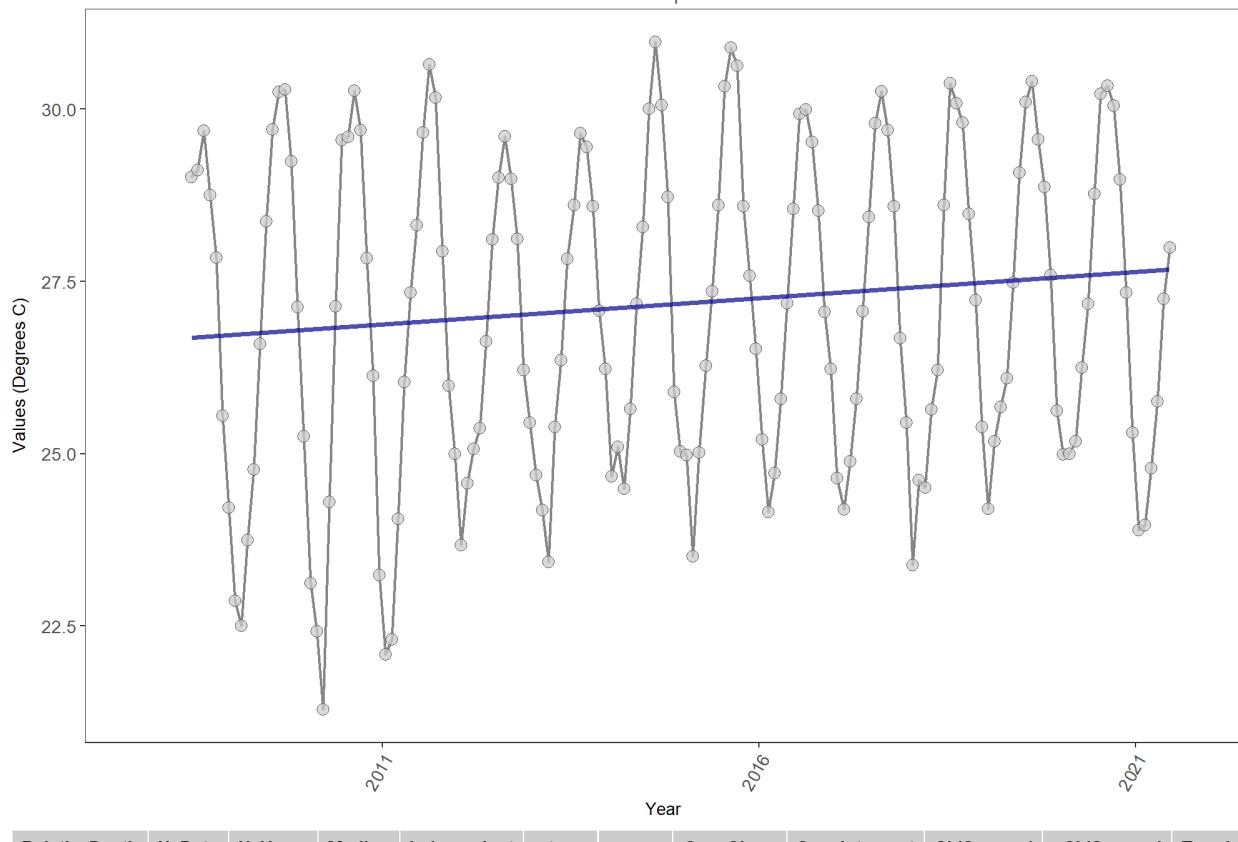


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	213322	17	26.64	TRUE	0.2994	0.0000	0.05830561	26.31248	8.5442	0.6639	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 52  
 Water Temperature

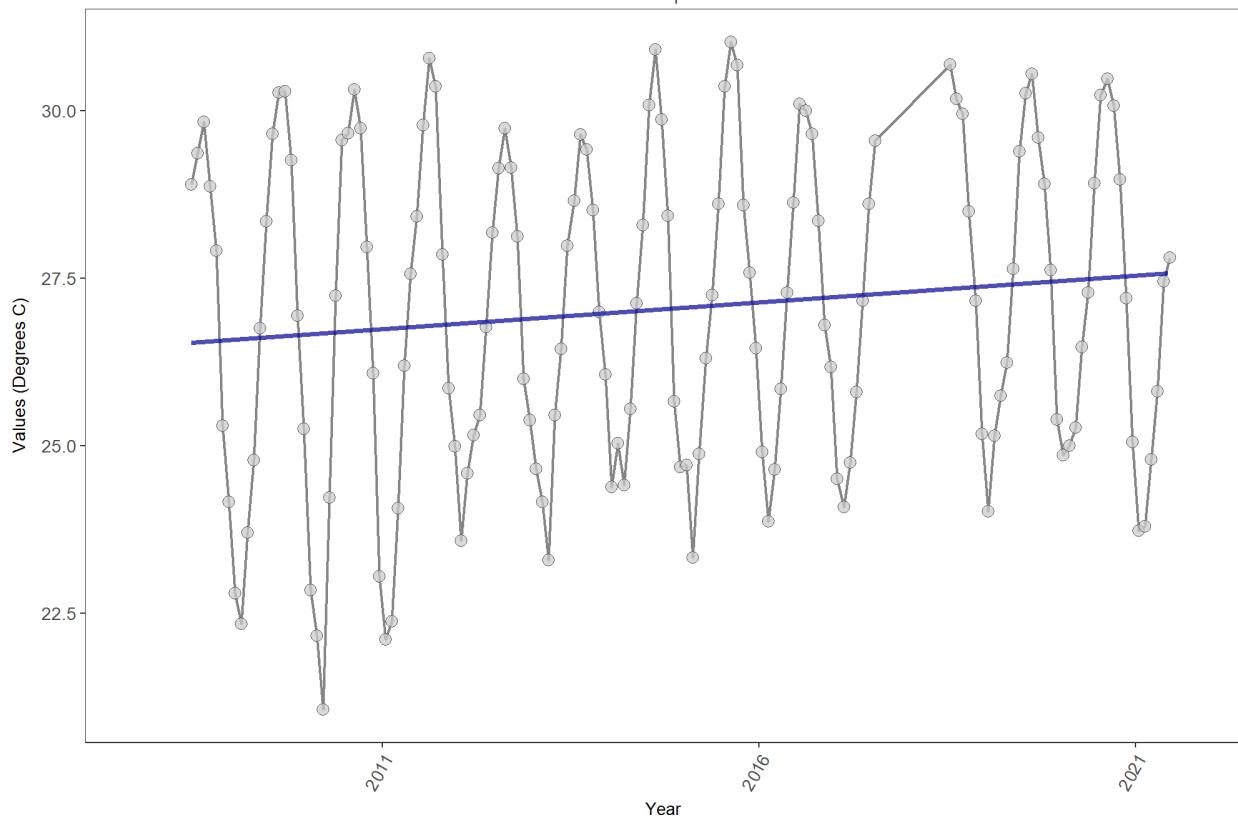


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	178708	14	26.89	TRUE	0.3257	0.0000	0.07589916	26.65121	5.8396	0.8838	1

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 53  
 Water Temperature

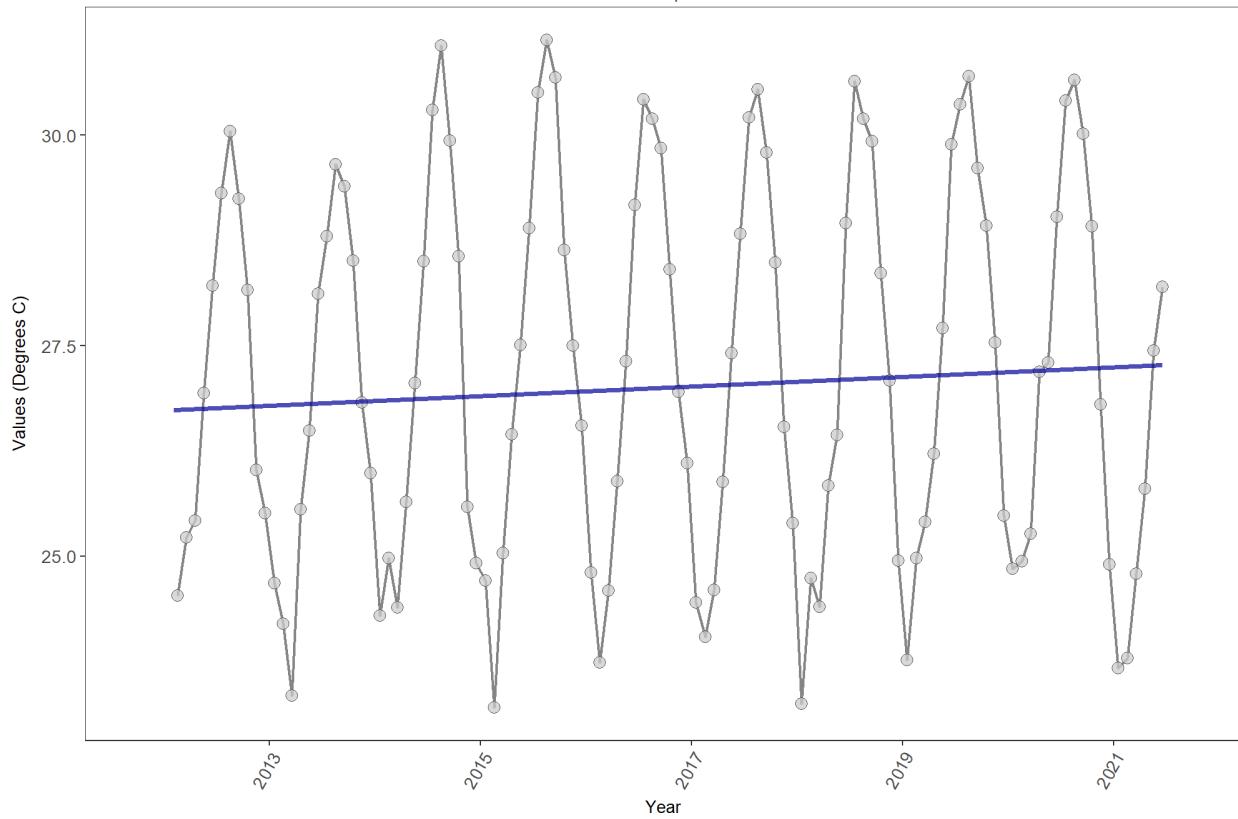


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	169828	14	26.96	TRUE	0.3697	0.0000	0.07990024	26.4967	5.7797	0.8877	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 54  
 Water Temperature

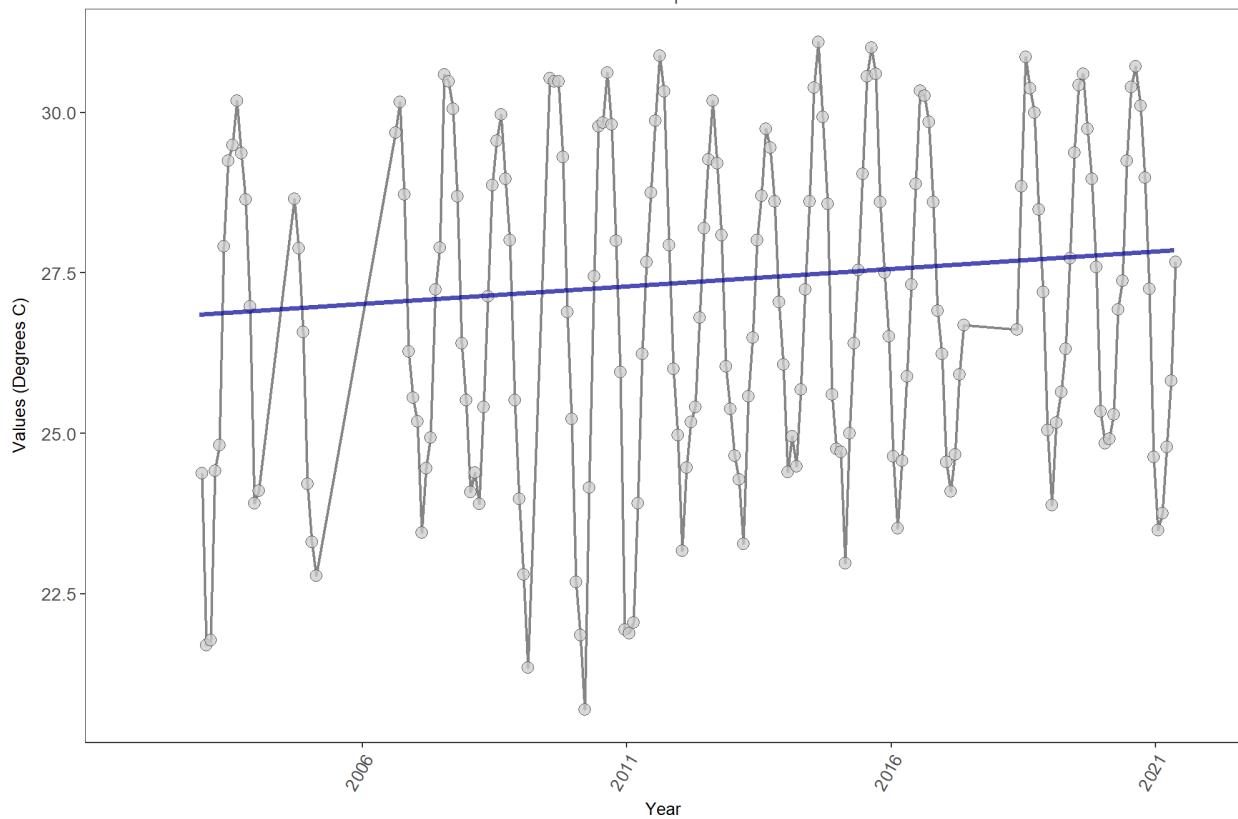


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	119502	10	26.965	TRUE	0.2242	0.0024	0.05693811	26.73481	9.0305	0.6191	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 55  
 Water Temperature

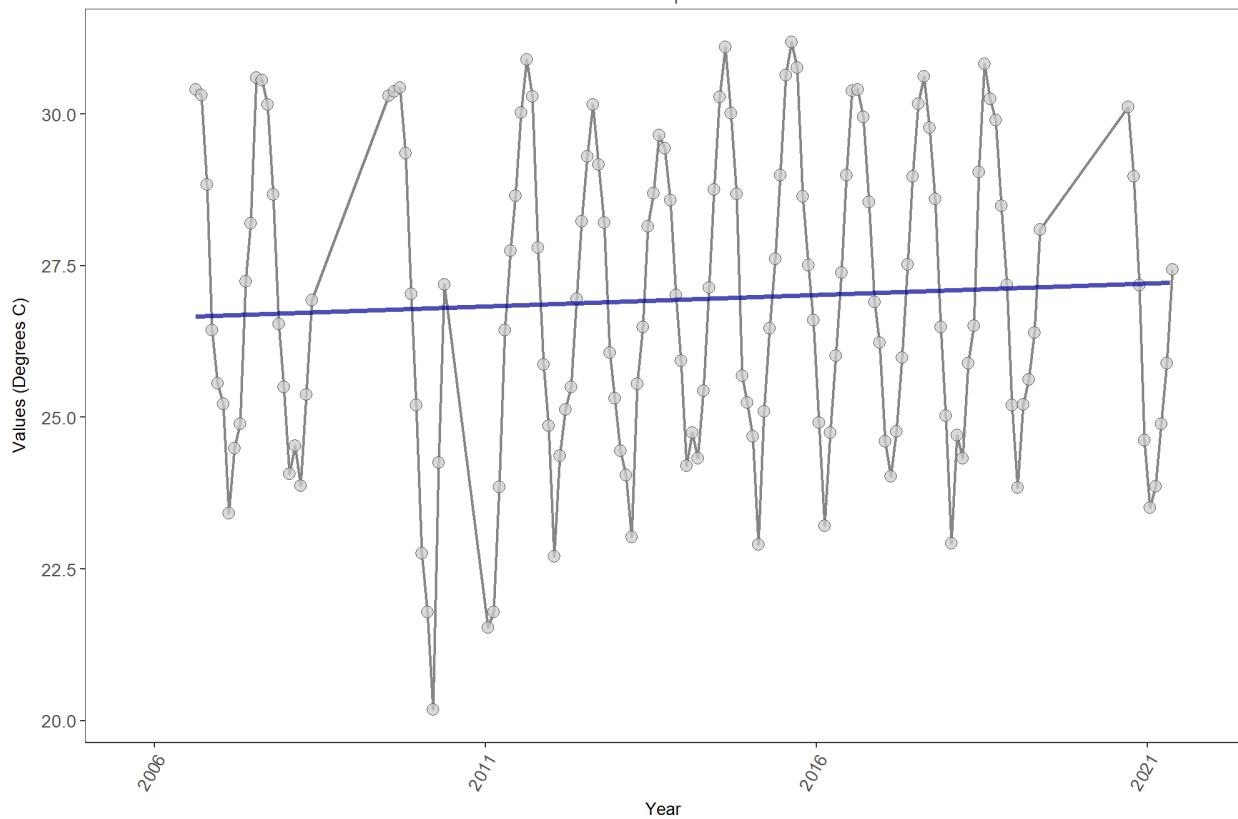


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	216638	20	26.84	TRUE	0.2853	0.0000	0.0544839	26.79716	7.8781	0.7242	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 56  
 Water Temperature

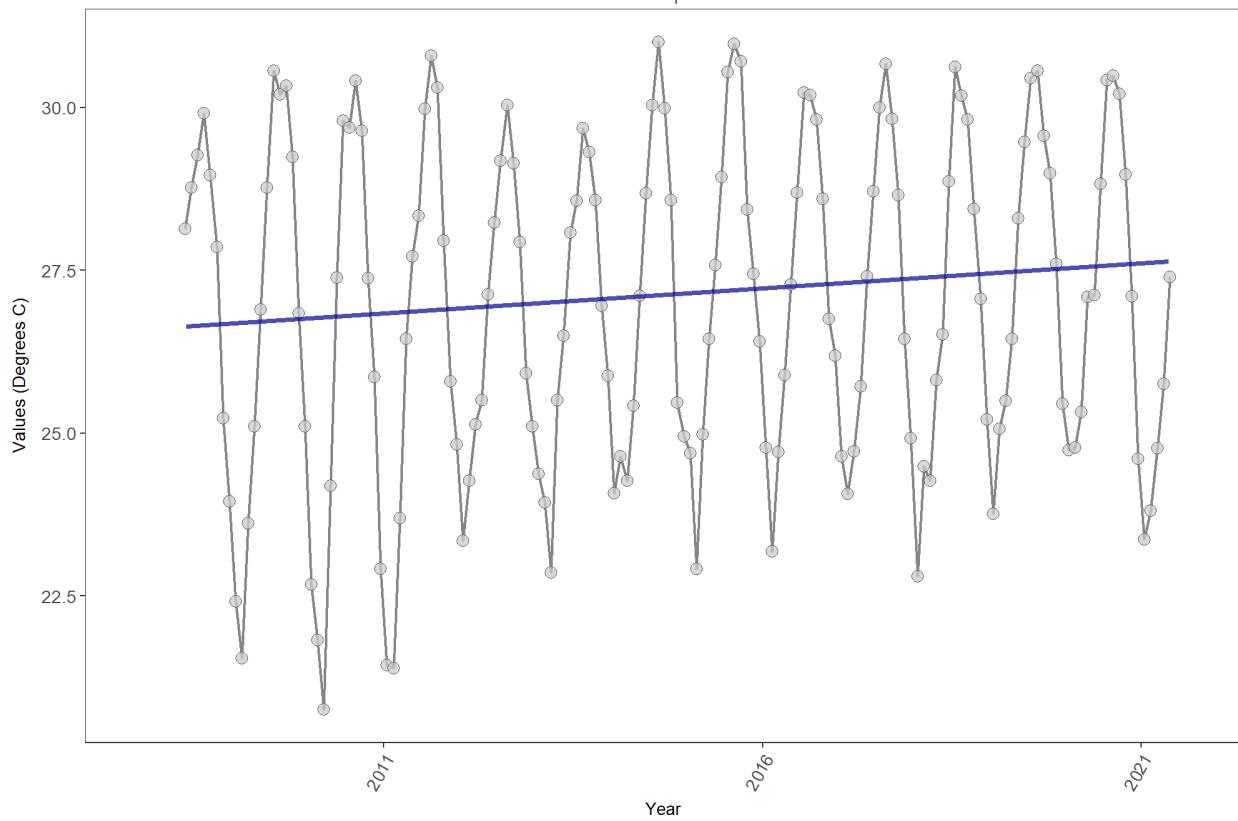


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	166716	16	26.646	TRUE	0.1478	0.0260	0.03790529	26.63508	12.6453	0.3171	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 57  
 Water Temperature

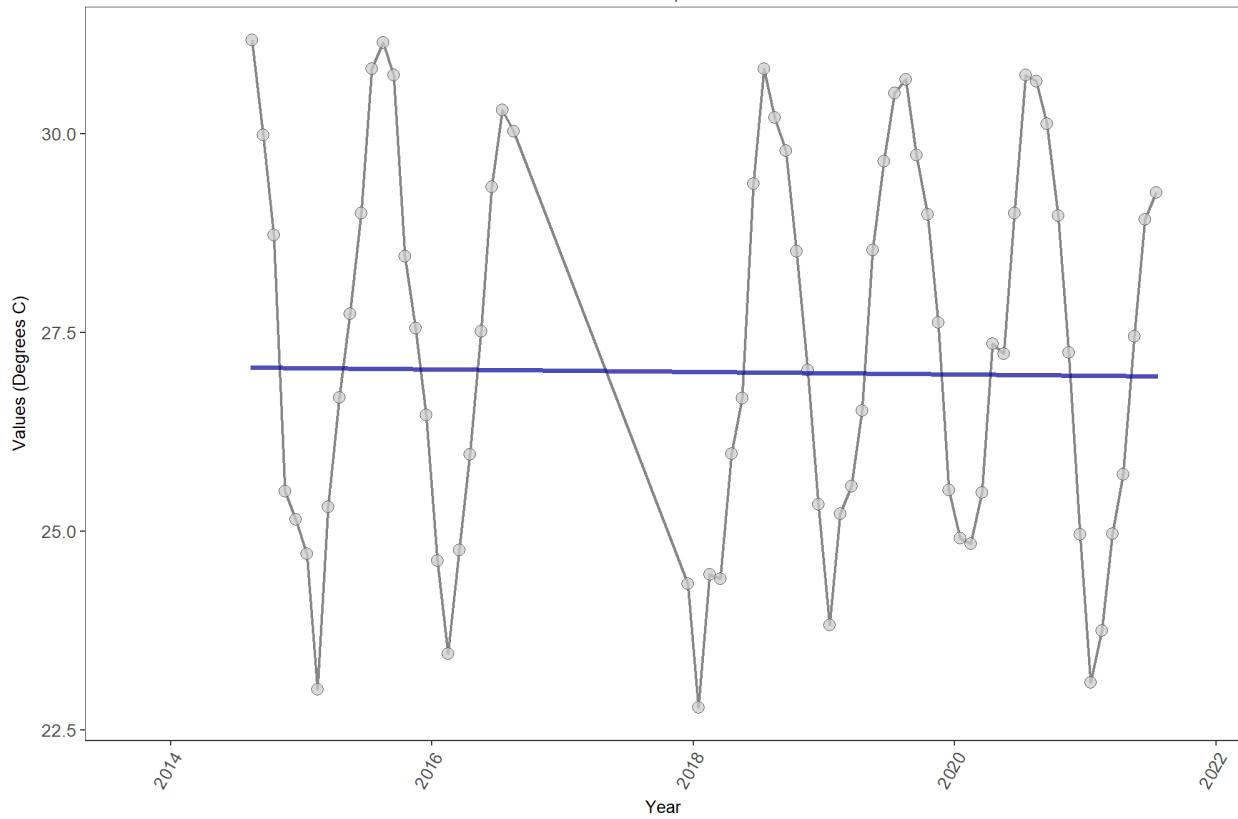


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	178985	14	26.965	TRUE	0.3175	0.0000	0.07662102	26.6105	8.0755	0.7065	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 58  
 Water Temperature

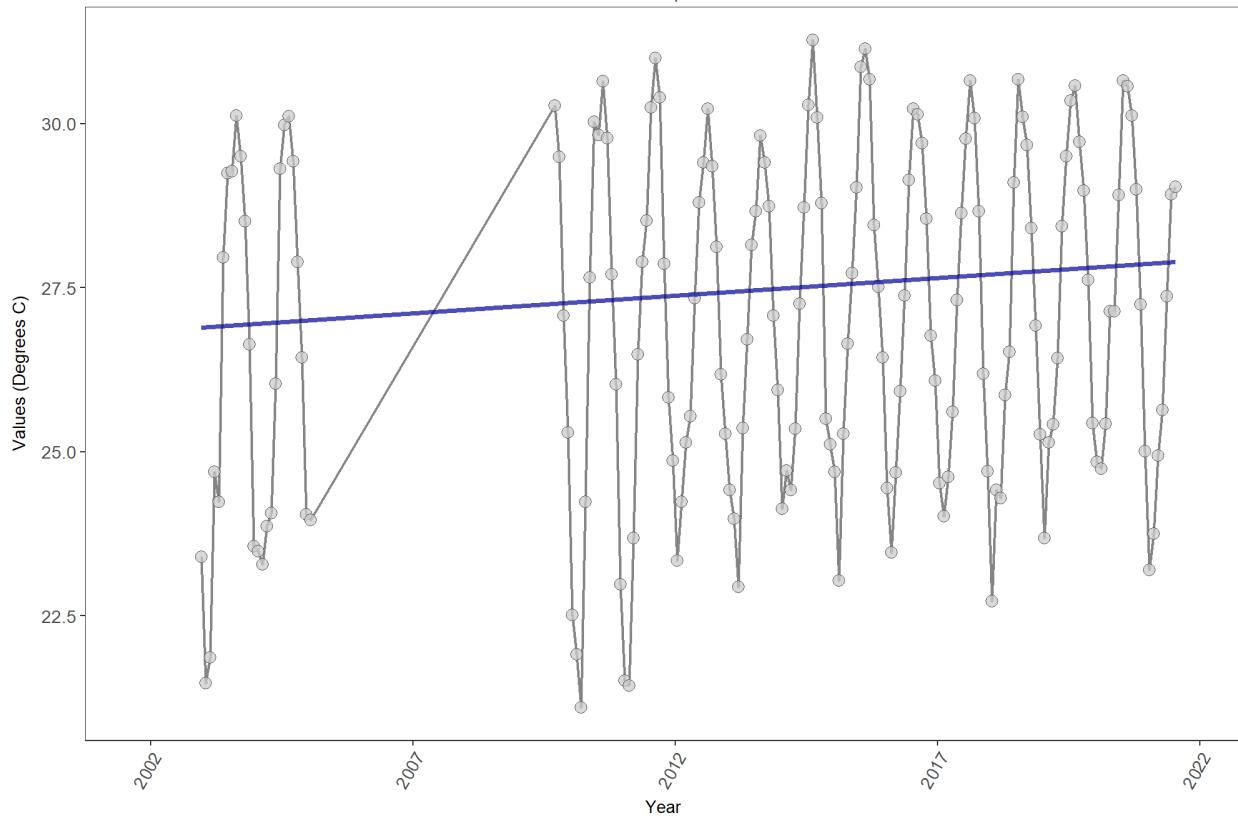


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	64476	8	27.21	TRUE	-0.0435	0.6469	-0.01665063	27.07021	7.4085	0.7651	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 59  
 Water Temperature

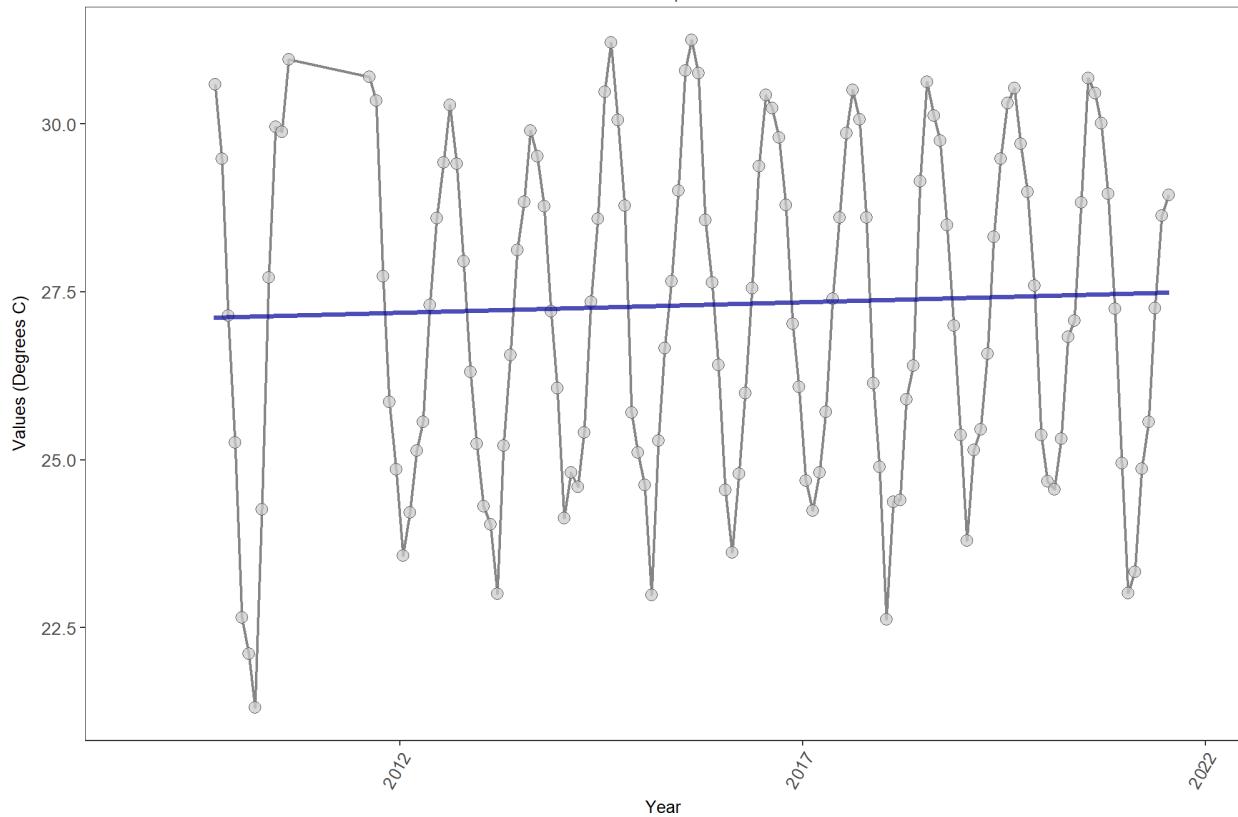


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	183805	17	26.818	TRUE	0.253	0.0000	0.05390625	26.8366	10.5348	0.483	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 60  
 Water Temperature

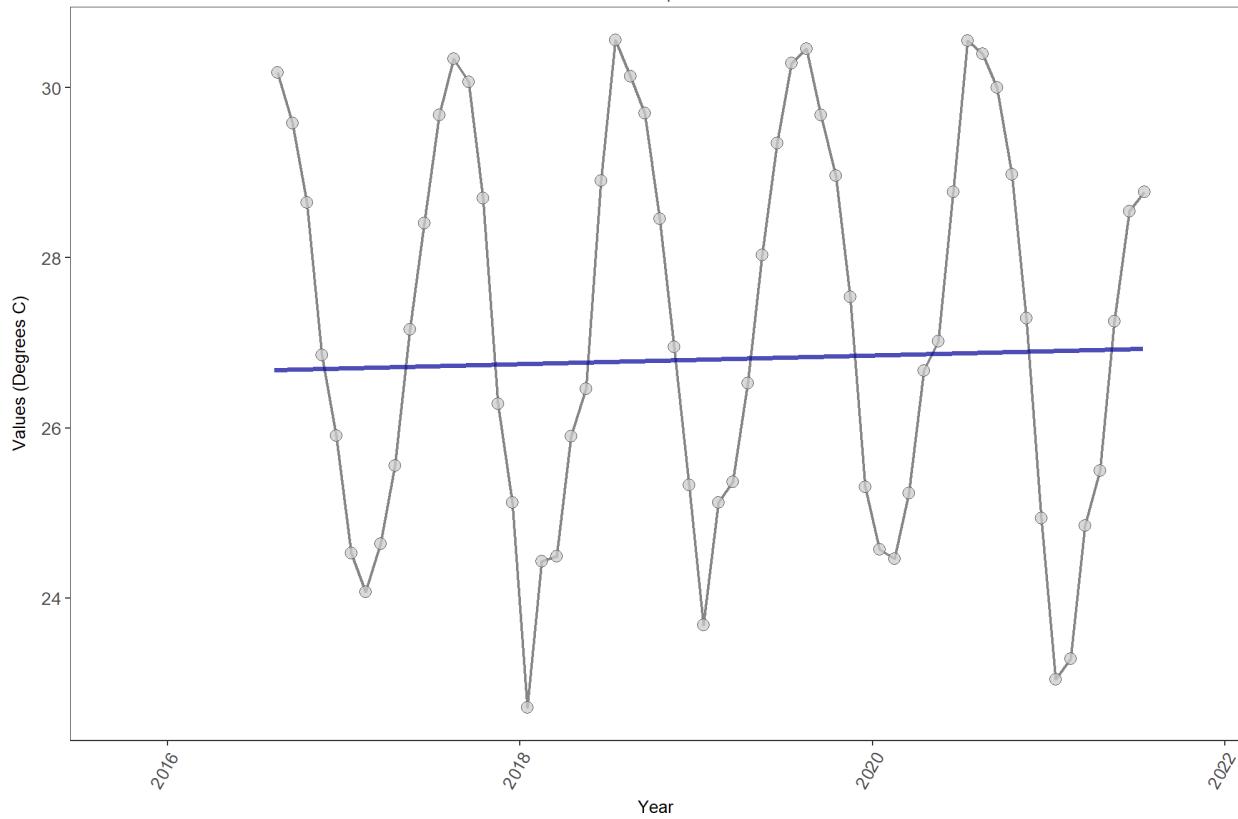


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	142216	13	26.96	TRUE	0.1394	0.0408	0.0317376	27.09074	8.9374	0.6277	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 61  
 Water Temperature

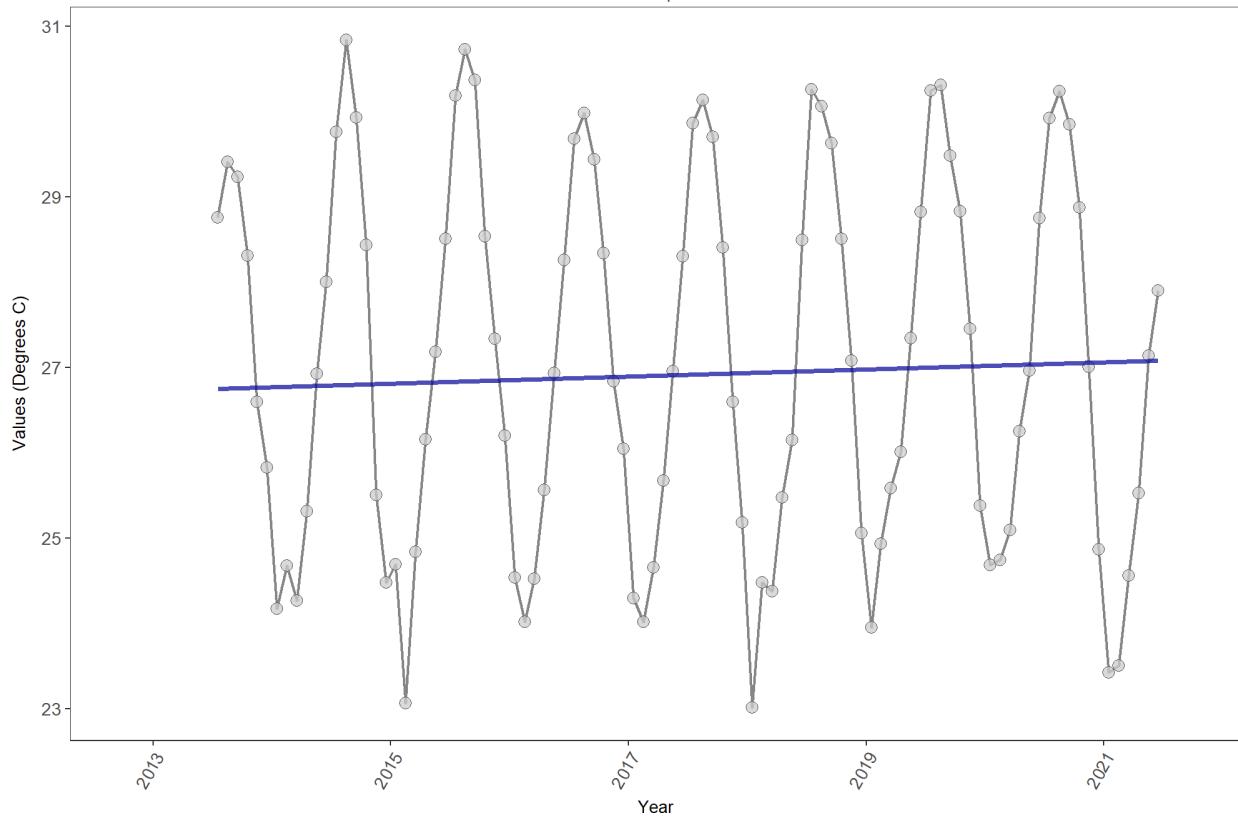


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	46150	6	27.18	TRUE	0.1333	0.2888	0.04961196	26.65384	7.36	0.7692	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 70  
 Water Temperature

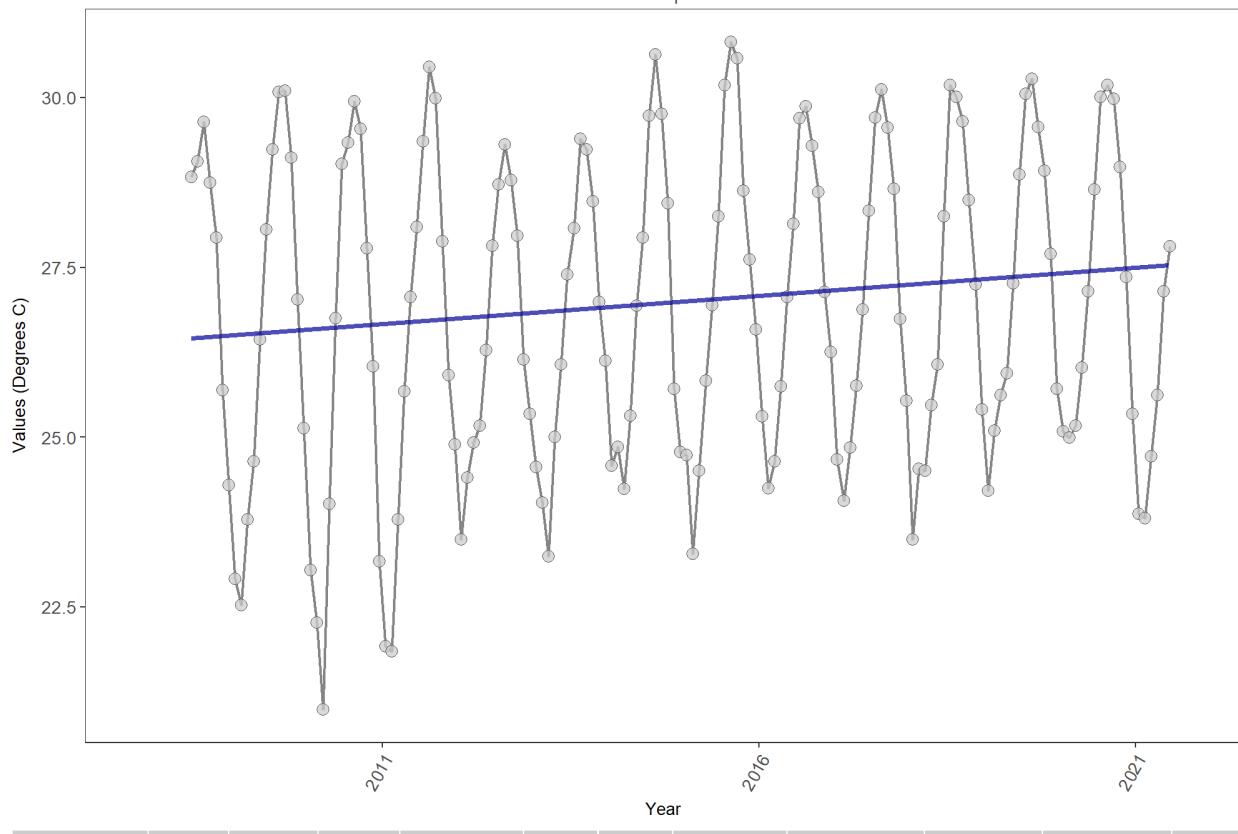


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	95384	9	26.89	TRUE	0.1905	0.0244	0.04127407	26.72817	9.9592	0.5341	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 72  
 Water Temperature

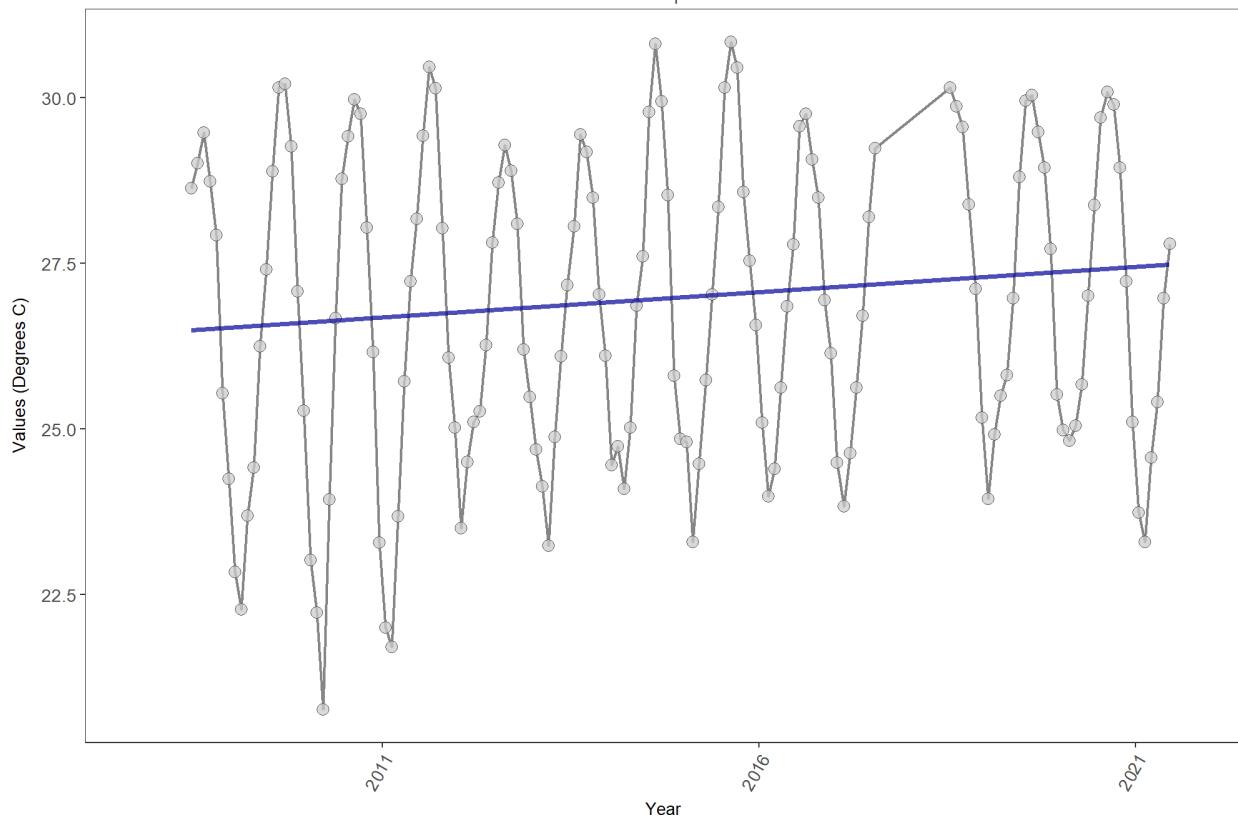


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	178618	14	26.744	TRUE	0.3977	0.0000	0.08307034	26.41537	6.5562	0.8338	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 73  
 Water Temperature

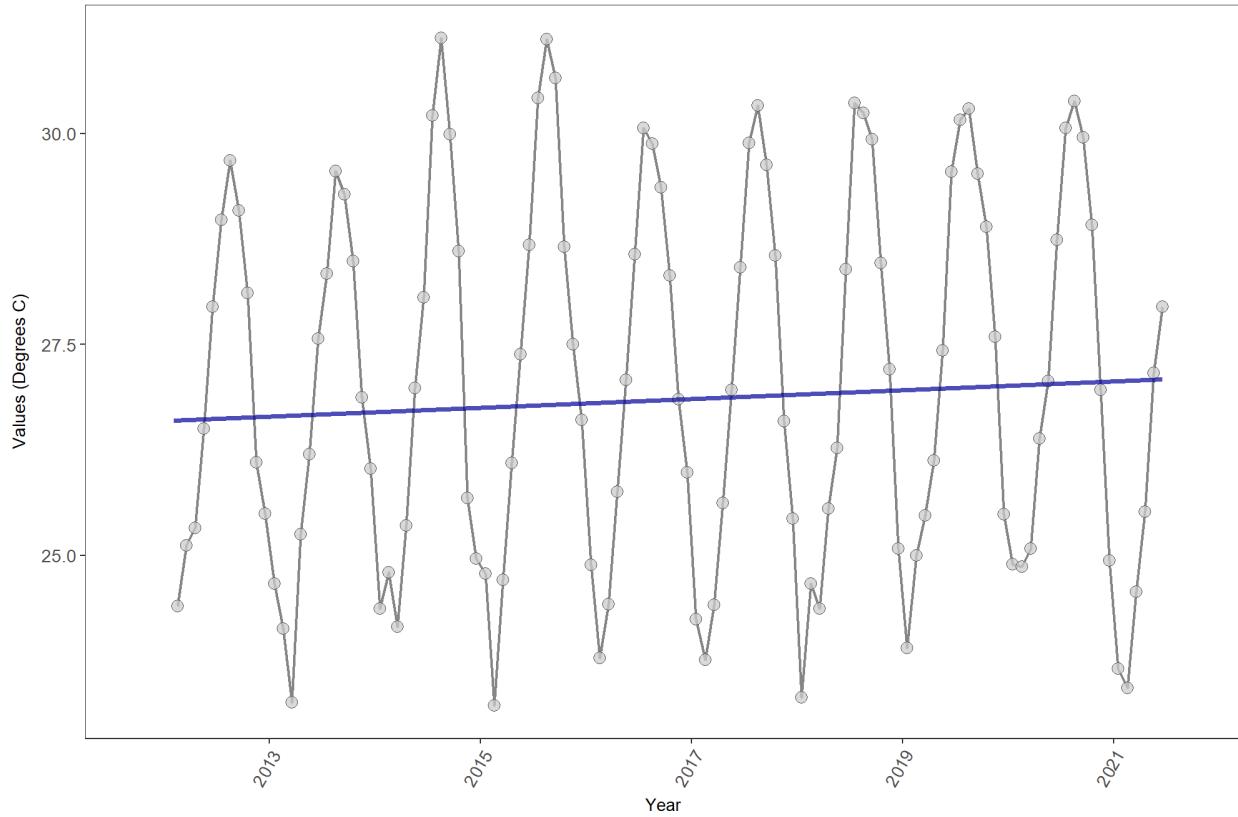


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	169932	14	26.69	TRUE	0.3323	0.0000	0.07646026	26.45925	5.6013	0.8986	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 74  
 Water Temperature

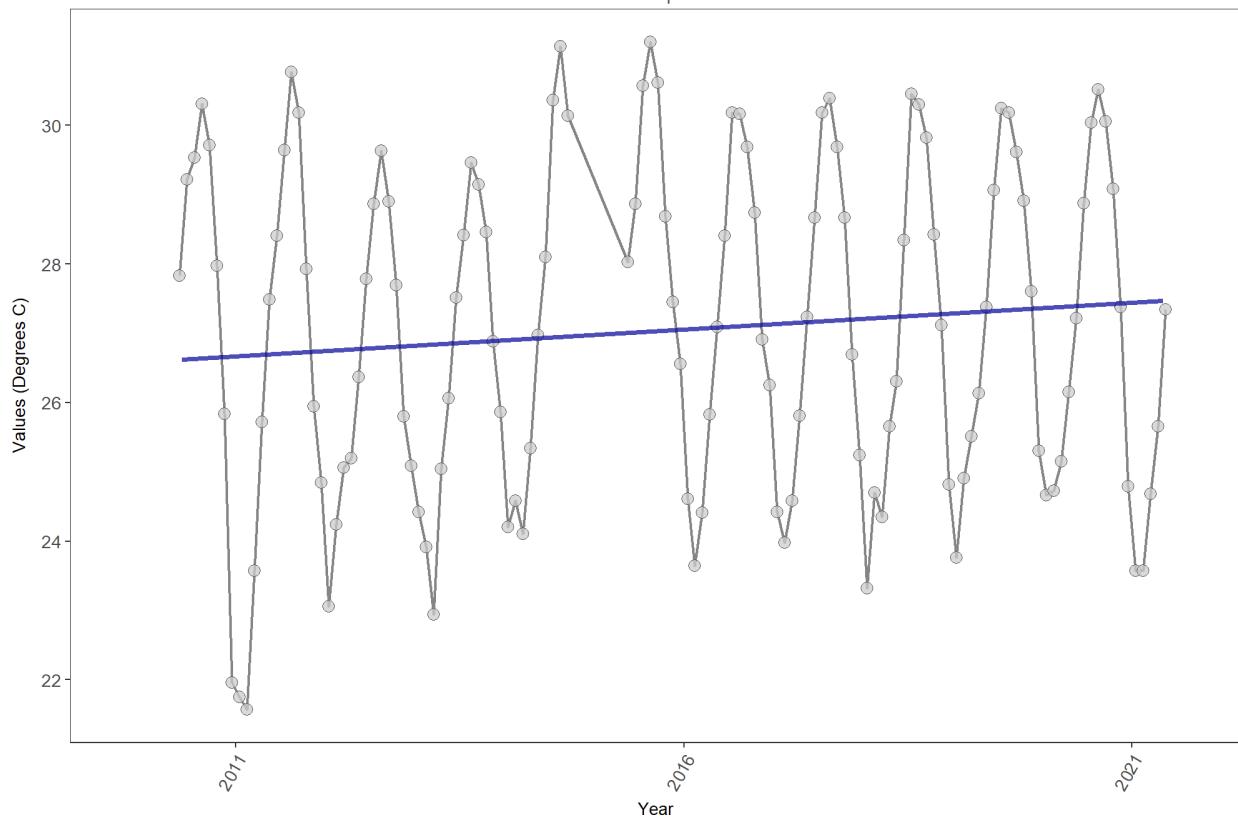


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	119436	10	26.793	TRUE	0.1996	0.0070	0.05245836	26.59364	11.2709	0.4209	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 75  
 Water Temperature

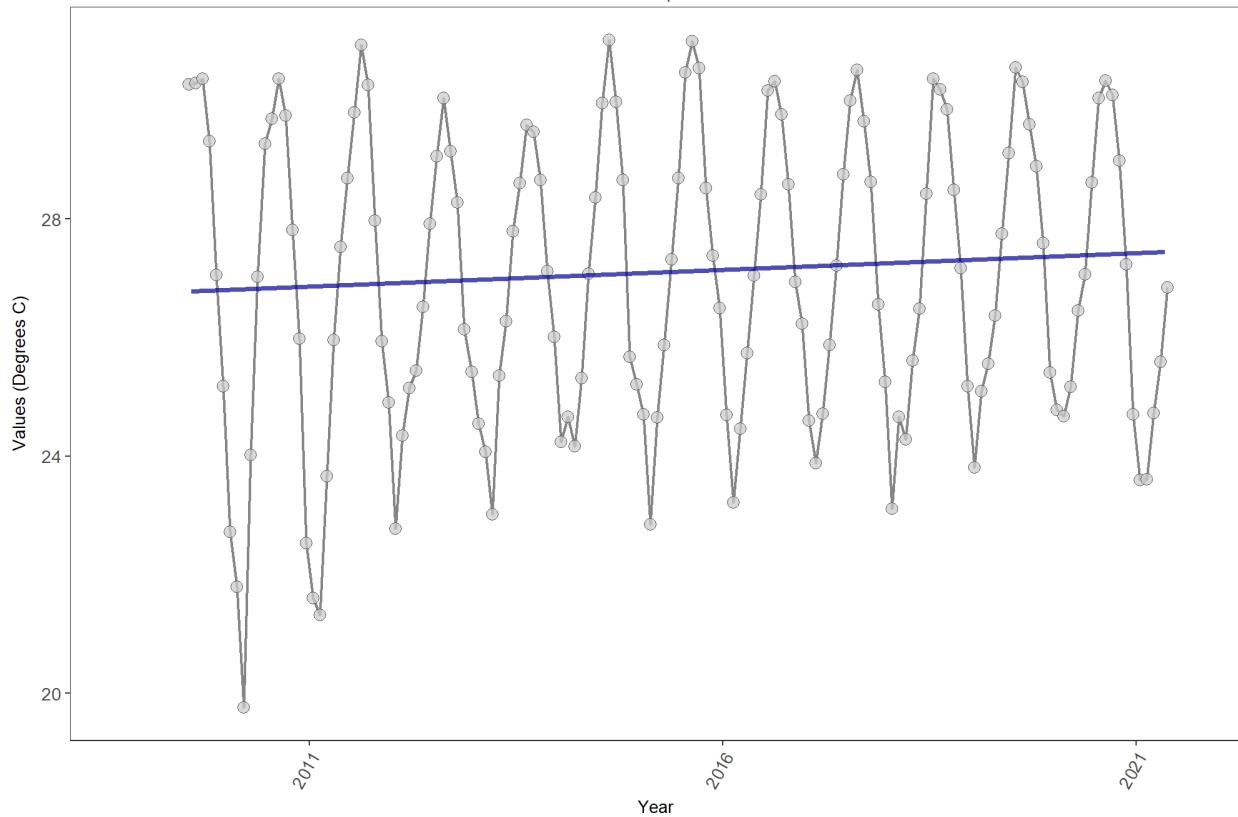


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	135590	12	27.08	TRUE	0.2709	0.0002	0.07720869	26.58939	7.9908	0.7141	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 76  
 Water Temperature

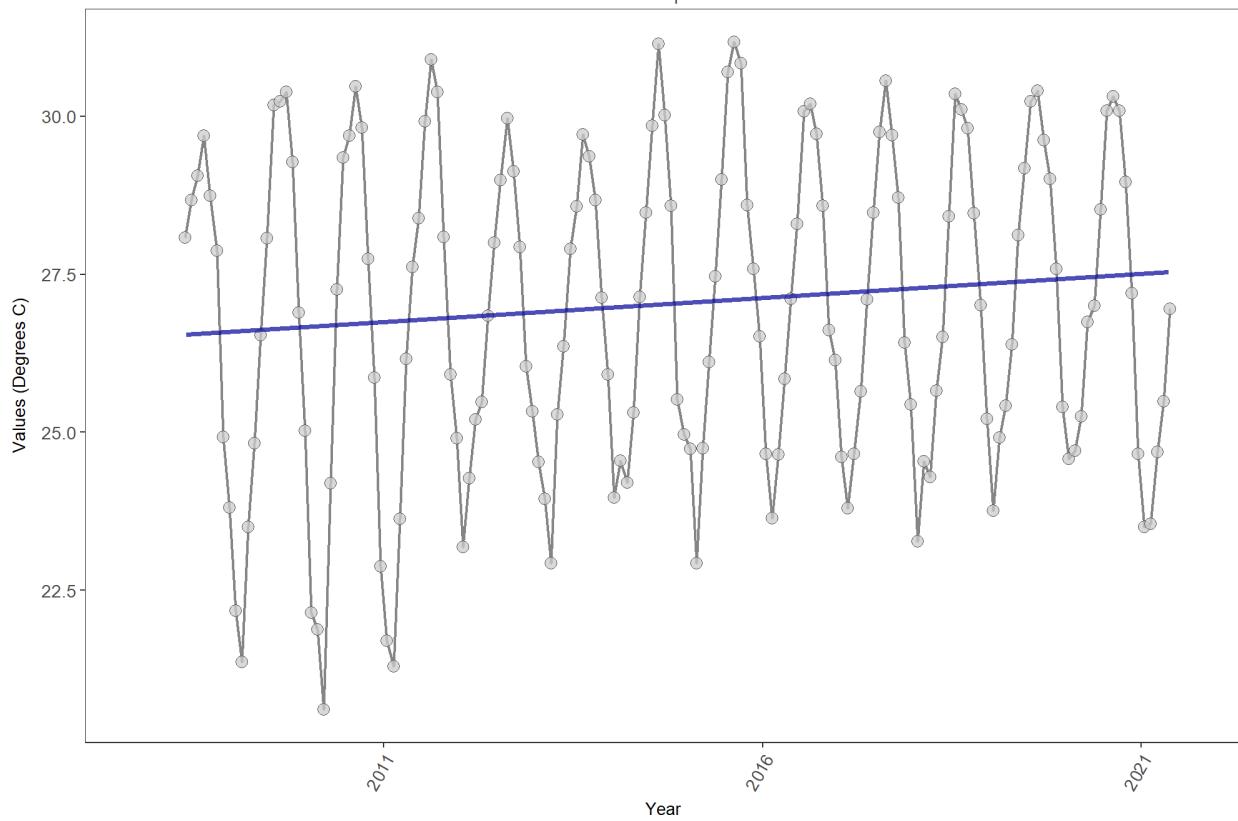


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	159983	13	26.842	TRUE	0.2437	0.0001	0.05576643	26.75169	8.656	0.6536	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 77  
 Water Temperature

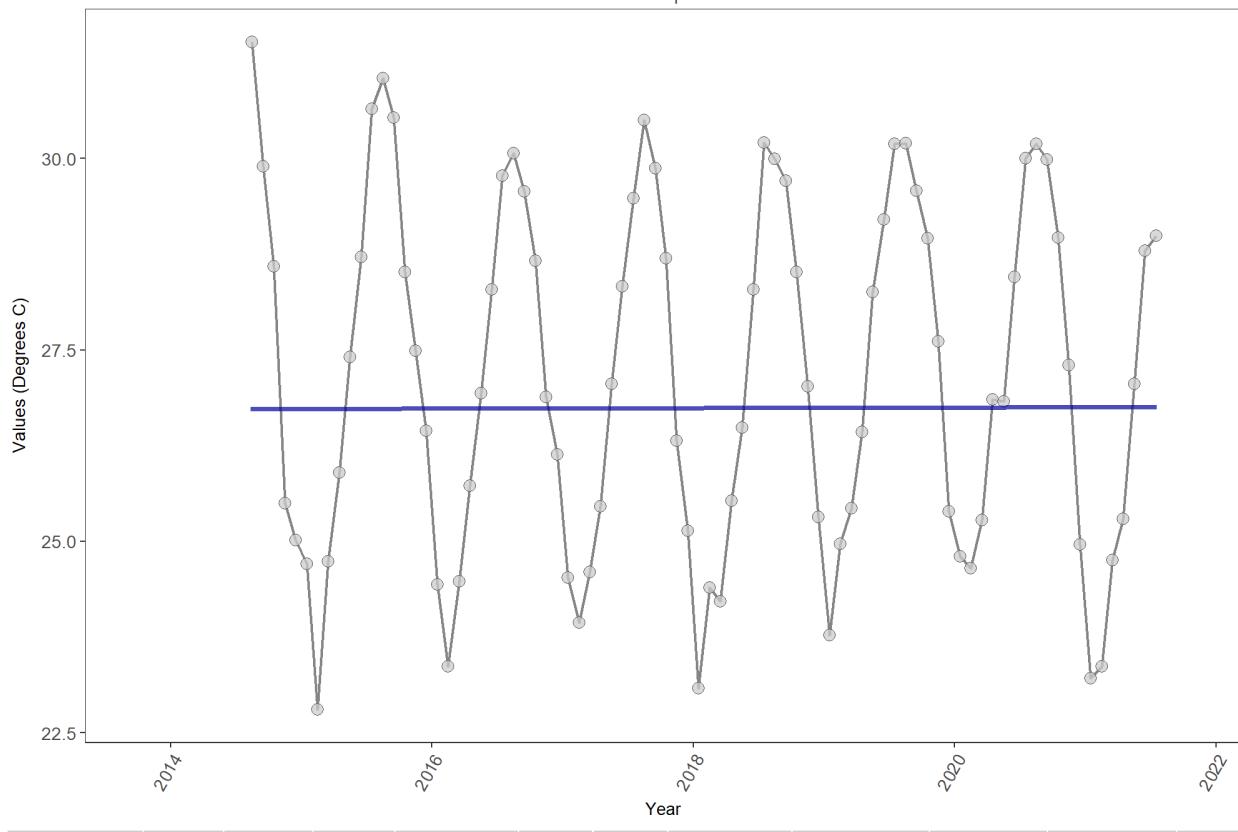


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	179404	14	26.89	TRUE	0.2783	0.0000	0.07603218	26.51603	10.5306	0.4834	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 78  
 Water Temperature

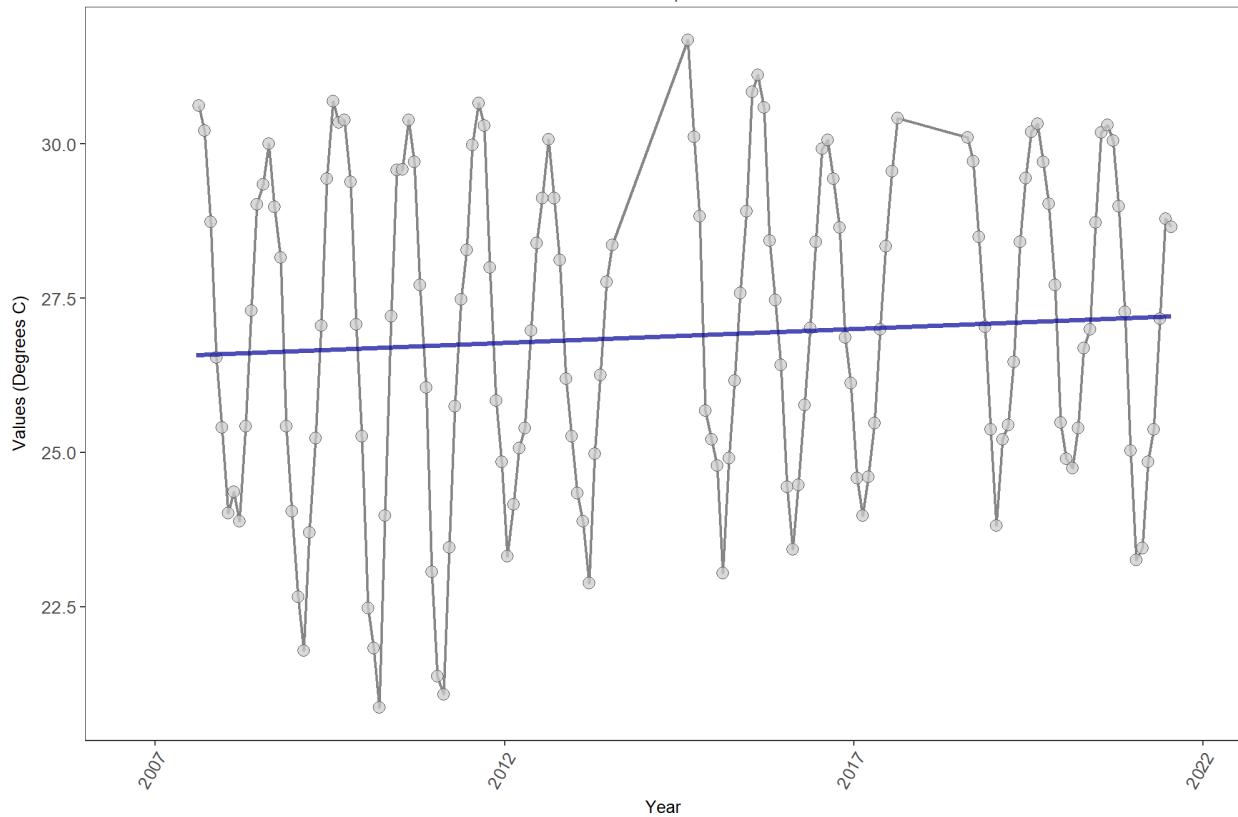


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	80030	8	27.03	TRUE	0.0317	0.7615	0.003411781	26.72587	15.3083	0.1688	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 79  
 Water Temperature

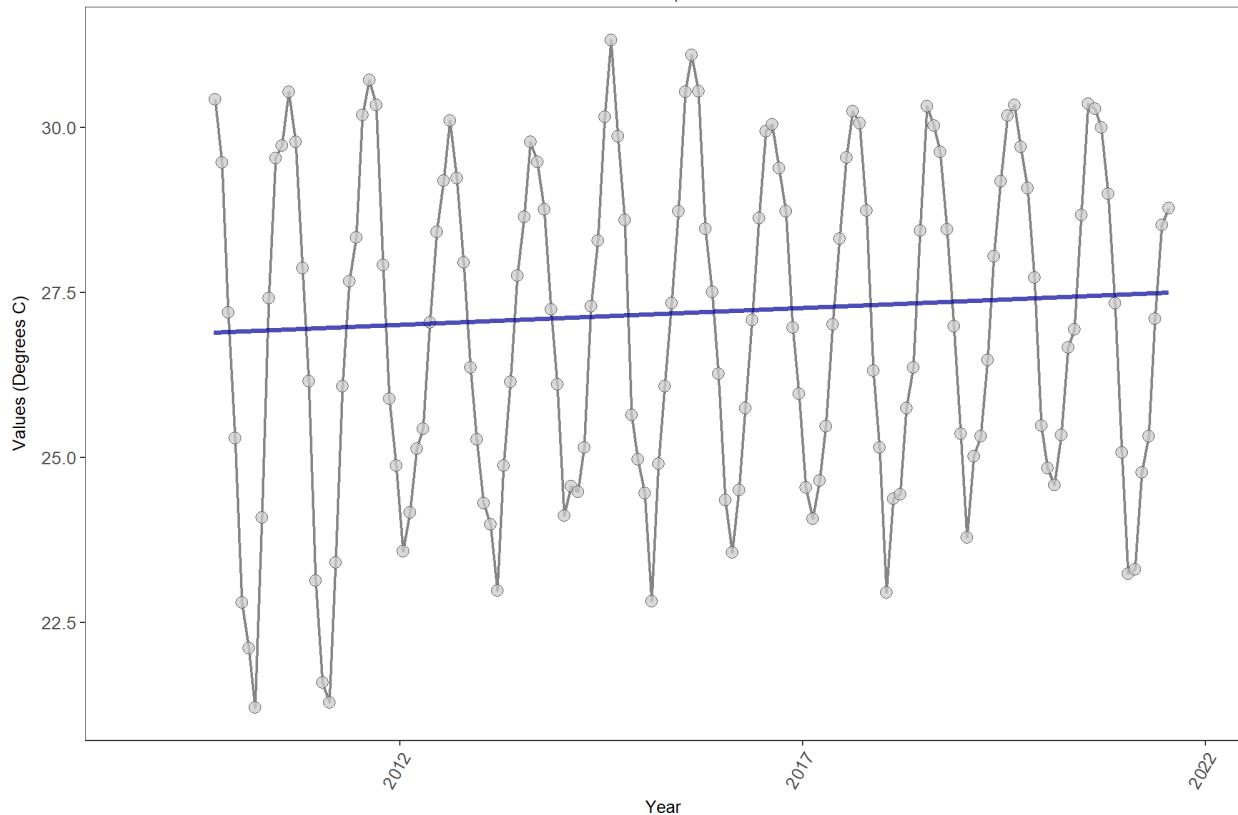


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	167474	15	26.793	TRUE	0.181	0.0051	0.04474392	26.55387	8.9627	0.6253	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 80  
 Water Temperature

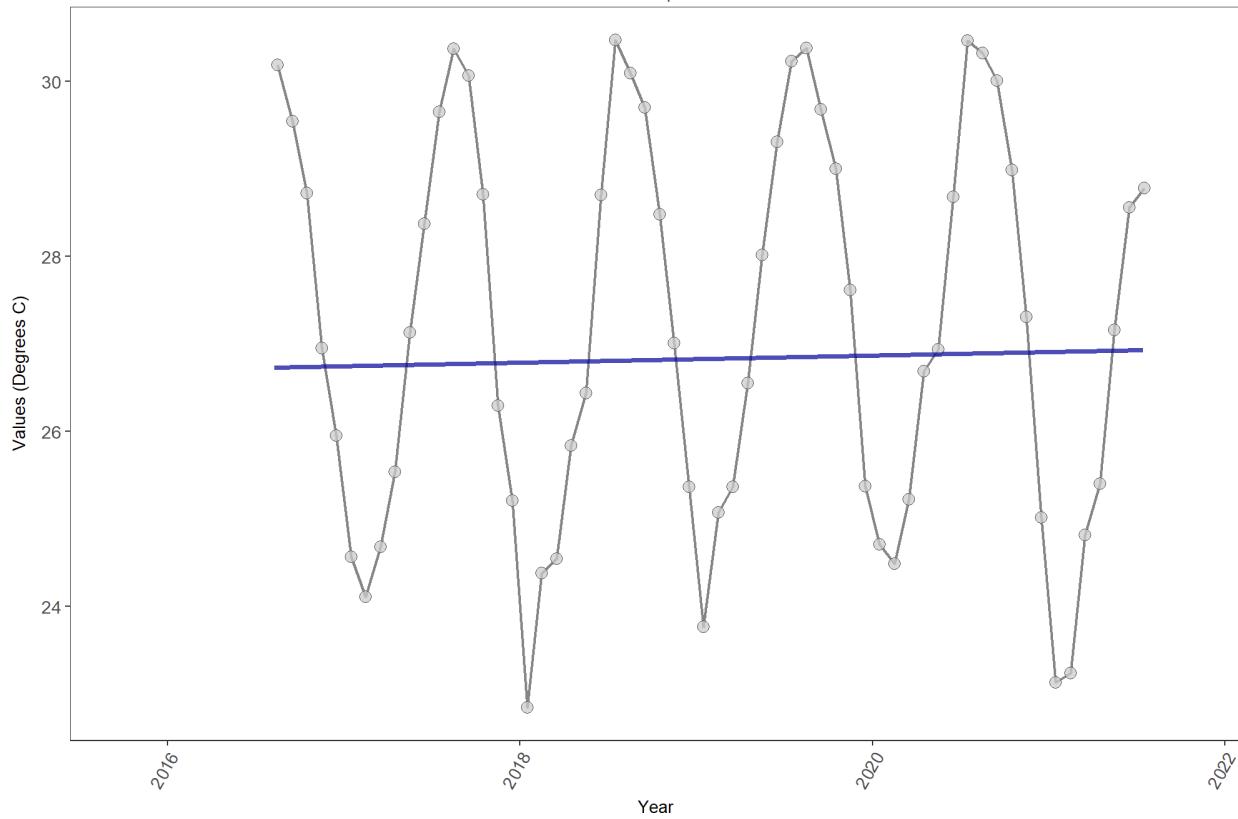


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	159586	13	26.91	TRUE	0.1936	0.0024	0.05126736	26.85856	10.5352	0.483	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 81  
 Water Temperature

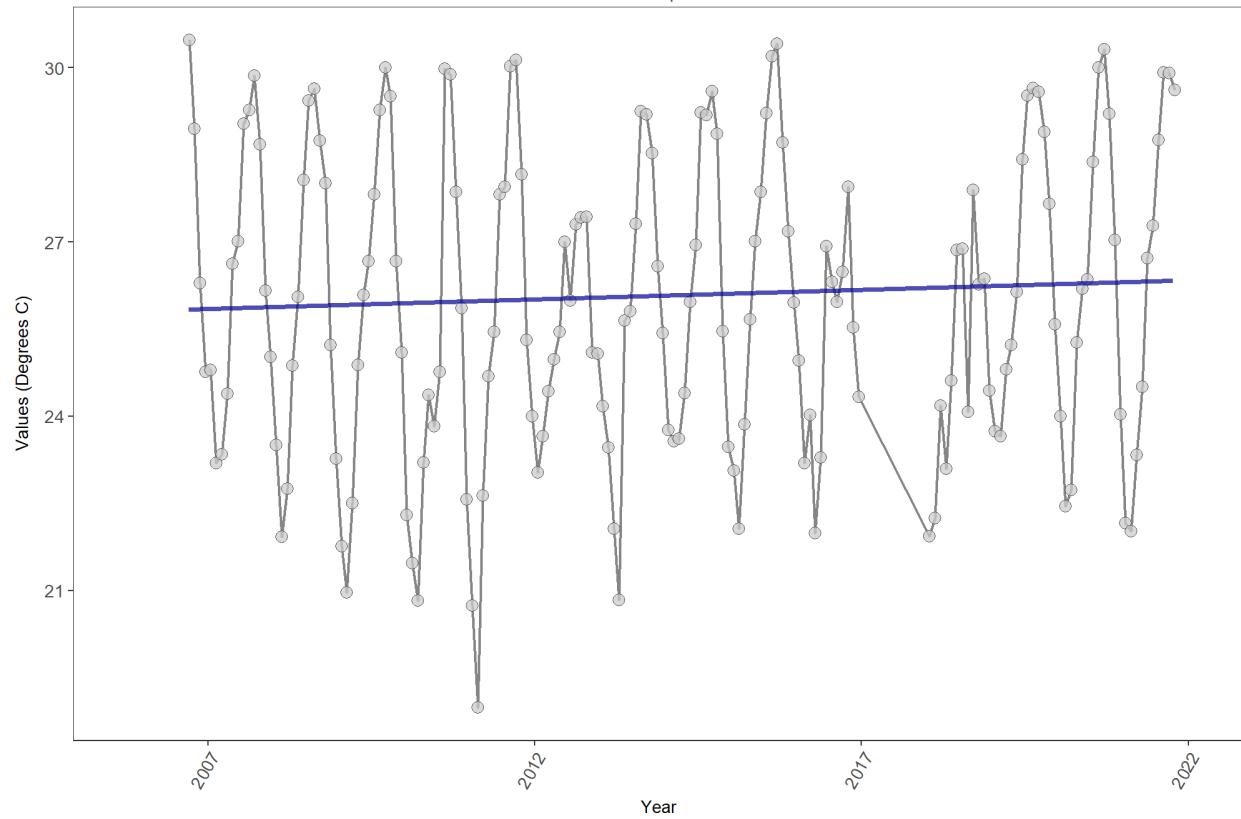


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	46084	6	27.18	TRUE	0.1	0.4367	0.03922995	26.71035	4.08	0.9675	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 83  
 Water Temperature

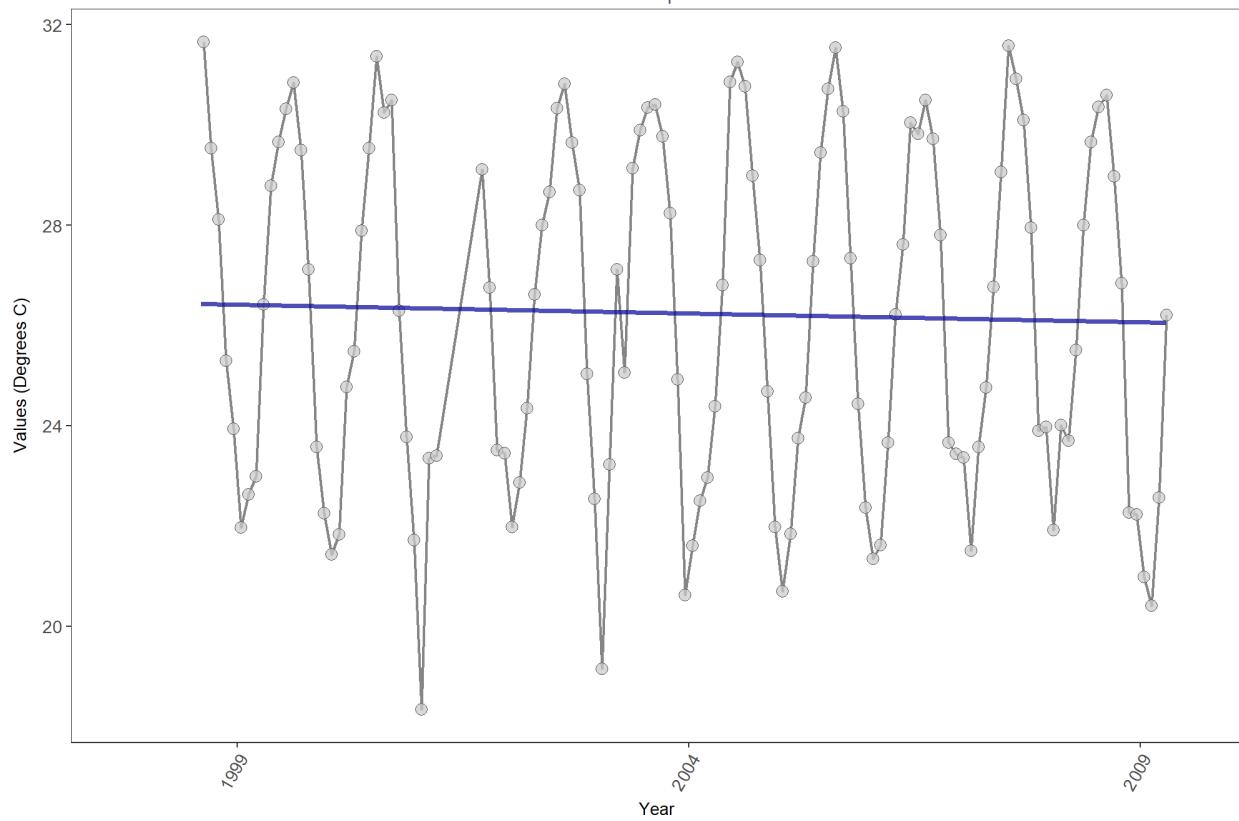


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
Surface	123165	15	25.79	TRUE	0.1047	0.0744	0.03298669	25.81632	3.4656	0.983	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_200YR\_HD**  
 Water Temperature

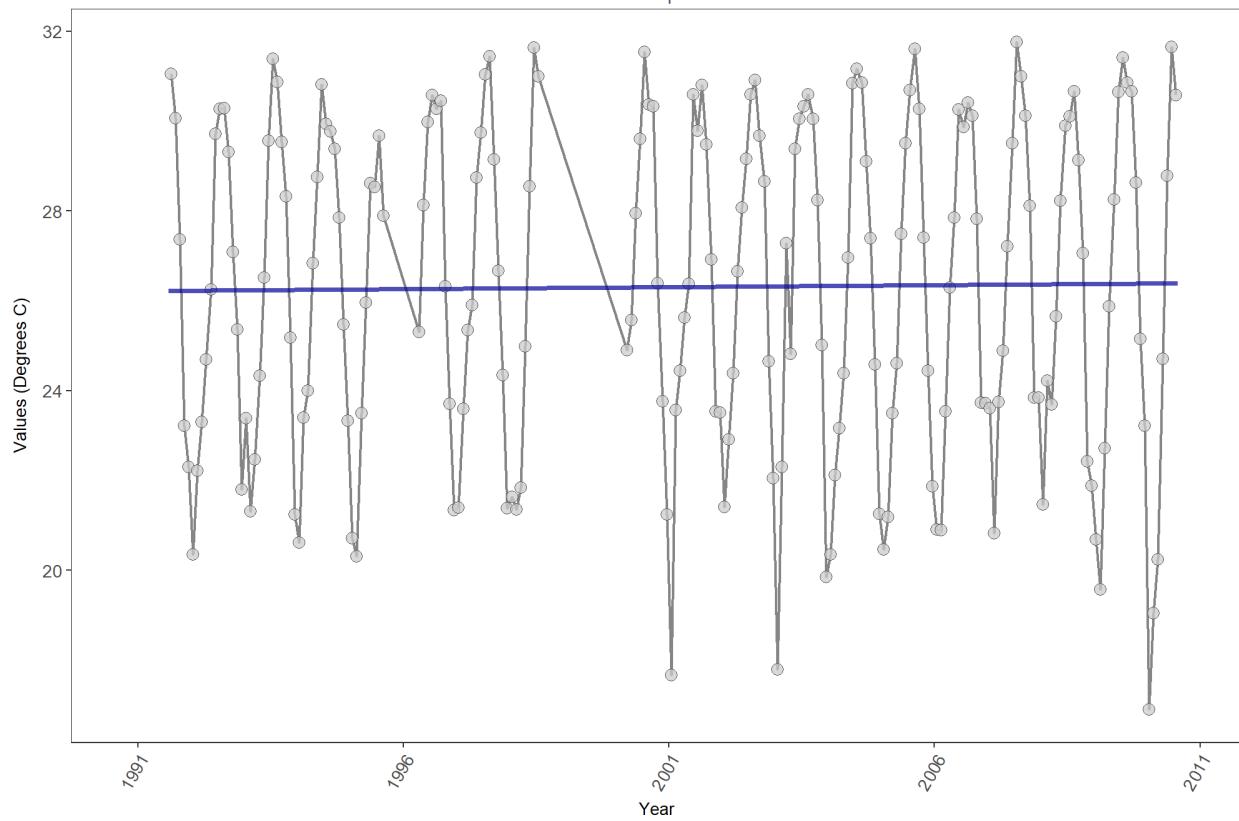


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	44601	12	26.1024	TRUE	-0.0961	0.1720	-0.03503859	26.44961	5.3004	0.9158	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_7MILE\_BR  
 Water Temperature

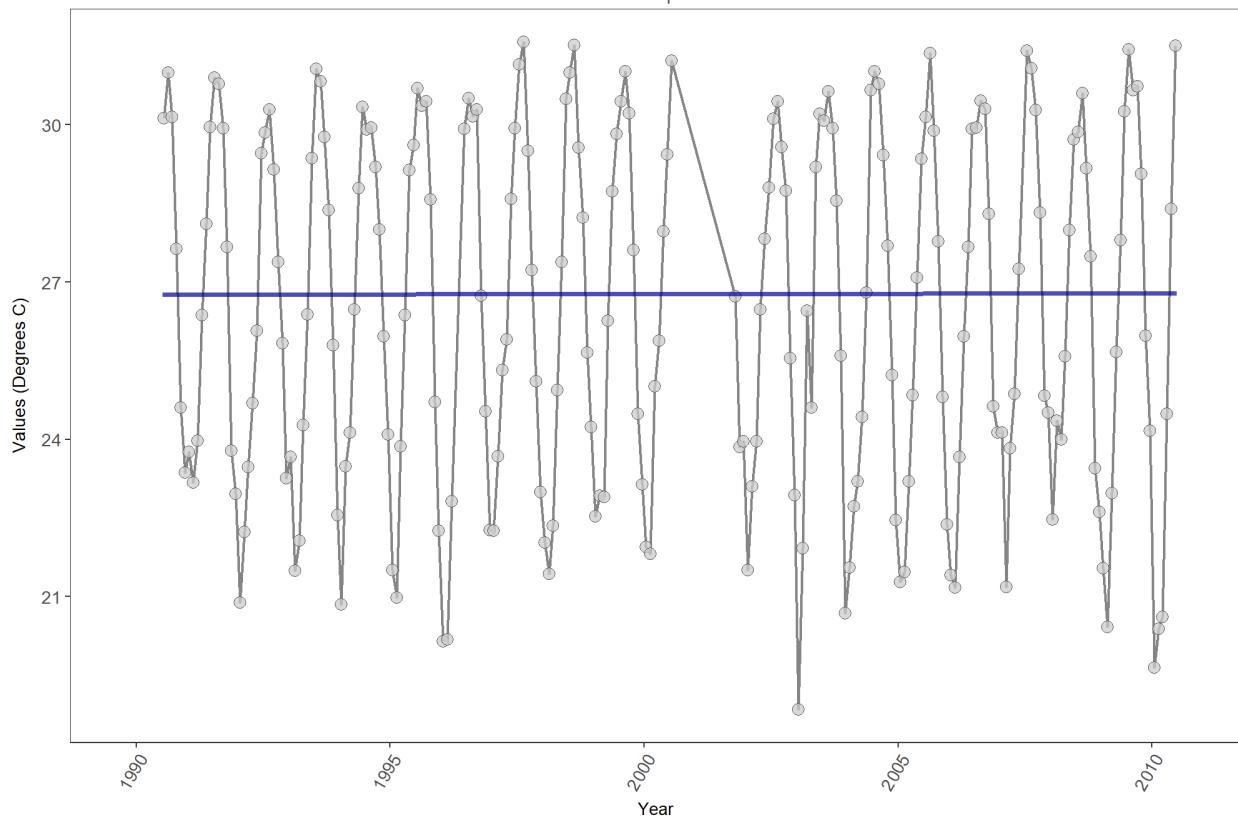


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	73055	19	26.6562	TRUE	0.0465	0.3549	0.008583988	26.2211	10.1261	0.5191	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_9FT\_SHOAL  
 Water Temperature

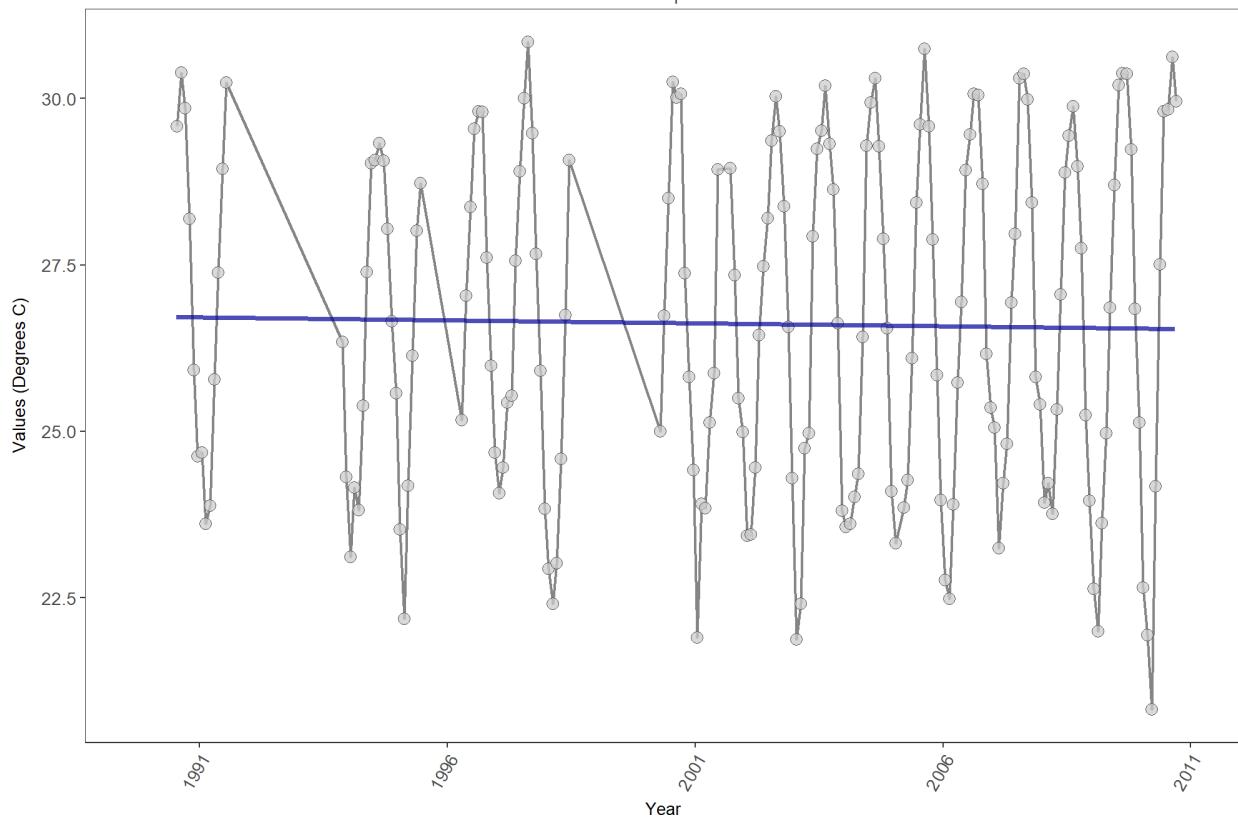


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	80299	21	26.5	TRUE	0.0016	0.9917	0.0008159053	26.76346	7.908	0.7215	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_ALLIGATOR**  
 Water Temperature

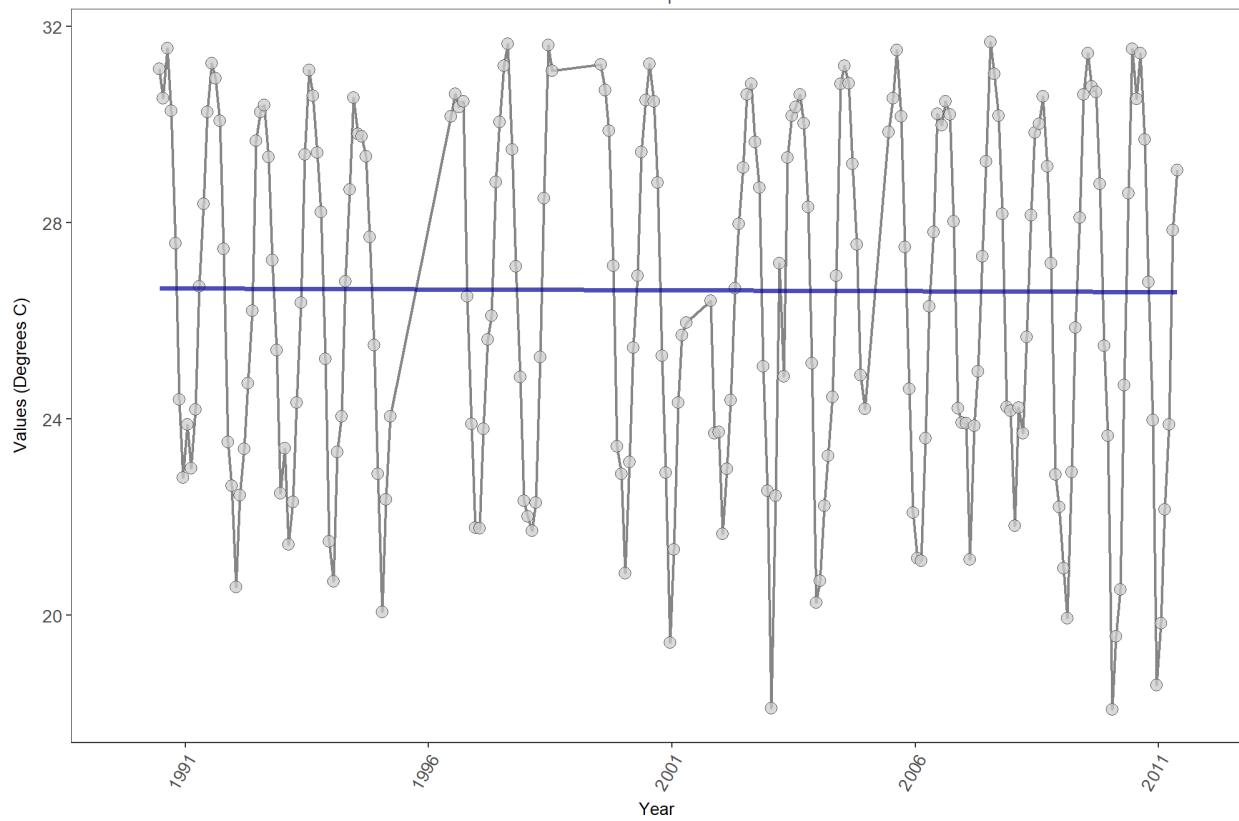


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	65144	19	26.54545	TRUE	-0.059	0.2339	-0.008569064	26.71909	13.8065	0.2439	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_BHONDA\_BR  
 Water Temperature

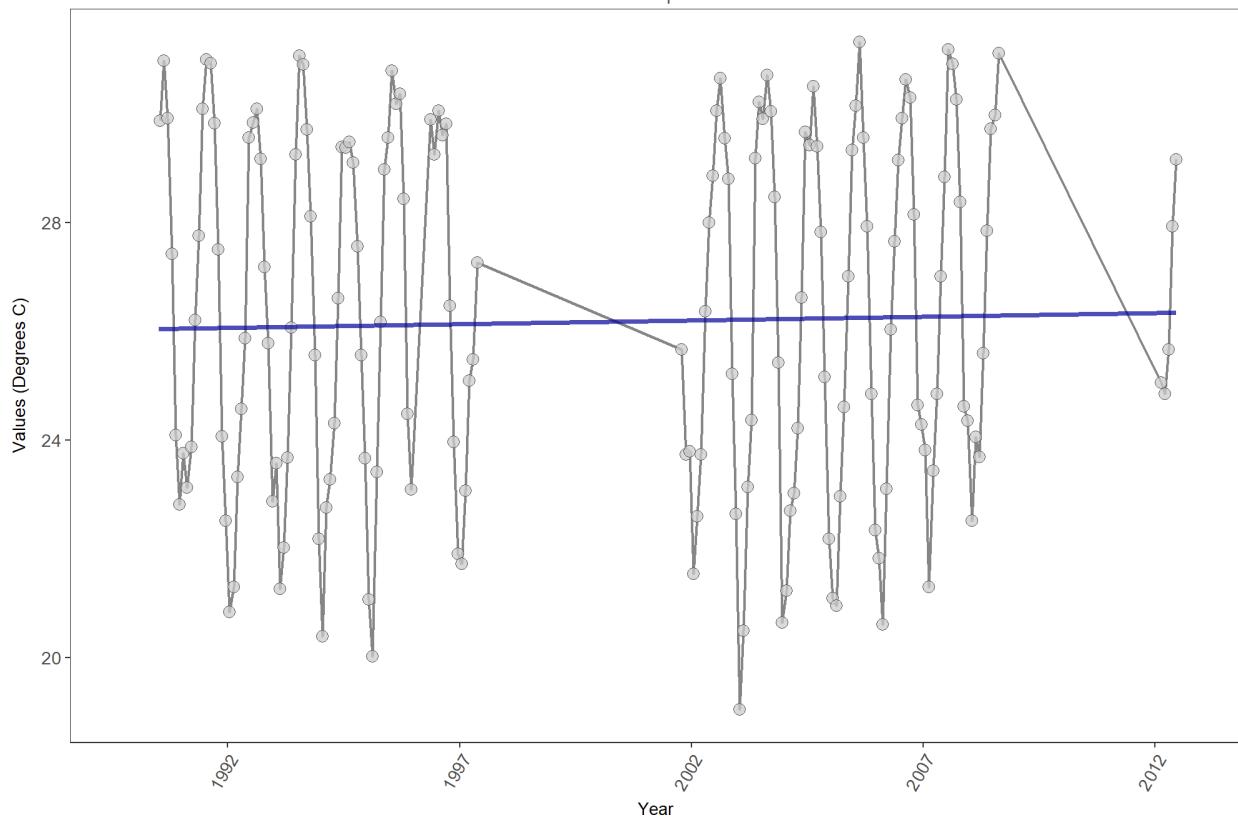


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	77111	22	26.6	TRUE	-0.0217	0.6571	-0.004045514	26.67081	7.3456	0.7704	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_BOCA\_GRND  
 Water Temperature

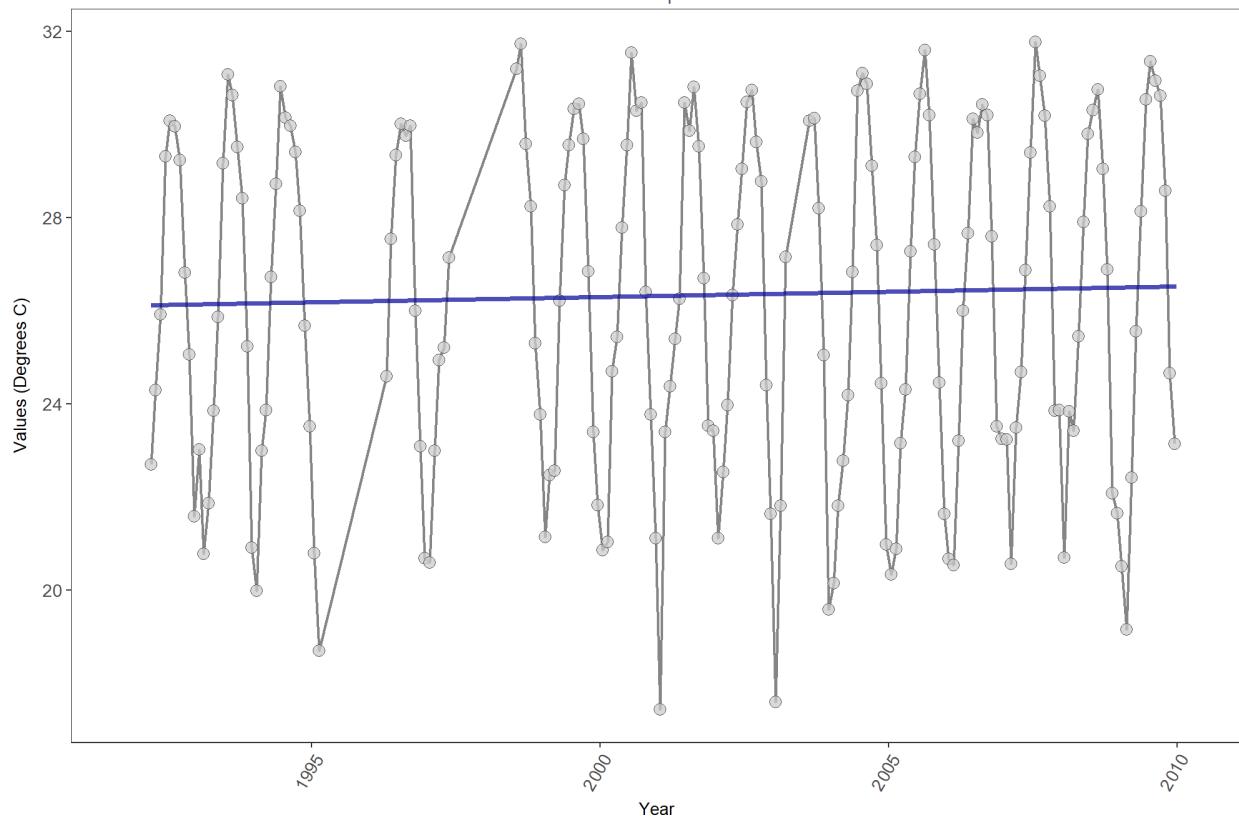


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	73434	17	26.14295	TRUE	0.0814	0.1662	0.01333094	26.04008	6.7244	0.8209	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_BULLARD  
 Water Temperature

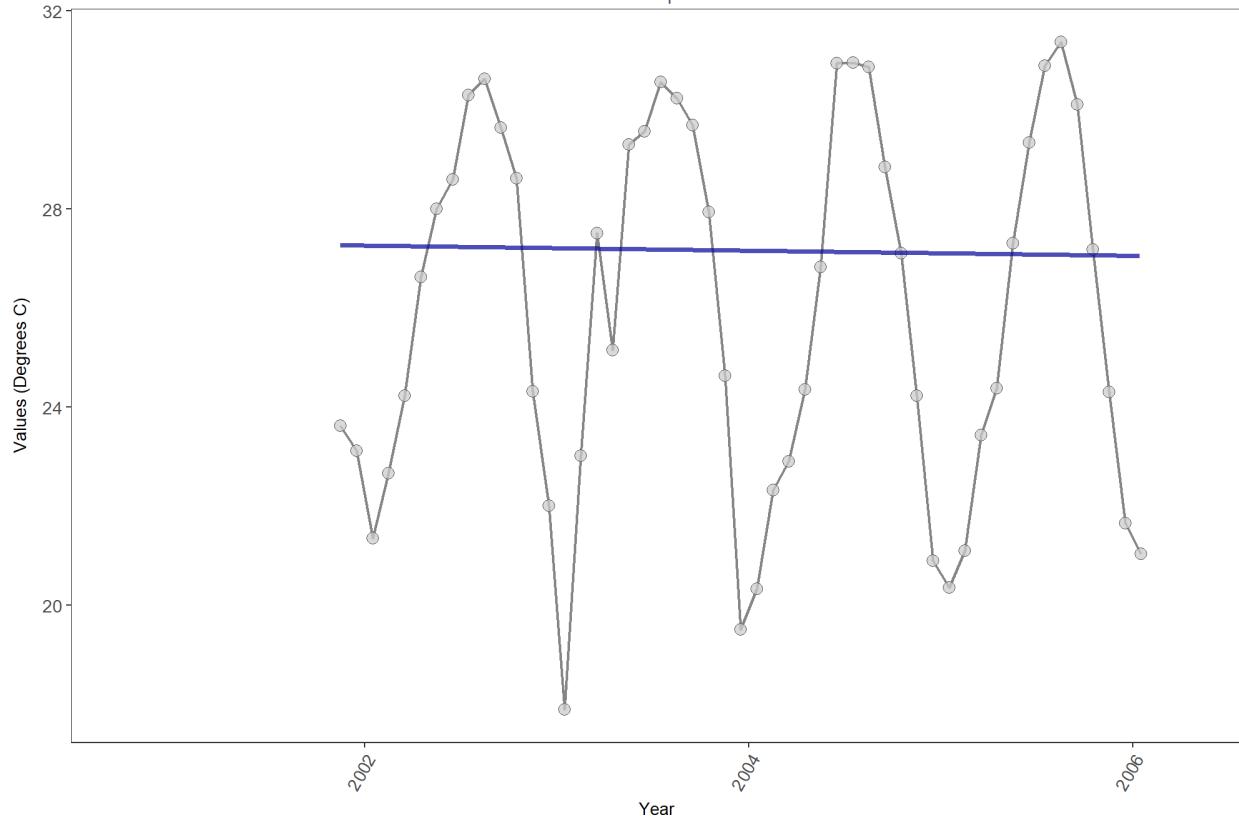


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	66230	18	26.30925	TRUE	0.1179	0.0313	0.02315278	26.10559	11.2537	0.4223	1

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKMS\_CARD\_SND  
 Water Temperature

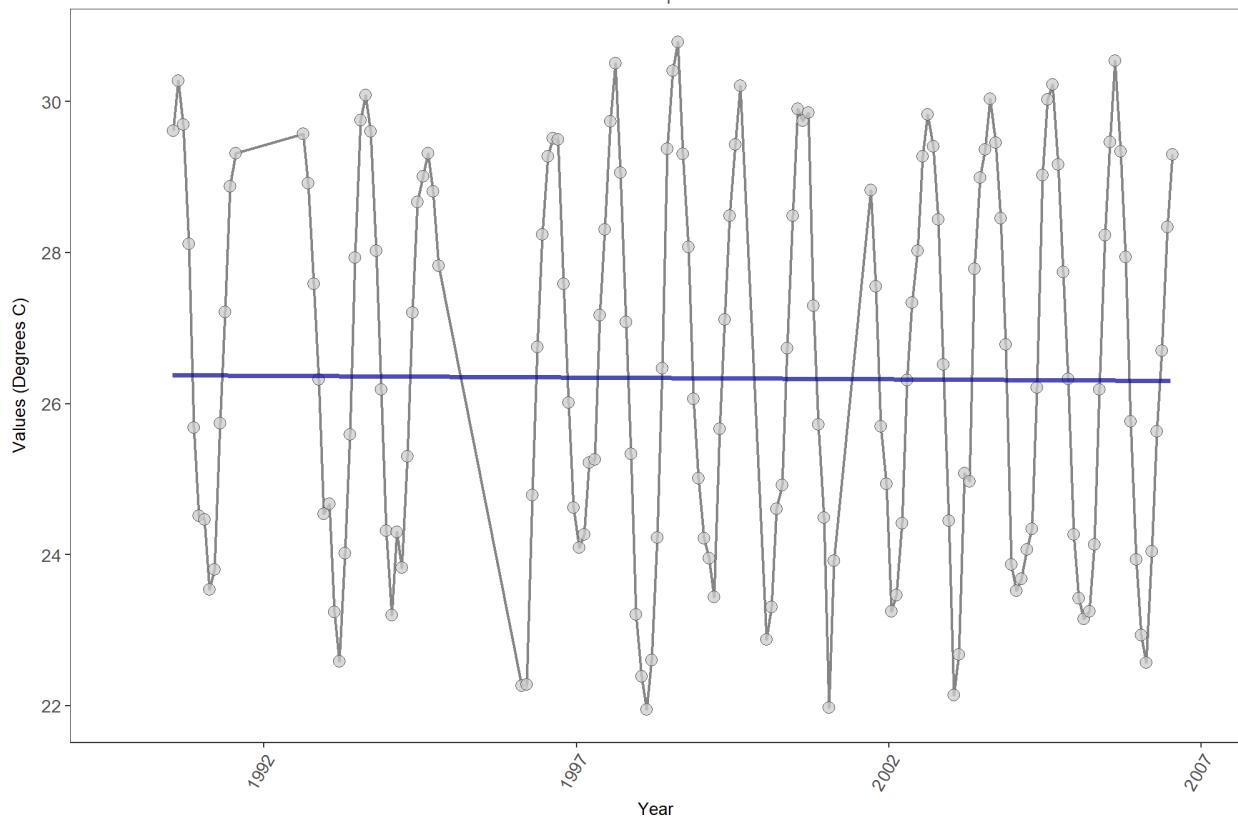


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	18249	6	26.5198	TRUE	-0.0523	0.7909	-0.05242602	27.32067	12.3631	0.337	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_CARYSFORT  
 Water Temperature

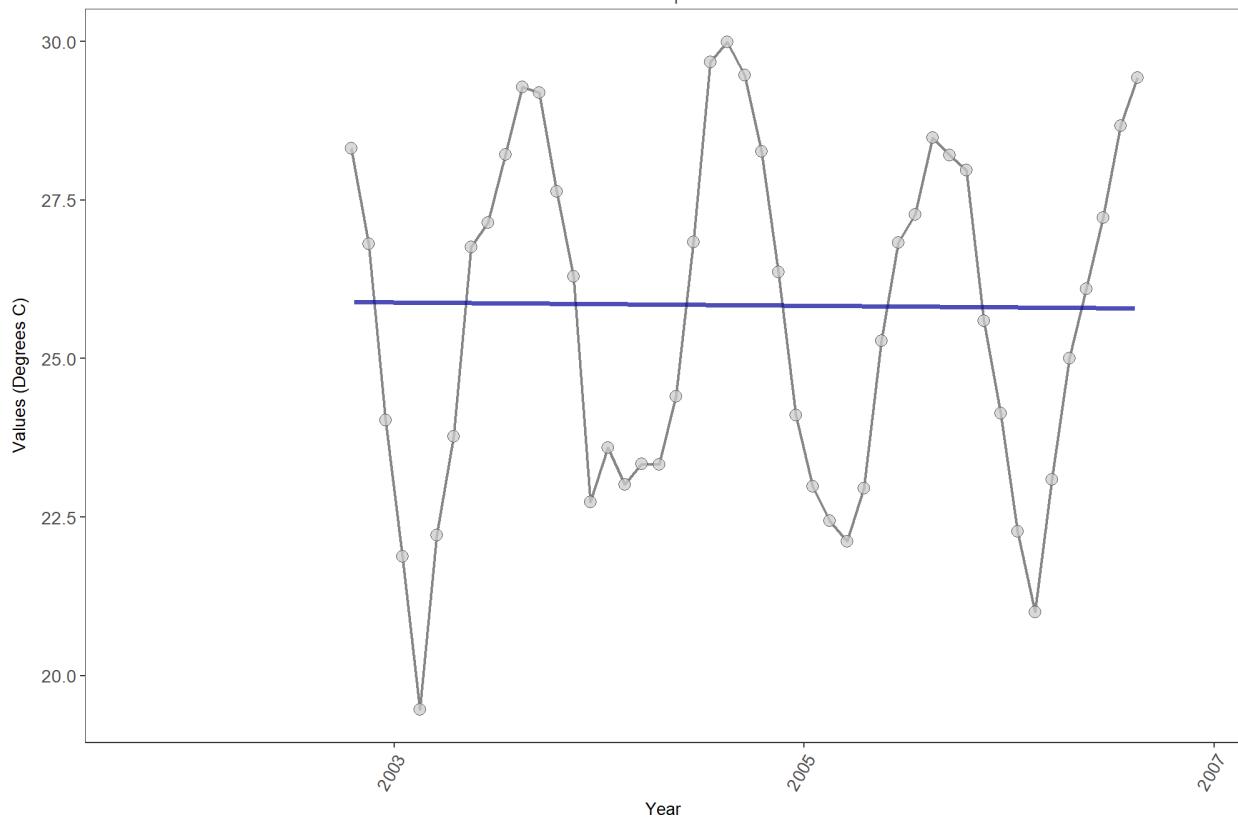


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	55001	16	26.4	TRUE	-0.029	0.6354	-0.004691132	26.37757	8.3572	0.681	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_DIEGO\_TER**  
 Water Temperature

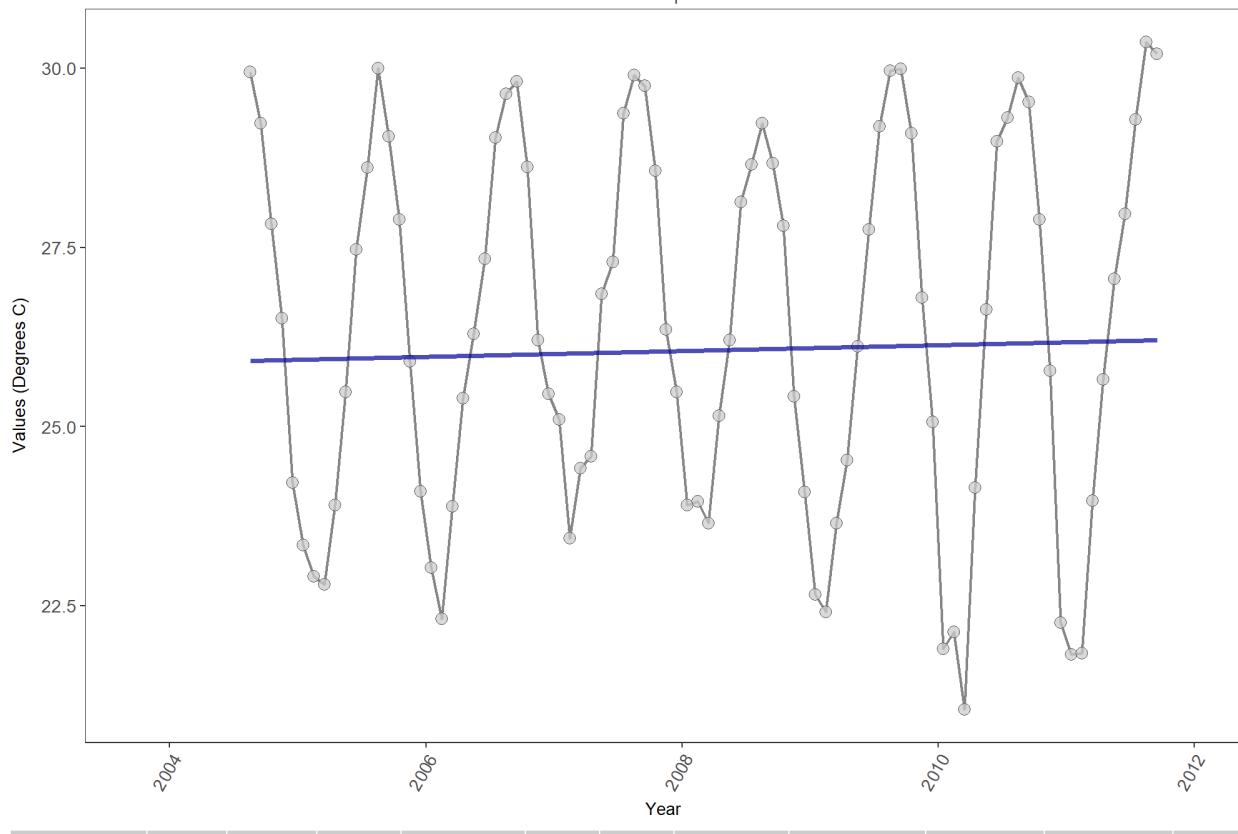


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	16693	5	25.5793	TRUE	-0.0496	0.8407	-0.0252168	25.91058	4.3063	0.9601	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_ELPIS  
 Water Temperature

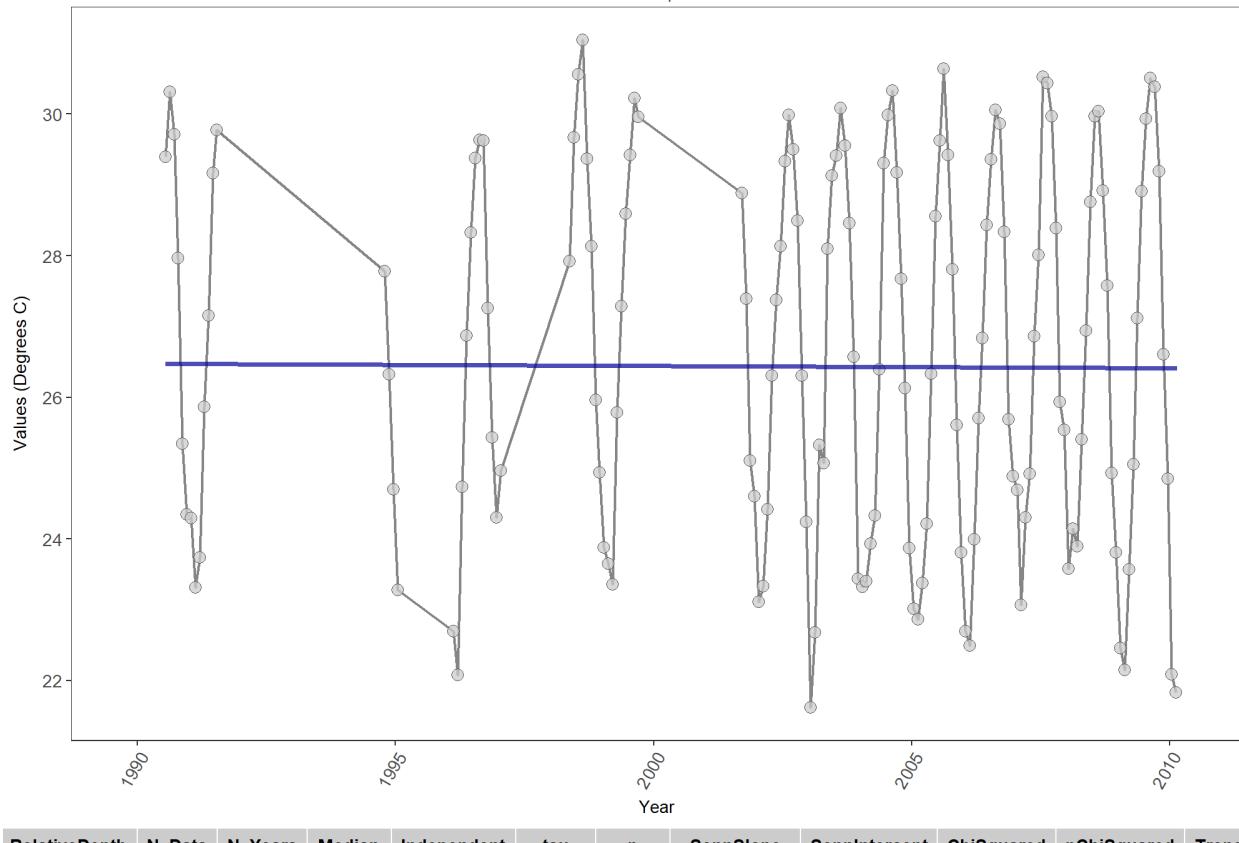


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	31035	8	26.3487	TRUE	0.0554	0.5313	0.04028765	25.89604	13.9061	0.2382	0

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_GRECIAN  
 Water Temperature

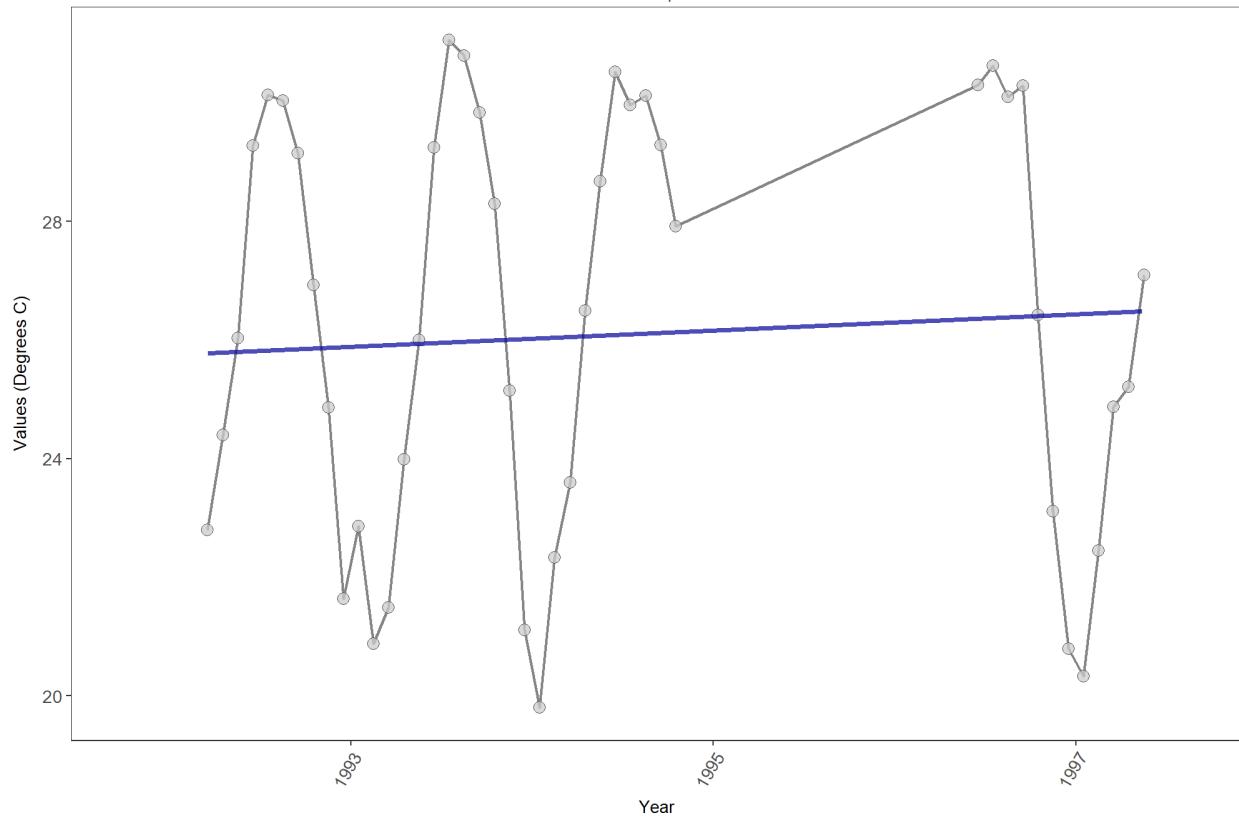


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	51723	18	26.6537	TRUE	-0.0317	0.6634	-0.003490323	26.47889	10.1713	0.515	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

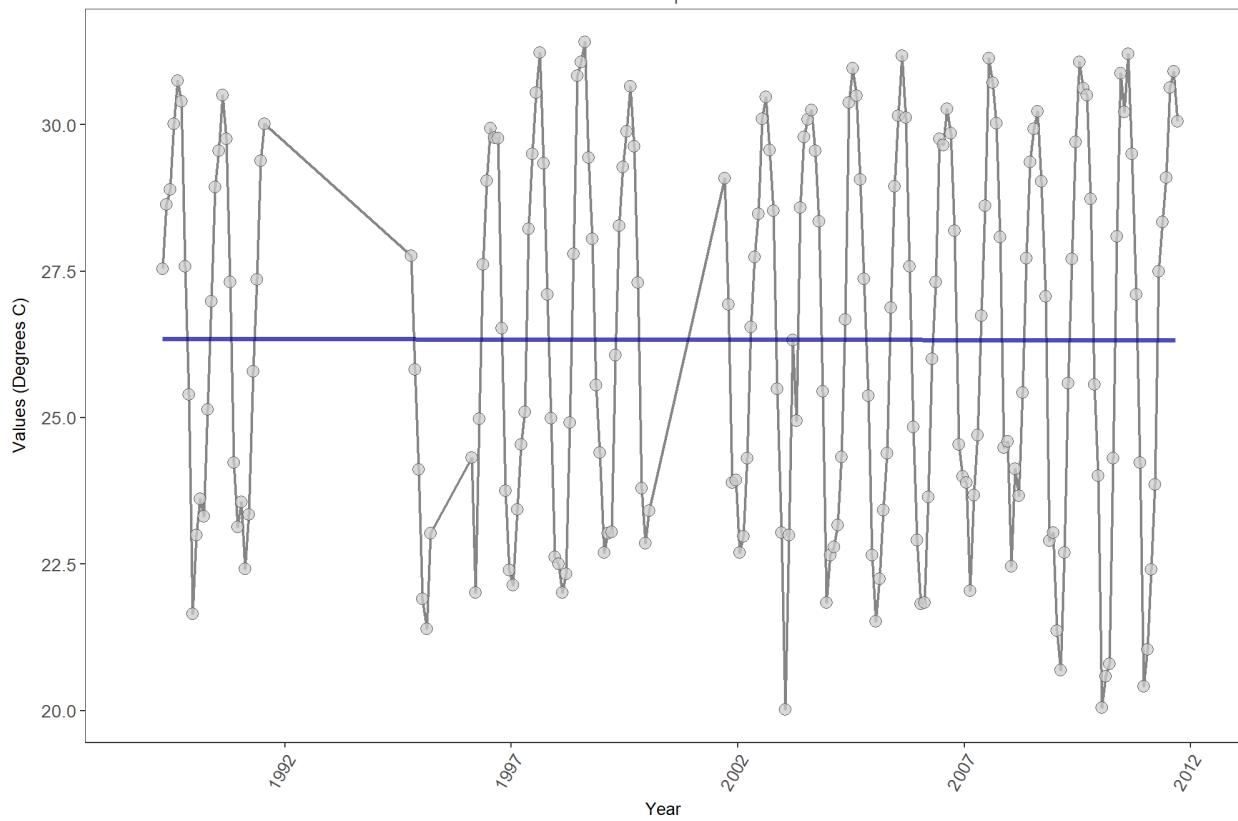
Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_HARBORKEY**  
 Water Temperature



*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_HEN&CHIX  
 Water Temperature

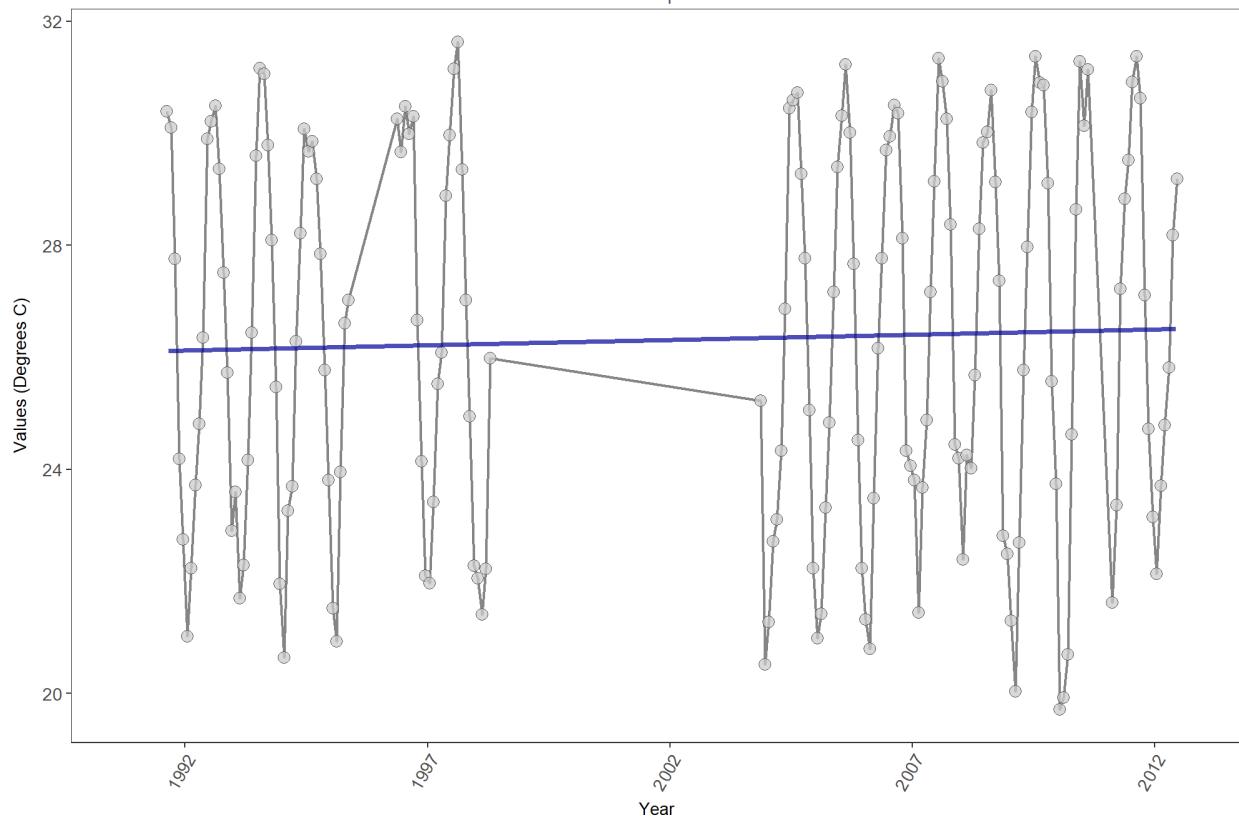


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	72285	21	26.5	TRUE	-0.0085	0.8763	-0.001228167	26.34774	14.6961	0.1968	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKMS\_KW\_CHANL  
 Water Temperature

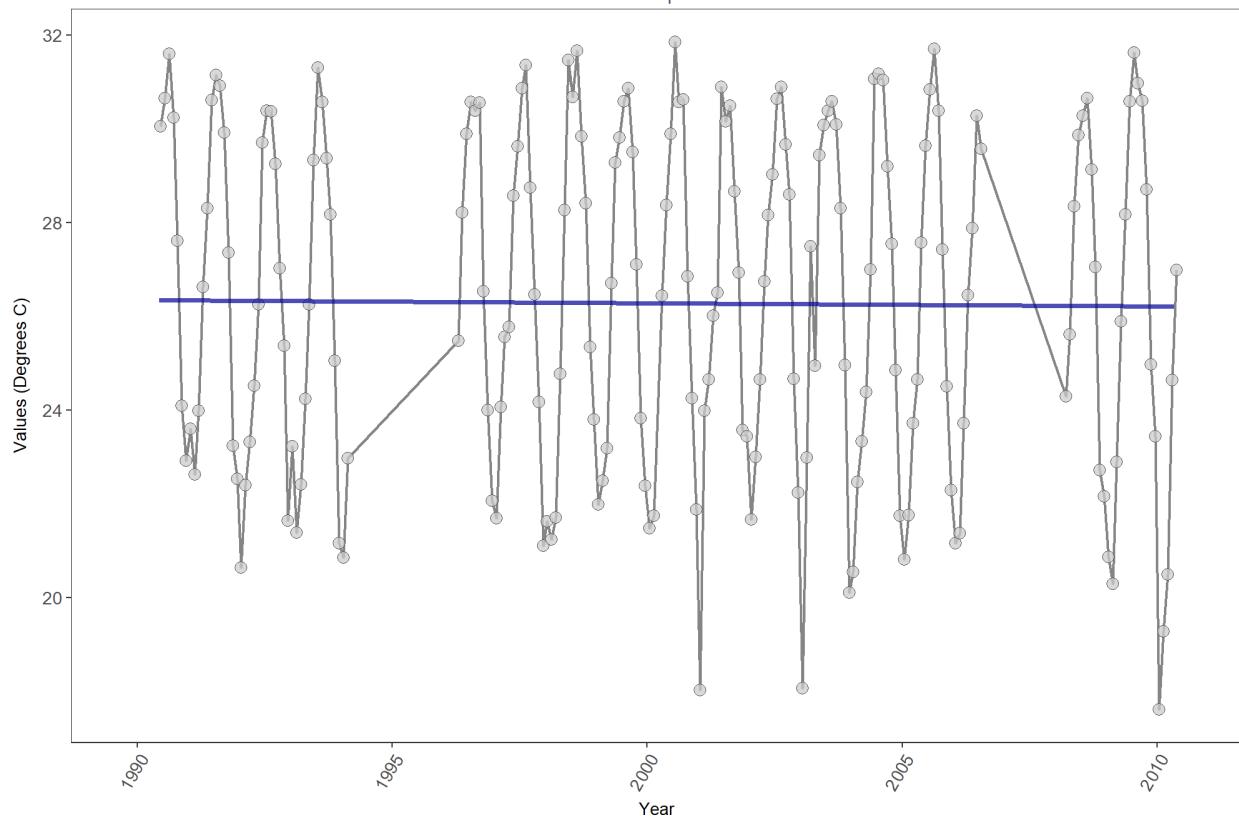


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	123578	18	26.2719	TRUE	0.1034	0.0805	0.01870402	26.10889	10.0738	0.5238	0

$p < 0.00005$  appear as 0 due to rounding.

SennIntercept is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_LONG\_KEY**  
 Water Temperature

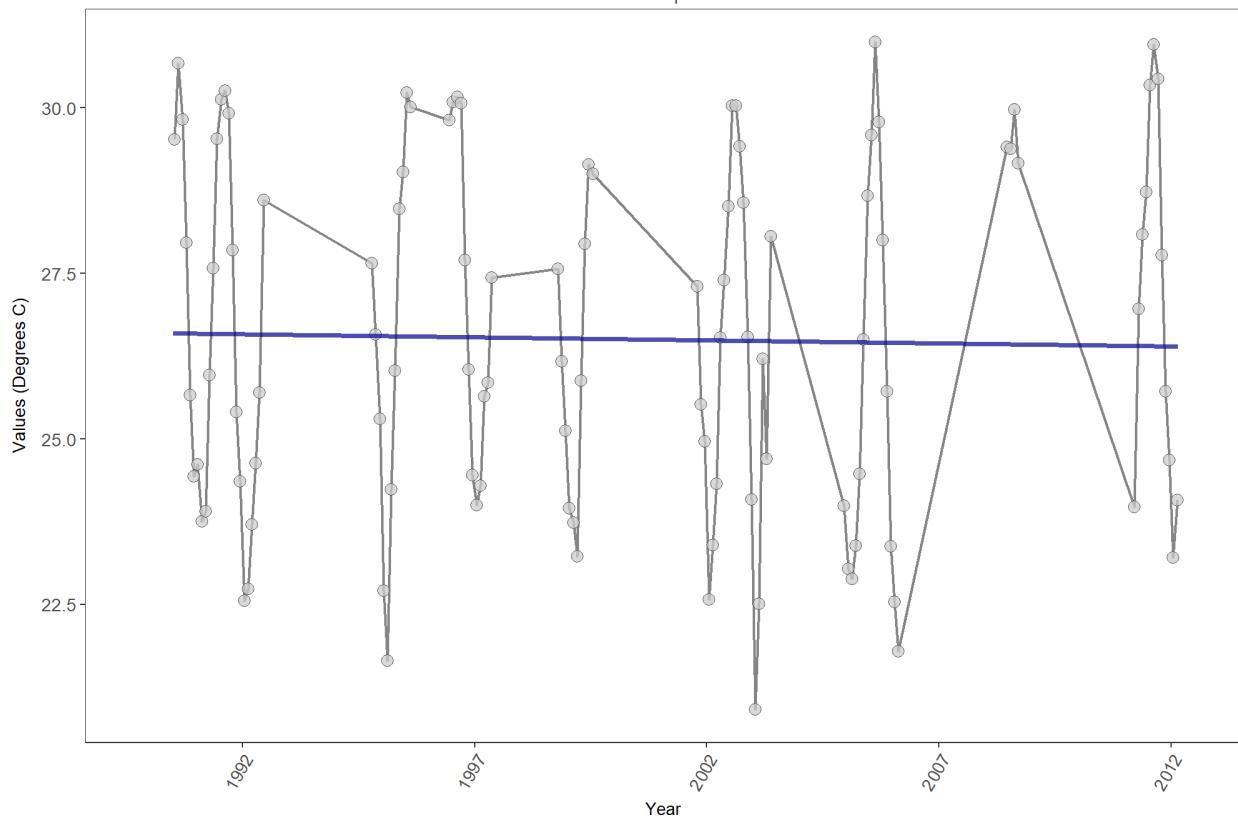


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	69656	19	26.63535	TRUE	-0.0313	0.5769	-0.006707473	26.35111	9.5462	0.5716	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_LOOE\_BACK  
 Water Temperature

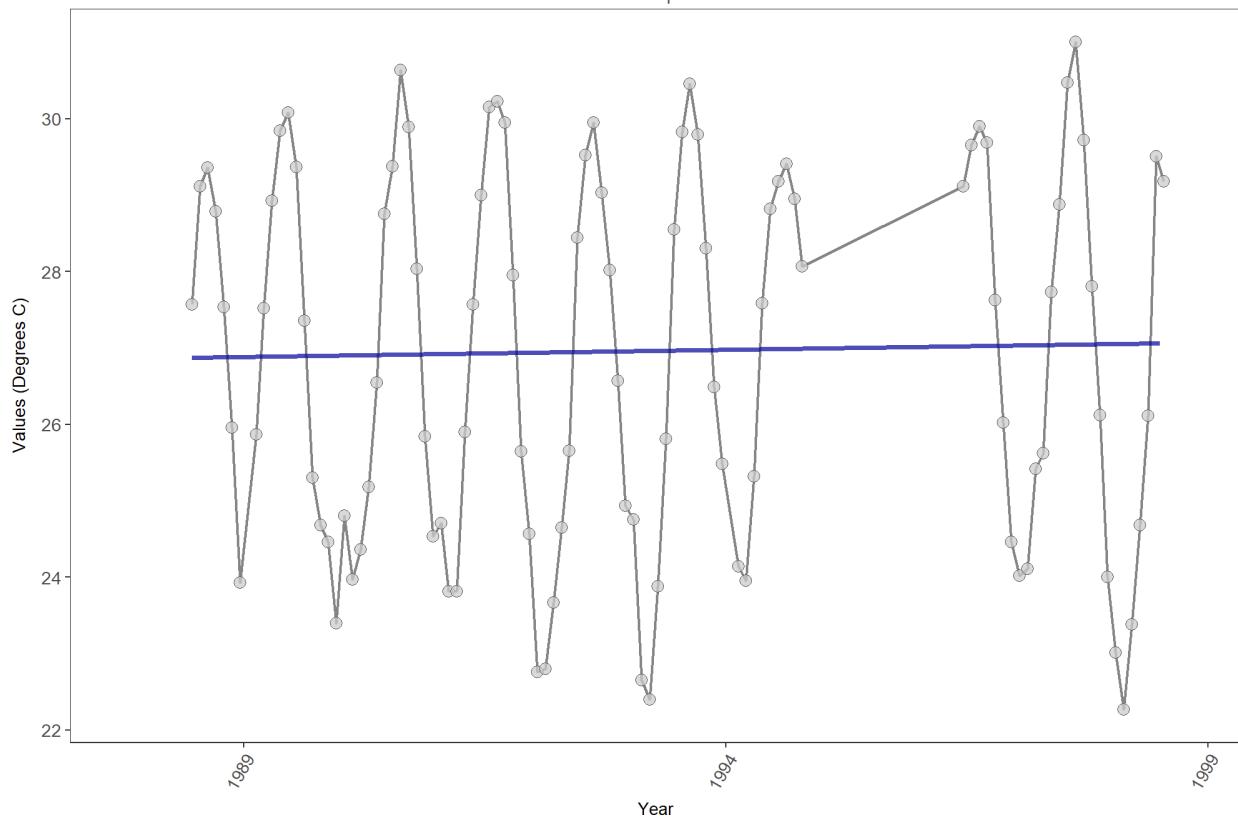


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	84984	18	26.8	TRUE	-0.0588	0.4216	-0.009048563	26.5961	2.7471	0.9937	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_LOOE\_BUOY5  
 Water Temperature

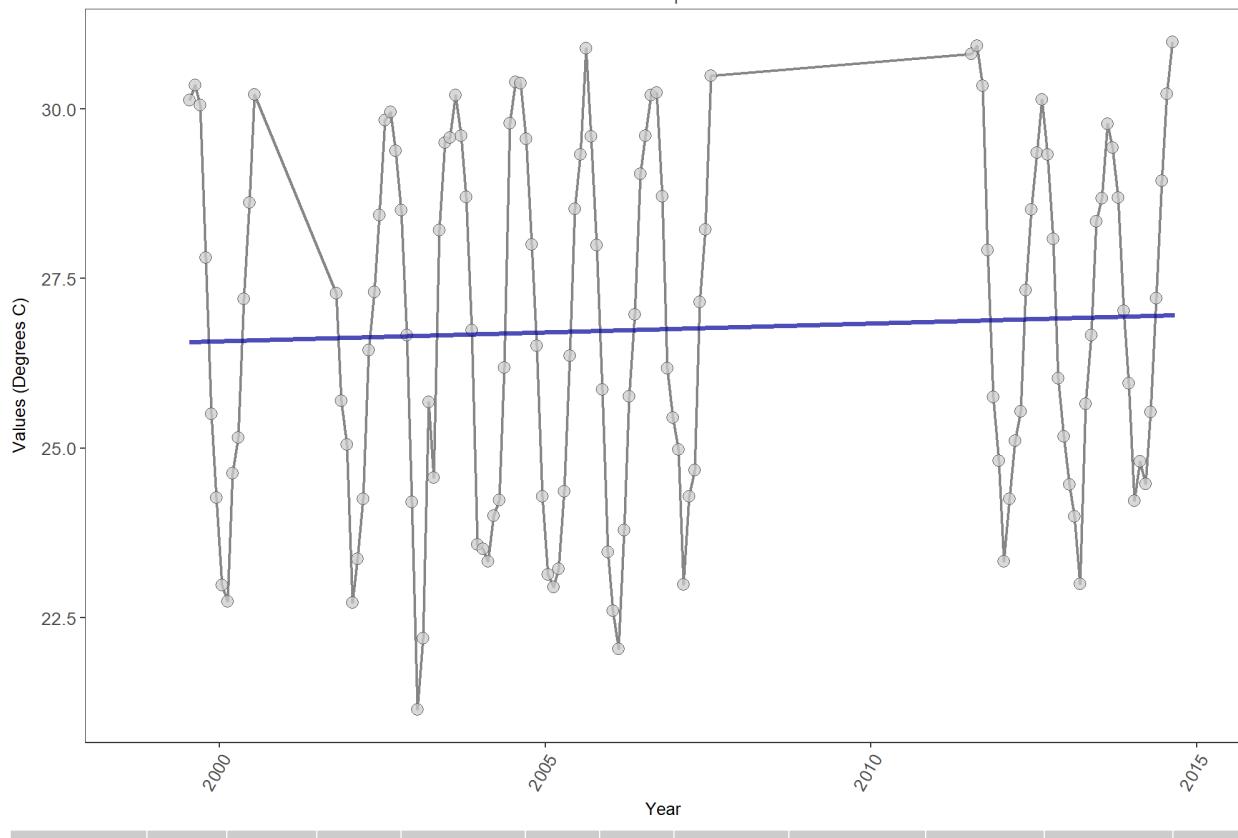


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	35252	10	26.9	TRUE	0.0493	0.3627	0.01930272	26.85949	13.6928	0.2505	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_LOOE\_ISELIN**  
 Water Temperature

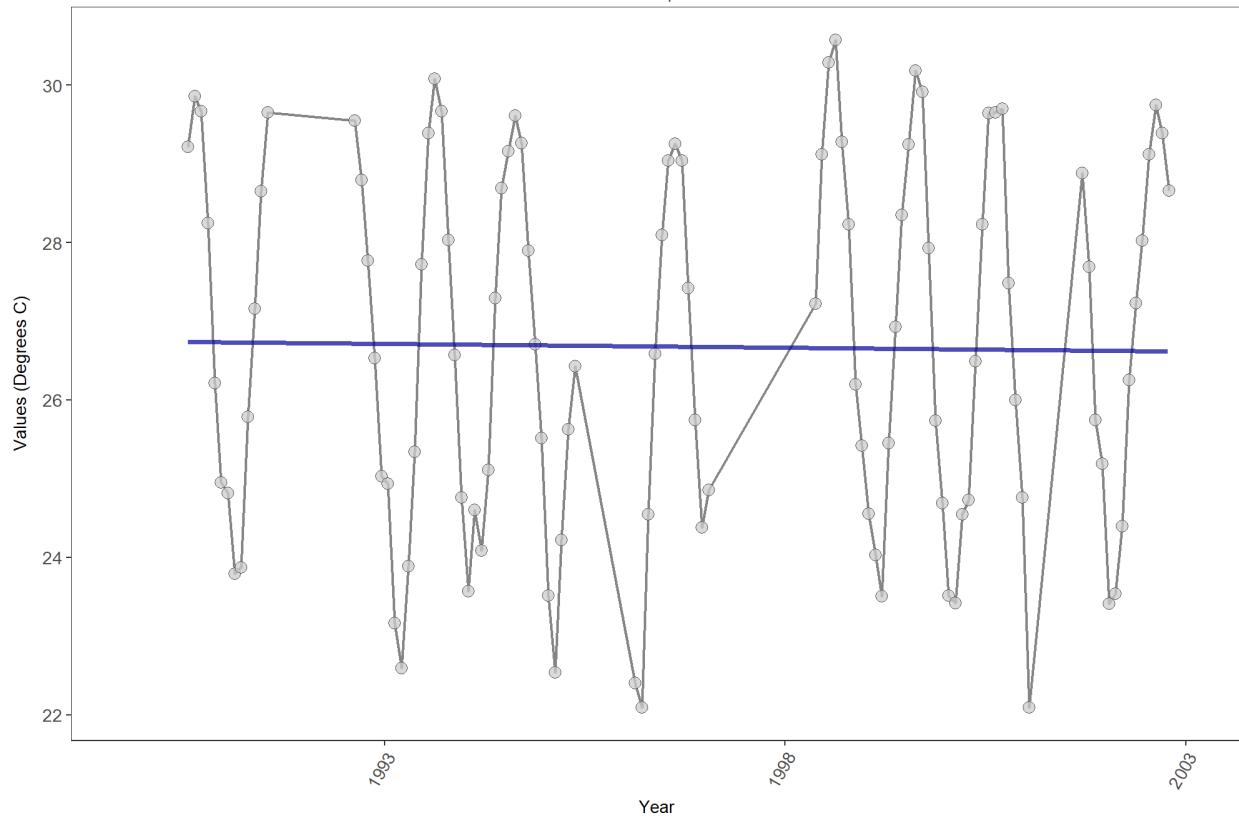


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	194367	13	26.8781	TRUE	0.1294	0.0801	0.02613332	26.54692	8.8436	0.6363	0

$p < 0.00005$  appear as 0 due to rounding.

*SennIntercept* is intercept value at beginning of record for monitoring location

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_MOLASSES**  
 Water Temperature

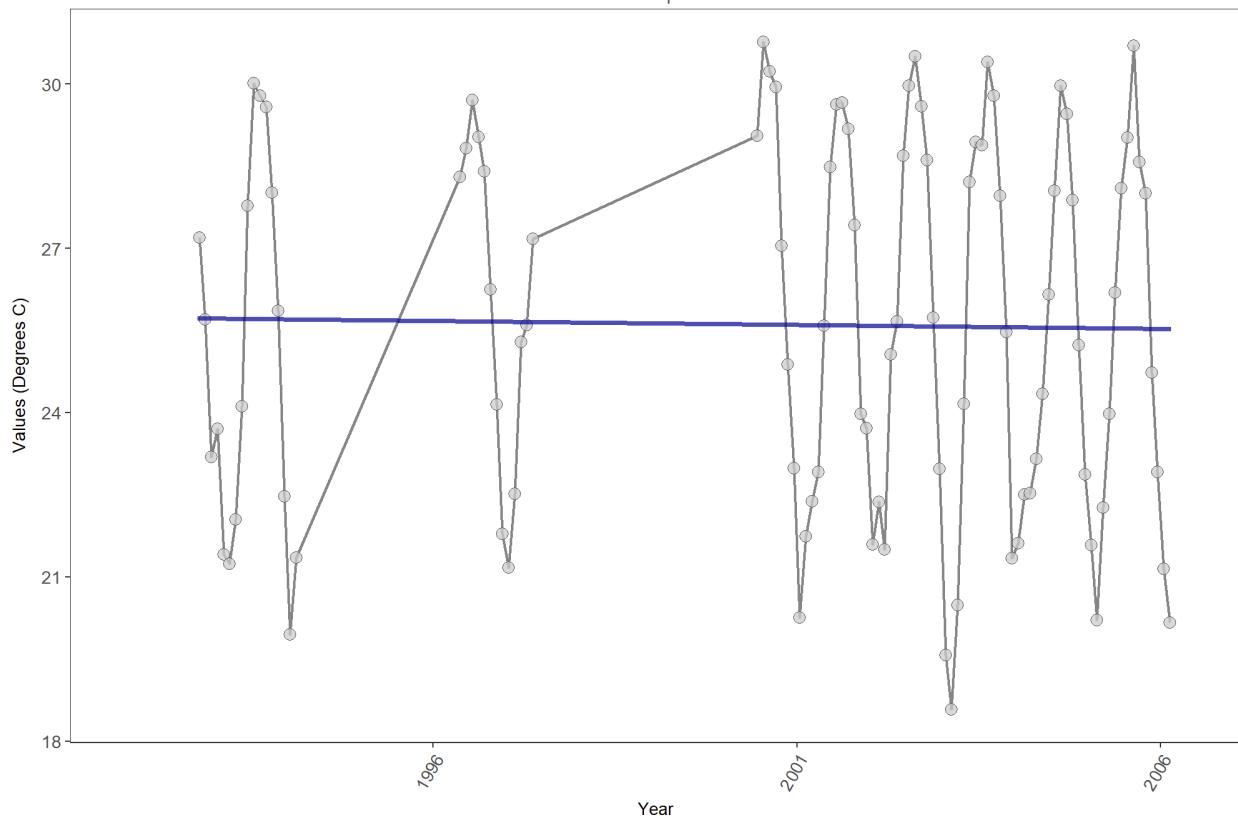


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	36146	13	26.7	TRUE	-0.0539	0.4806	-0.009538945	26.74323	10.5494	0.4817	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_NEWSGROUND  
 Water Temperature

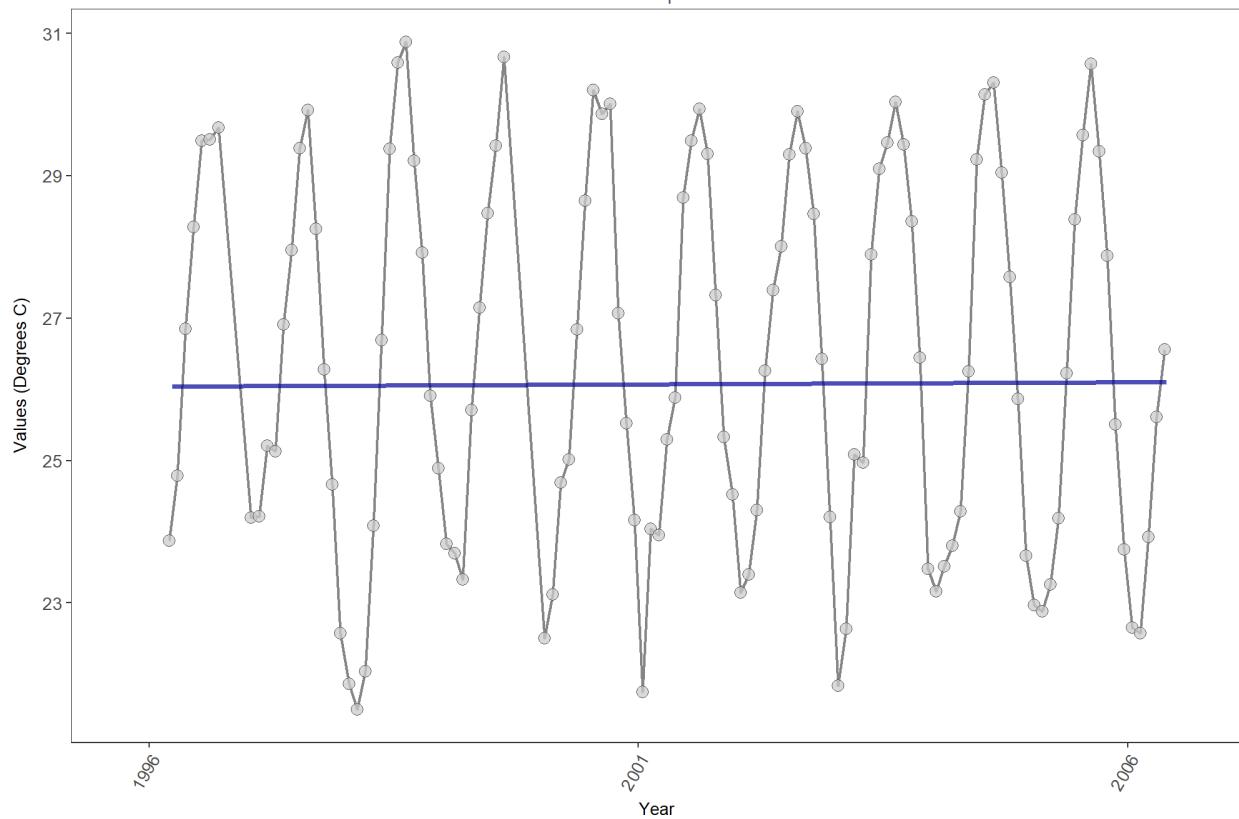


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	35329	12	25.4929	TRUE	-0.0534	0.5207	-0.01390845	25.72914	10.2425	0.5087	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_PILLAR  
 Water Temperature

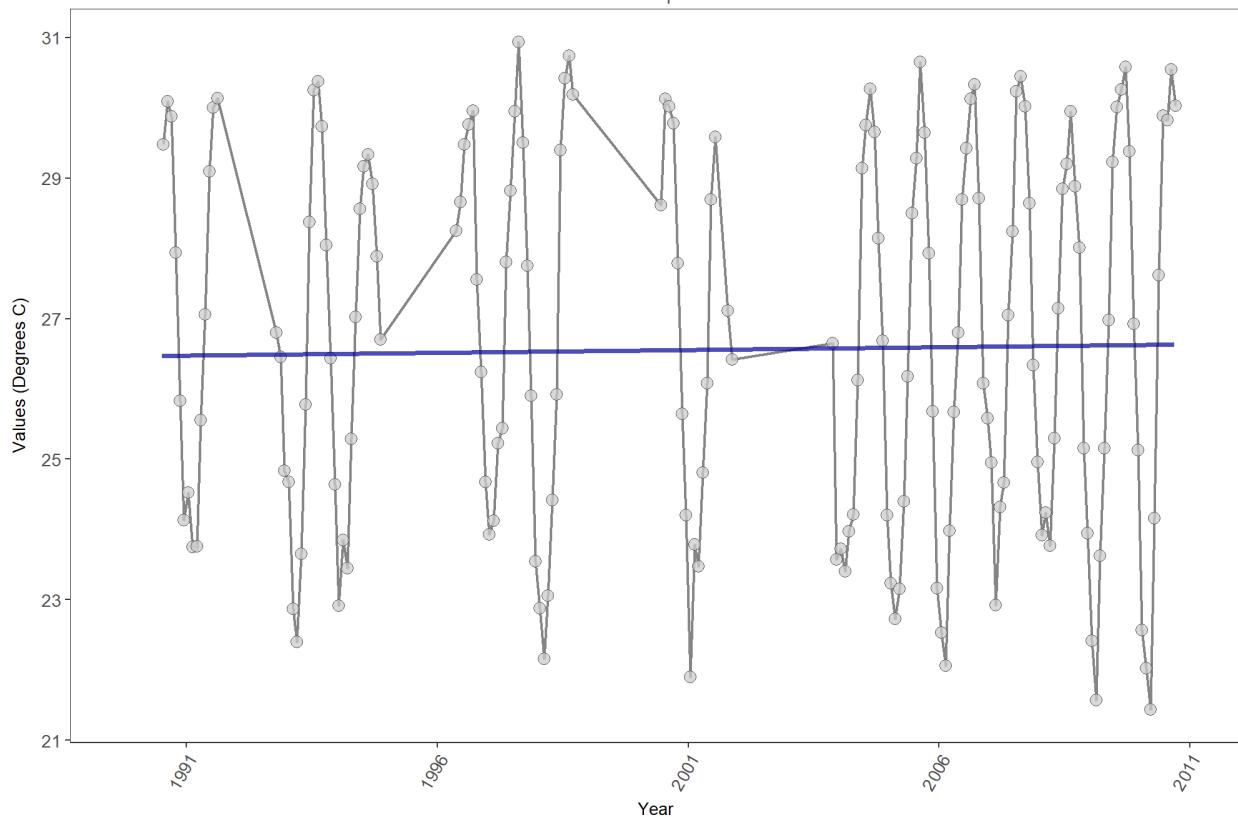


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	40805	11	26.243	TRUE	0.0163	0.9363	0.006506991	26.03793	7.3311	0.7717	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_SAND\_KEY**  
 Water Temperature

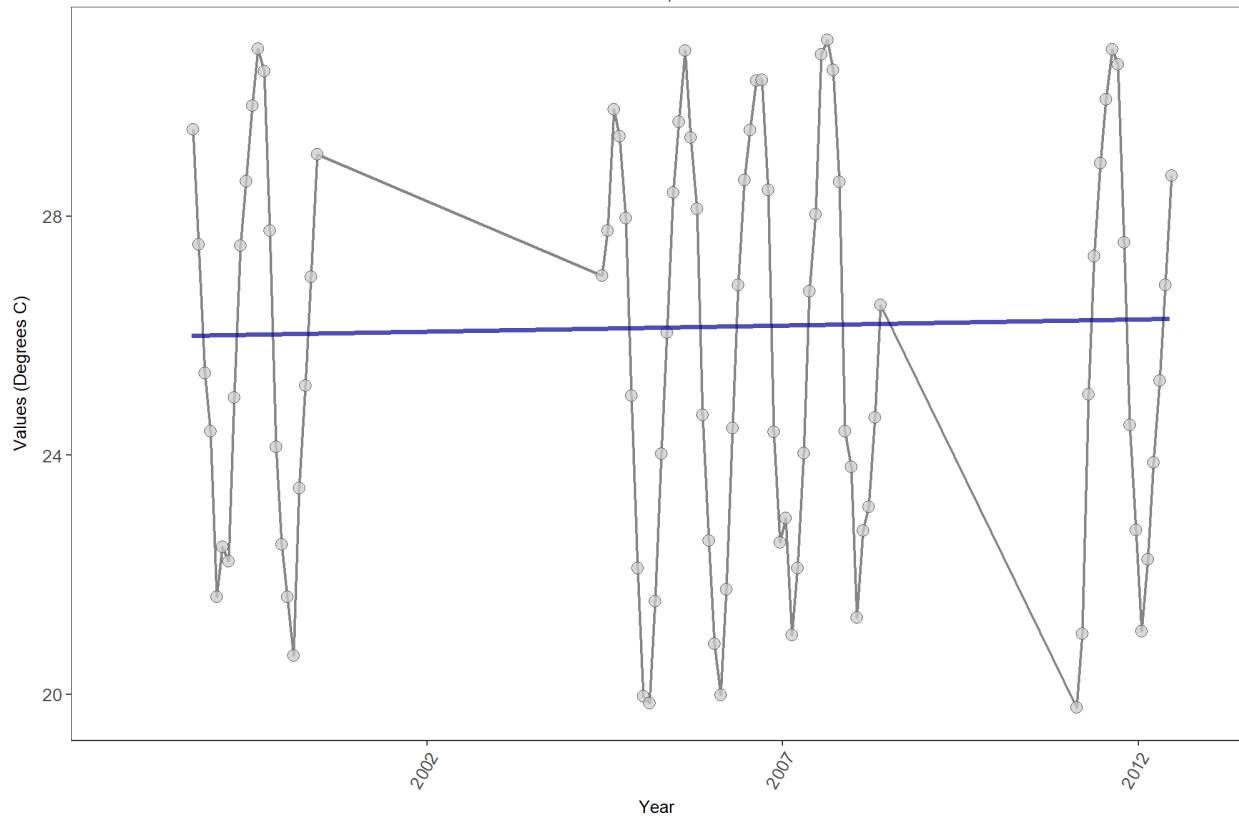


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	59287	18	26.7	TRUE	0.0532	0.3230	0.00790518	26.46411	12.8275	0.3047	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SMITH\_SHL  
 Water Temperature

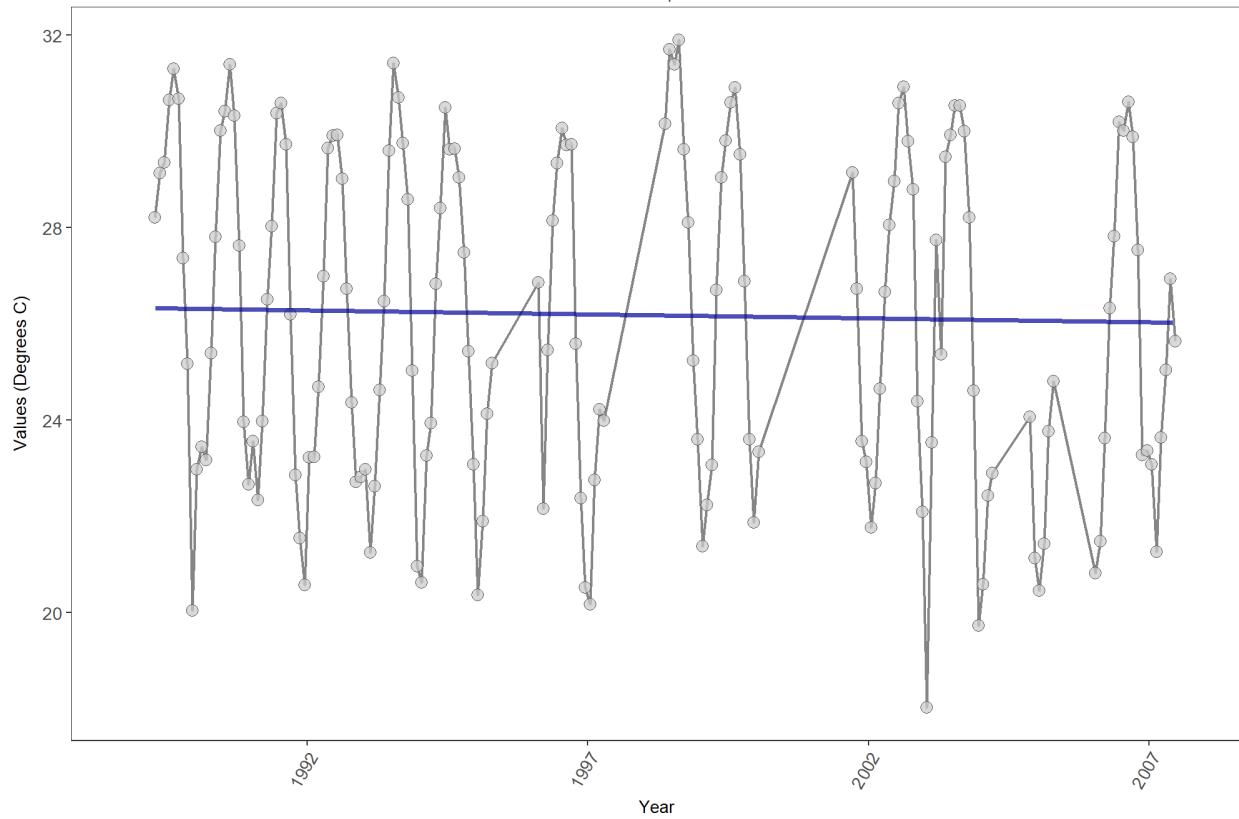


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	94527	10	25.4464	TRUE	0.1271	0.1933	0.02024458	25.98996	6.1795	0.8611	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_SNAKE\_CRK**  
 Water Temperature

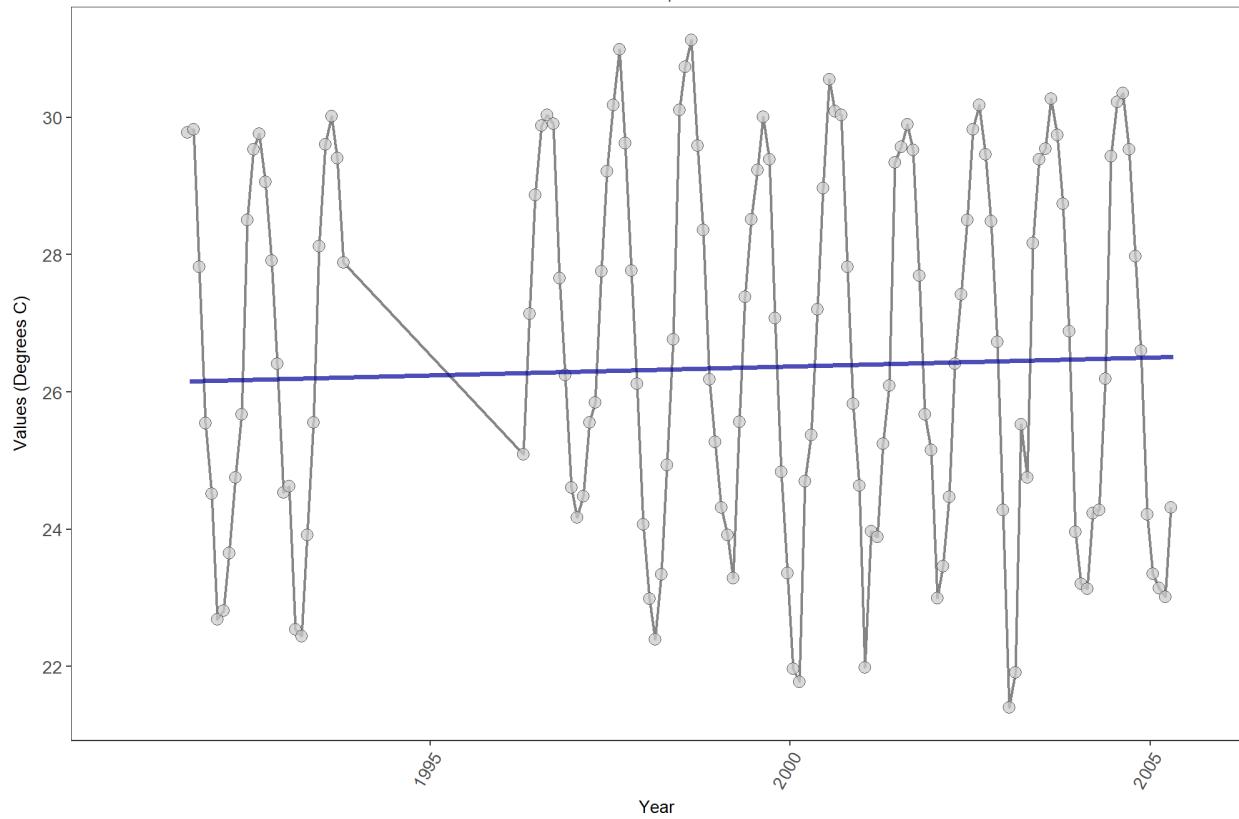


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	56777	19	26.1553	TRUE	-0.0585	0.2771	-0.01634269	26.32951	8.7565	0.6444	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKMS\_SOMBREO  
 Water Temperature

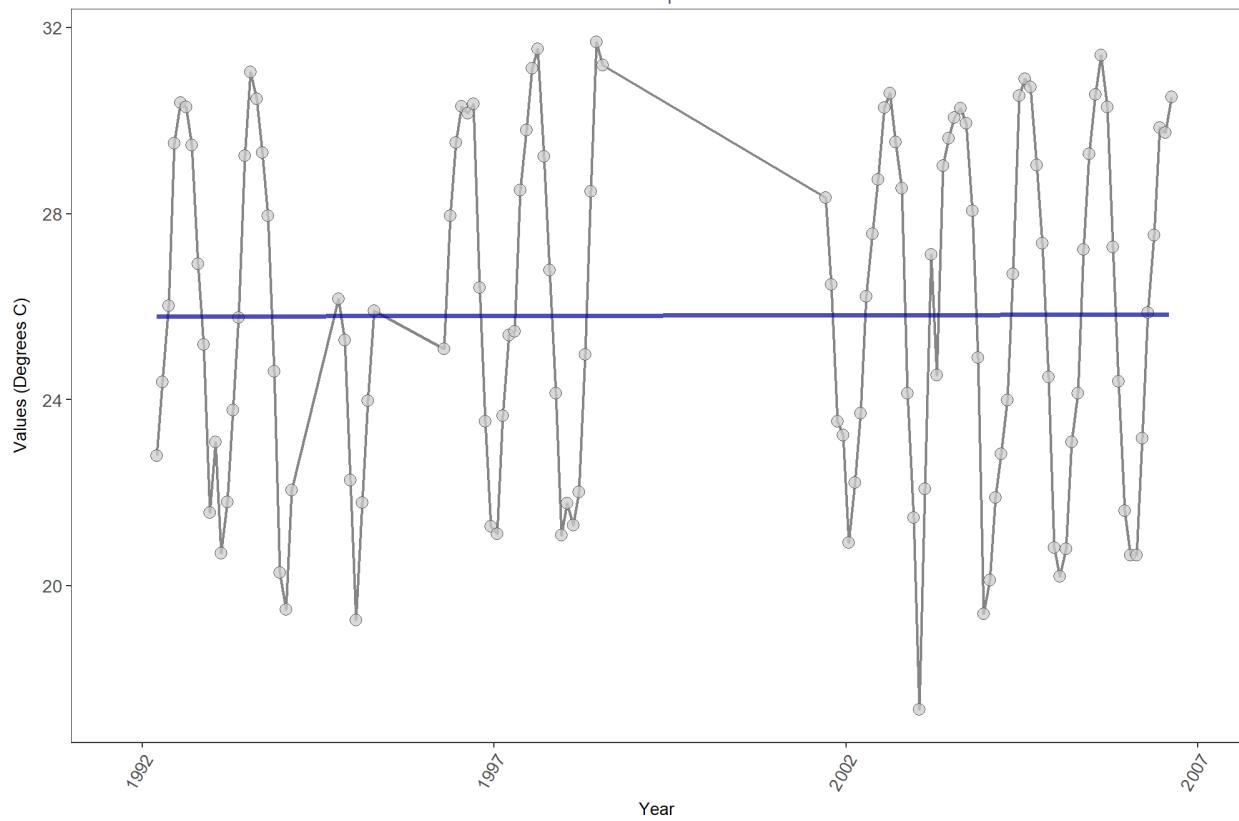


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	48974	13	26.5	TRUE	0.1297	0.0508	0.02626158	26.13611	8.8227	0.6383	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_SPRIGGER**  
 Water Temperature

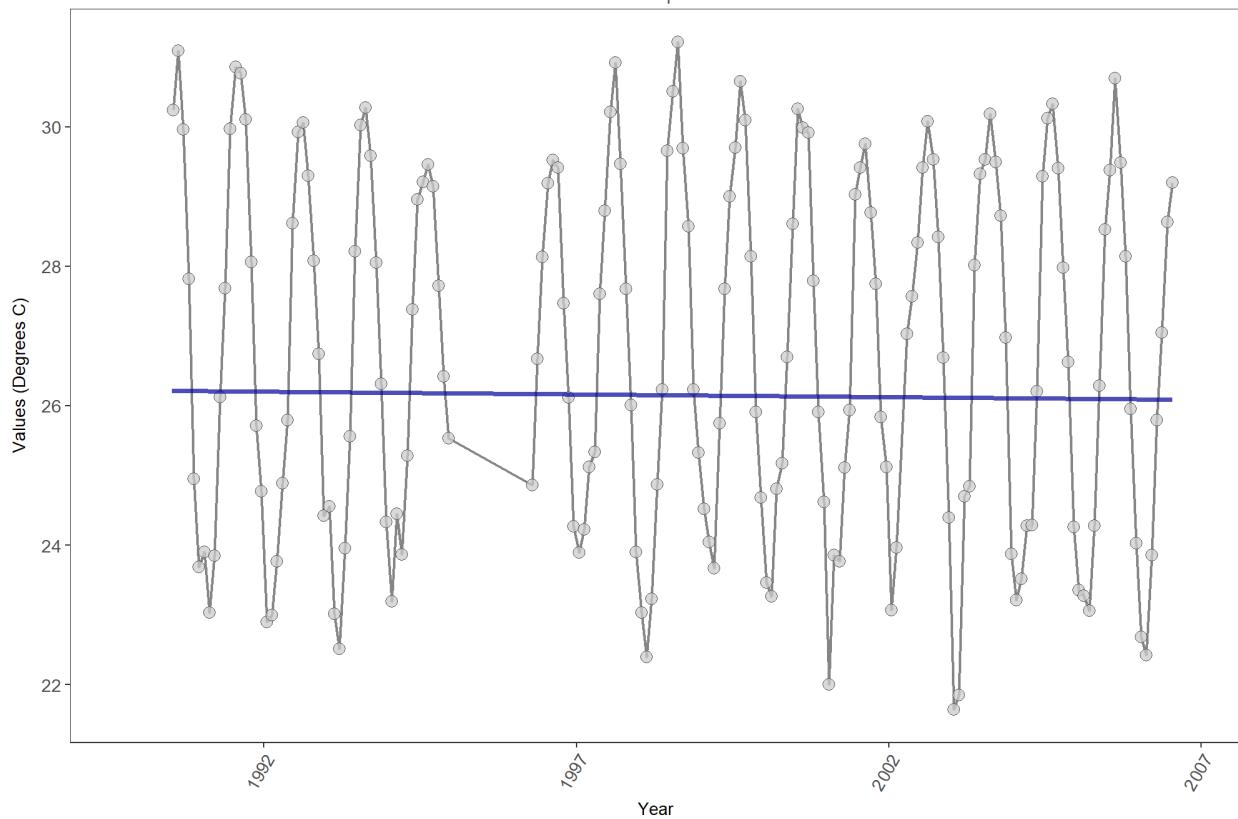


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	41834	13	26.1	TRUE	0.0176	0.8553	0.002975159	25.78396	6.9677	0.8017	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNNMS\_TENN\_REEF  
 Water Temperature

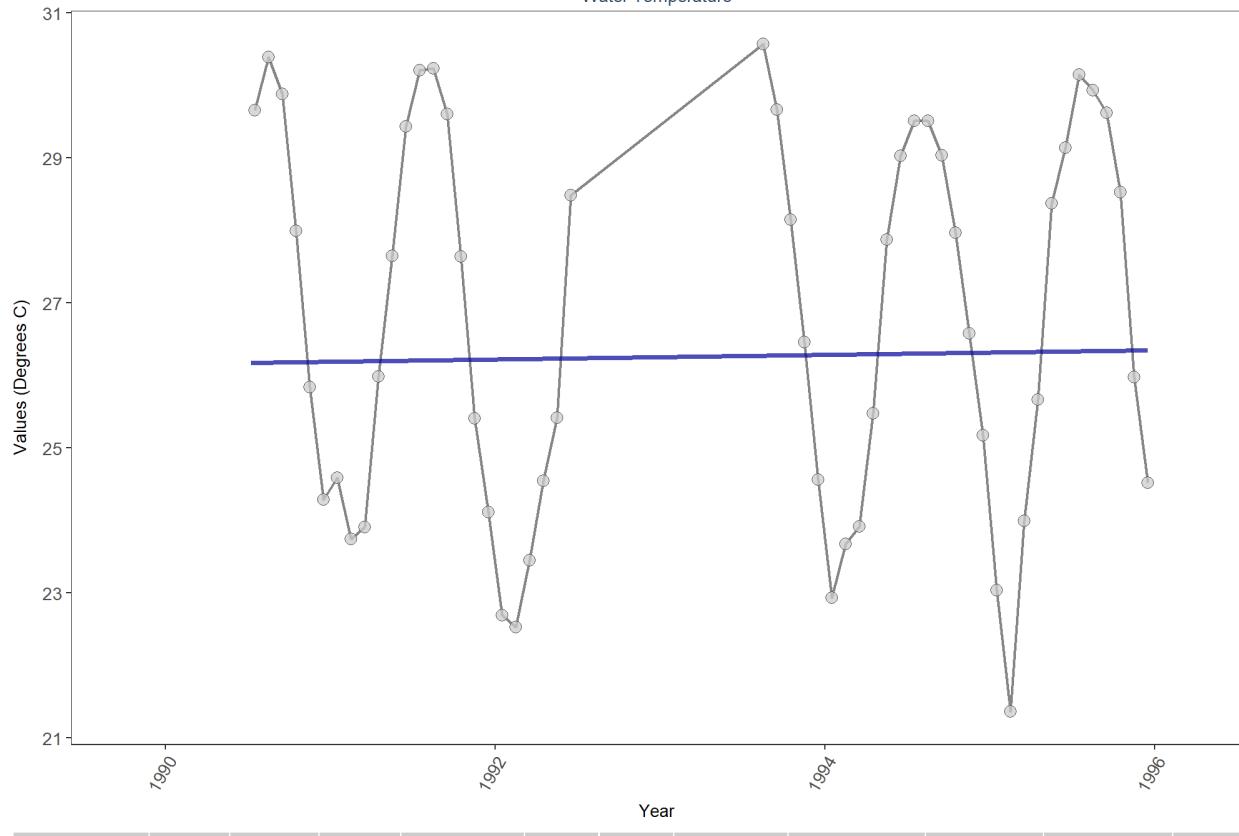


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	63260	16	26.7	TRUE	-0.0607	0.2738	-0.007926261	26.21651	8.028	0.7108	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_W\_SAMBO  
 Water Temperature

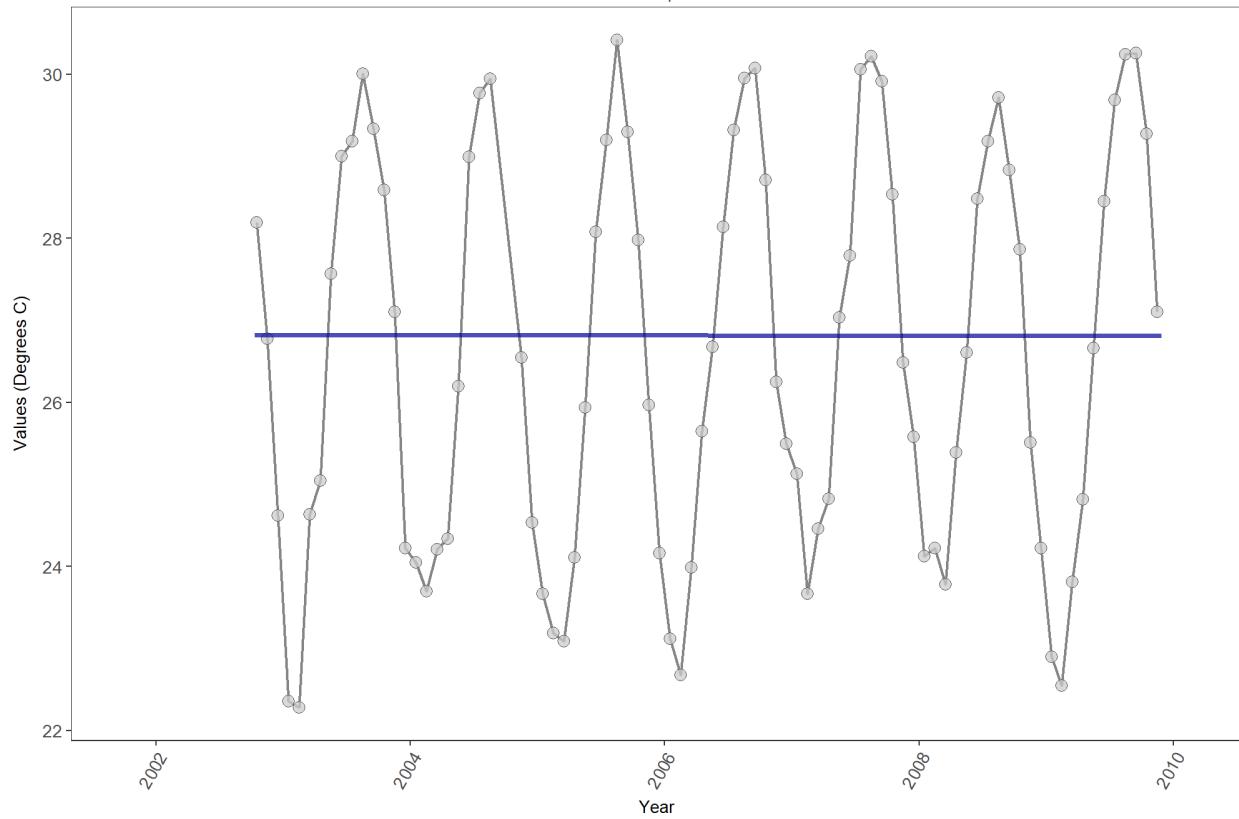


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	18786	6	26.9	TRUE	0.0881	0.5597	0.03038889	26.16243	9.8827	0.541	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_WELLWOOD**  
 Water Temperature

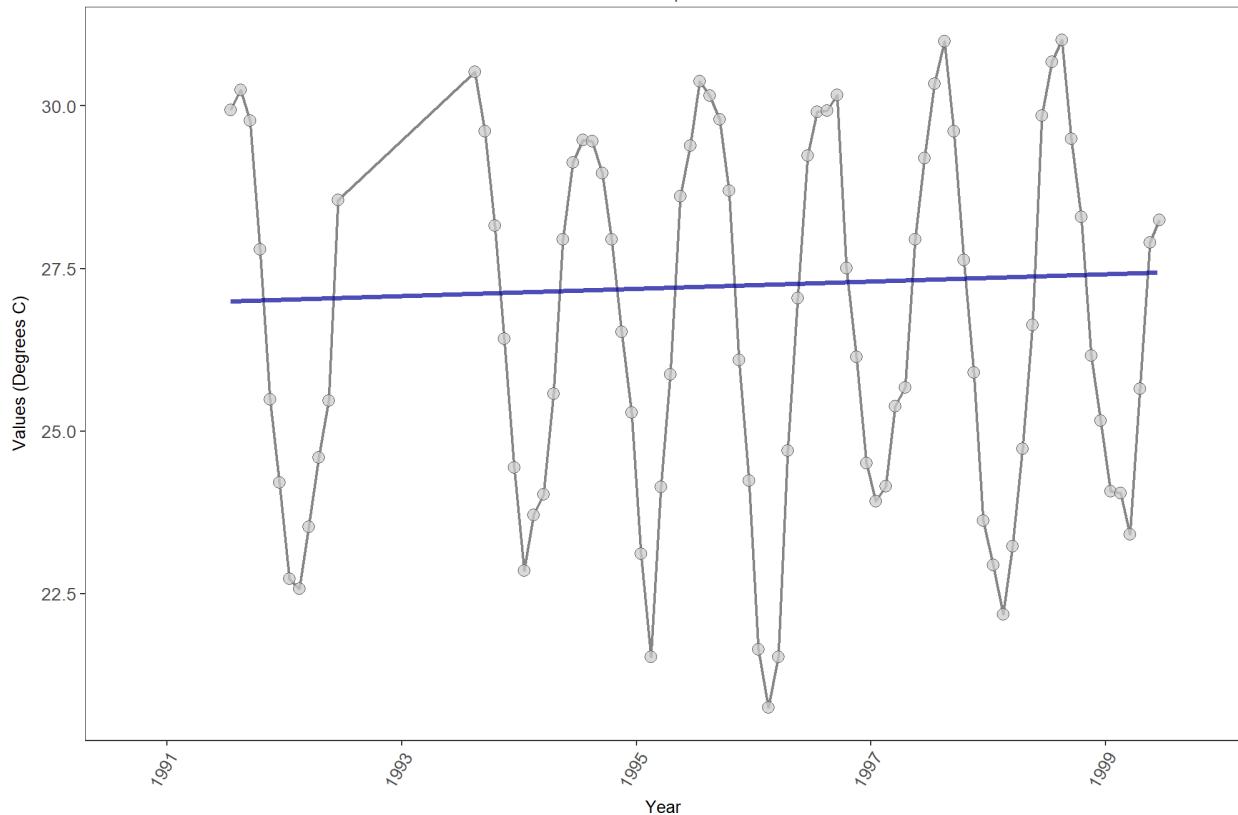


RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	30427	8	26.43	TRUE	0.0018	1.0000	-0.0002133333	26.8169	4.1607	0.965	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_WS\_JACKYL  
 Water Temperature



RelativeDepth	N_Data	N_Years	Median	Independent	tau	p	SennSlope	SennIntercept	ChiSquared	pChiSquared	Trend
bottom	29557	9	26.4	TRUE	0.1663	0.0860	0.05625896	26.96473	3.5723	0.9808	0

*p < 0.00005 appear as 0 due to rounding.*

*SennIntercept is intercept value at beginning of record for monitoring location*

### Appendix III: Monitoring Location Summary Box Plots

Data is taken and grouped by MonitoringID. The scripts that create plots follow this format

1. Use the data set that only has `Use_In_Analysis` of TRUE for the desired monitoring location
2. Determine the earliest and latest year of the data to create x-axis scale and intervals
3. Determine the minimum, mean, and standard deviation for the data to be used for y-axis scales
  - Excludes the top 2% of values to reduce the impact of extreme outliers on the y-axis scale
4. Set what values are to be used for the x-axis, y-axis, and the variable that should determine groups for the box plots
5. Set the plot type as a box plot with the size of the outlier points
6. Create the title, x-axis, y-axis, and color fill labels
7. Set the y and x limits
8. Make the axis labels bold
9. Plot the arrangement as a set of panels

The following plots are arranged by MonitoringID with data grouped by Year, then Year and Month, then finally Month only. Each program area will have 3 sets of plots, each with 3 panels in them. Each panel goes as follows:

1. Y-axis autoscaled
2. Y-axis set to be mean + 4 times the standard deviation
3. Y-axis set to be mean + 4 times the standard deviation for most recent 10 years of data

```
# Determines whether analyzed monitoring locations exist. If they do, begins
# looping through them
if(n==0){
  print("There are no monitoring locations that qualify.")
} else {
  # Begin looping through monitoringg locations
  for (i in 1:n) {
    # Determine upper and lower bounds of time for x-axis
    year_lower <- min(data$Year[data$Use_In_Analysis==TRUE &
                                data$MonitoringID==Mon_IDs[i]])
    year_upper <- max(data$Year[data$Use_In_Analysis==TRUE &
                                data$MonitoringID==Mon_IDs[i]])

    # Determine upper and lower bounds of ResultValue for y-axis
    min_RV <- min(data$ResultValue[data$Use_In_Analysis==TRUE &
                                data$MonitoringID==Mon_IDs[i]])
    mn_RV <- mean(data$ResultValue[data$Use_In_Analysis==TRUE &
                                data$MonitoringID==Mon_IDs[i] &
                                data$ResultValue <
                                quantile(data$ResultValue, 0.98)])
    sd_RV <- sd(data$ResultValue[data$Use_In_Analysis==TRUE &
                                data$MonitoringID==Mon_IDs[i] &
                                data$ResultValue <
                                quantile(data$ResultValue, 0.98)])

    # Sets x- and y-axis scale
    x_scale <- ifelse(year_upper - year_lower > 30, 10, 5)
    y_scale <- mn_RV + 4 * sd_RV
    # Gets managed area name for title
    MA_name <- skt_stats$ManagedAreaName[skt_stats$MonitoringID==Mon_IDs[i]]
    # Gets program location name for title
    Mon_name <- paste0(skt_stats$ProgramID[skt_stats$MonitoringID==Mon_IDs[i]],
                        "\n", skt_stats$ProgramName[skt_stats$MonitoringID==Mon_IDs[i]], "\n",
                        skt_stats$ProgramLocationID[skt_stats$MonitoringID==Mon_IDs[i]])

    ##Year plots
    # Create plot object for auto-scaled y-axis plot
    p1 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                            data$MonitoringID==Mon_IDs[i], ],
                  aes(x=Year, y=ResultValue, group=Year)) +
      geom_boxplot(color="#333333", fill="#cccccc", outlier.shape=21,
                   outlier.size=3, outlier.color="#333333",
                   outlier.fill="#cccccc", outlier.alpha=0.75) +
      labs(subtitle="Autoscale",
           x="Year", y=paste0("Values (", unit, ")")) +
      scale_x_continuous(limits=c(year_lower - 1, year_upper + 1),
                         breaks=rev(seq(year_upper,
                                       year_lower, -x_scale))) +
      # Add other layers here if needed
  }
}
```

```

plot_theme
# Create plot object for y-axis scaled plot
p2 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i], ],
              aes(x=Year, y=ResultValue, group=Year)) +
  geom_boxplot(color="#333333", fill="#cccccc", outlier.shape=21,
               outlier.size=3, outlier.color="#333333",
               outlier.fill="#cccccc", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation",
       x="Year", y=paste0("Values (", unit, ")")) +
  ylim(min_RV, y_scale) +
  scale_x_continuous(limits=c(year_lower - 1, year_upper + 1),
                     breaks=rev(seq(year_upper,
                                   year_lower, -x_scale))) +
  plot_theme
# Create plot object for y-axis scaled plot for past 10 years
p3 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i] &
                        data$Year>=year_upper-10, ],
              aes(x=Year, y=ResultValue, group=Year)) +
  geom_boxplot(color="#333333", fill="#cccccc", outlier.shape=21,
               outlier.size=3, outlier.color="#333333",
               outlier.fill="#cccccc", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation, Last 10 Years",
       x="Year", y=paste0("Values (", unit, ")")) +
  ylim(min_RV, y_scale) +
  scale_x_continuous(limits=c(year_upper - 10.5, year_upper + 1),
                     breaks=rev(seq(year_upper, year_upper - 10,-2))) +
  plot_theme
# Arrange plot objects
Yset <- ggarrange(p1, p2, p3, ncol=1)
# Create plot title object
p0 <- ggplot() + labs(title=paste0(MA_name, "\n", Mon_name),
                       subtitle="By Year") +
  plot_theme + theme(panel.border=element_blank(),
                     panel.grid.major=element_blank(),
                     panel.grid.minor=element_blank(),
                     axis.line=element_blank())

## Year & Month Plots
# Create plot object for auto-scaled y-axis plot
p4 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i], ],
              aes(x=YearMonthDec, y=ResultValue,
                  group=YearMonth, color=as.factor(Month))) +
  geom_boxplot(fill="#cccccc", outlier.size=1.5, outlier.alpha=0.75) +
  labs(subtitle="Autoscale",
       x="Year", y=paste0("Values (", unit, ")"), color="Month") +
  scale_x_continuous(limits=c(year_lower - 1, year_upper + 1),
                     breaks=rev(seq(year_upper,
                                   year_lower, -x_scale))) +
  plot_theme +

```

```

    theme(legend.position="none")
# Create plot object for y-axis scaled plot
p5 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i], ],
              aes(x=YearMonthDec, y=ResultValue,
                  group=YearMonth, color=as.factor(Month))) +
  geom_boxplot(fill="#cccccc", outlier.size=1.5, outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation",
       x="Year", y=paste0("Values (", unit, ")"), color="Month") +
  ylim(min_RV, y_scale) +
  scale_x_continuous(limits=c(year_lower - 1, year_upper + 1),
                     breaks=rev(seq(year_upper,
                                    year_lower, -x_scale))) +
  plot_theme +
  theme(legend.position="top", legend.box="horizontal") +
  guides(color=guide_legend(nrow=1))
# Create plot object for y-axis scaled plot for past 10 years
p6 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i], ],
              aes(x=YearMonthDec, y=ResultValue,
                  group=YearMonth, color=as.factor(Month))) +
  geom_boxplot(fill="#cccccc", outlier.size=1.5, outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation, Last 10 Years",
       x="Year", y=paste0("Values (", unit, ")"), color="Month") +
  ylim(min_RV, y_scale) +
  scale_x_continuous(limits=c(year_upper - 10.5, year_upper + 1),
                     breaks=rev(seq(year_upper, year_upper - 10,-2))) +
  plot_theme +
  theme(legend.position="none")
# Create legend object
leg1 <- get_legend(p5)
# Arrange plots and legend
YMset <- ggarrange(leg1, p4, p5 + theme(legend.position="none"), p6,
                    ncol=1, heights=c(0.1, 1, 1, 1))
# Create plot title object
p00 <- ggplot() + labs(title=paste0(MA_name, "\n", Mon_name),
                        subtitle="By Year & Month") + plot_theme +
  theme(panel.border=element_blank(),
        panel.grid.major=element_blank(),
        panel.grid.minor=element_blank(), axis.line=element_blank())

## Month Plots
# Create plot object for auto-scaled y-axis plot
p7 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i], ],
              aes(x=Month, y=ResultValue,
                  group=Month, fill=as.factor(Month))) +
  geom_boxplot(color="#333333", outlier.shape=21, outlier.size=3,
               outlier.color="#333333", outlier.alpha=0.75) +
  labs(subtitle="Autoscale",
       x="Month", y=paste0("Values (", unit, ")"), fill="Month") +
  scale_x_continuous(limits=c(0, 13), breaks=seq(3, 12, 3)) +
  plot_theme +

```

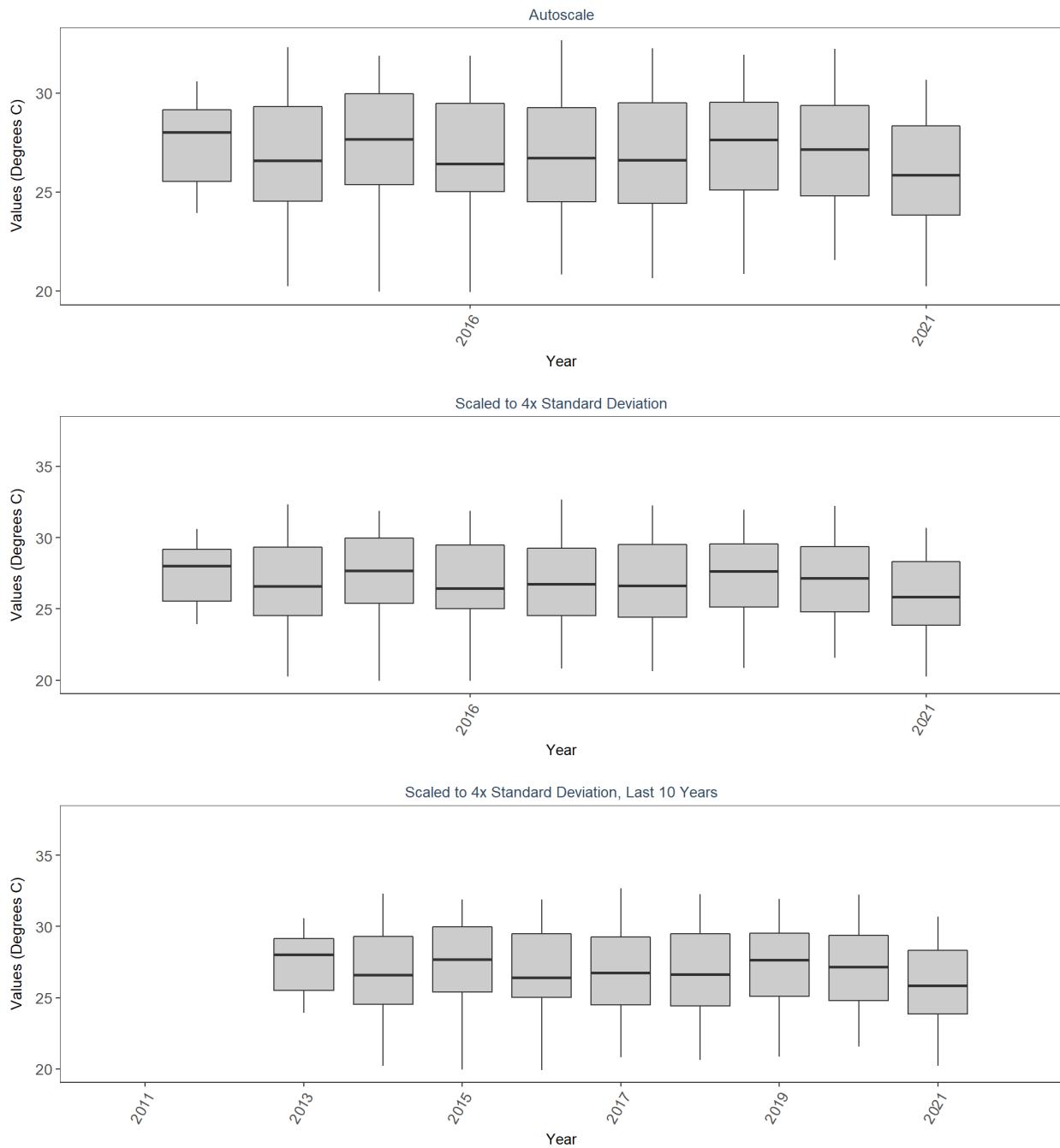
```

    theme(legend.position="none")
# Create plot object for y-axis scaled plot
p8 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i], ],
              aes(x=Month, y=ResultValue,
                  group=Month, fill=as.factor(Month))) +
  geom_boxplot(color="#333333", outlier.shape=21, outlier.size=3,
               outlier.color="#333333", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation",
       x="Month", y=paste0("Values (", unit, ")"), fill="Month") +
  ylim(min_RV, y_scale) +
  scale_x_continuous(limits=c(0, 13), breaks=seq(3, 12, 3)) +
  plot_theme +
  theme(legend.position="top", legend.box="horizontal") +
  guides(fill=guide_legend(nrow=1))
# Create plot object for y-axis scaled plot for past 10 years
p9 <- ggplot(data=data[data$Use_In_Analysis==TRUE &
                        data$MonitoringID==Mon_IDs[i] &
                        data$Year >= year_upper - 10, ],
              aes(x=Month, y=ResultValue,
                  group=Month, fill=as.factor(Month))) +
  geom_boxplot(color="#333333", outlier.shape=21, outlier.size=3,
               outlier.color="#333333", outlier.alpha=0.75) +
  labs(subtitle="Scaled to 4x Standard Deviation, Last 10 Years",
       x="Month", y=paste0("Values (", unit, ")"), fill="Month") +
  ylim(min_RV, y_scale) +
  scale_x_continuous(limits=c(0, 13), breaks=seq(3, 12, 3)) +
  plot_theme +
  theme(legend.position="none")
# Create legend object
leg2 <- get_legend(p8)
# Arrange plots and legend
Mset <- ggarrange(leg2, p7, p8 + theme(legend.position="none"), p9,
                  ncol=1, heights=c(0.1, 1, 1, 1))
# Create title object
p000 <- ggplot() + labs(title=paste0(MA_name, "\n", Mon_name),
                         subtitle="By Month") + plot_theme +
  theme(panel.border=element_blank(),
        panel.grid.major=element_blank(),
        panel.grid.minor=element_blank(), axis.line=element_blank())
# Arrange and display plots with titles for all combinations
print(ggarrange(p0, Yset, ncol=1, heights=c(0.1, 1)))
print(ggarrange(p00, YMset, ncol=1, heights=c(0.1, 1)))
print(ggarrange(p000, Mset, ncol=1, heights=c(0.1, 1)))

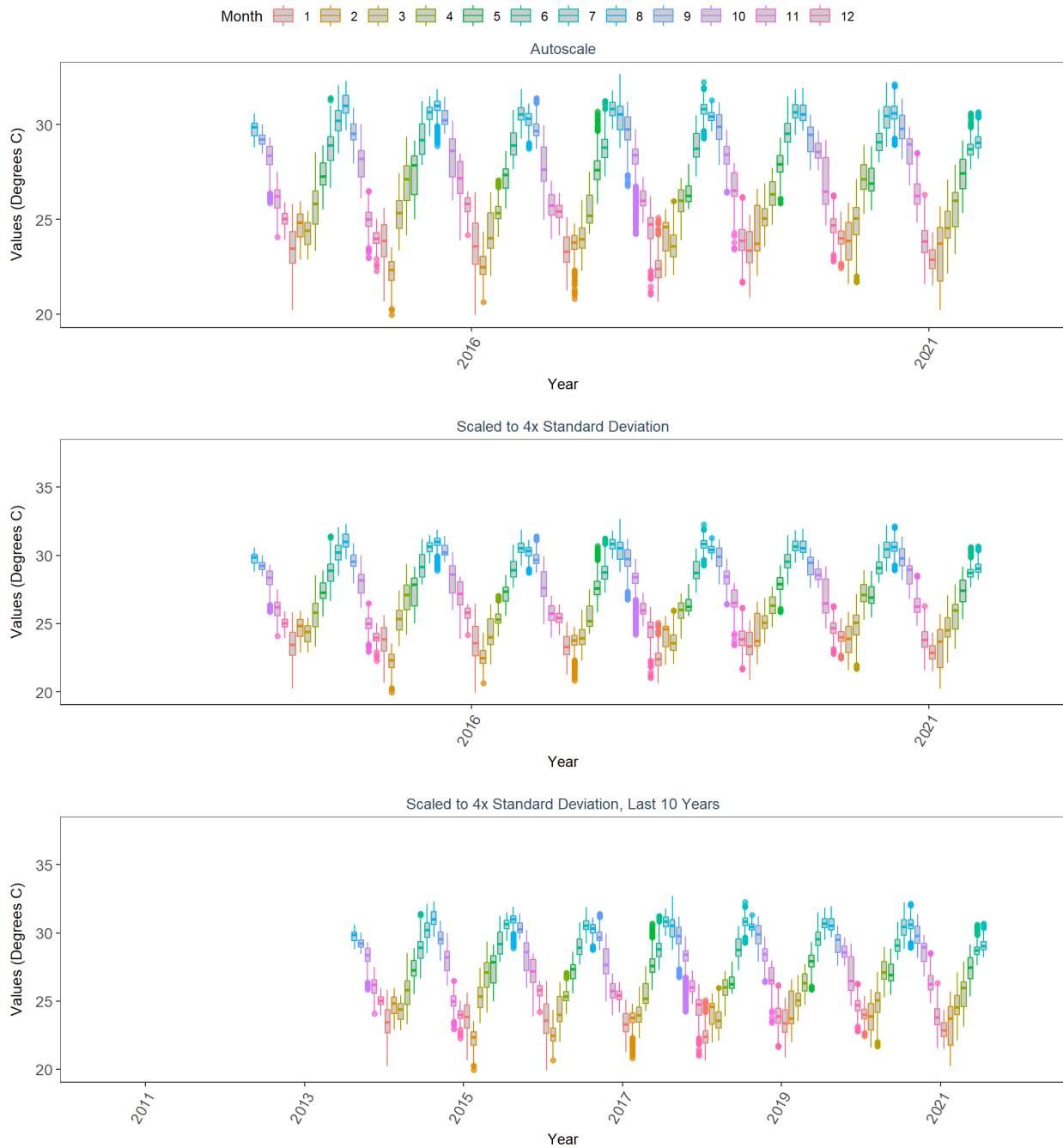
rm(plot_data)
rm(p1, p2, p3, p4, p5, p6, p7, p8, p9, p0, p00, p000, leg1, leg2,
    Yset, YMset, Mset)
}
}

```

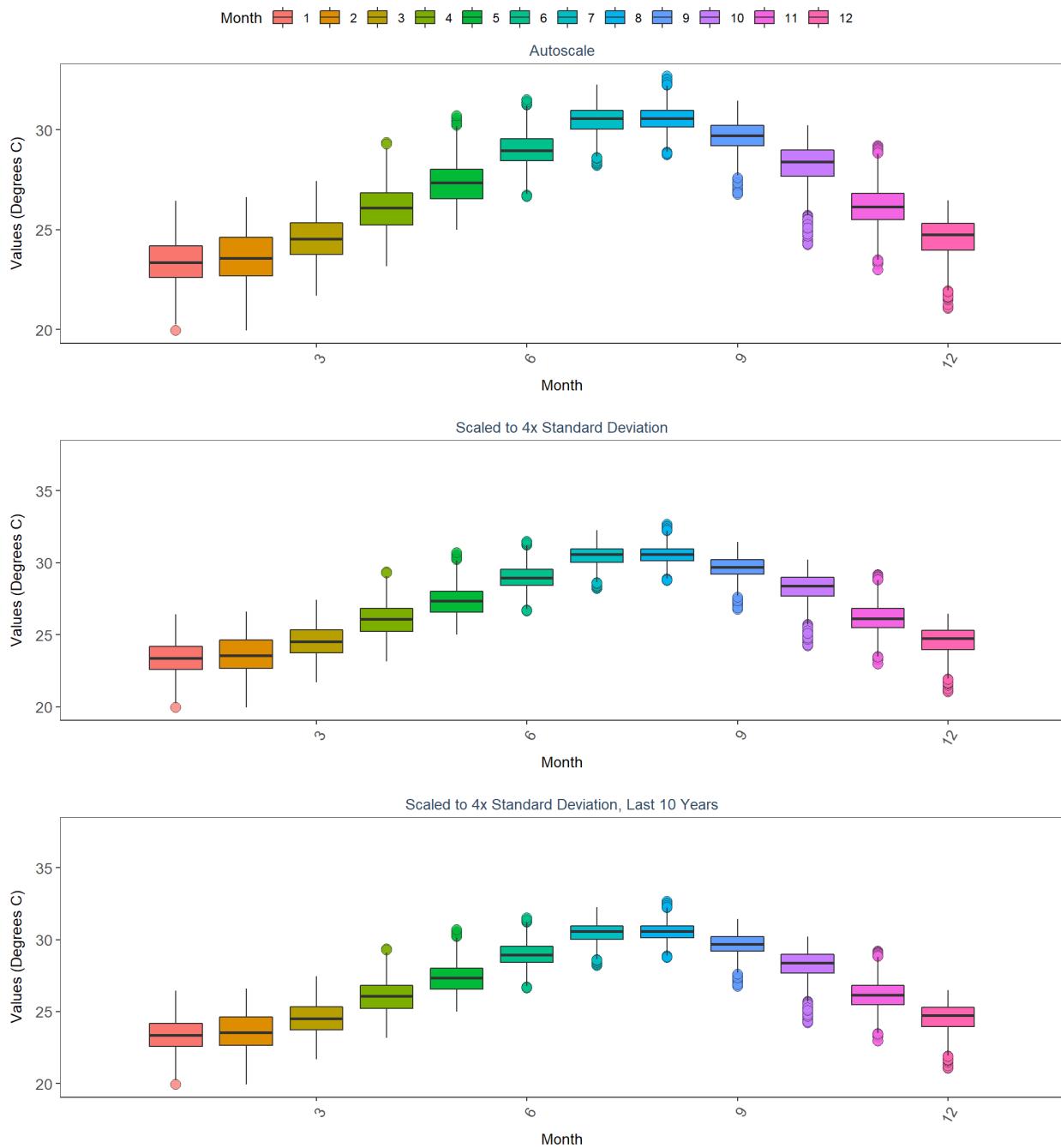
Biscayne Bay-Cape Florida to Monroe County Line Aquatic Preserve  
986  
Water Temperature on Coral Reefs in the Florida Keys  
6  
By Year



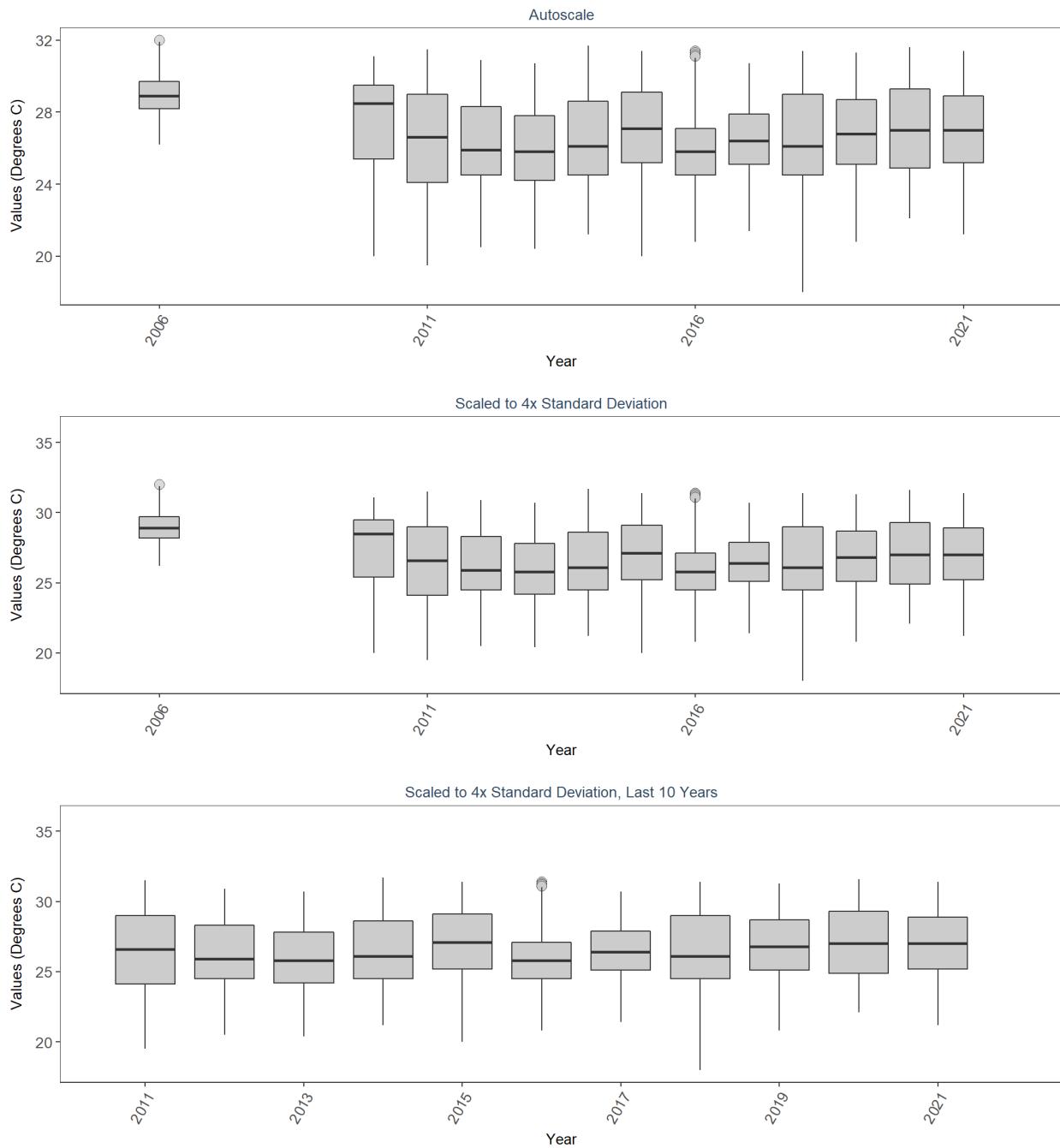
Biscayne Bay-Cape Florida to Monroe County Line Aquatic Preserve  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 6  
 By Year & Month



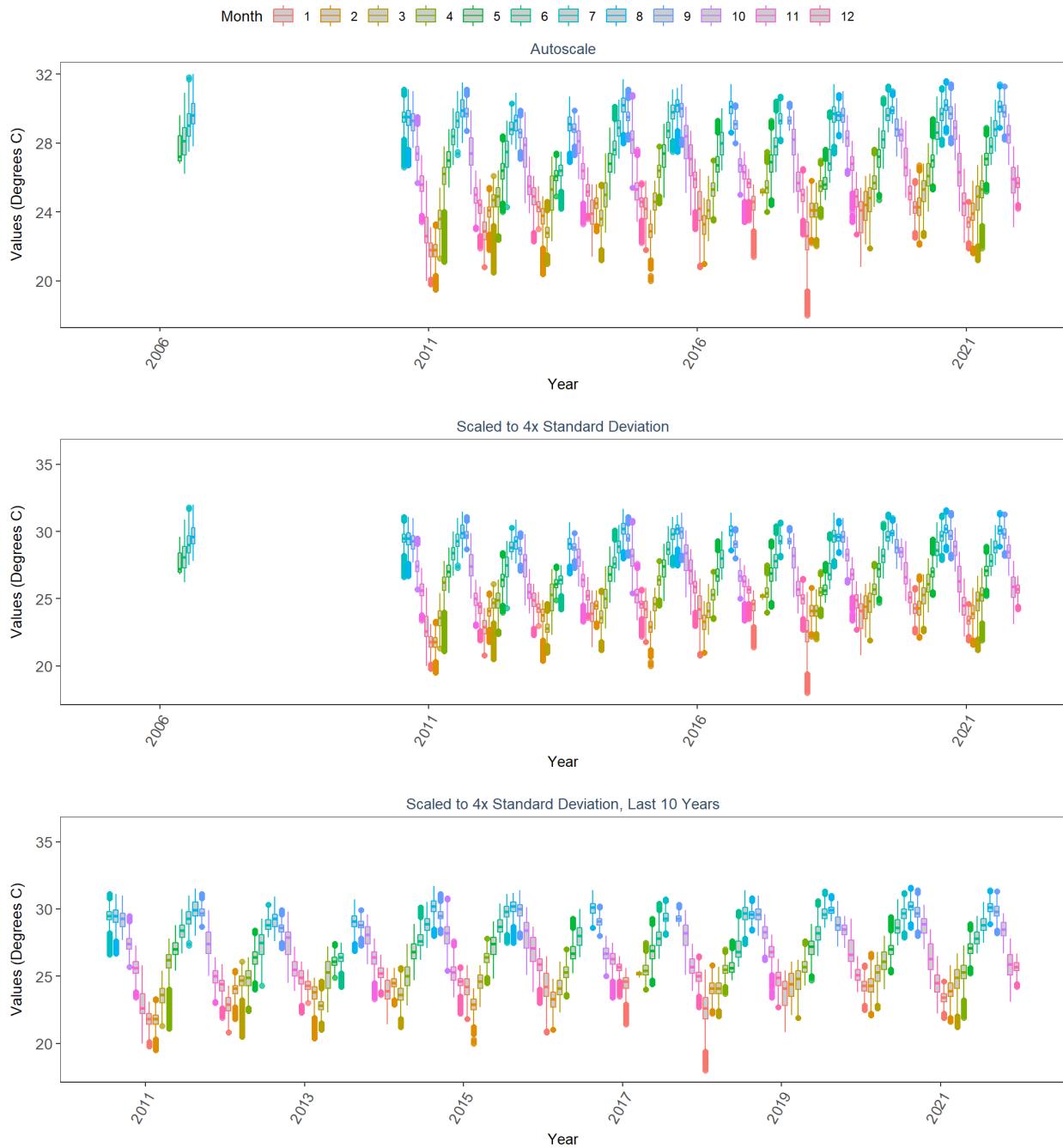
Biscayne Bay-Cape Florida to Monroe County Line Aquatic Preserve  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 6  
 By Month



Southeast Florida Coral Reef Ecosystem Conservation Area  
5  
National Data Buoy Center  
LKWF1  
By Year



Southeast Florida Coral Reef Ecosystem Conservation Area  
 5  
 National Data Buoy Center  
 LKWF1  
 By Year & Month



Southeast Florida Coral Reef Ecosystem Conservation Area

5

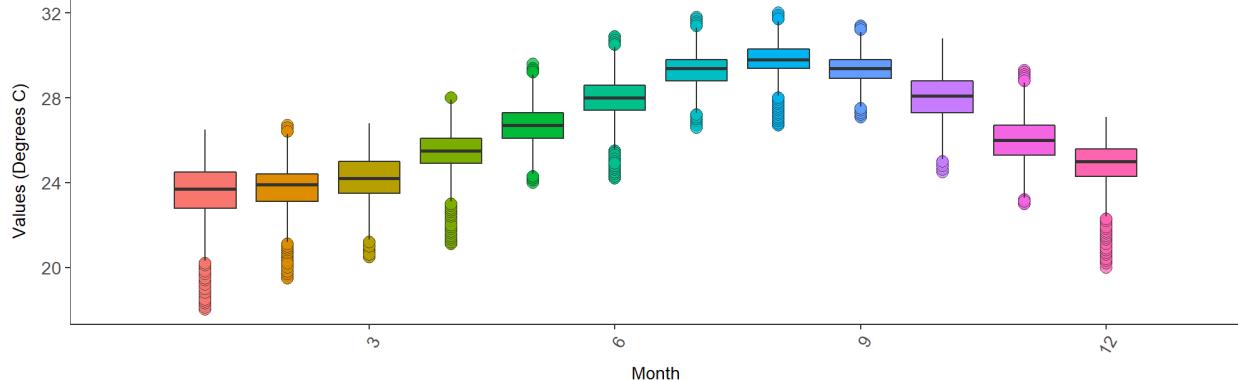
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LKWF1

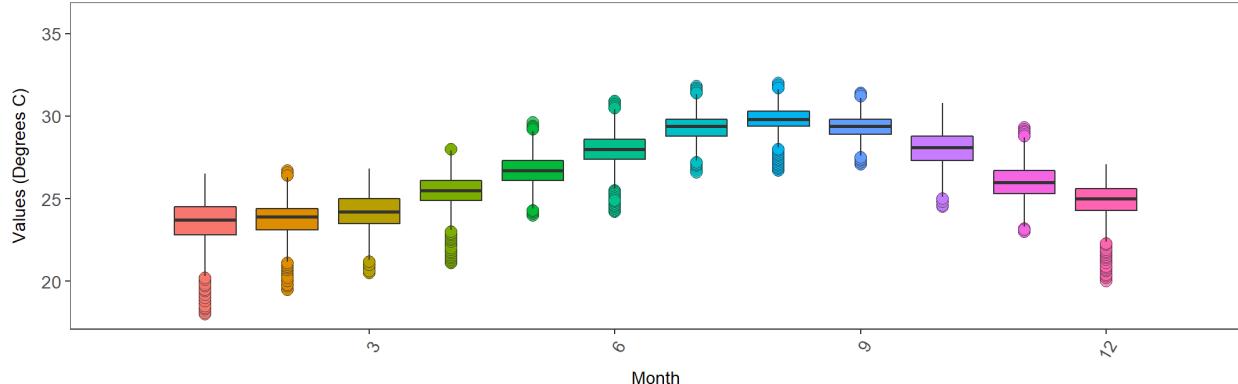
By Month

Month 1 2 3 4 5 6 7 8 9 10 11 12

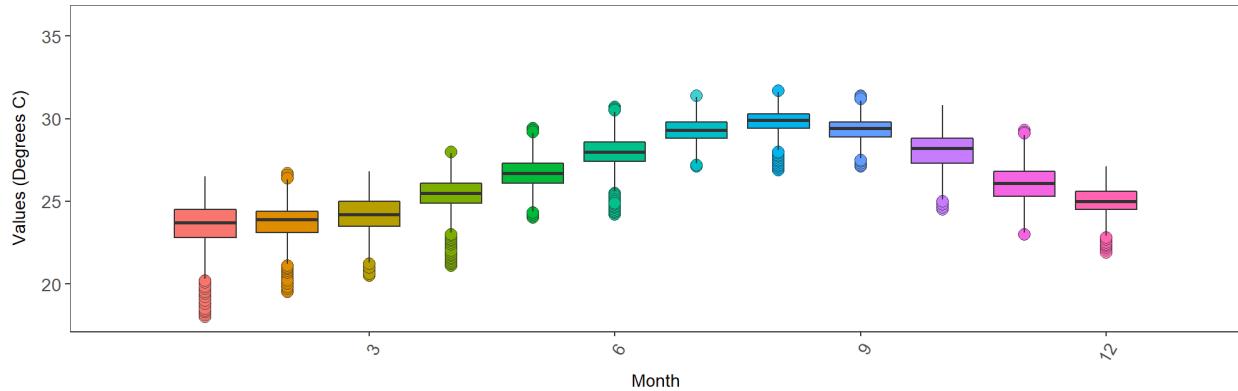
Autoscale



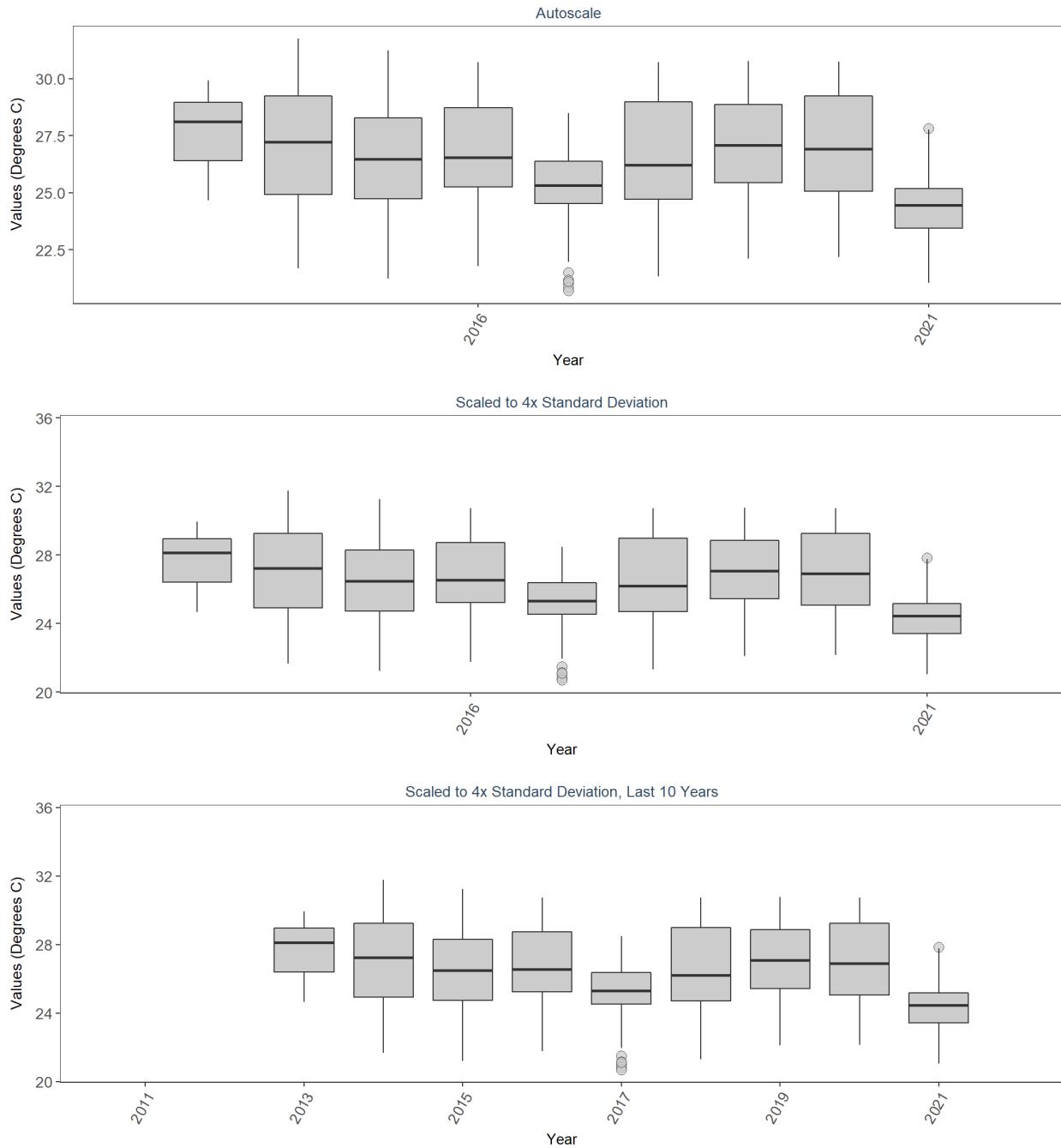
Scaled to 4x Standard Deviation



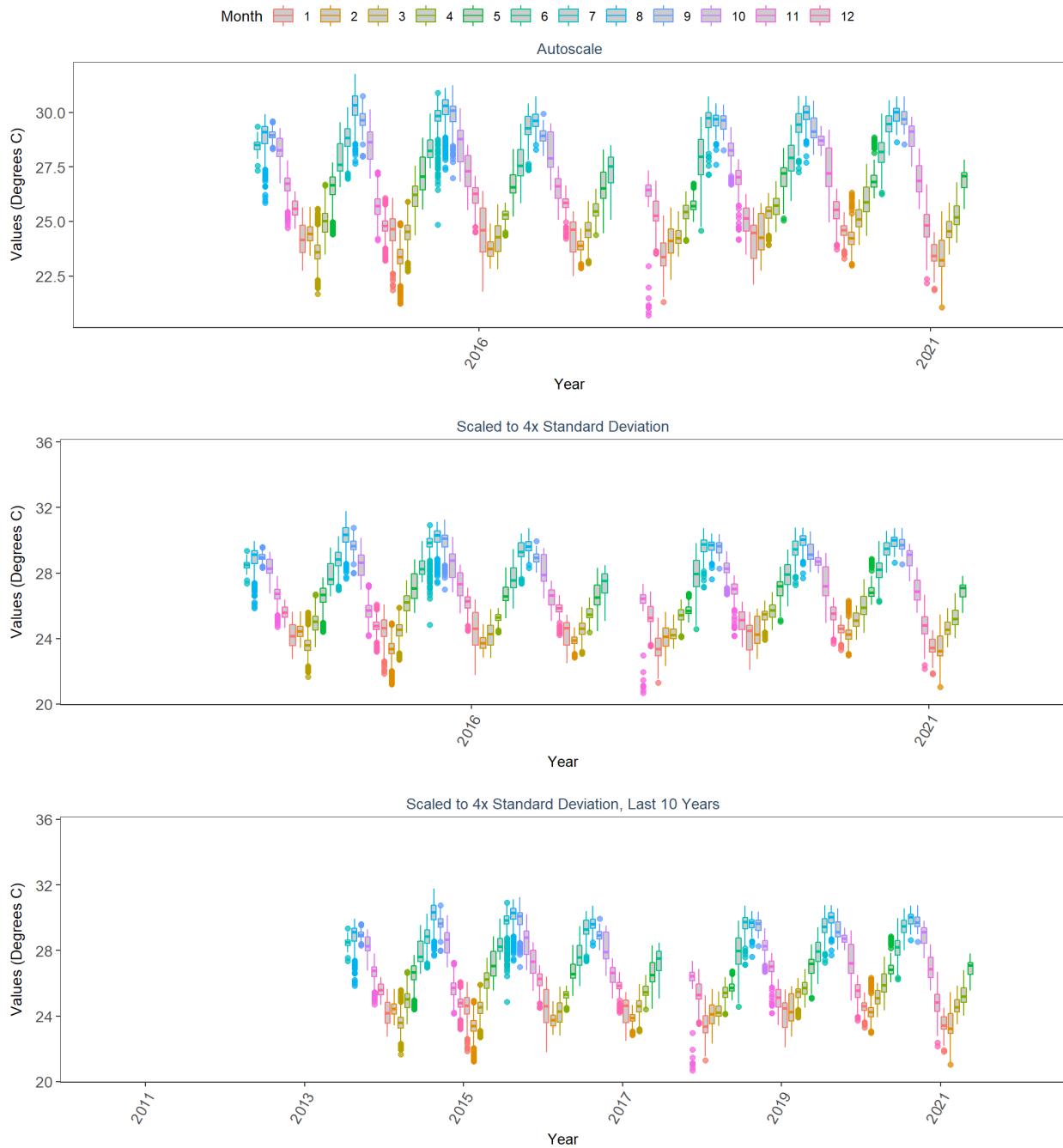
Scaled to 4x Standard Deviation, Last 10 Years



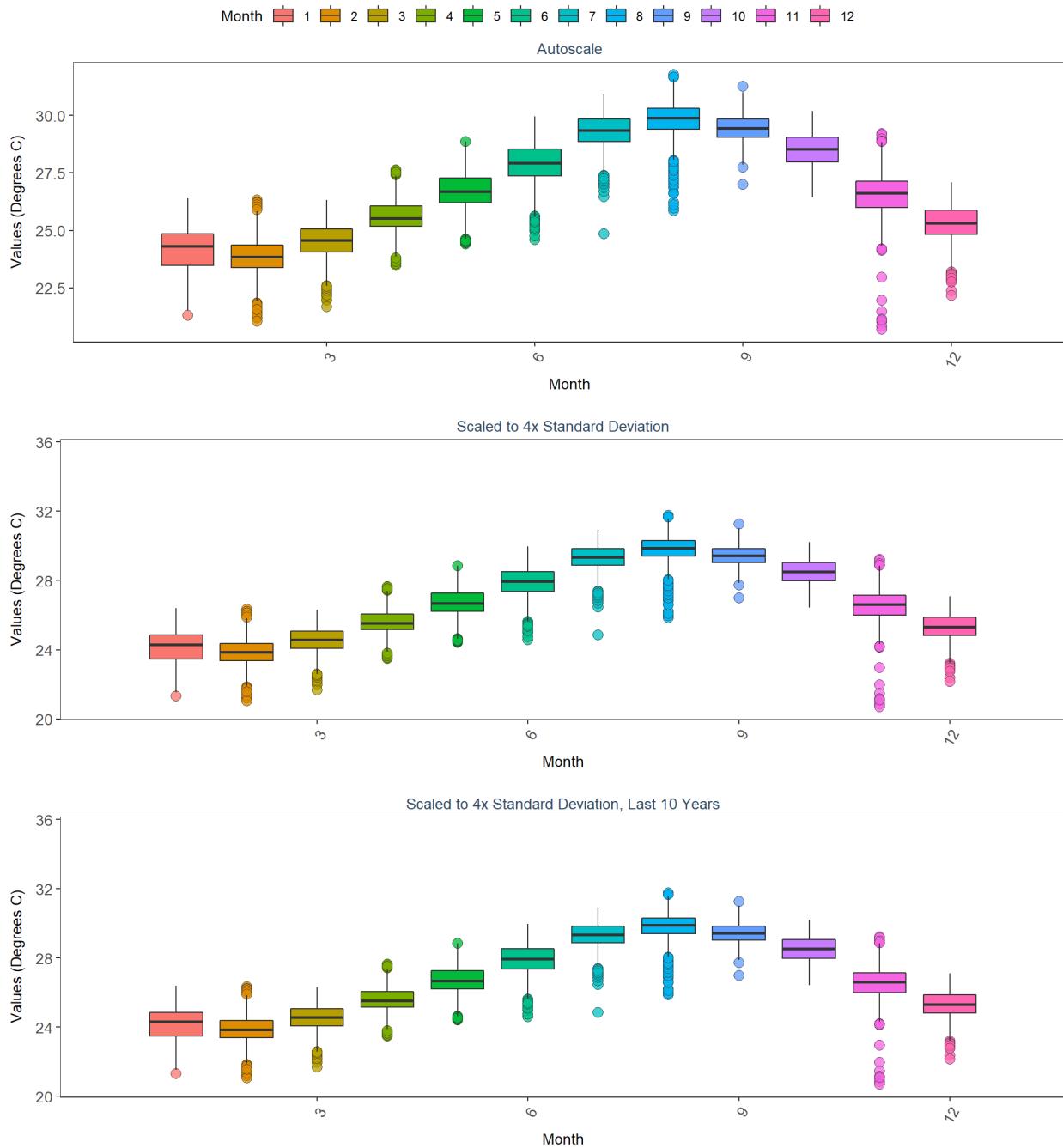
Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 1  
 By Year



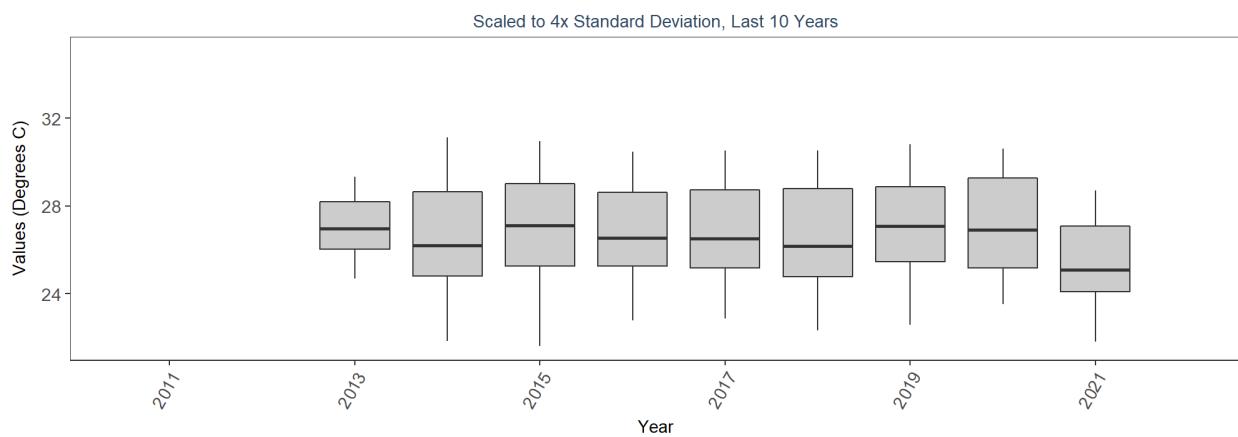
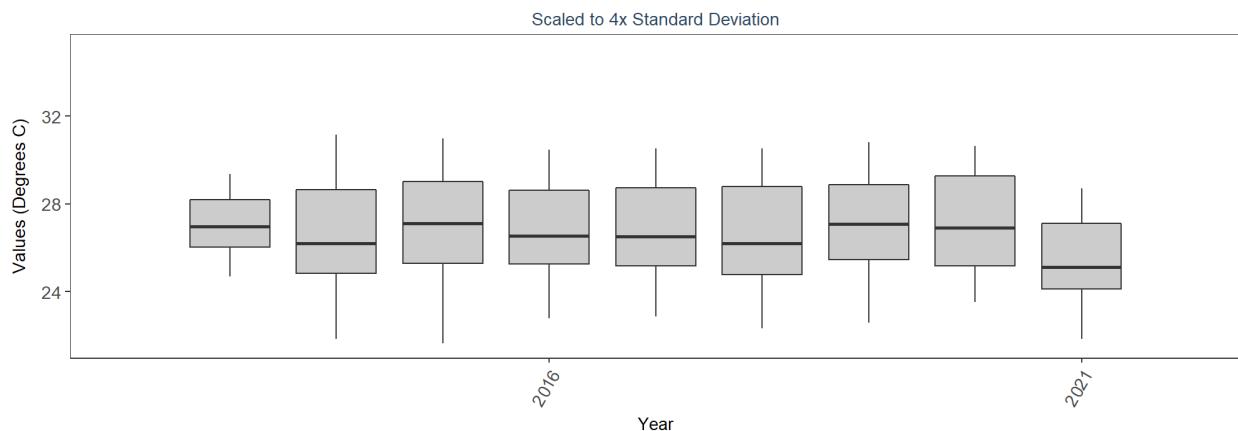
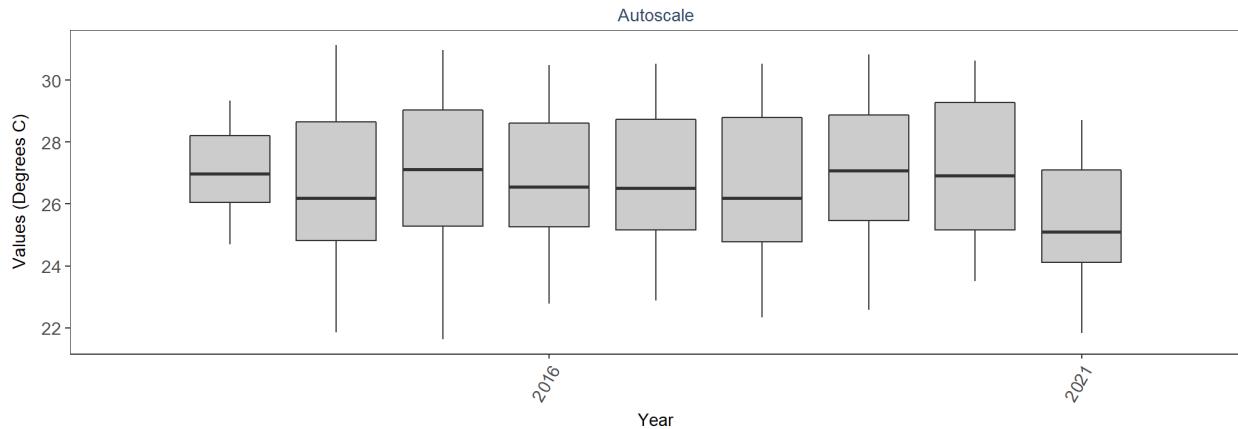
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 1  
 By Year & Month



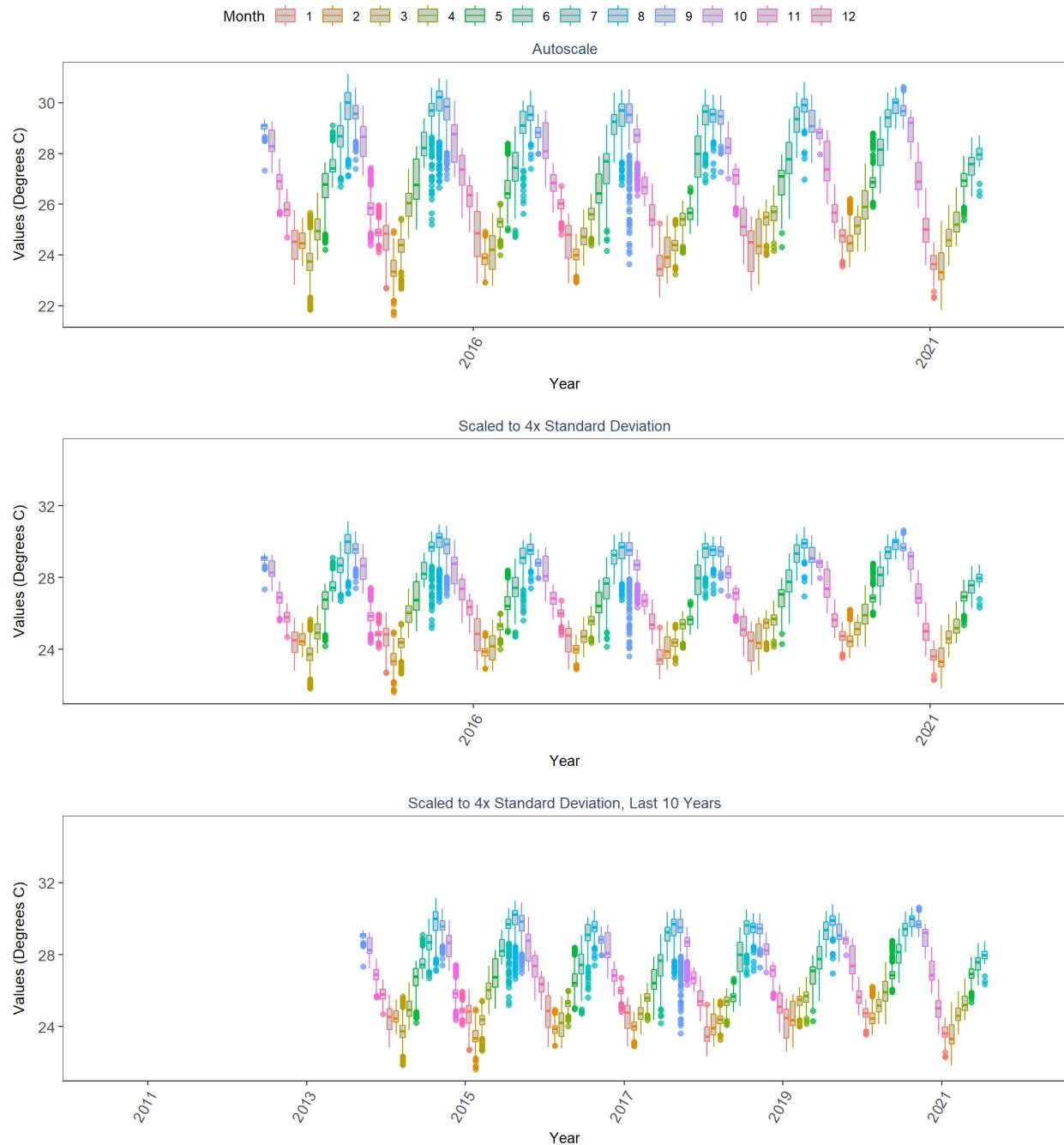
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 Water Temperature on Coral Reefs in the Florida Keys  
 1  
 By Month



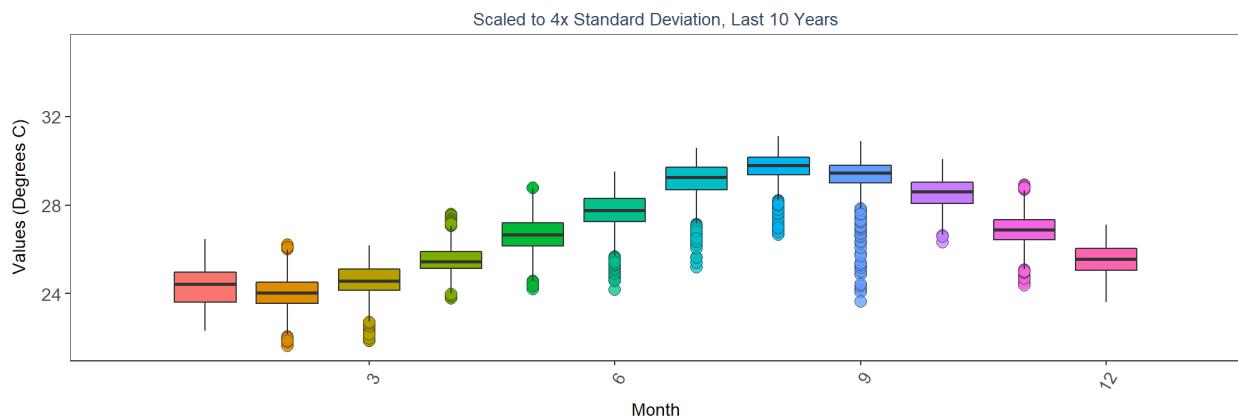
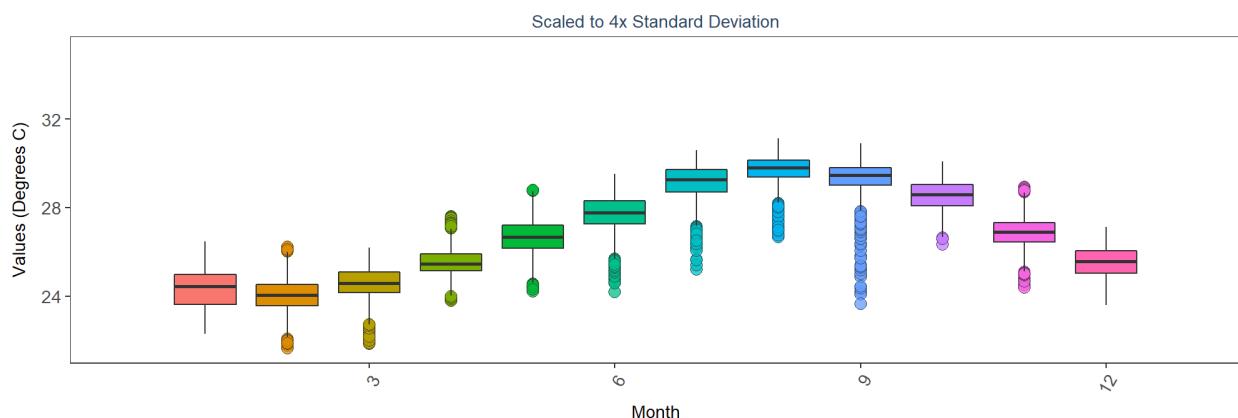
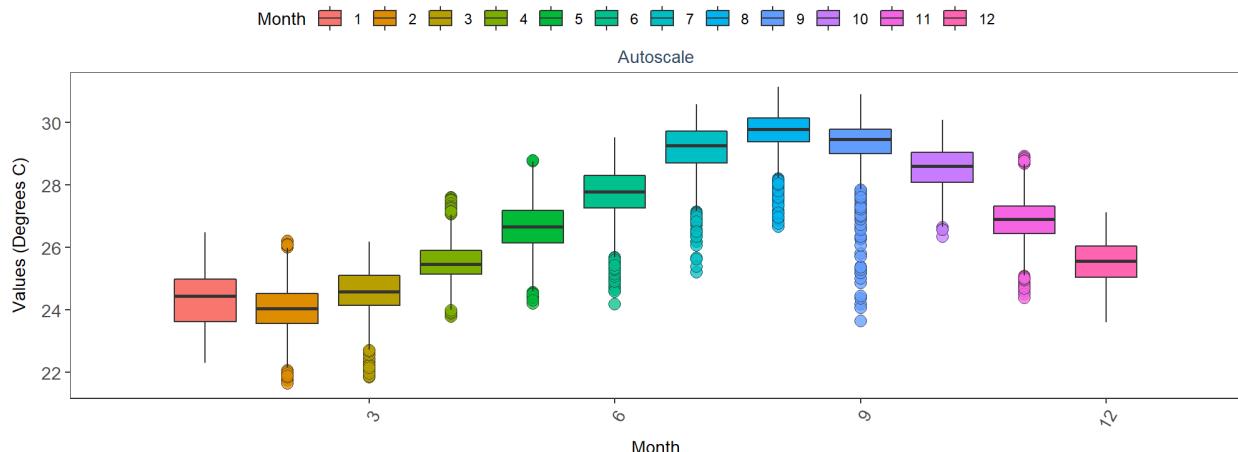
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Water Temperature on Coral Reefs in the Florida Keys  
2  
By Year



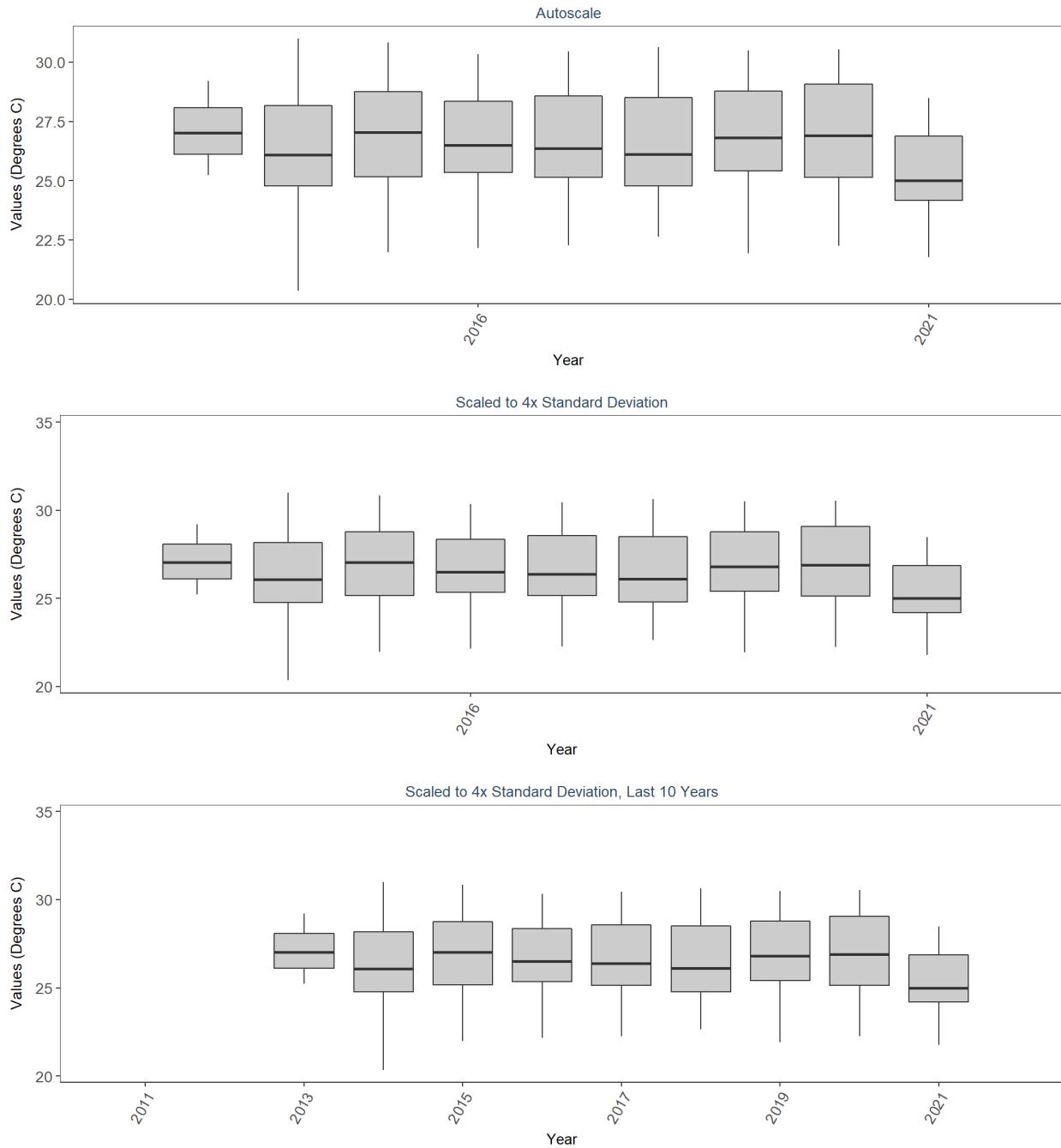
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 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 2  
 By Year & Month



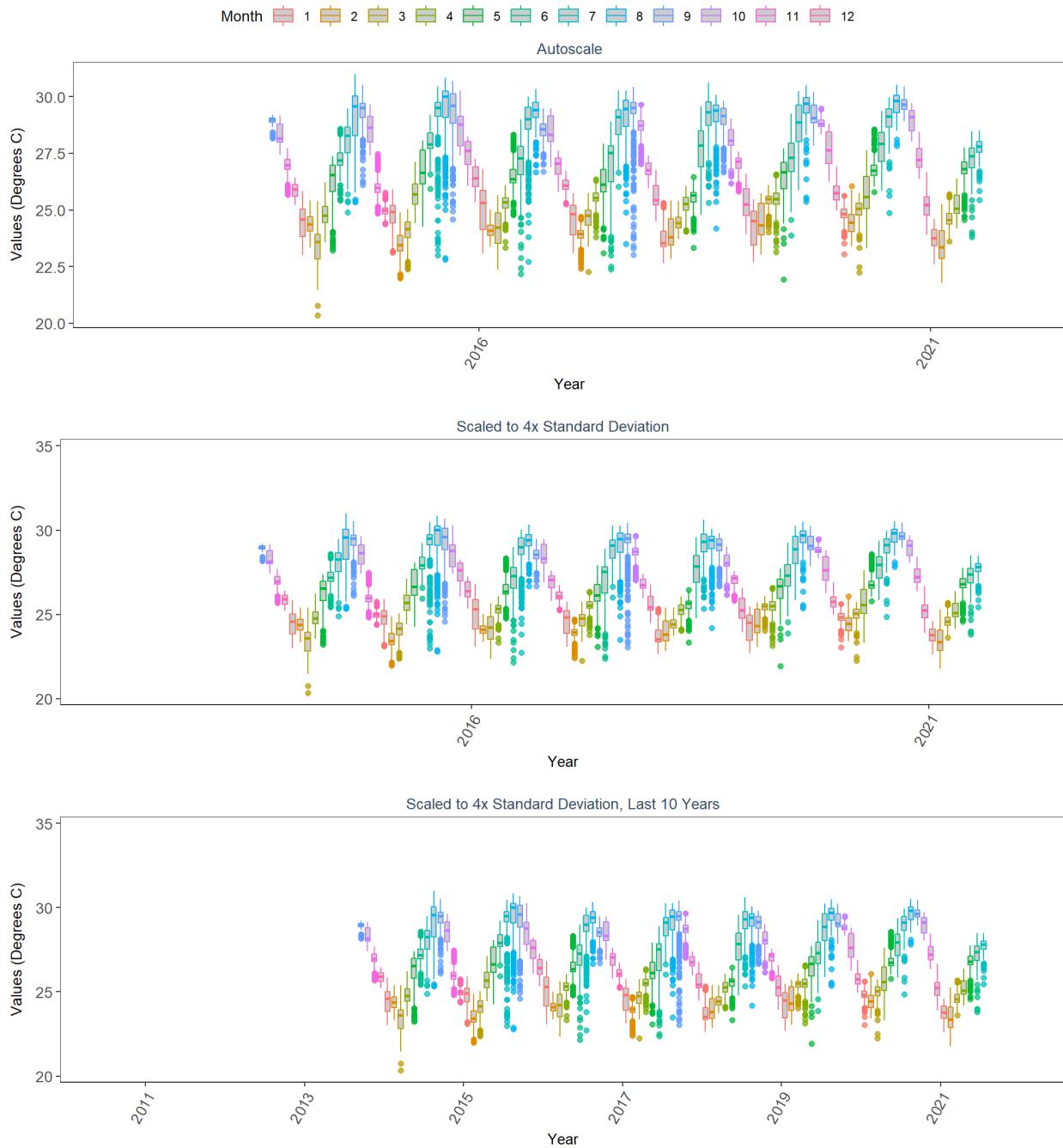
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 Water Temperature on Coral Reefs in the Florida Keys  
 2  
 By Month



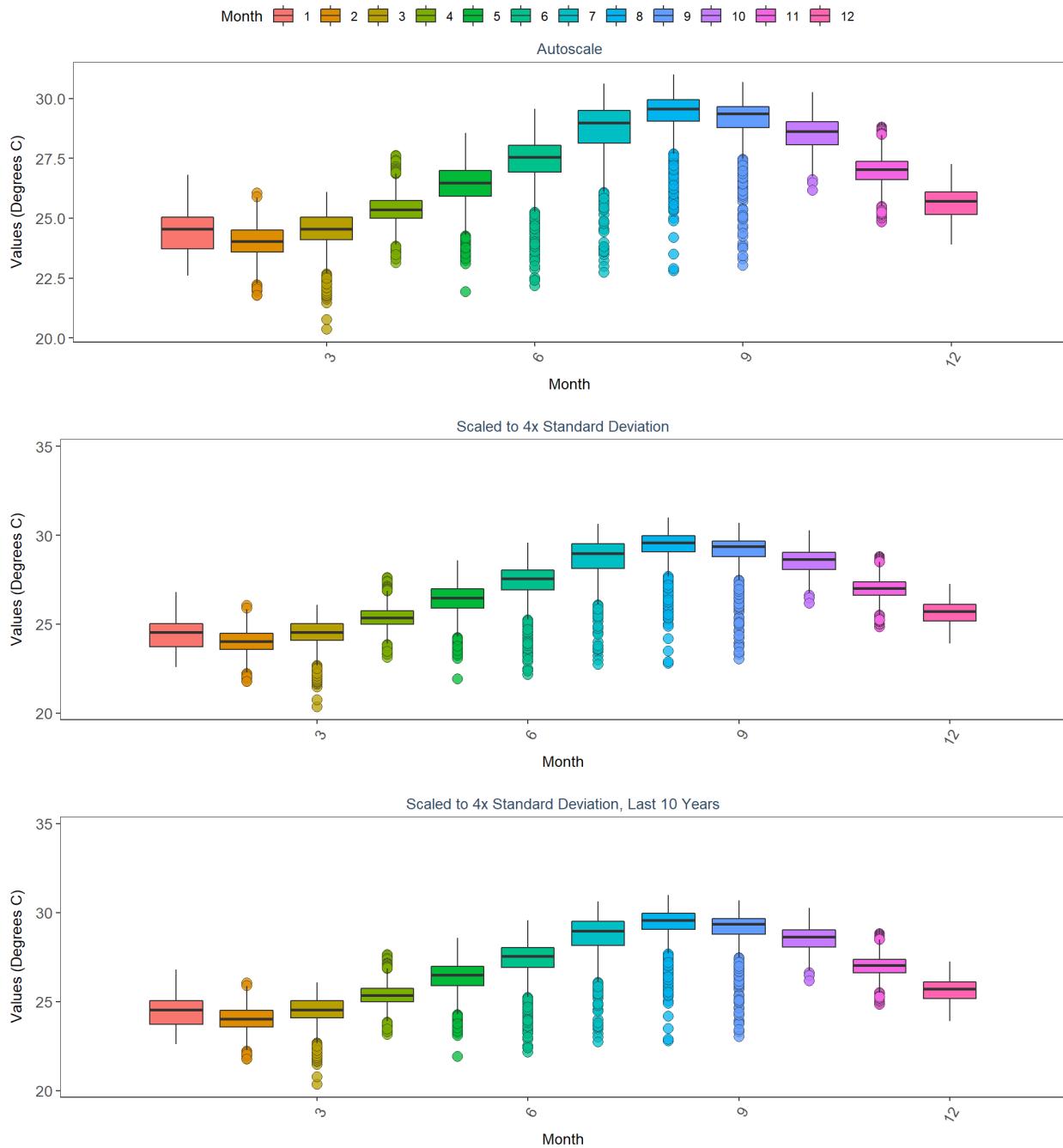
Southeast Florida Coral Reef Ecosystem Conservation Area  
986  
Water Temperature on Coral Reefs in the Florida Keys  
3  
By Year



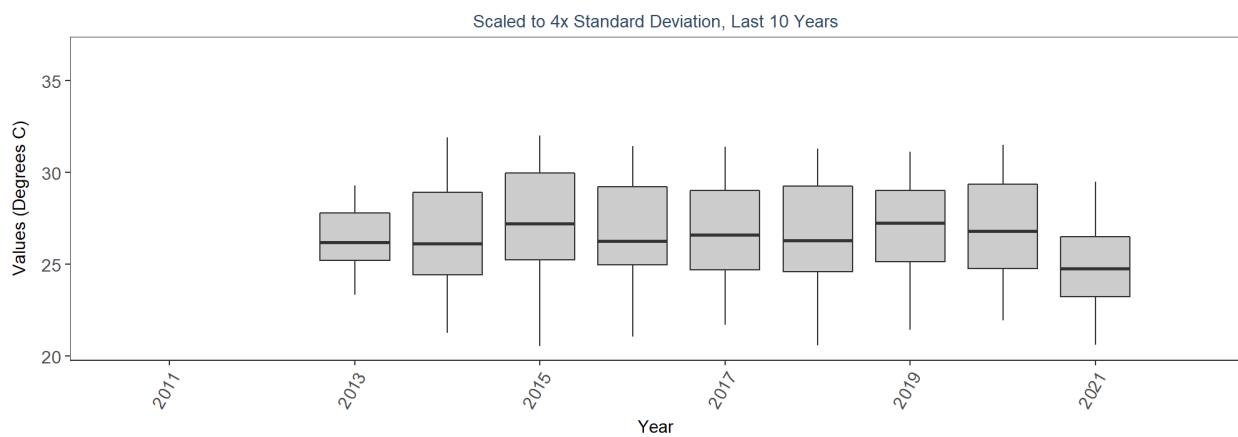
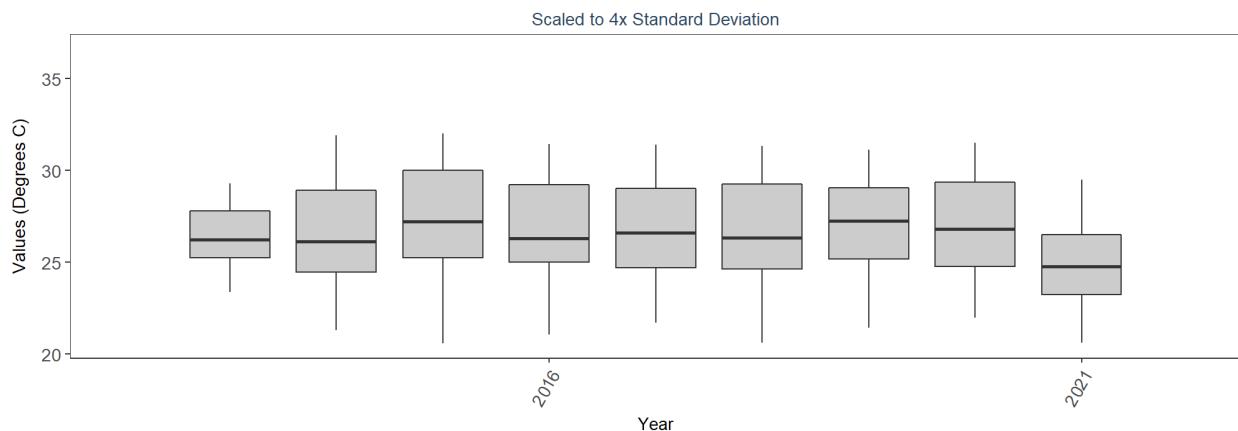
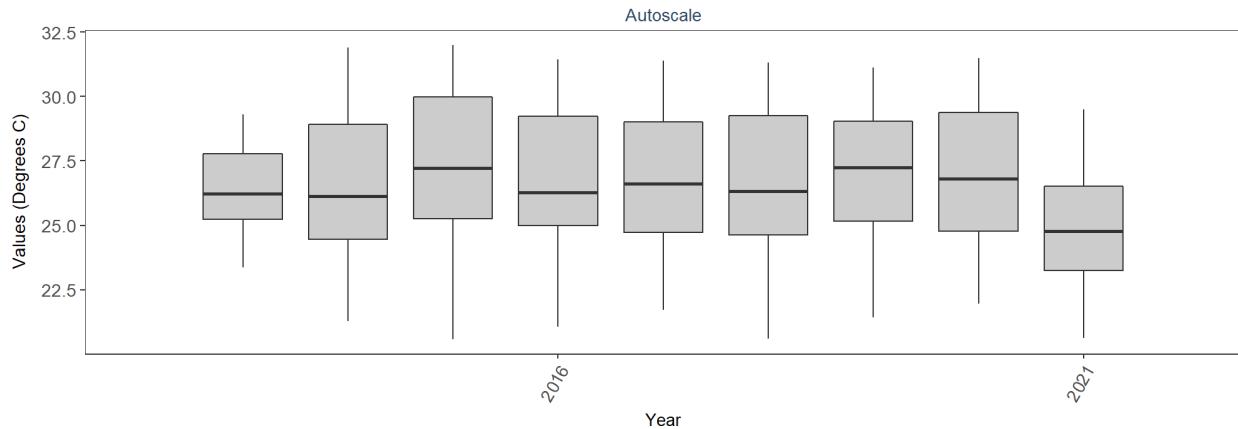
Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 3  
 By Year & Month



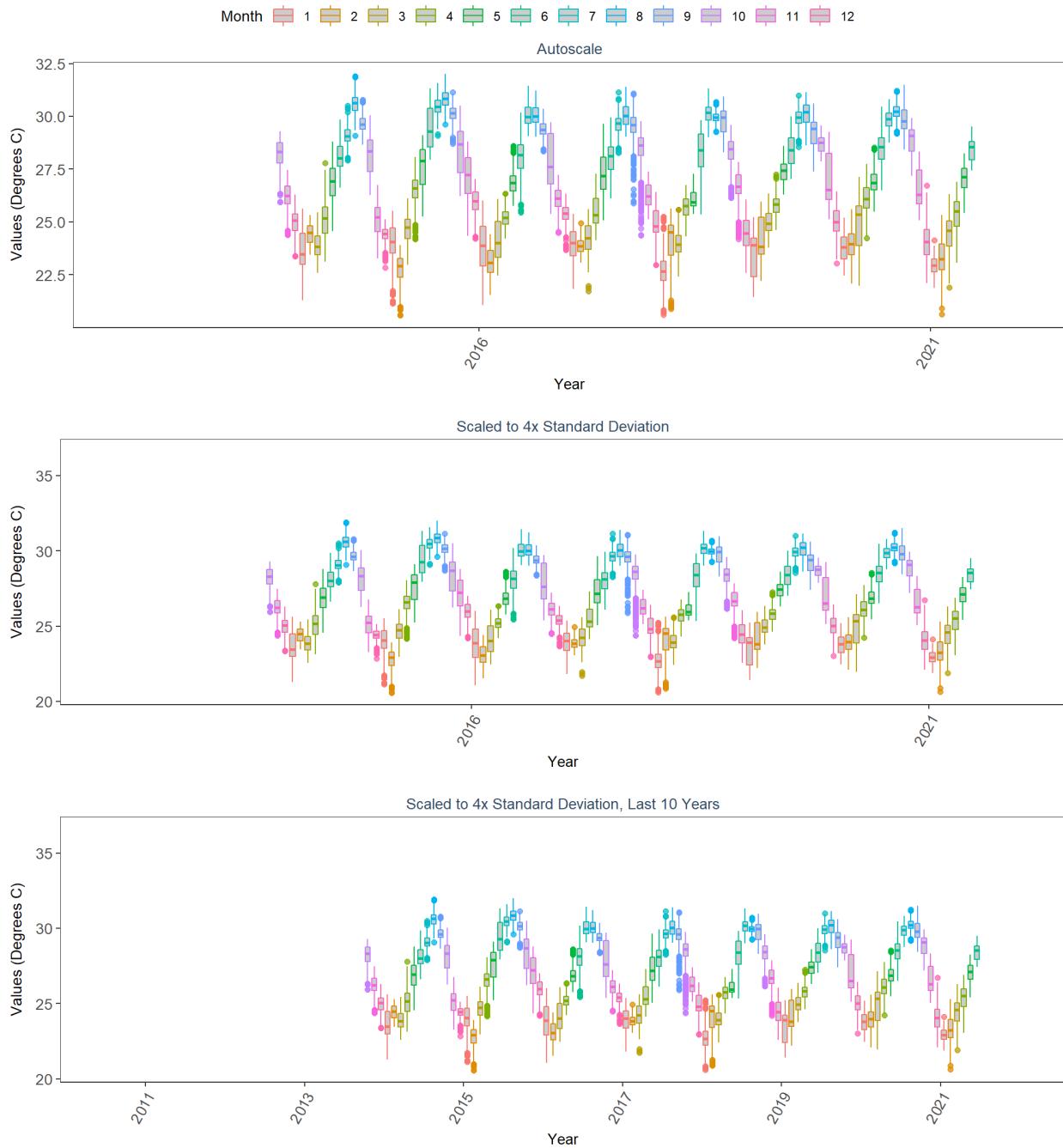
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 3  
 By Month



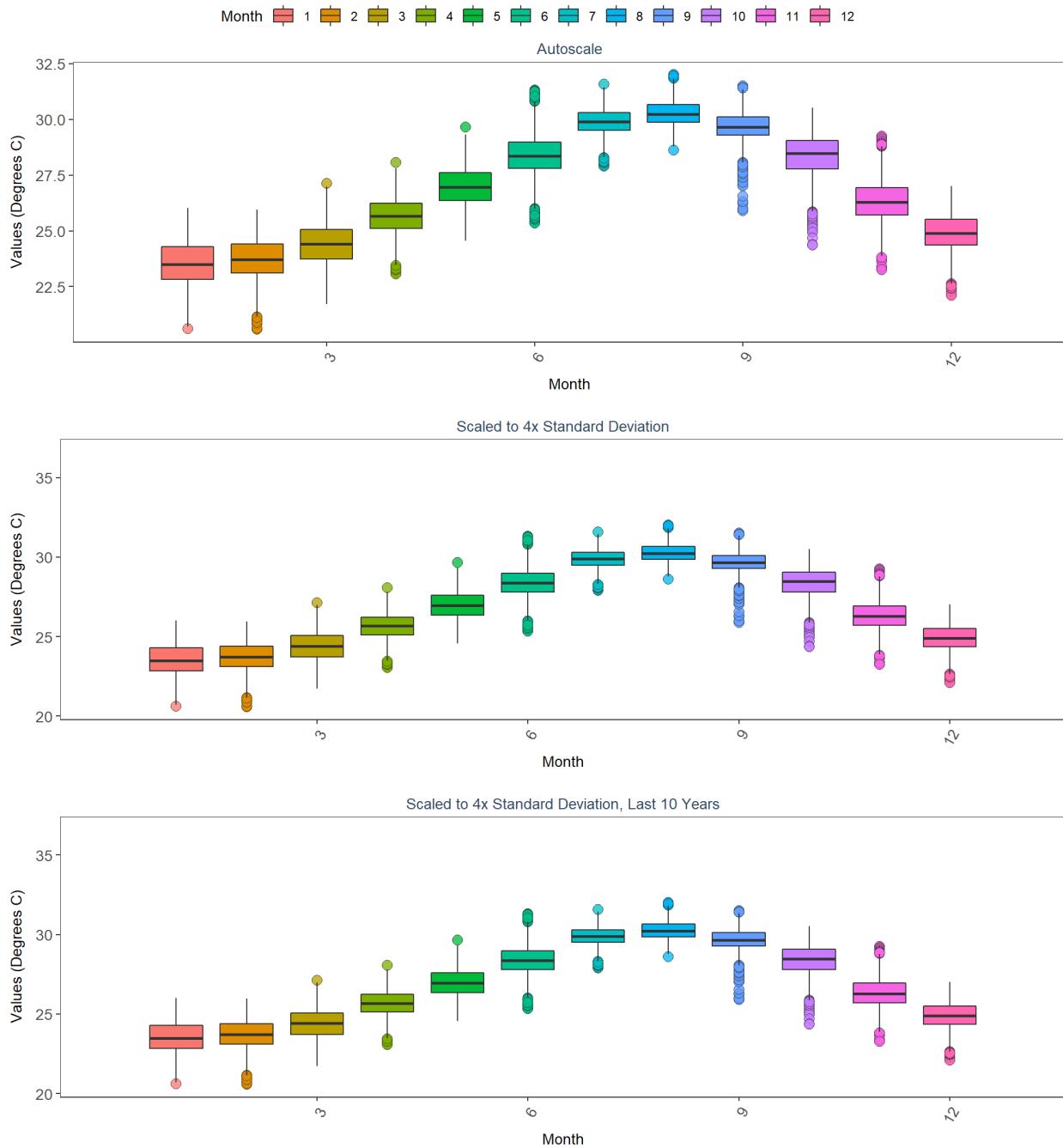
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986  
Water Temperature on Coral Reefs in the Florida Keys  
4  
By Year



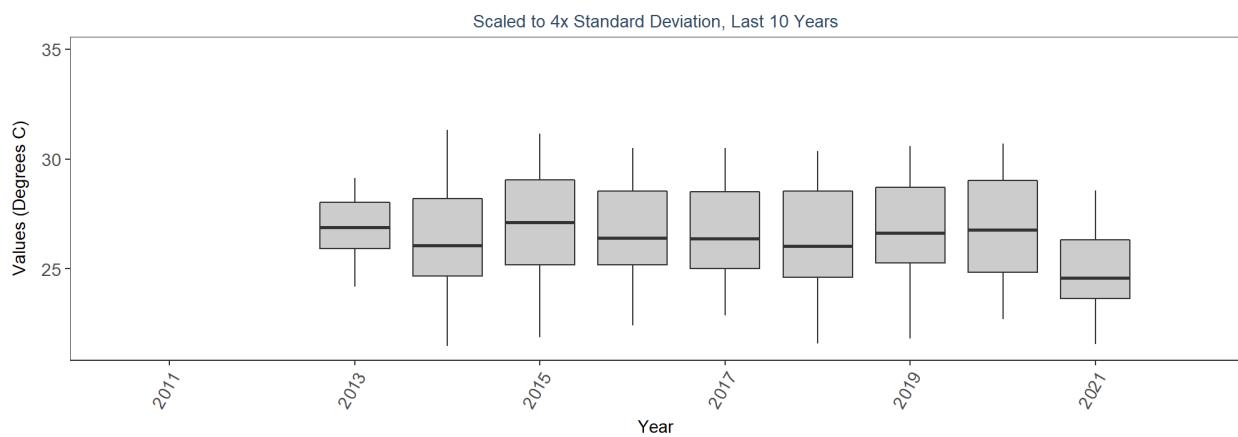
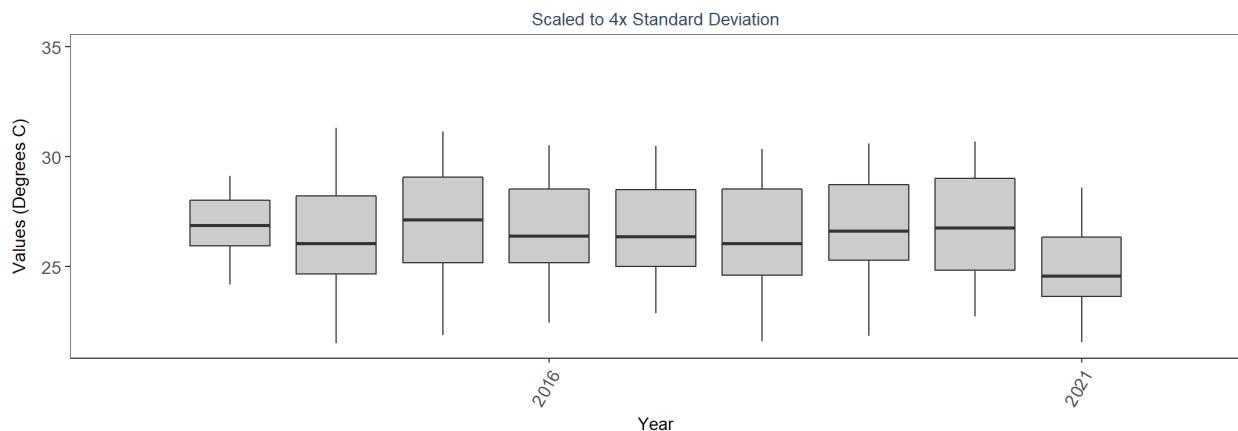
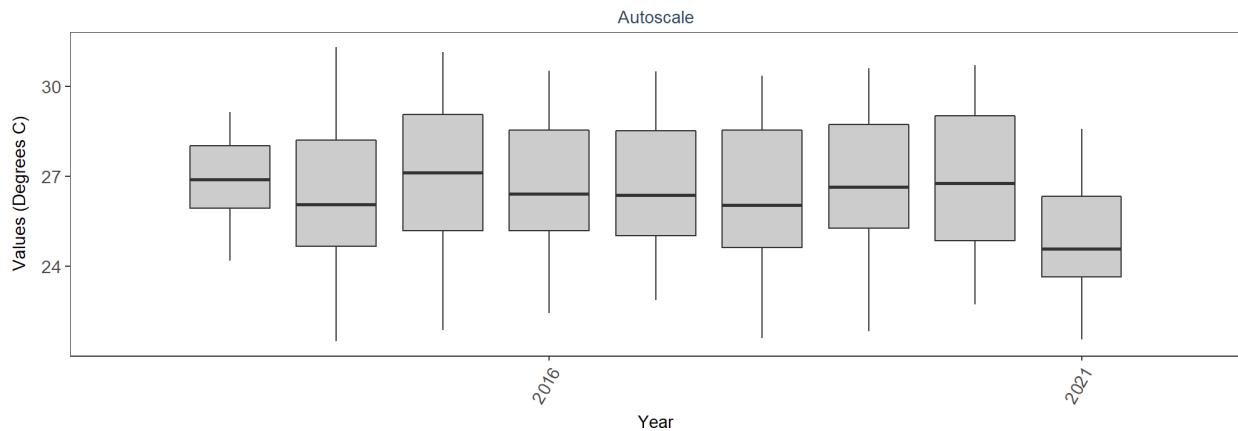
Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 4  
 By Year & Month



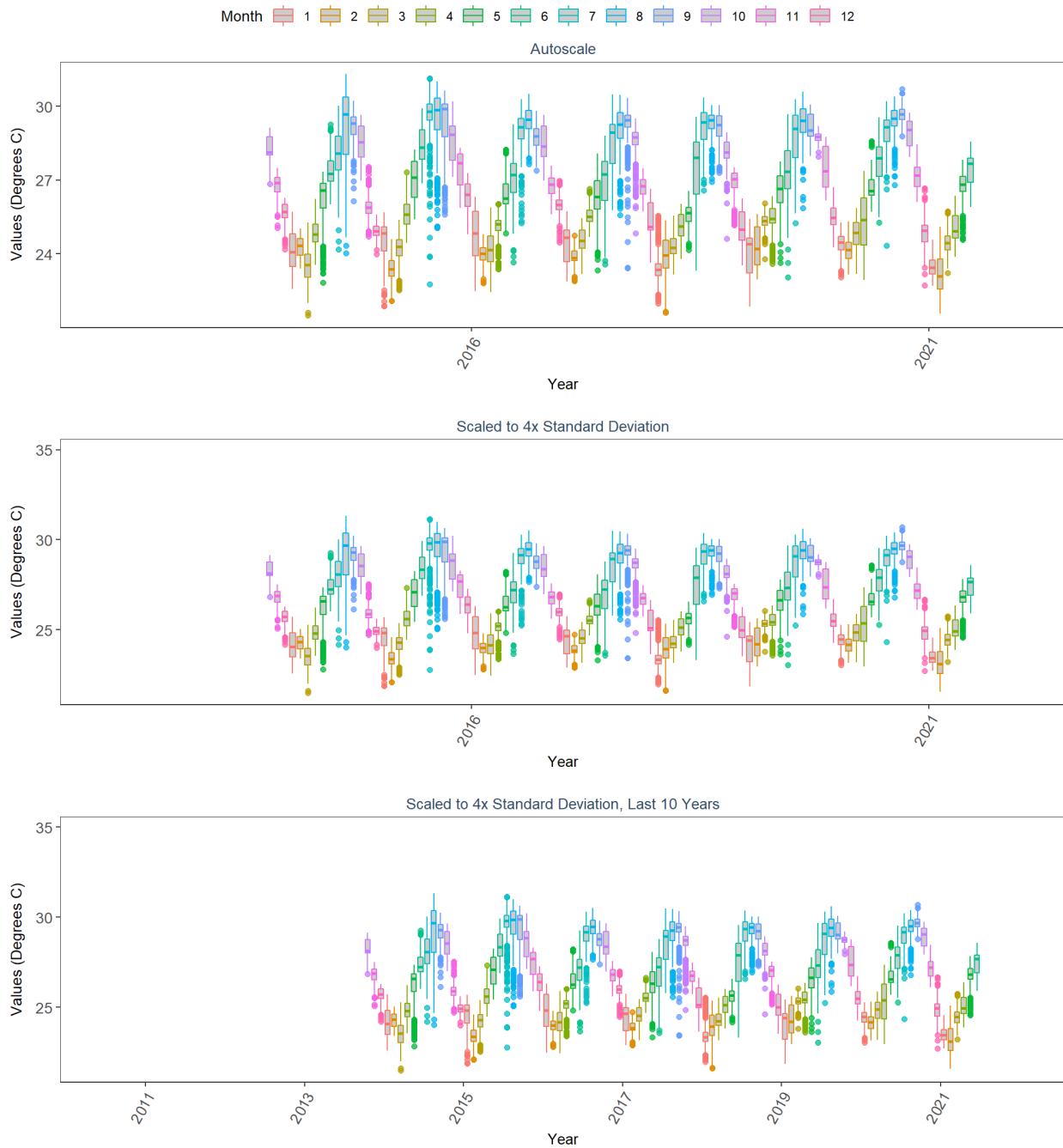
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 Water Temperature on Coral Reefs in the Florida Keys  
 4  
 By Month



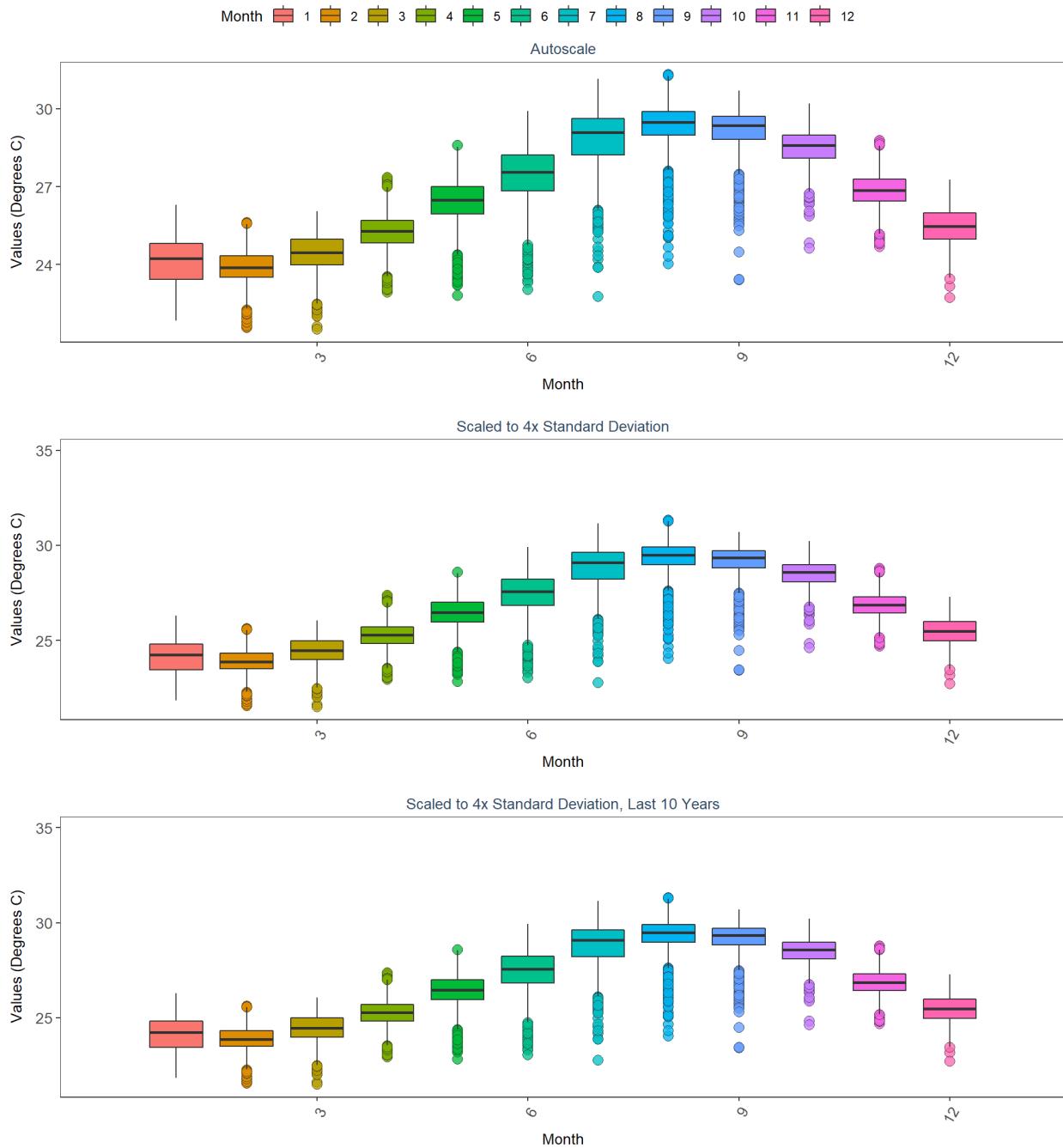
Southeast Florida Coral Reef Ecosystem Conservation Area  
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Water Temperature on Coral Reefs in the Florida Keys  
5  
By Year



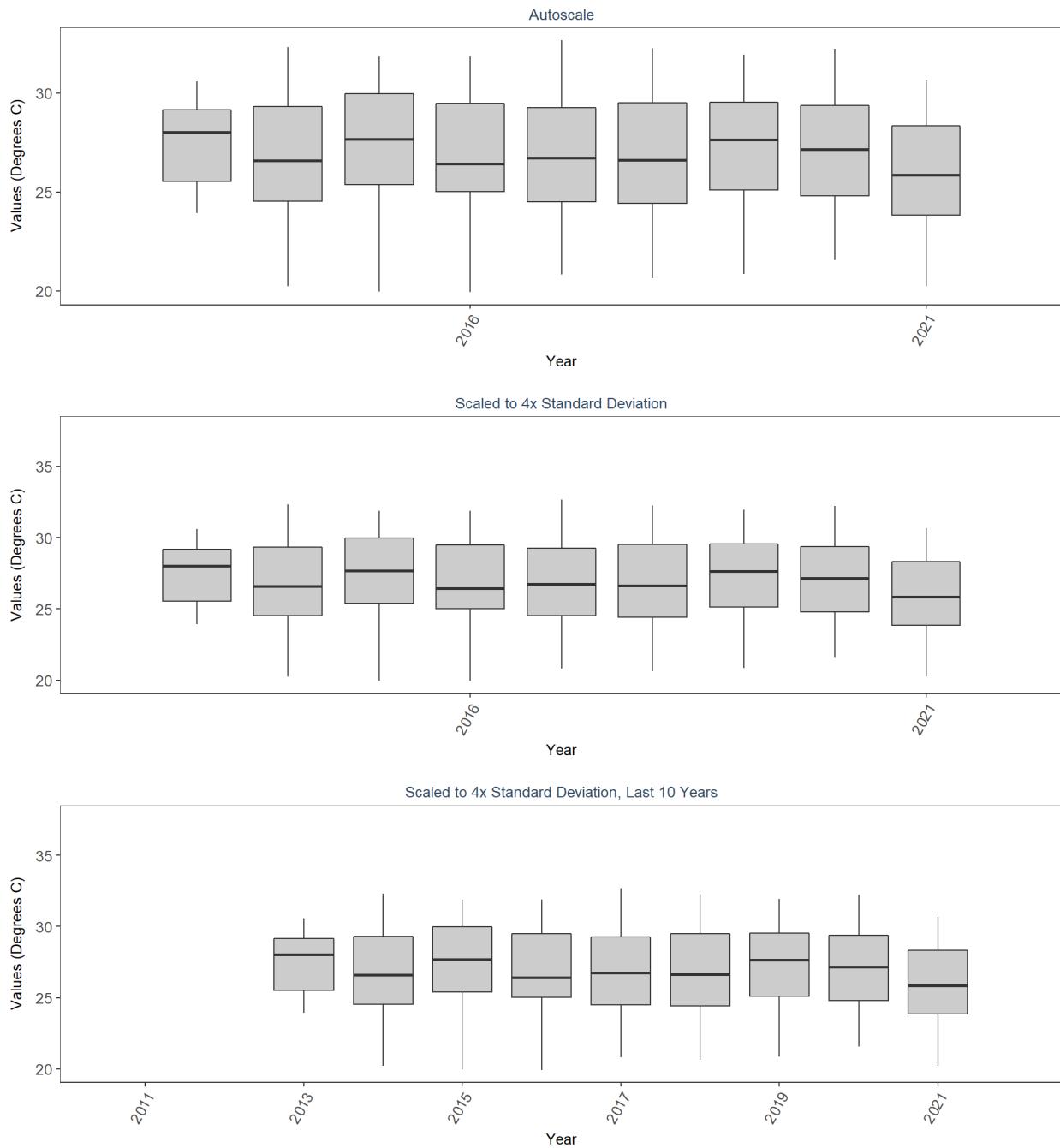
Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 5  
 By Year & Month



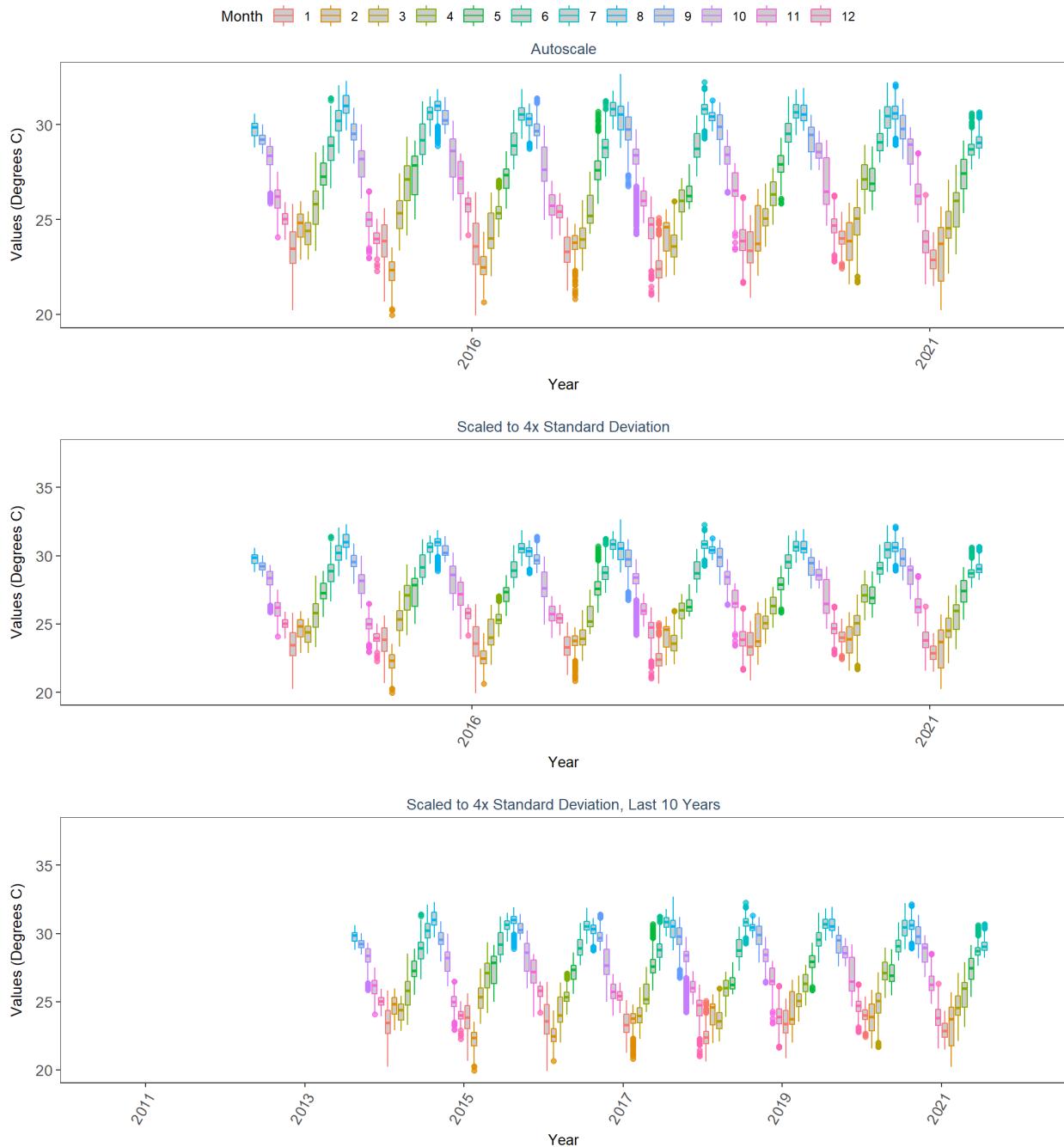
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 Water Temperature on Coral Reefs in the Florida Keys  
 5  
 By Month



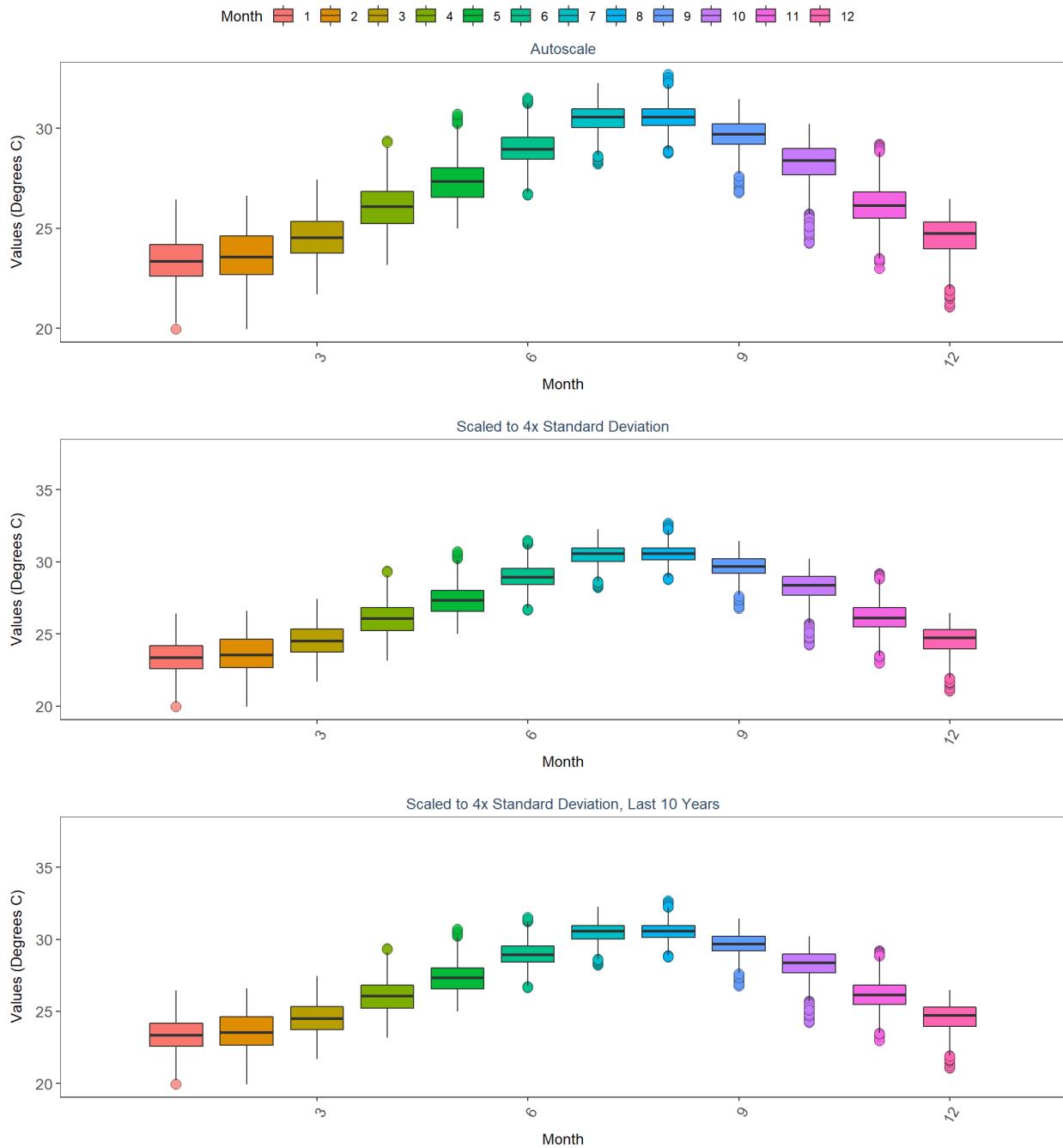
Southeast Florida Coral Reef Ecosystem Conservation Area  
986  
Water Temperature on Coral Reefs in the Florida Keys  
6  
By Year



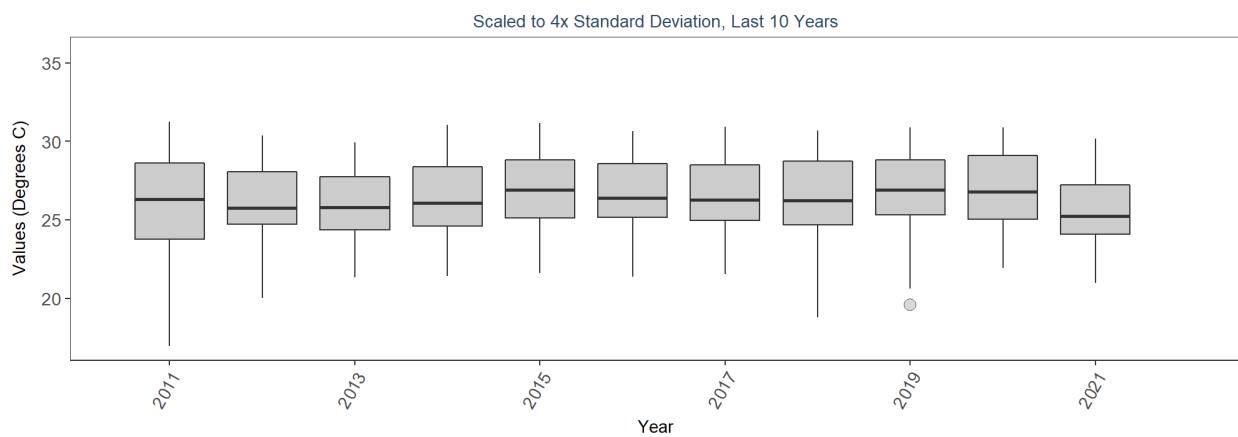
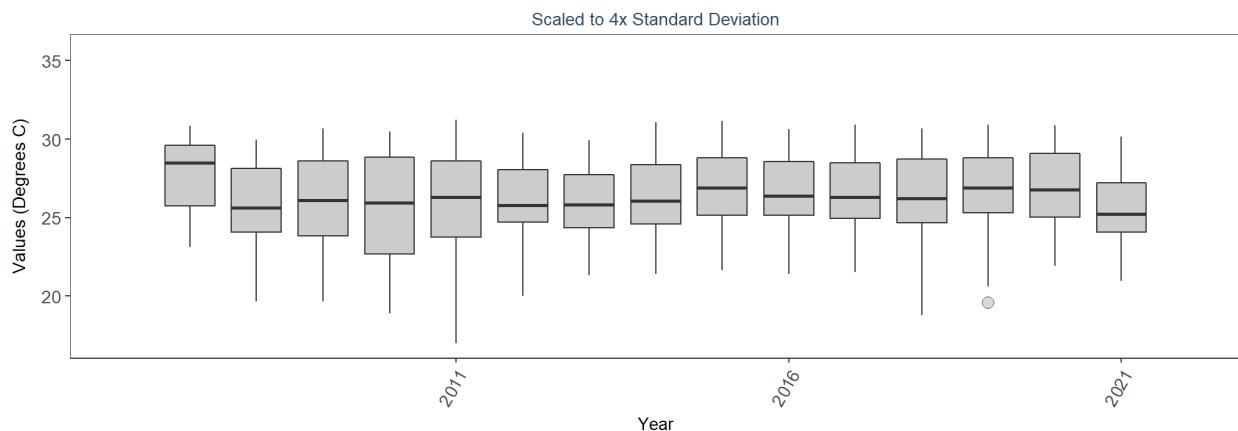
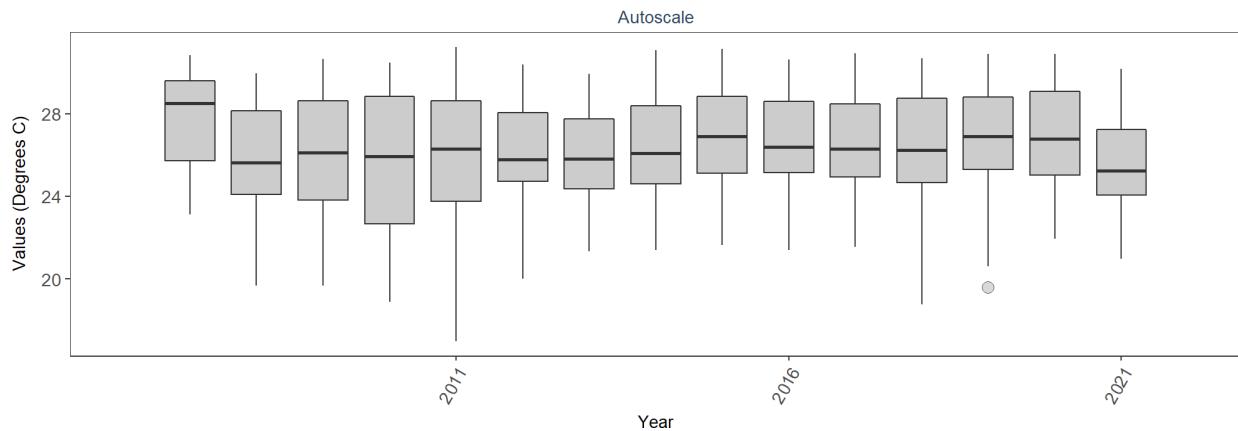
Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 6  
 By Year & Month



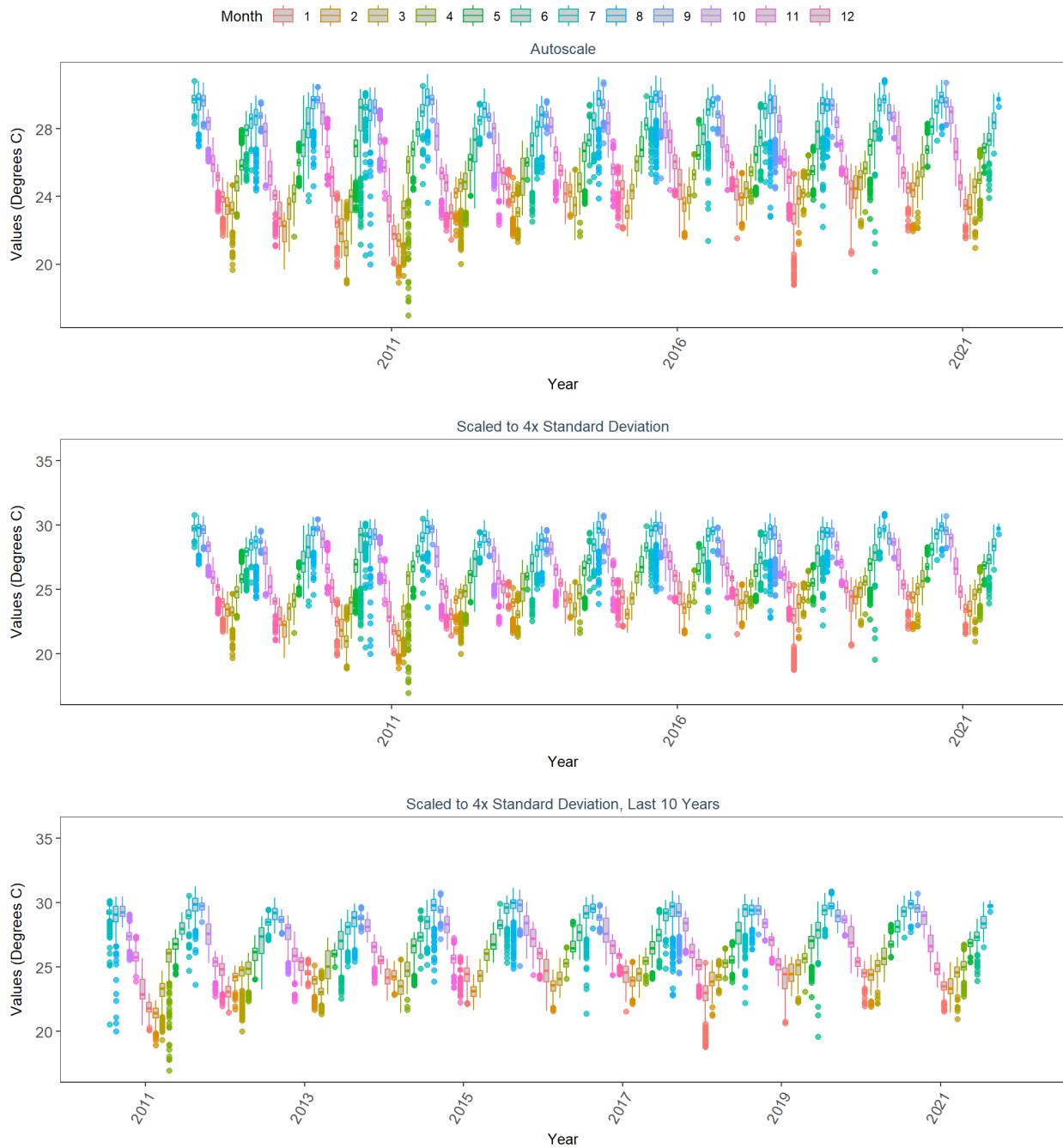
Southeast Florida Coral Reef Ecosystem Conservation Area  
 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 6  
 By Month



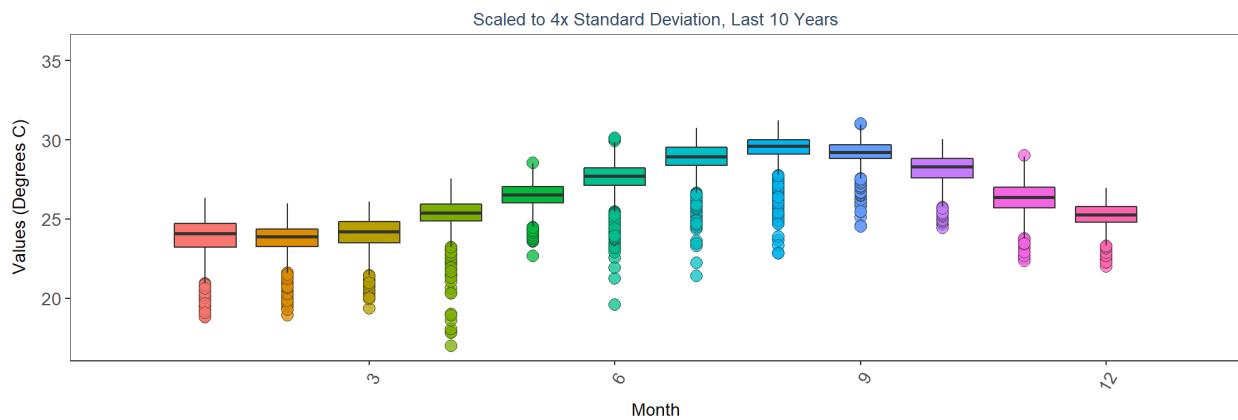
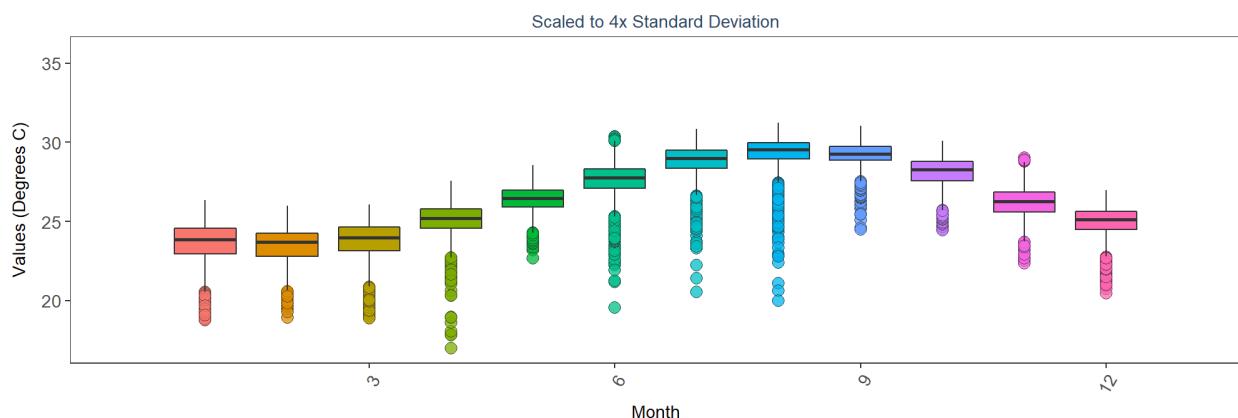
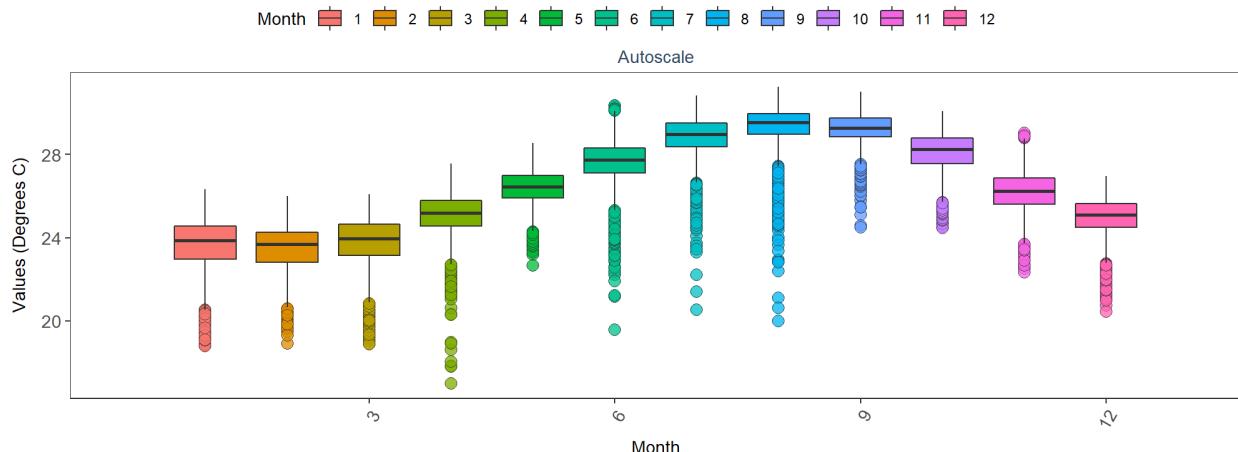
Southeast Florida Coral Reef Ecosystem Conservation Area  
986  
Water Temperature on Coral Reefs in the Florida Keys  
84  
By Year



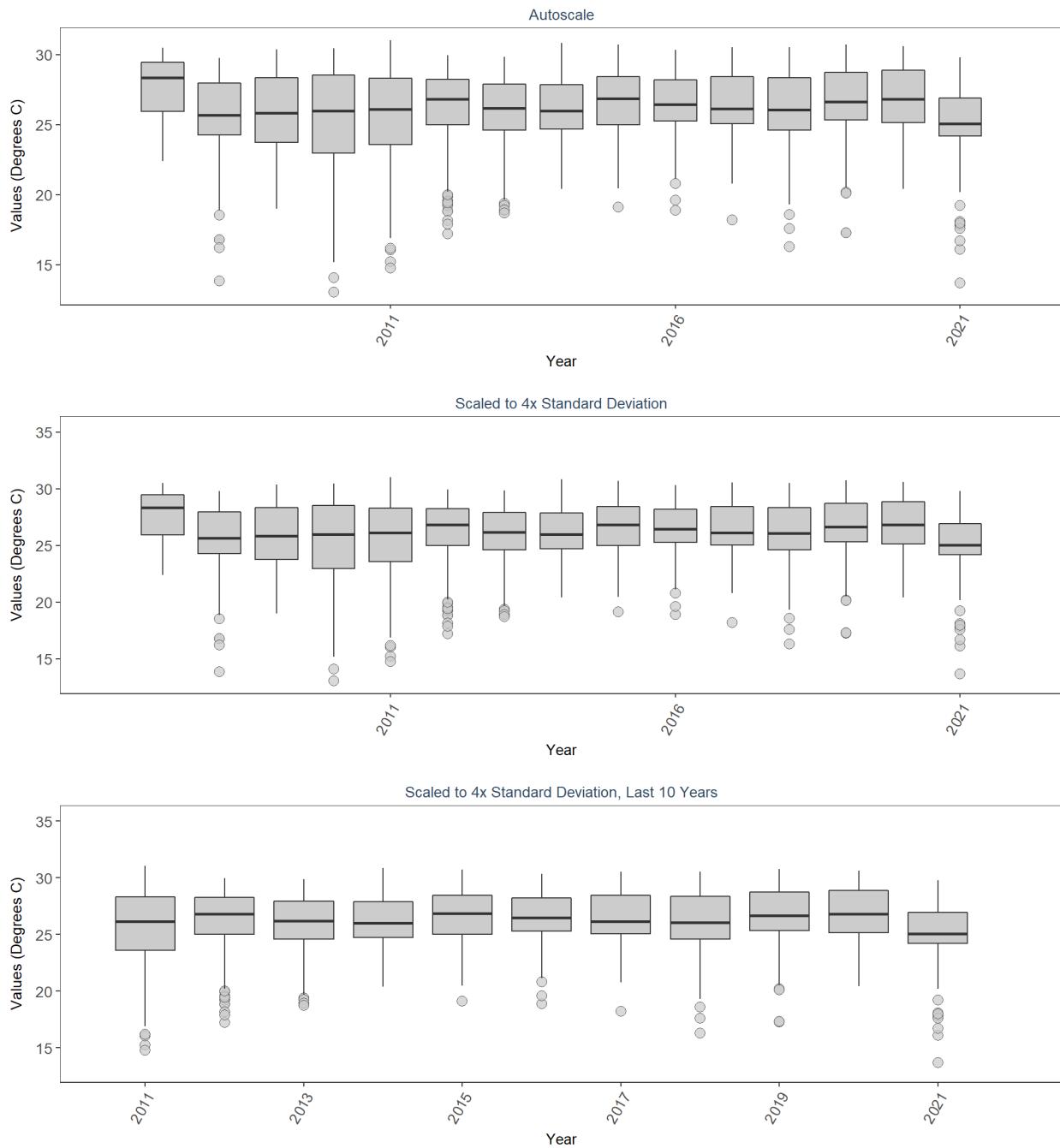
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 84  
 By Year & Month



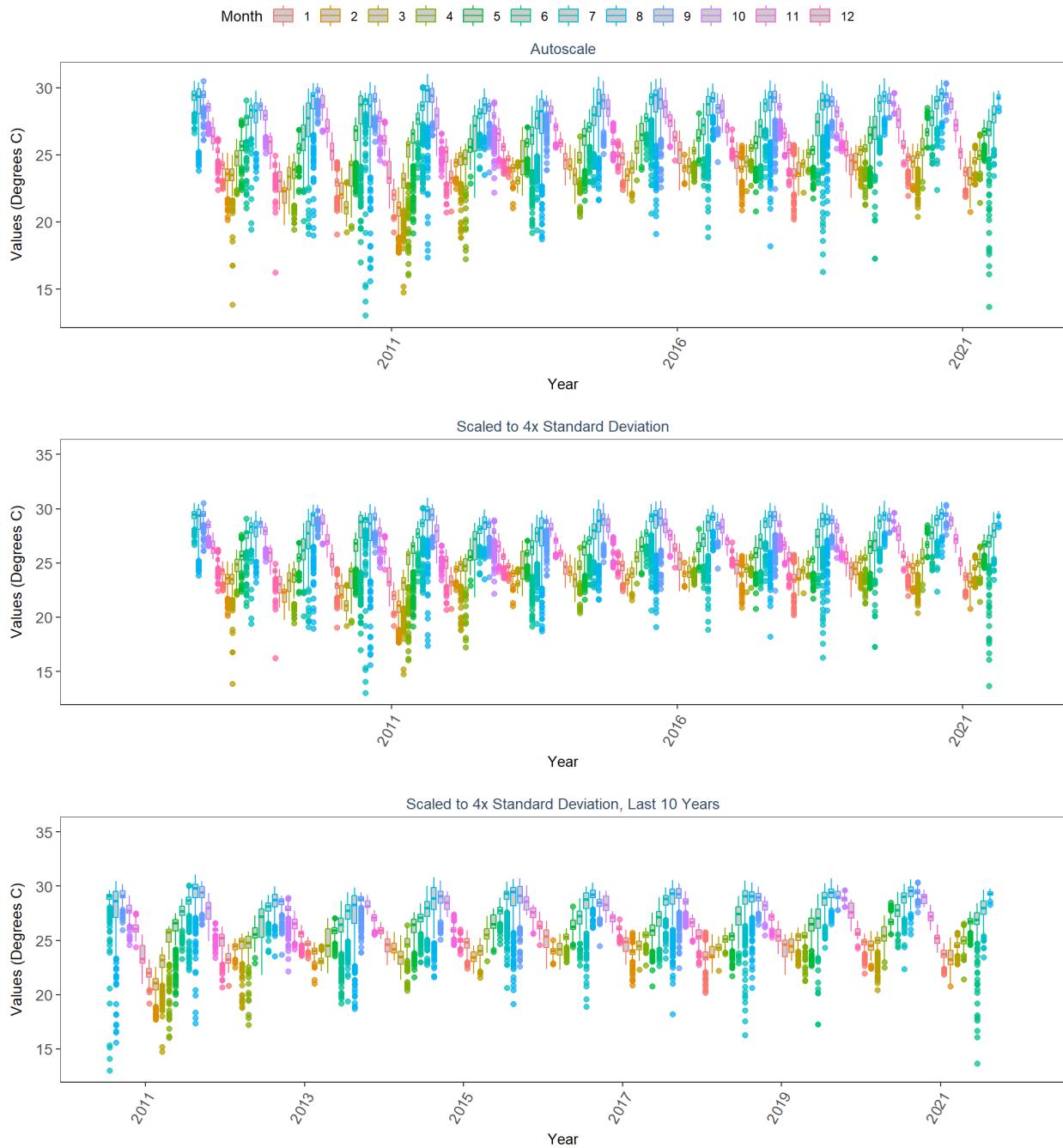
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 84  
 By Month



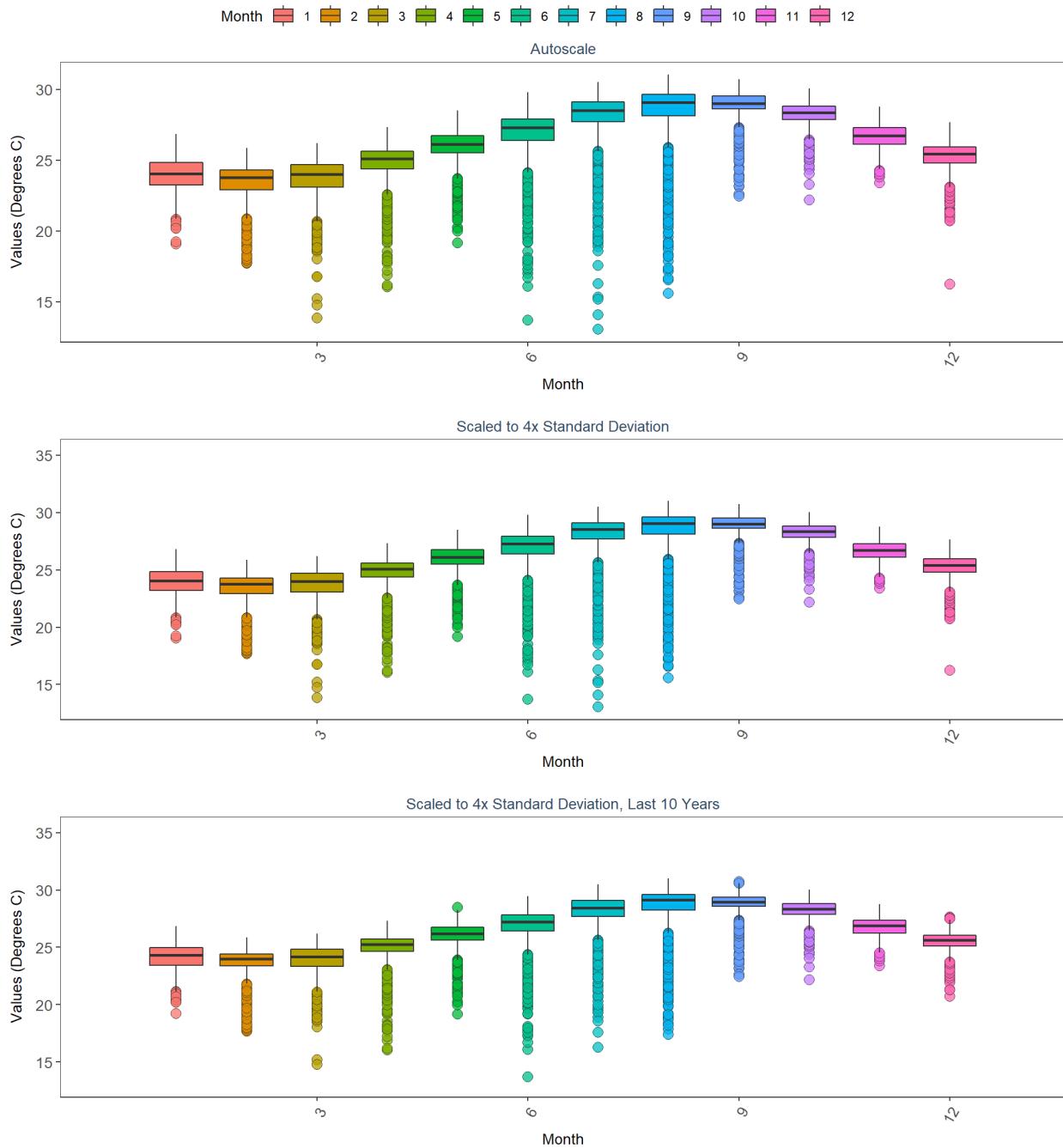
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 Water Temperature on Coral Reefs in the Florida Keys  
 85  
 By Year



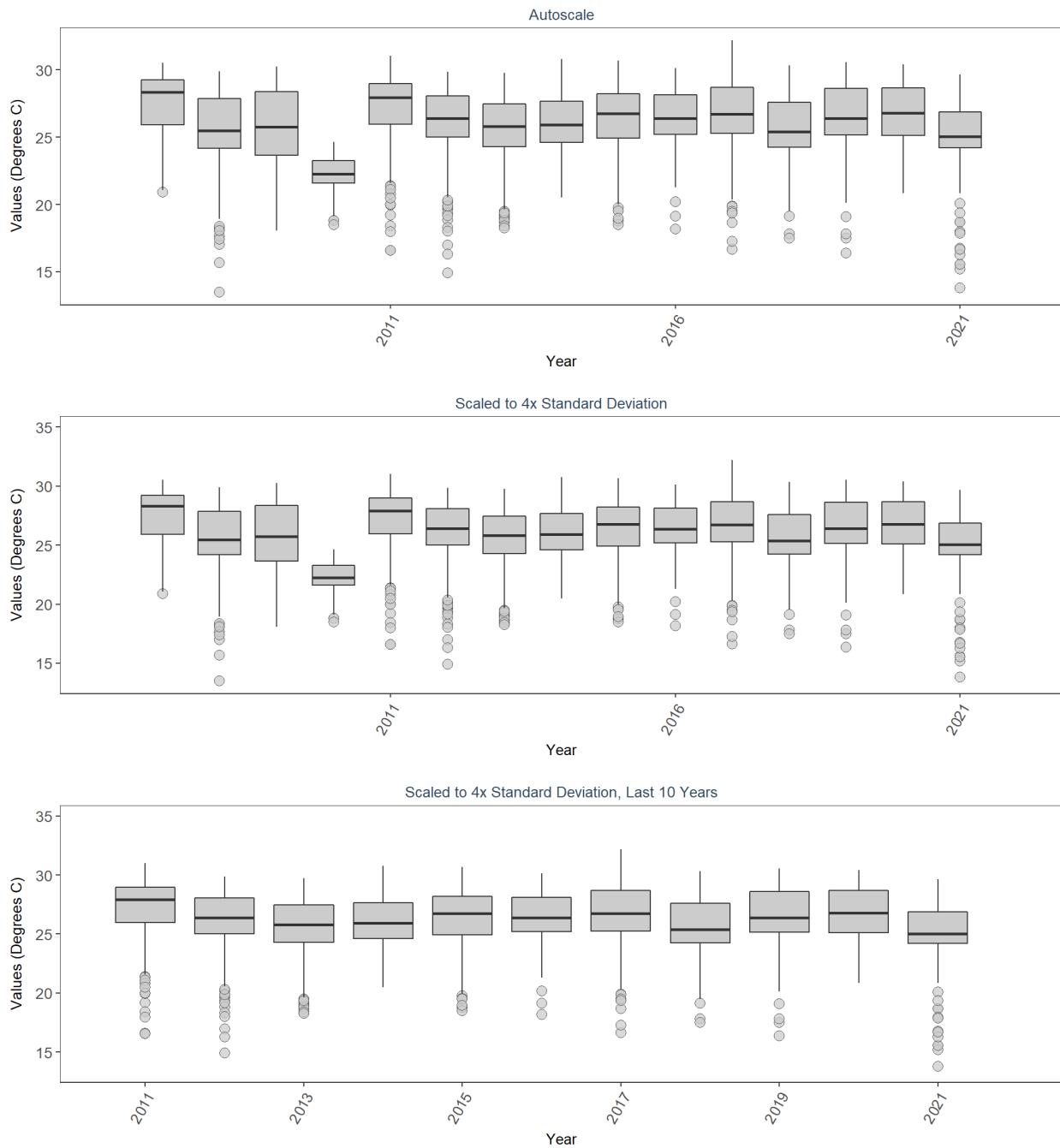
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 85  
 By Year & Month



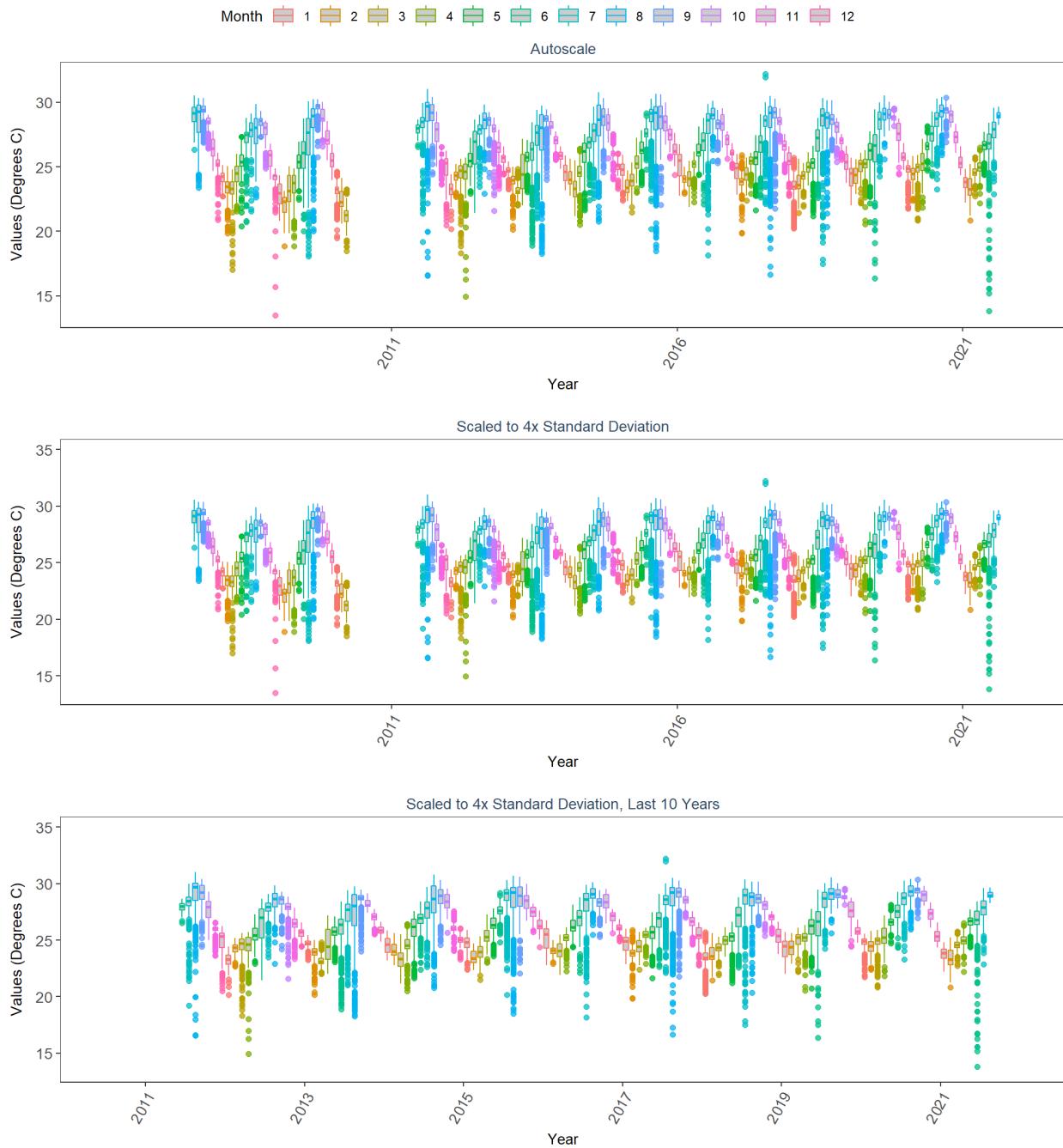
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 85  
 By Month



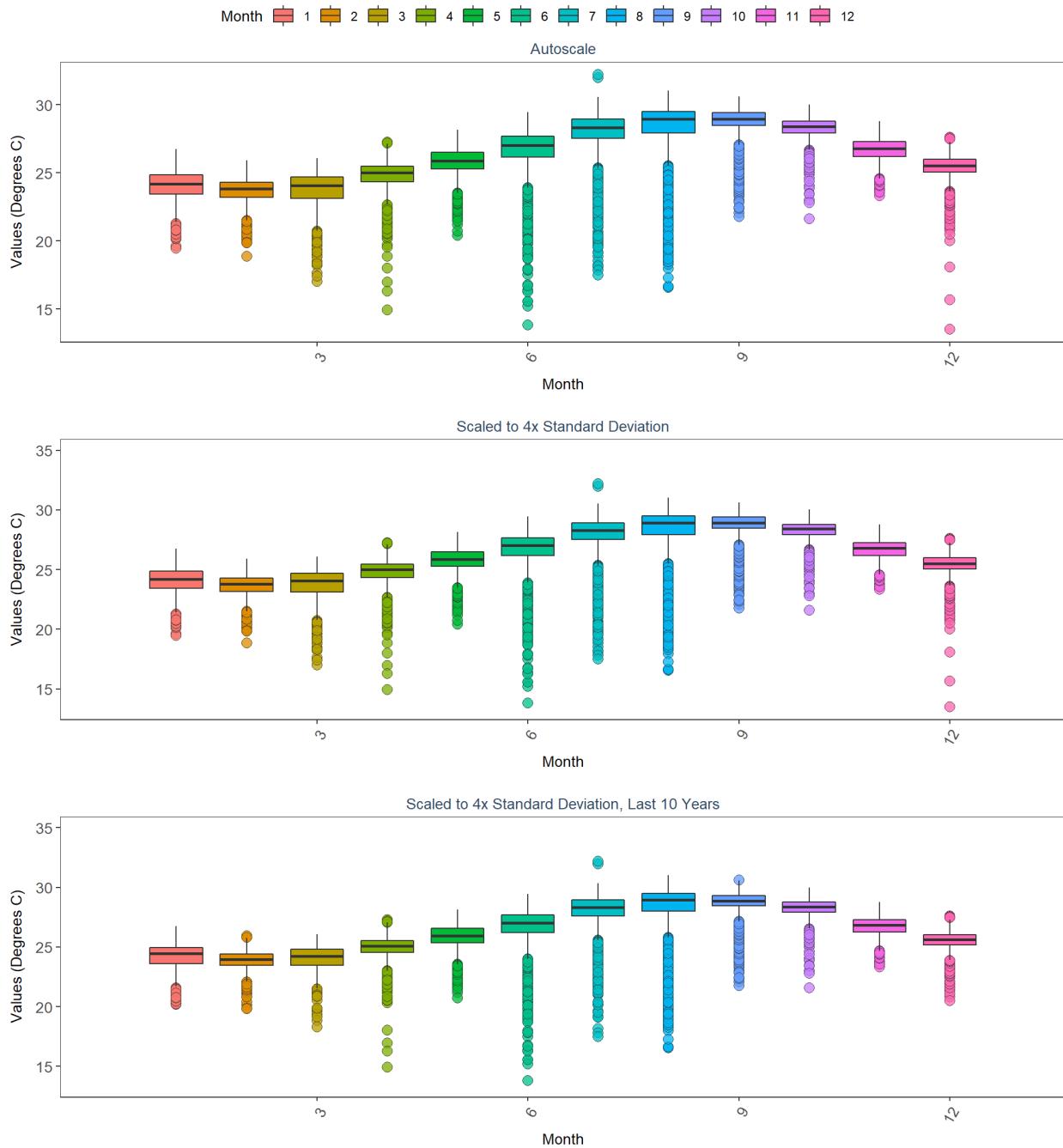
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 Water Temperature on Coral Reefs in the Florida Keys  
 86  
 By Year



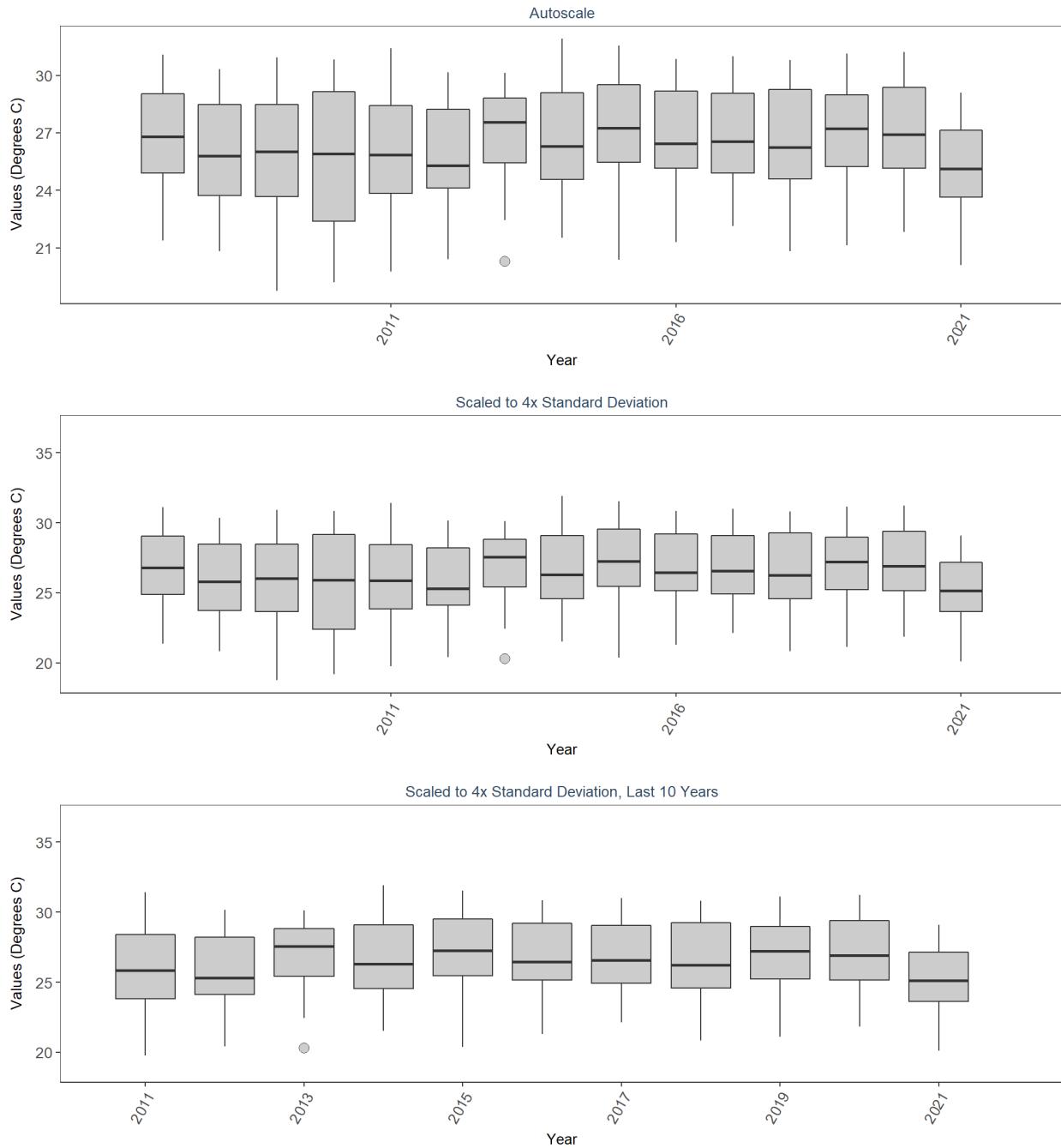
Southeast Florida Coral Reef Ecosystem Conservation Area  
986  
Water Temperature on Coral Reefs in the Florida Keys  
86  
By Year & Month



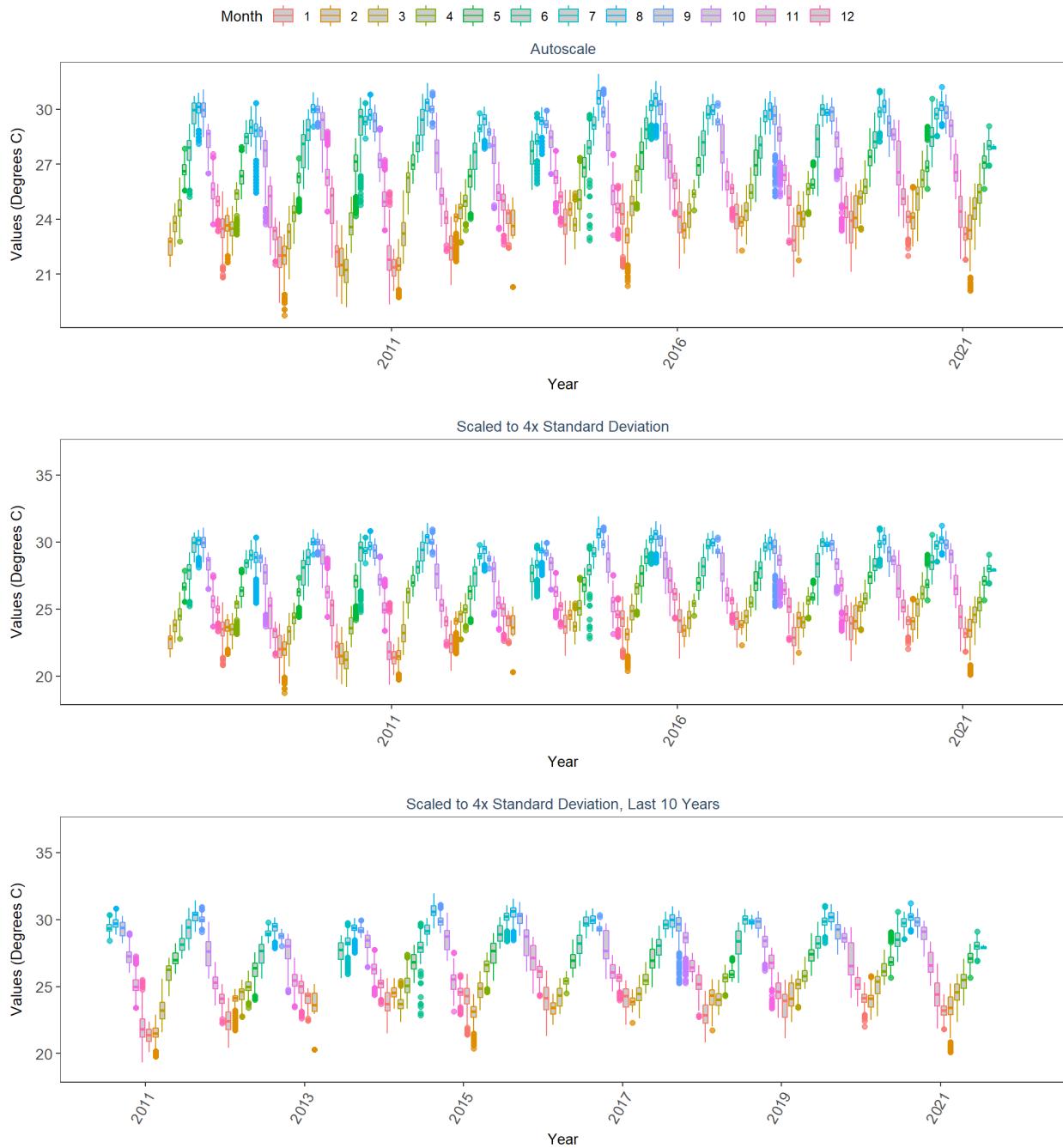
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 Water Temperature on Coral Reefs in the Florida Keys  
 86  
 By Month



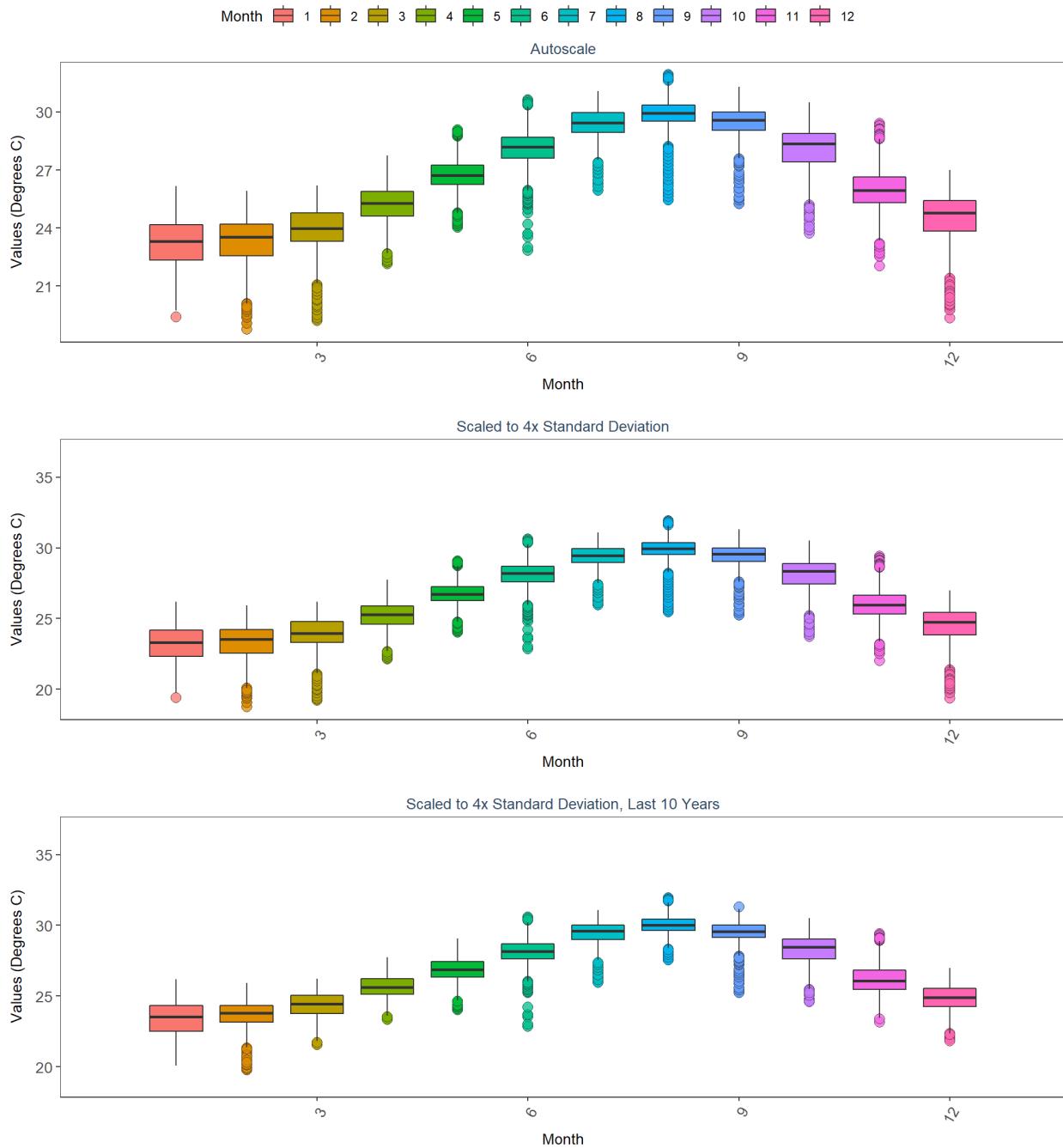
Southeast Florida Coral Reef Ecosystem Conservation Area  
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 Water Temperature on Coral Reefs in the Florida Keys  
 87  
 By Year



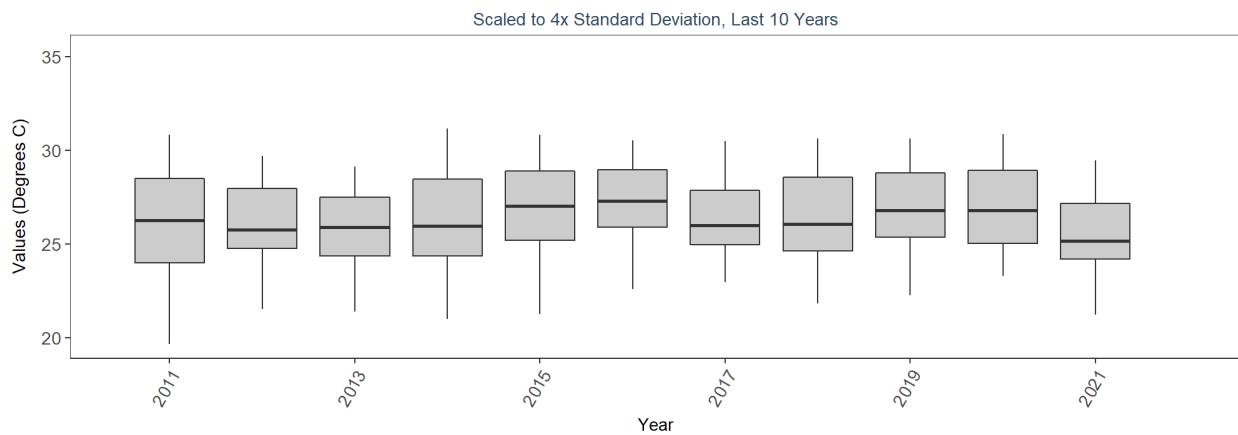
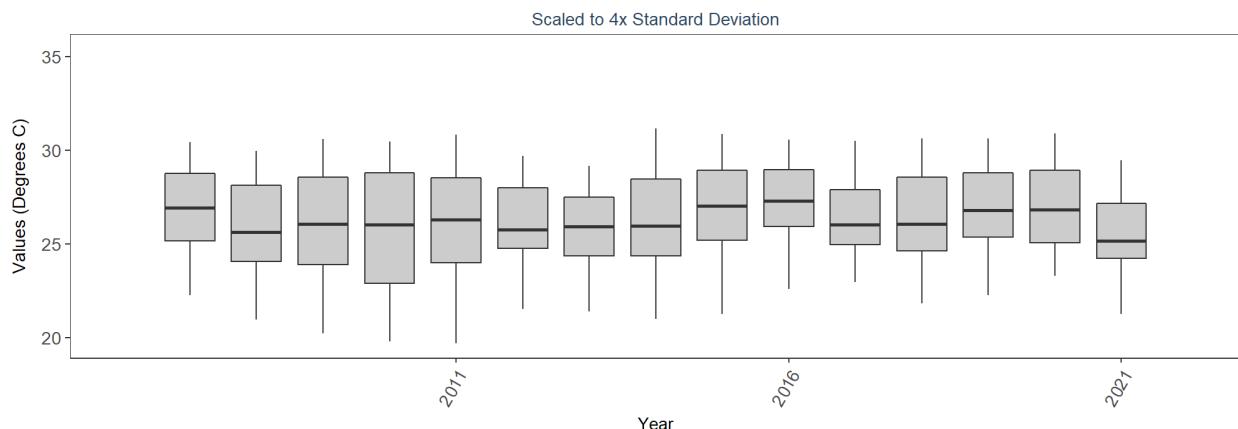
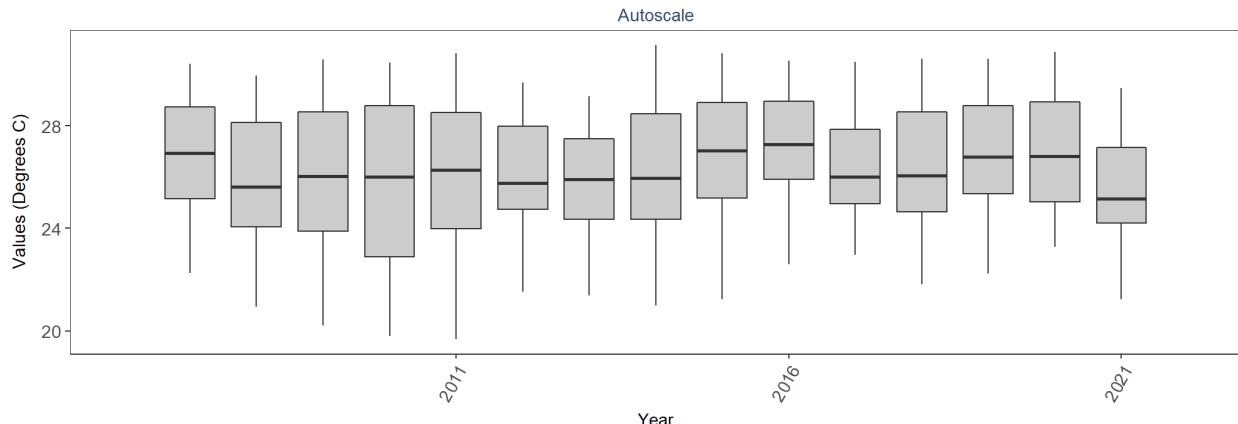
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 986  
 Water Temperature on Coral Reefs in the Florida Keys  
 87  
 By Year & Month



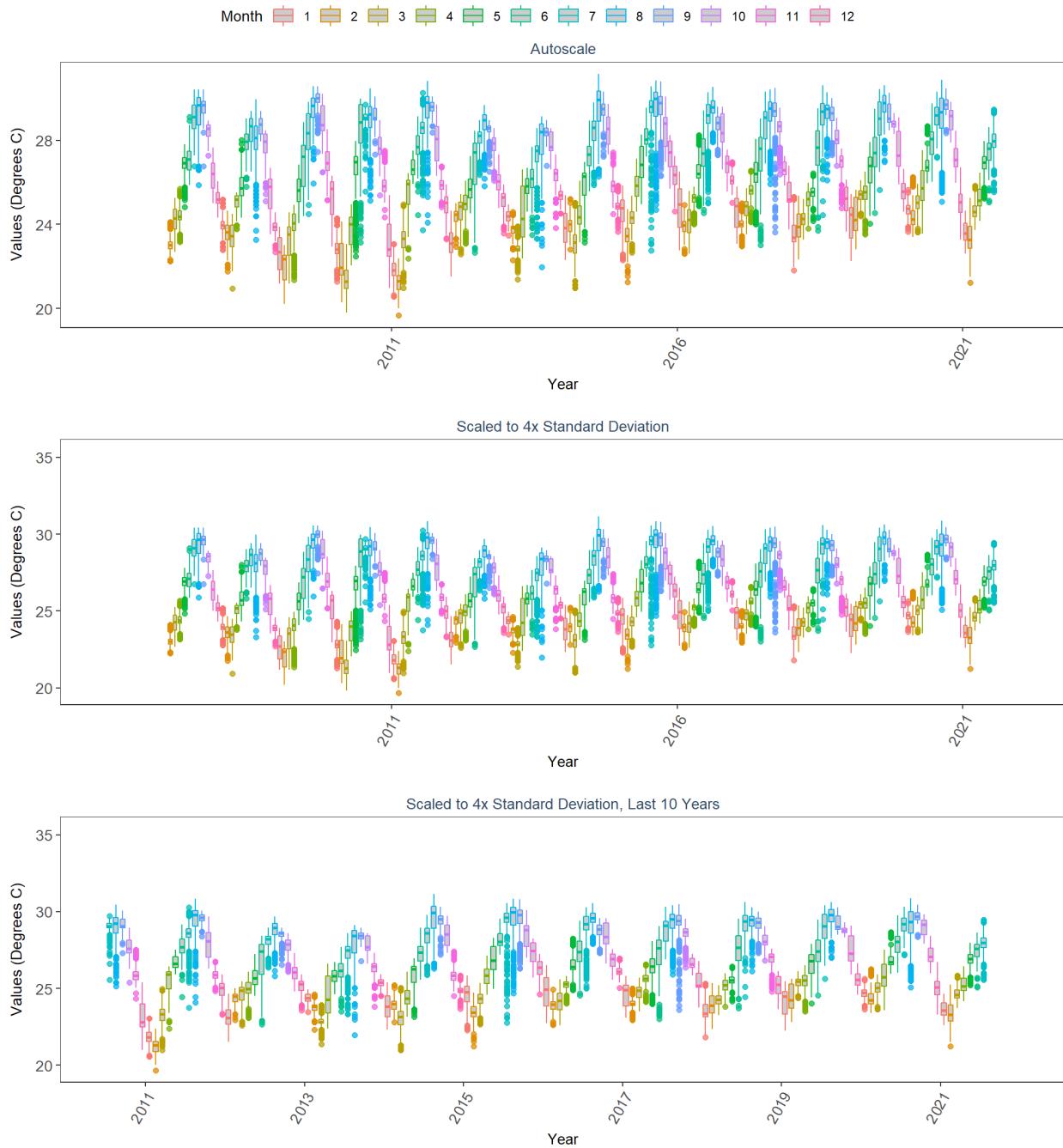
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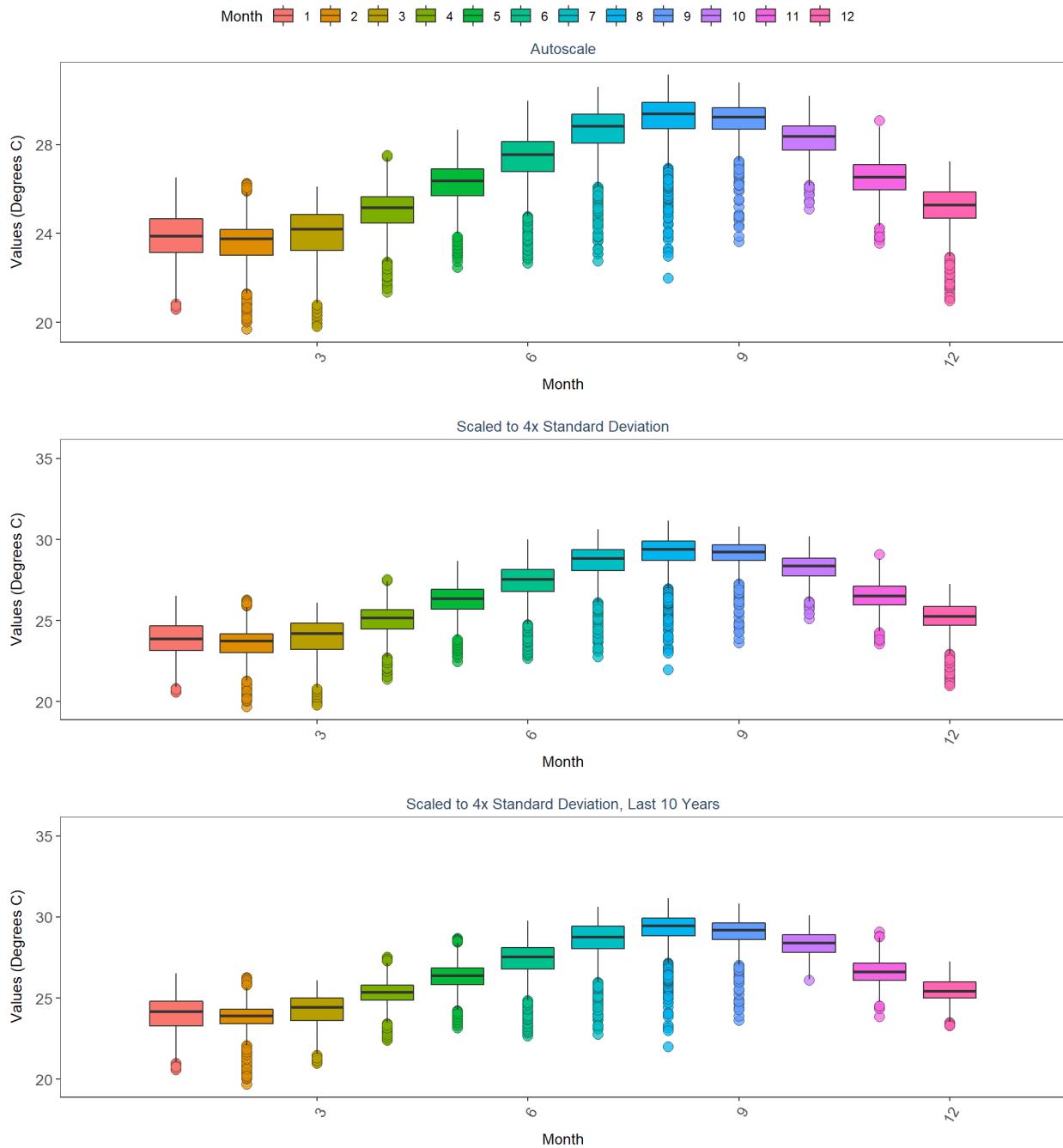
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88  
By Year



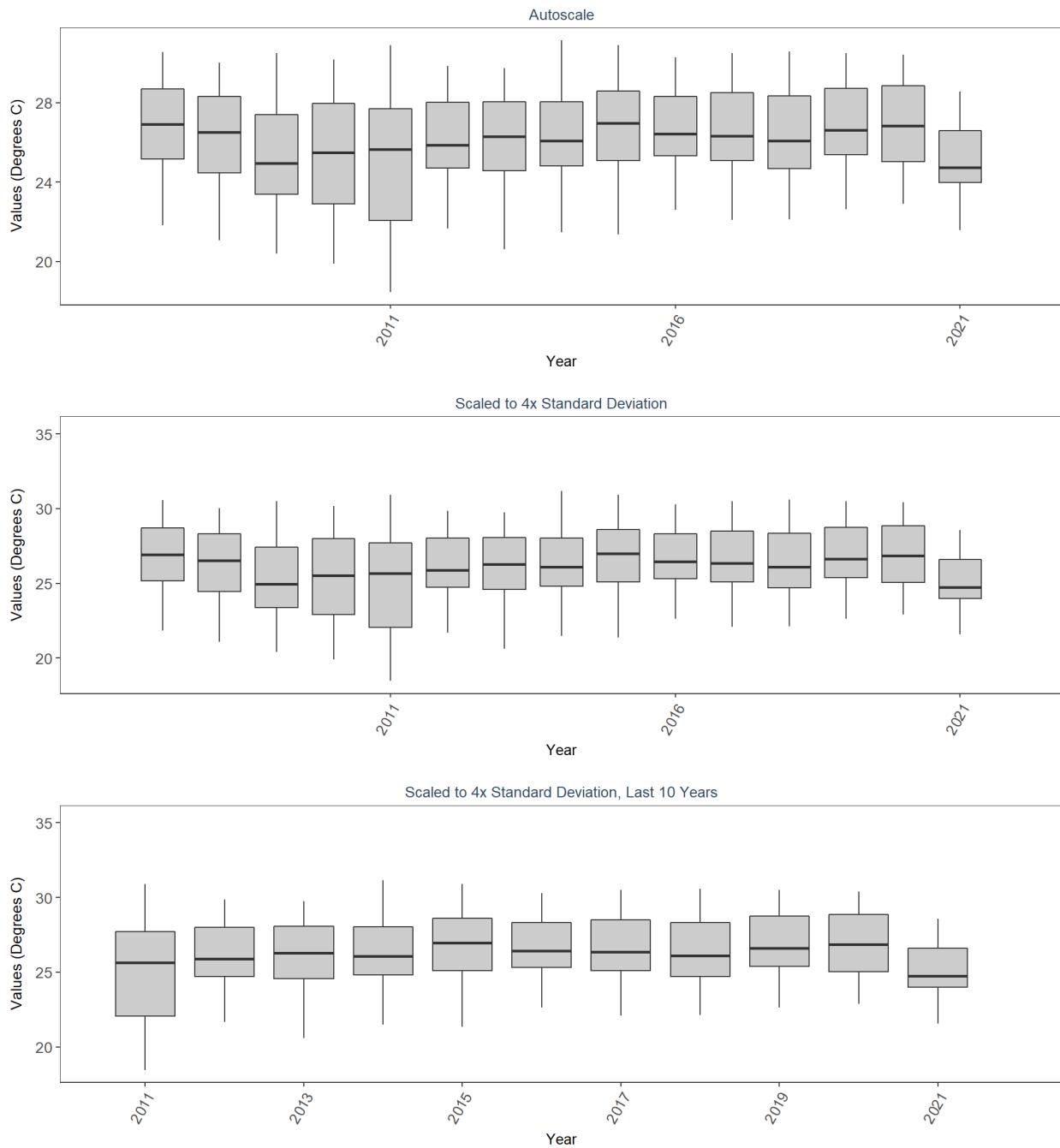
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 88  
 By Year & Month



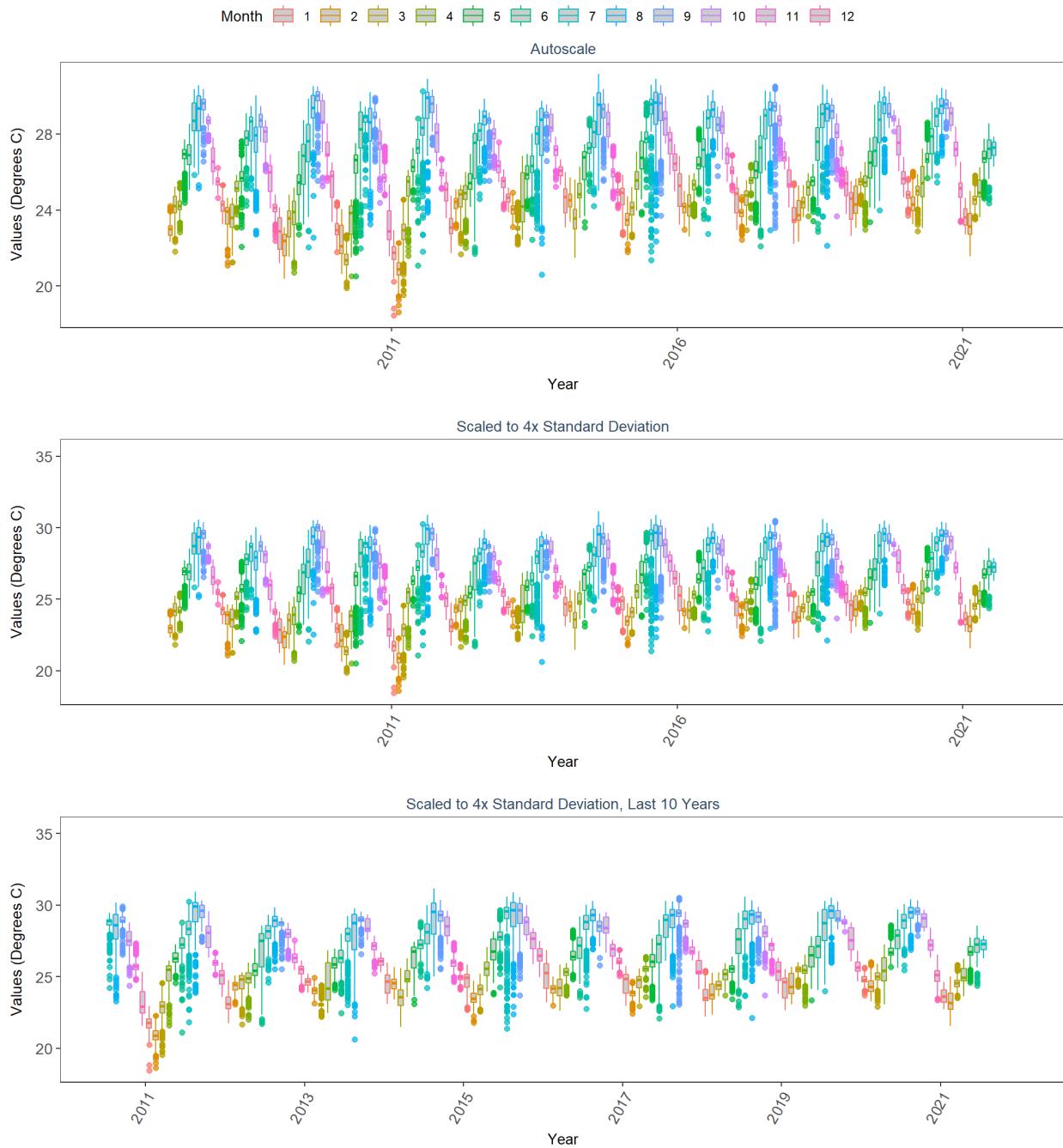
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 88  
 By Month



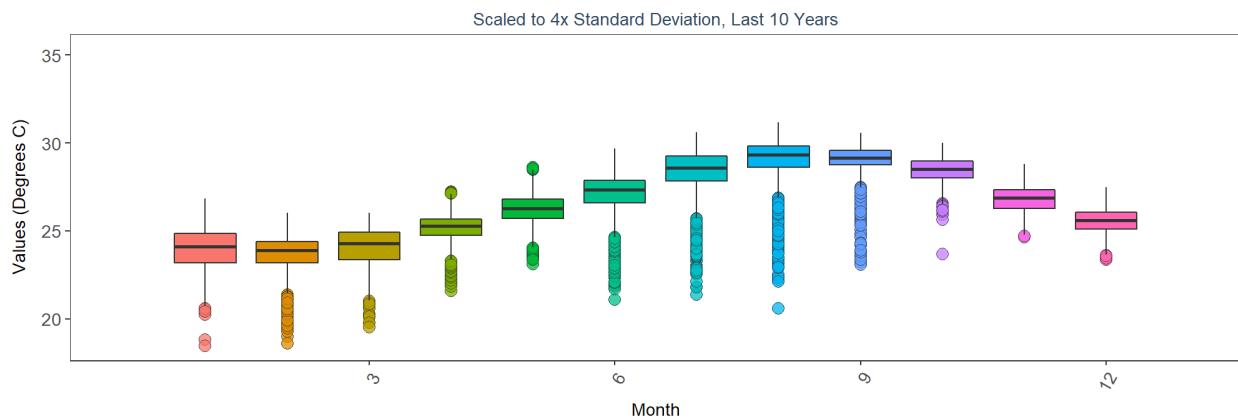
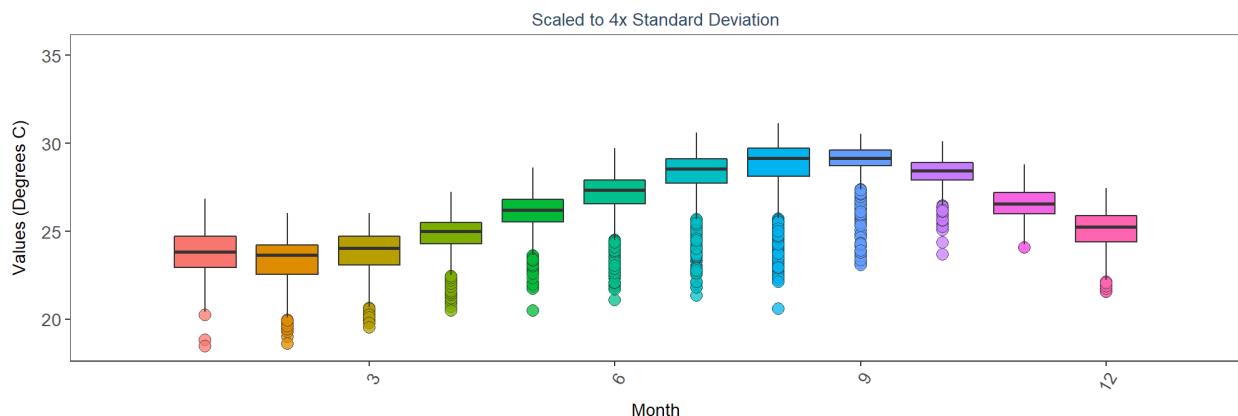
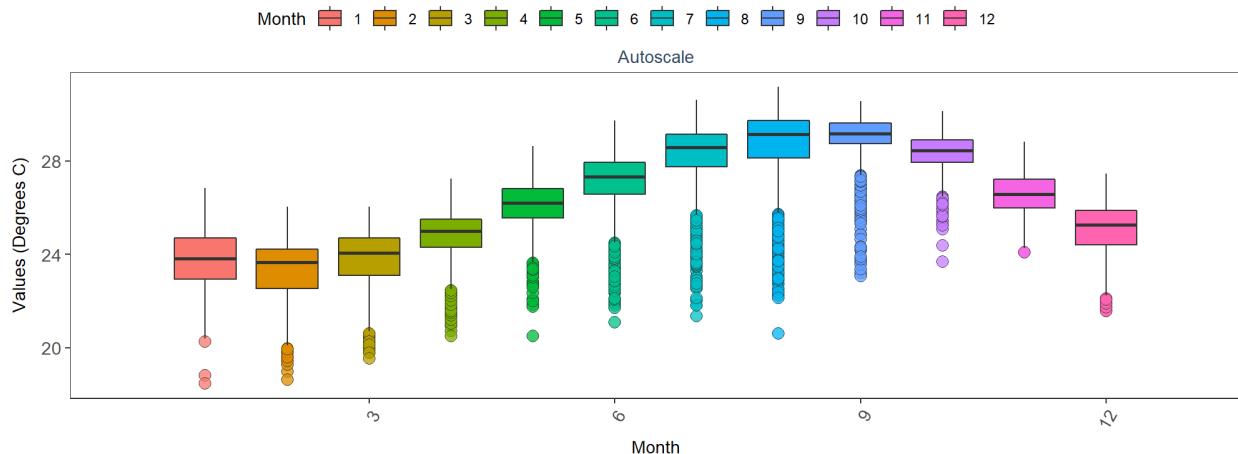
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Water Temperature on Coral Reefs in the Florida Keys  
89  
By Year



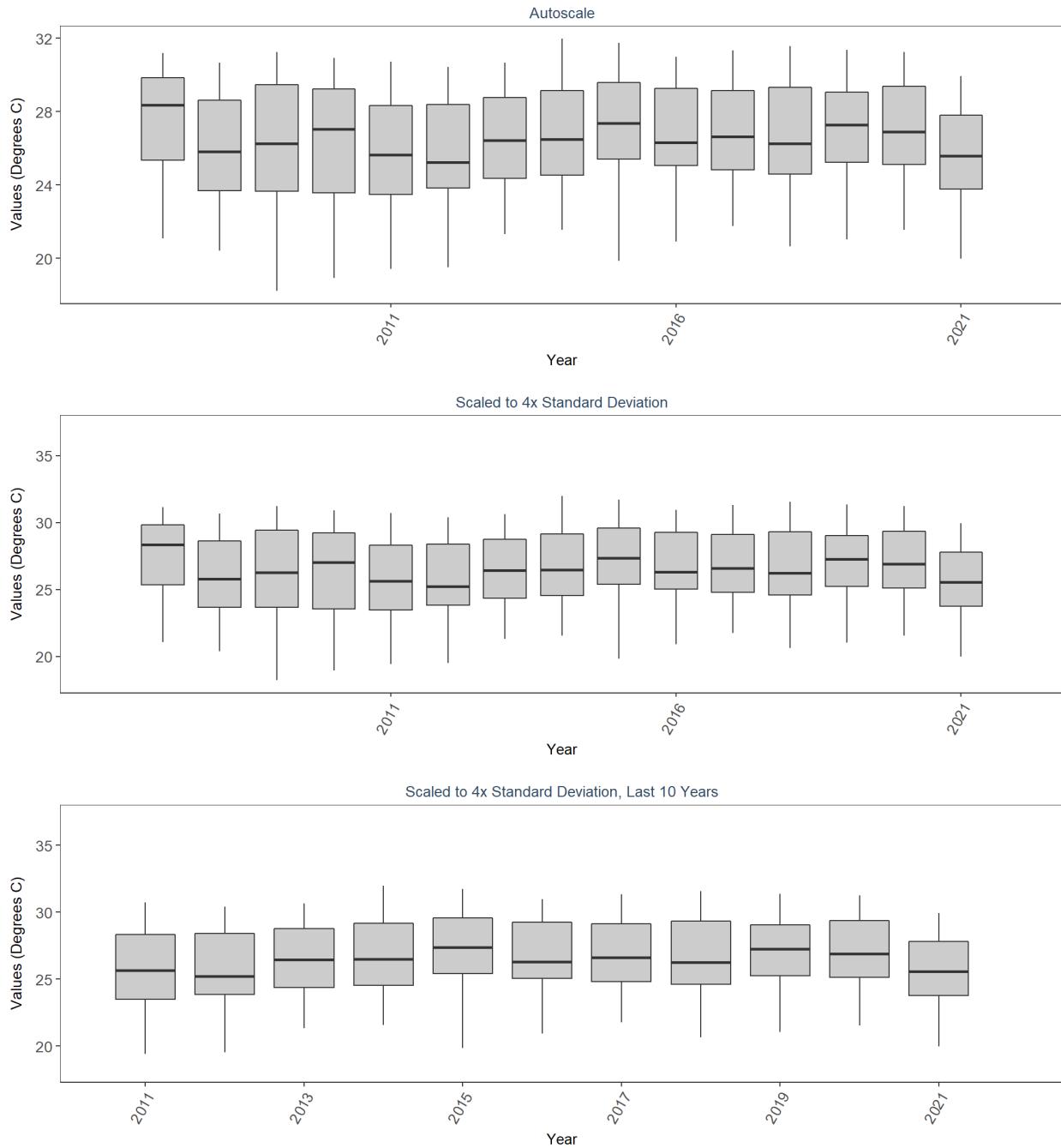
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89  
By Year & Month



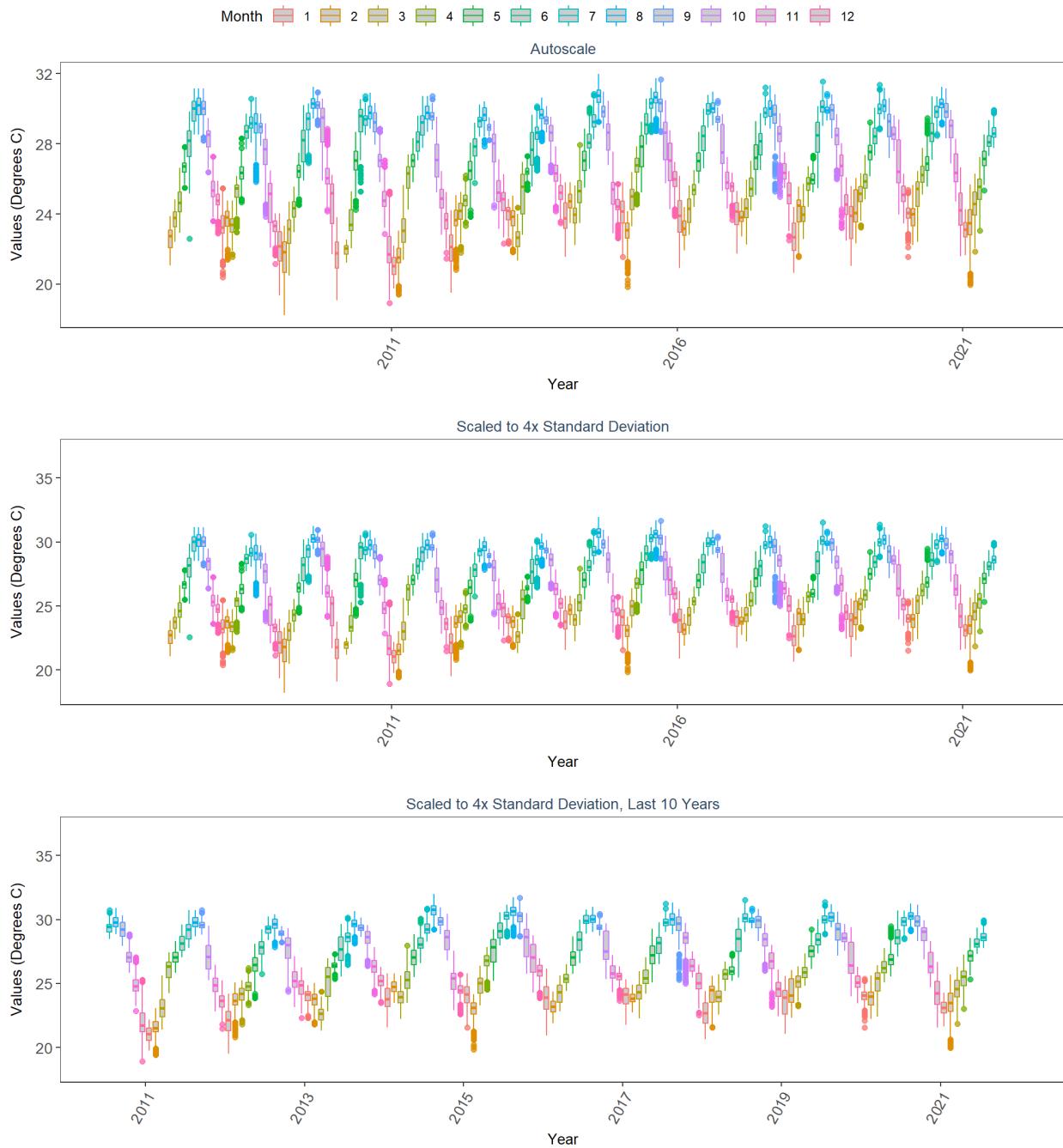
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 Water Temperature on Coral Reefs in the Florida Keys  
 89  
 By Month



Southeast Florida Coral Reef Ecosystem Conservation Area  
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Water Temperature on Coral Reefs in the Florida Keys  
90  
By Year



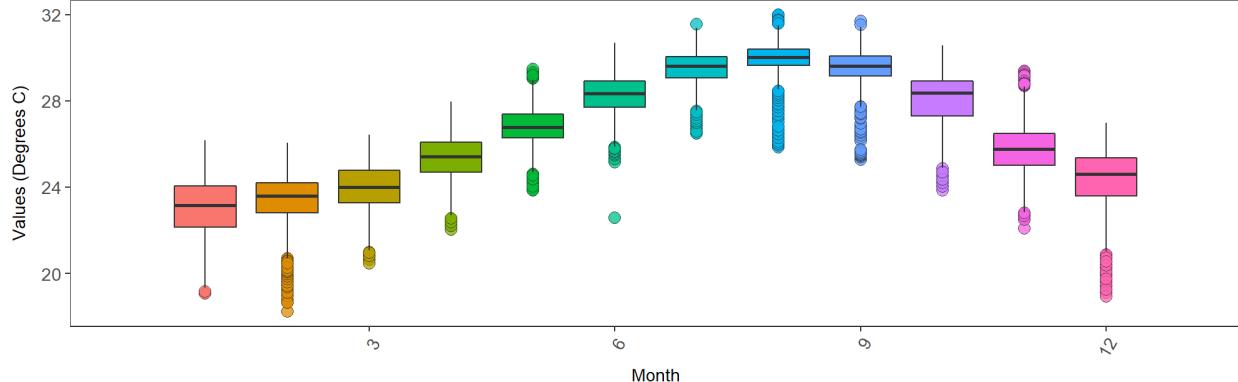
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 By Year & Month



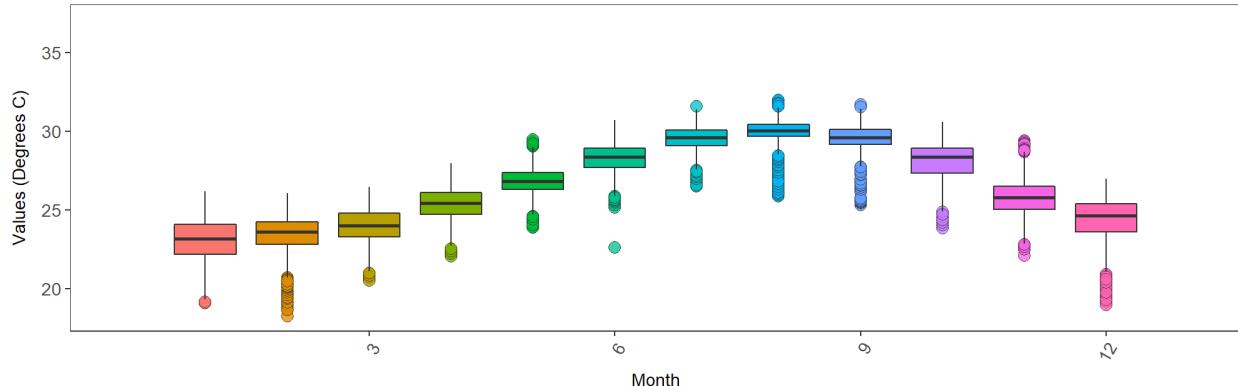
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 By Month

Month 1 2 3 4 5 6 7 8 9 10 11 12

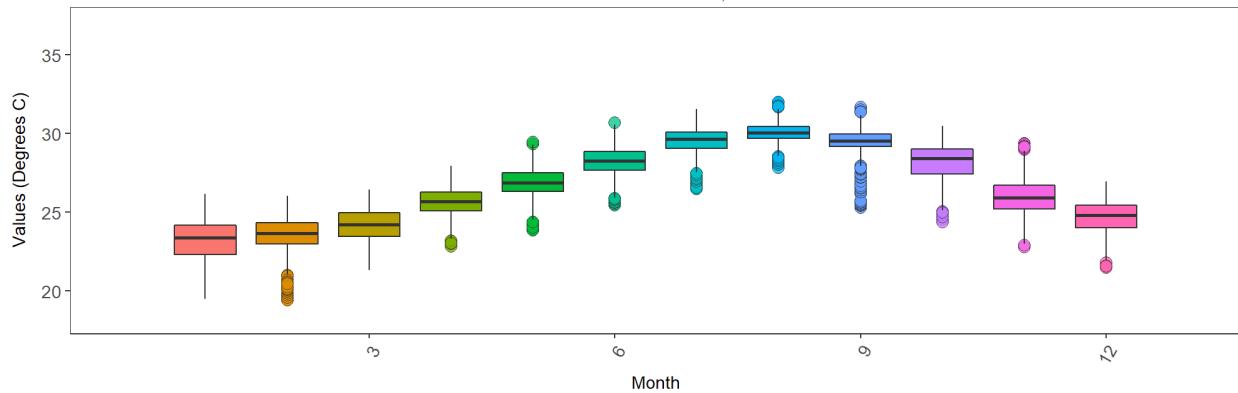
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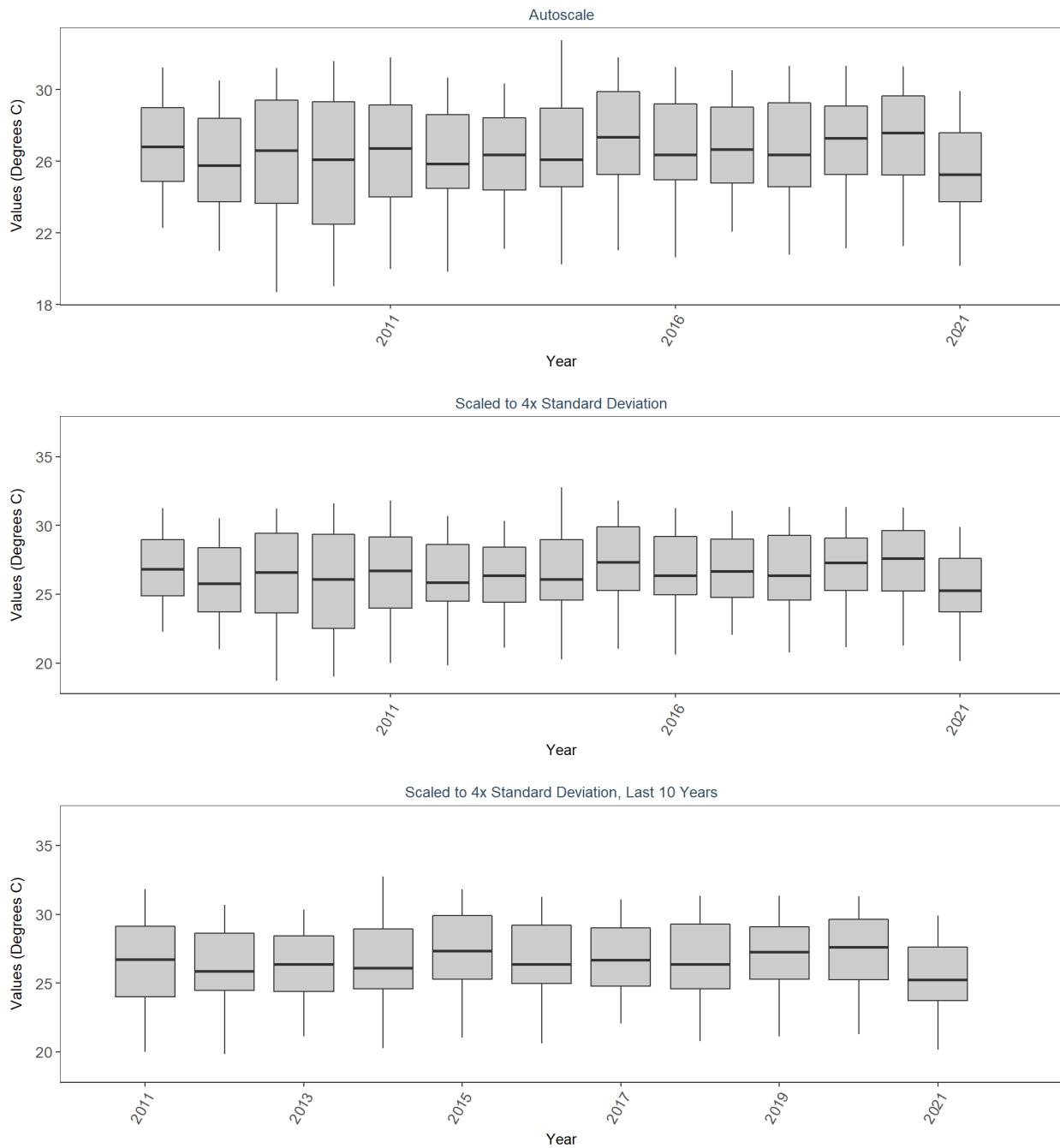
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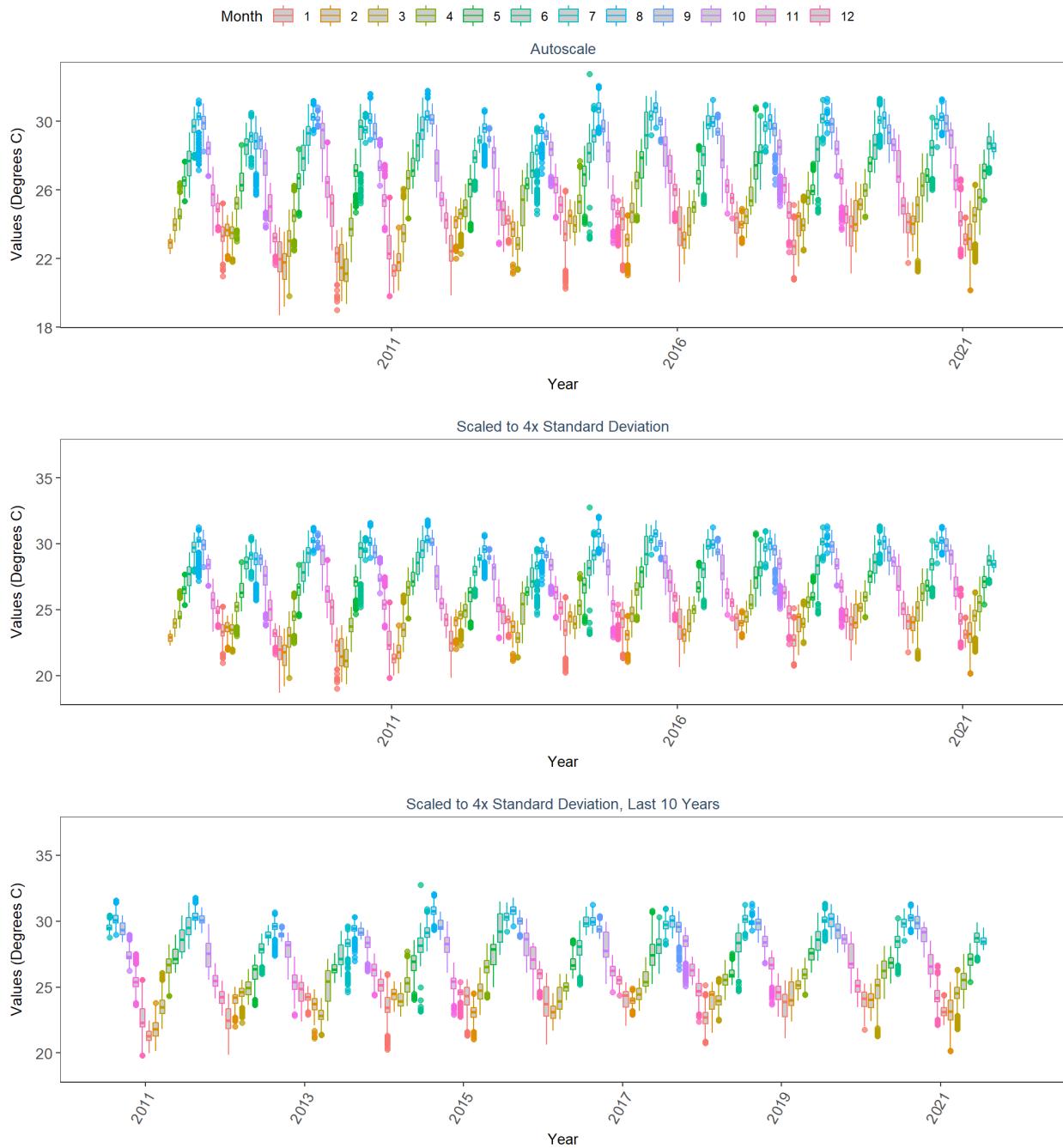
Scaled to 4x Standard Deviation, Last 10 Years



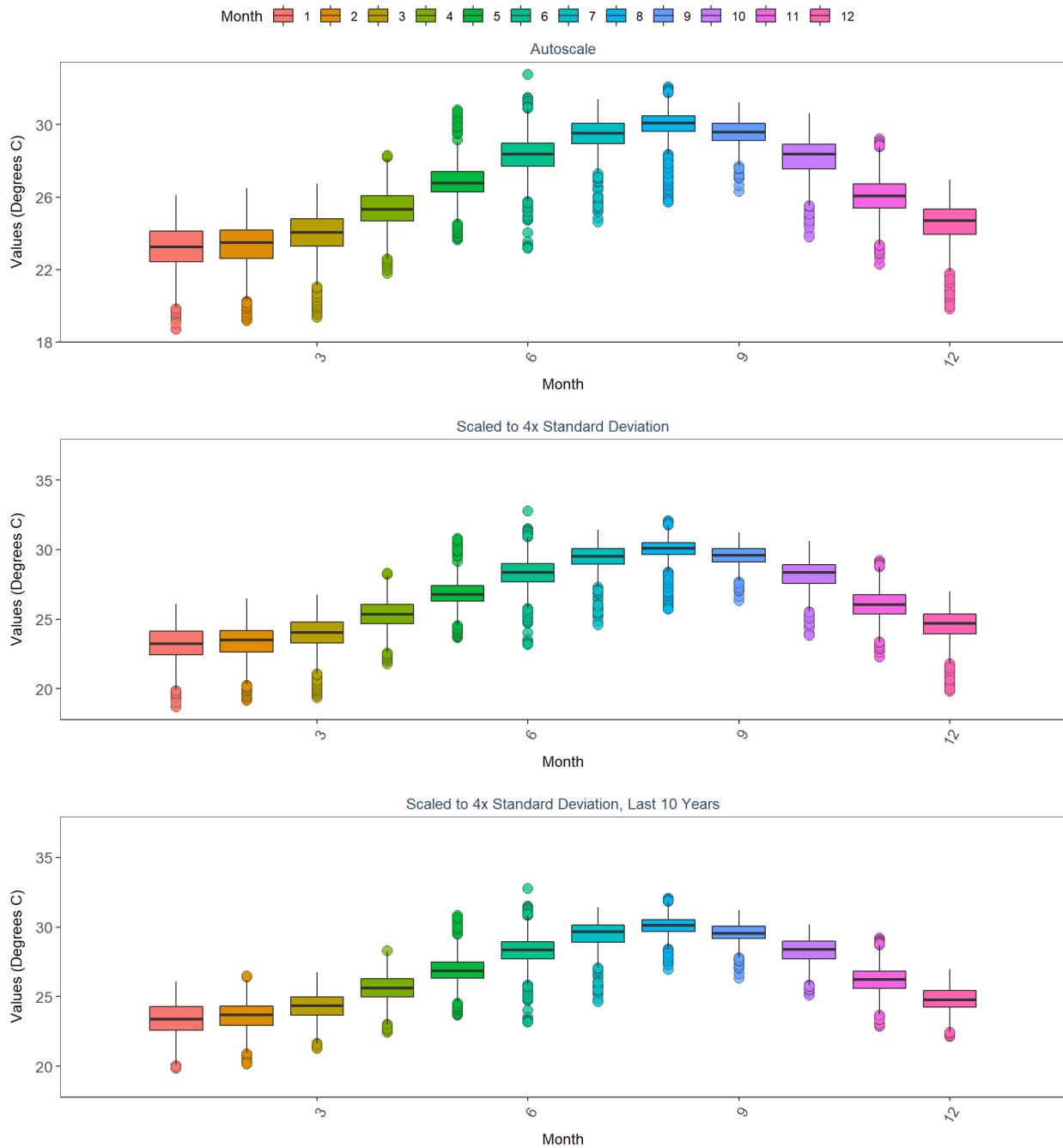
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91  
By Year



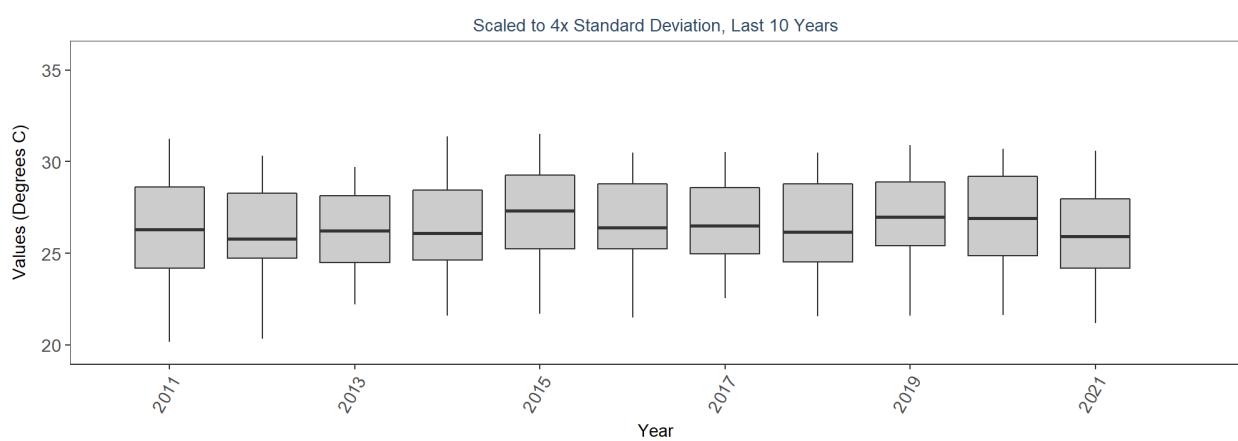
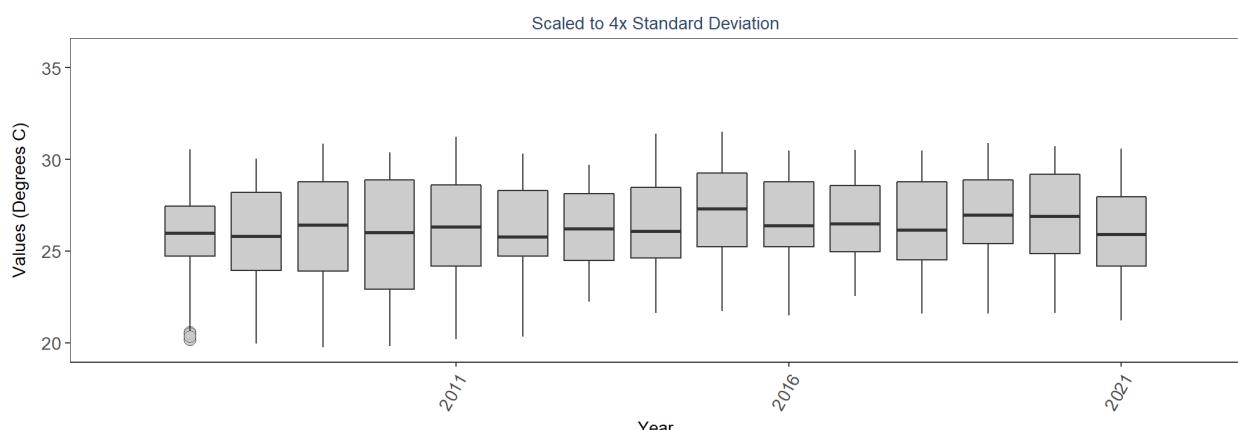
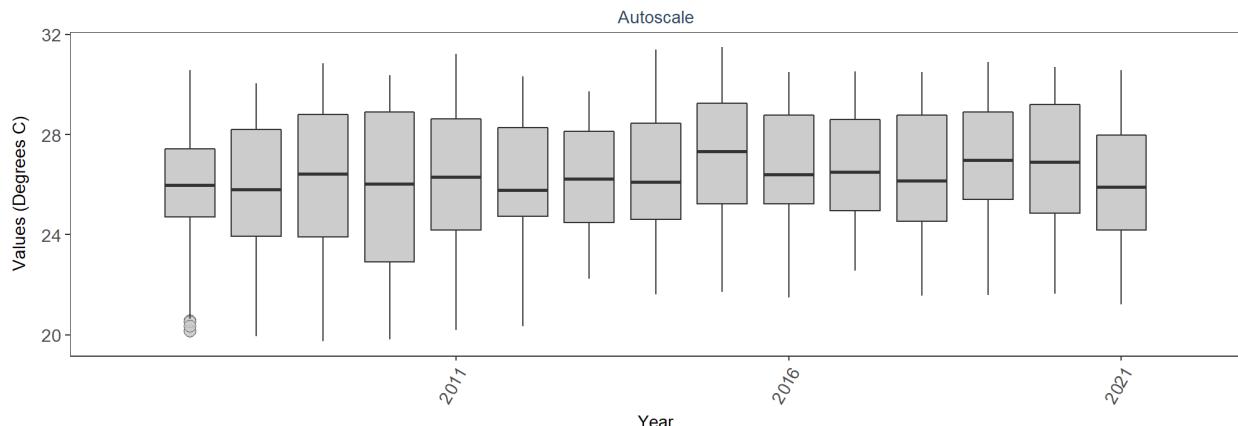
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 By Year & Month



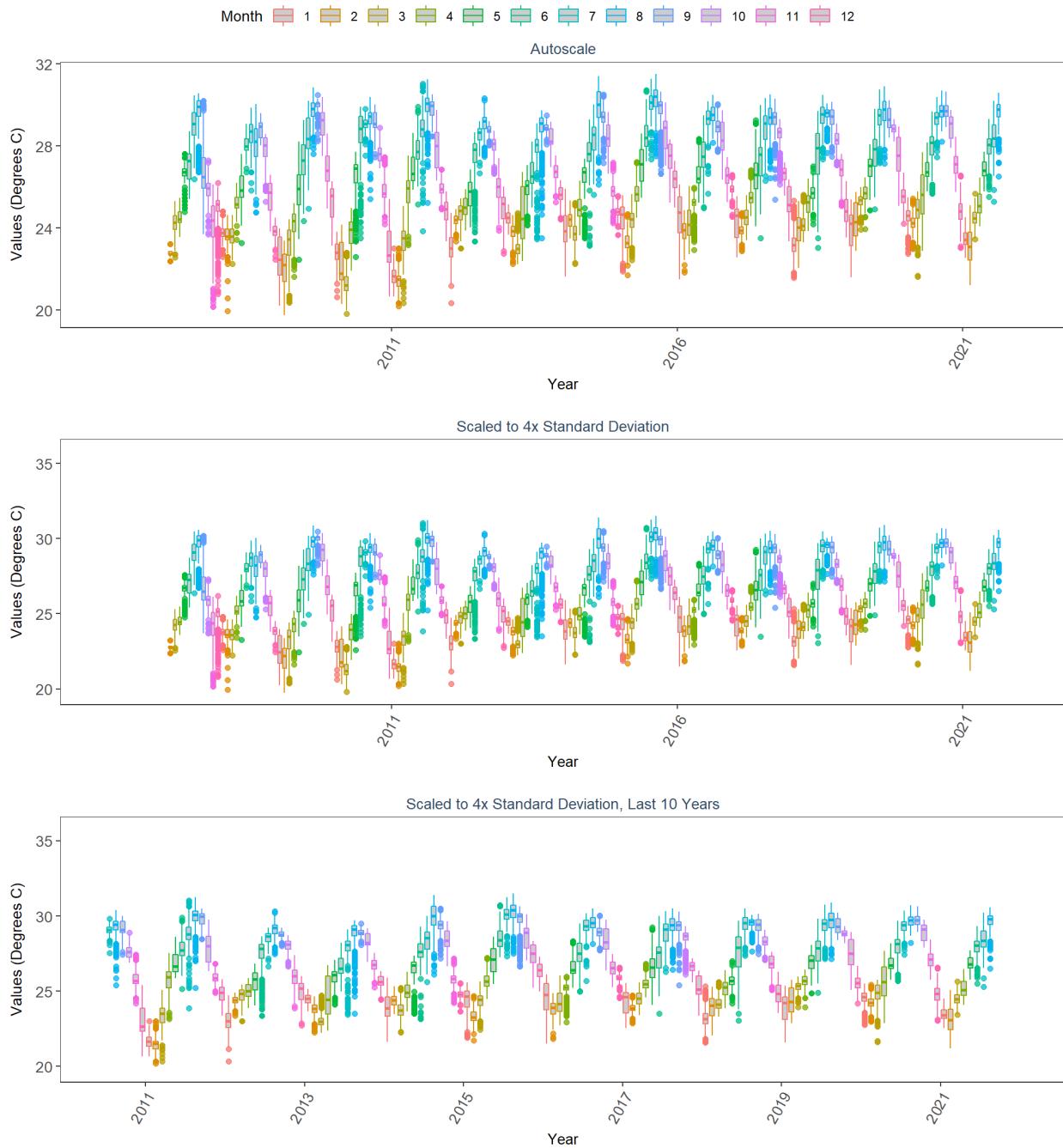
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 By Month



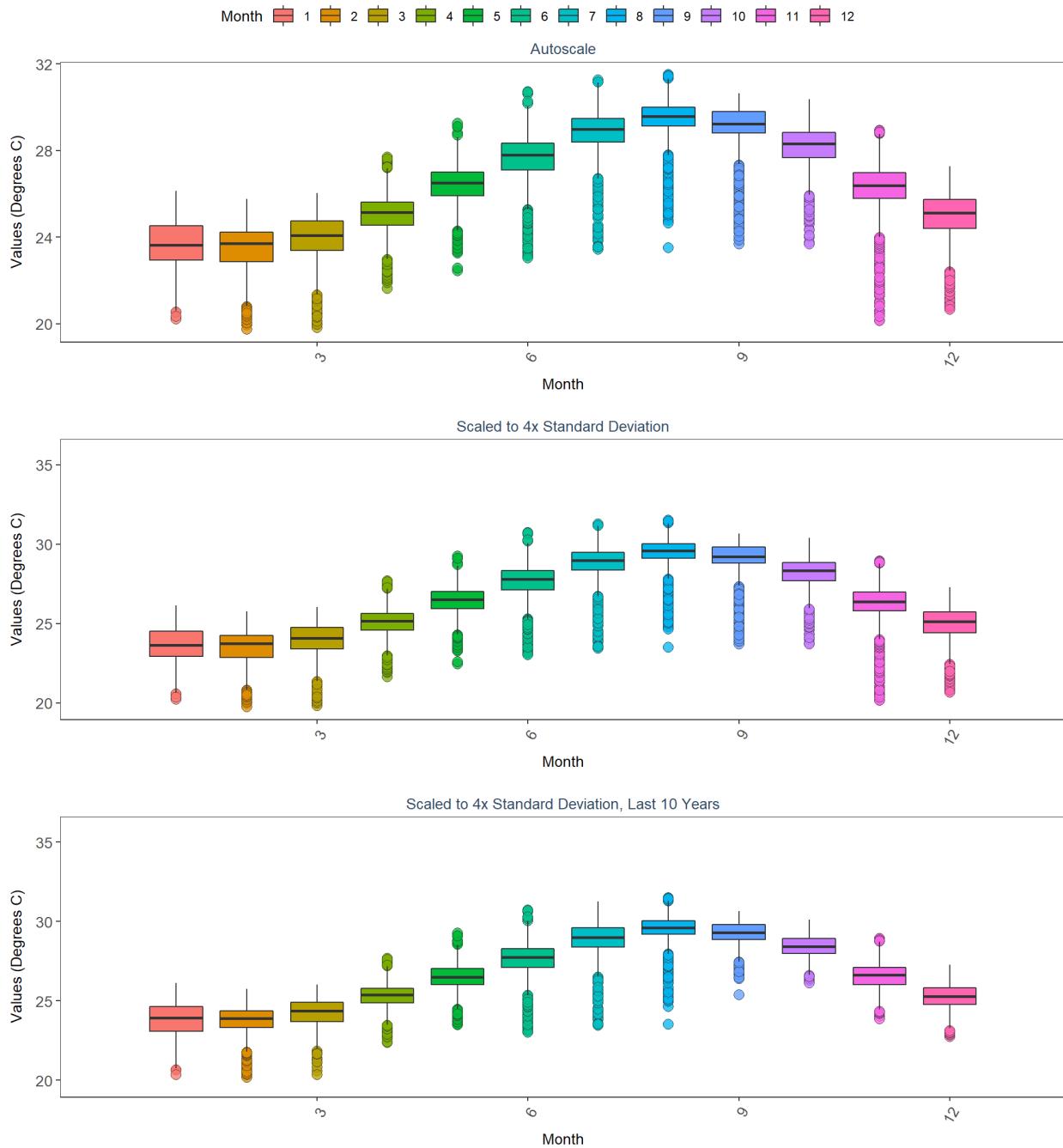
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By Year



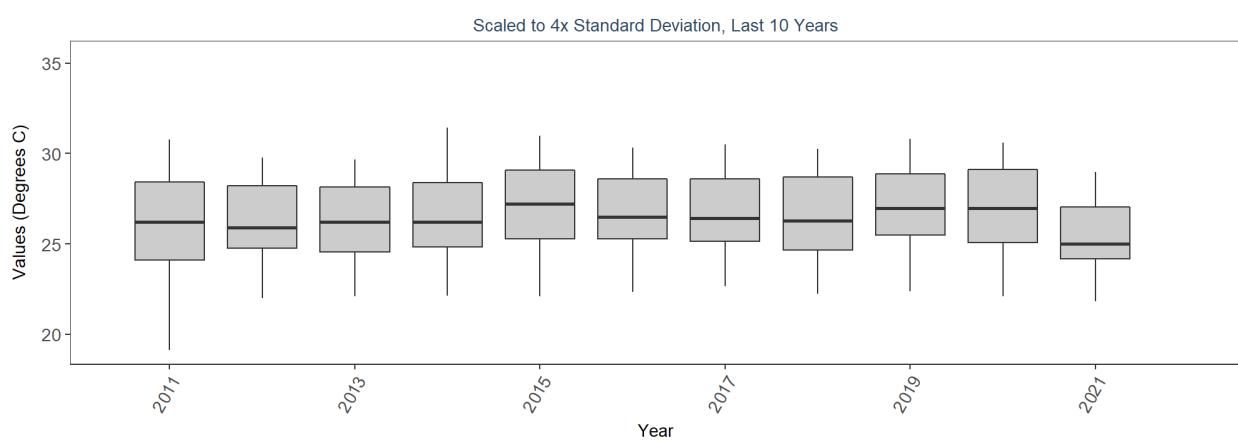
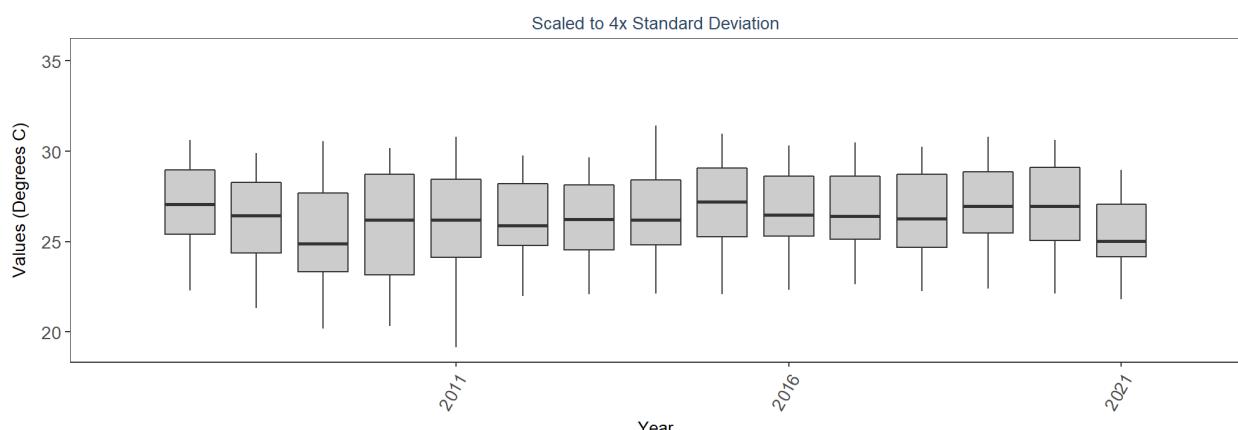
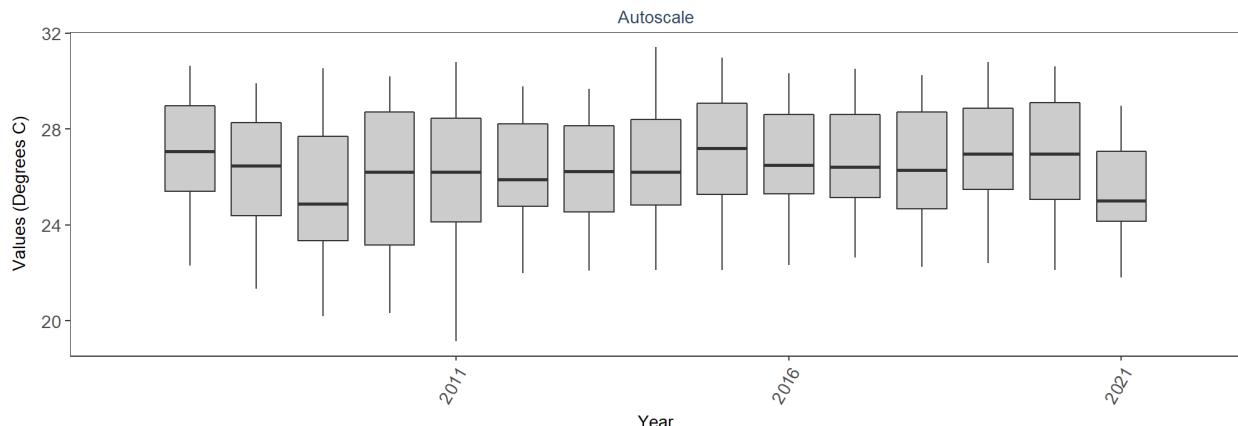
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 By Year & Month



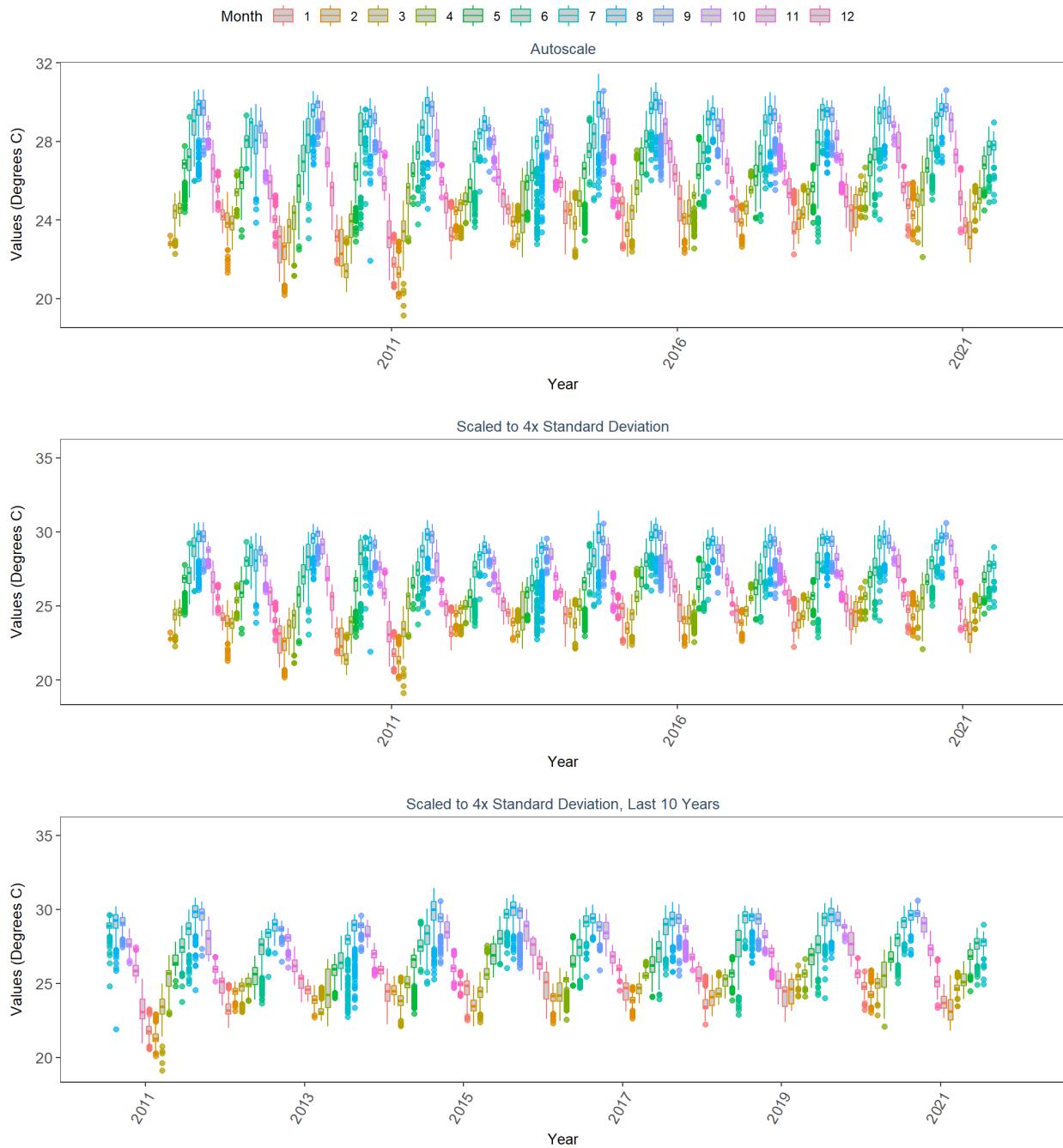
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 By Month



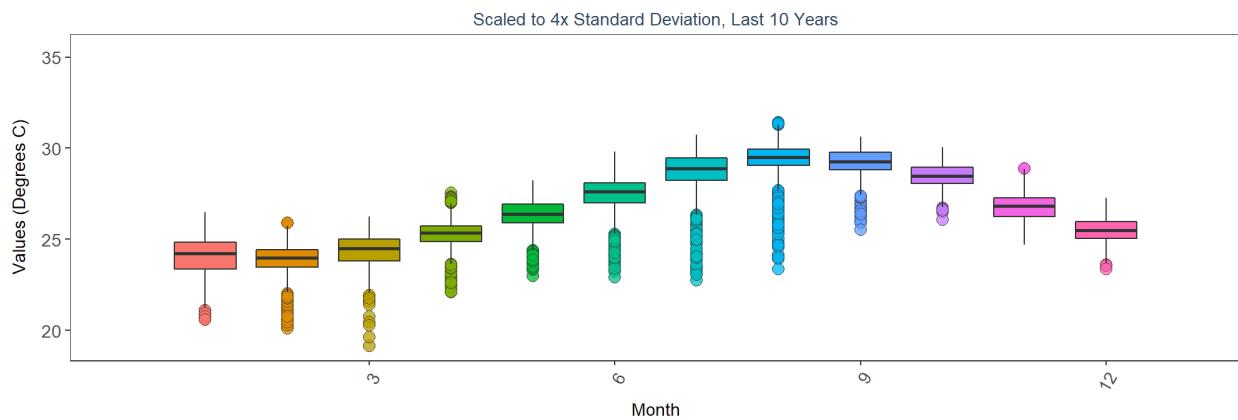
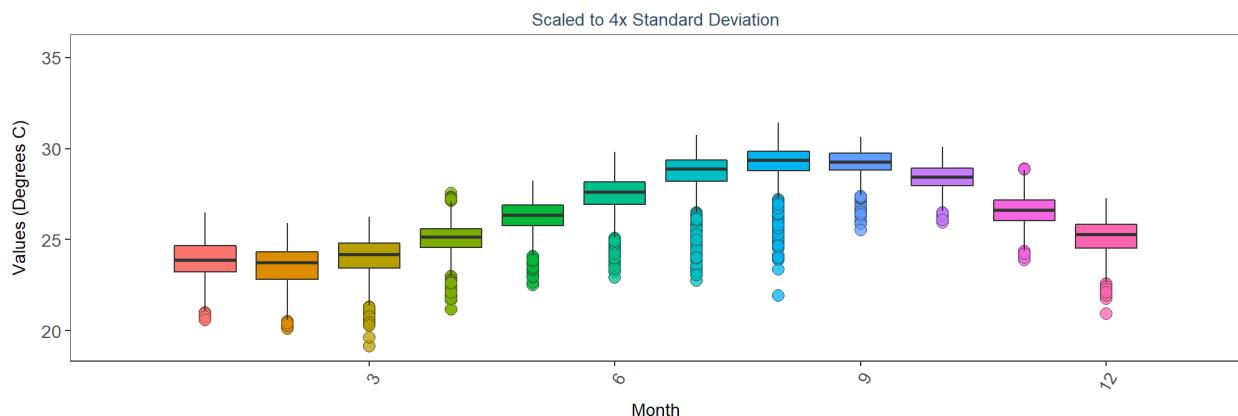
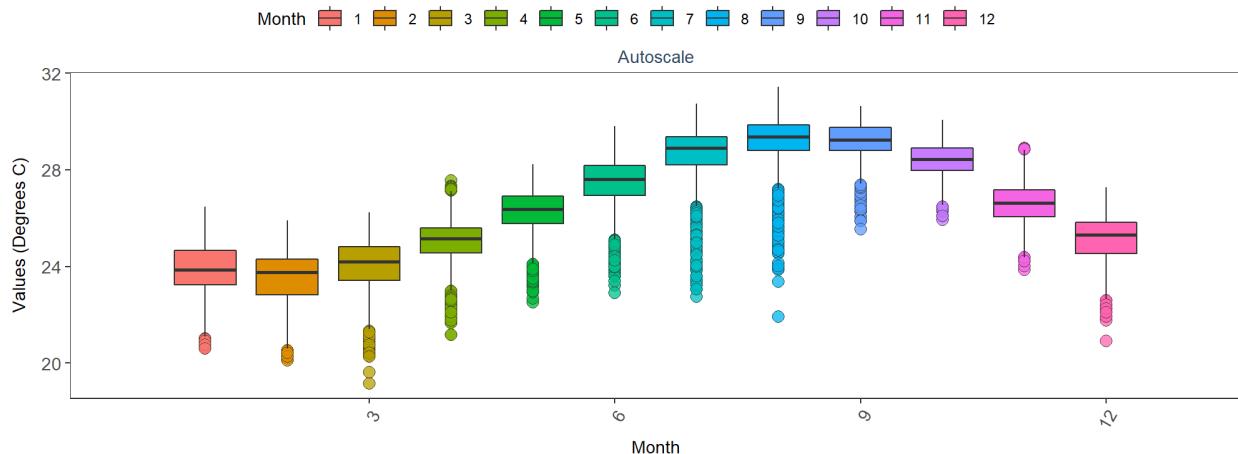
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By Year



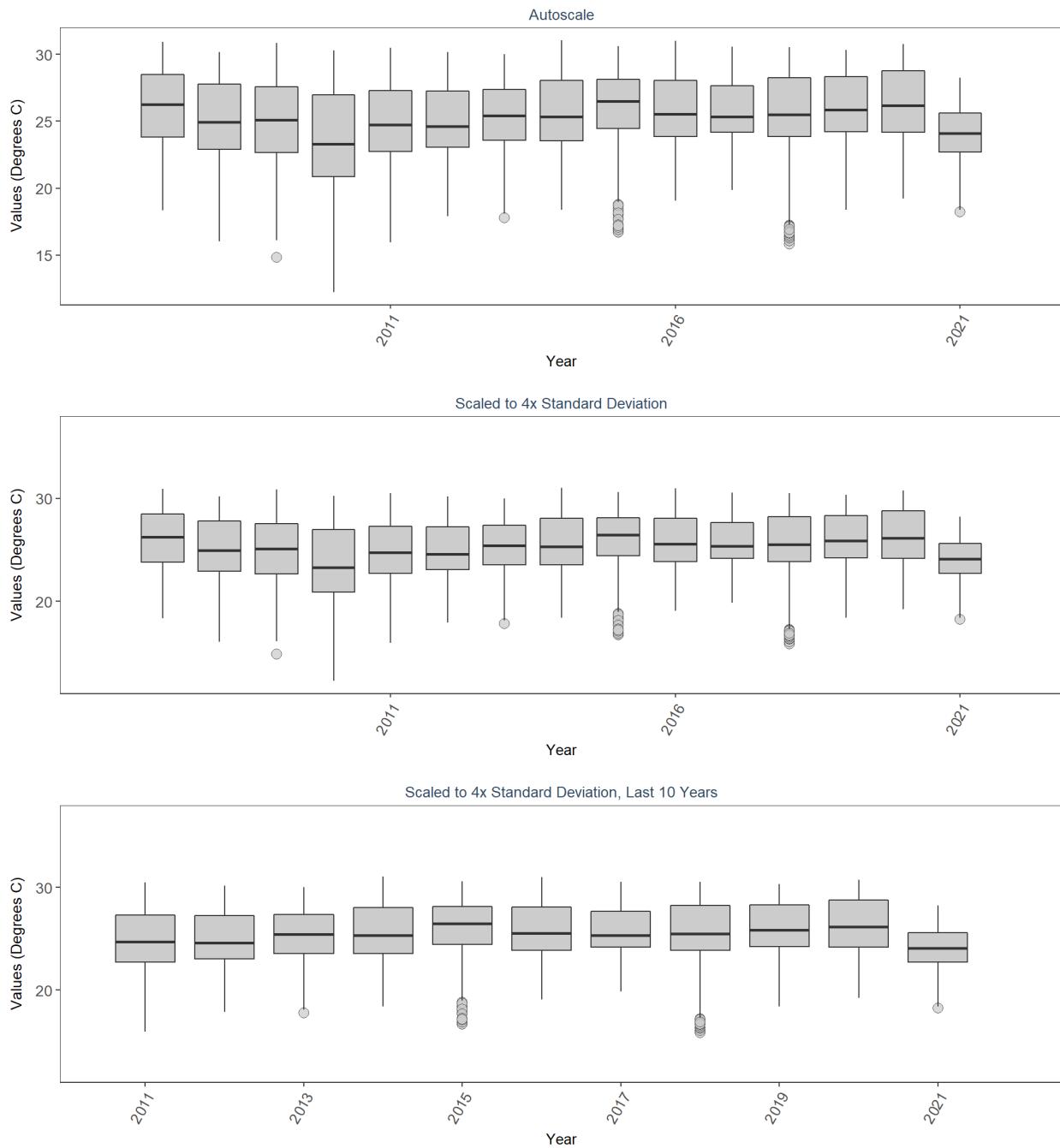
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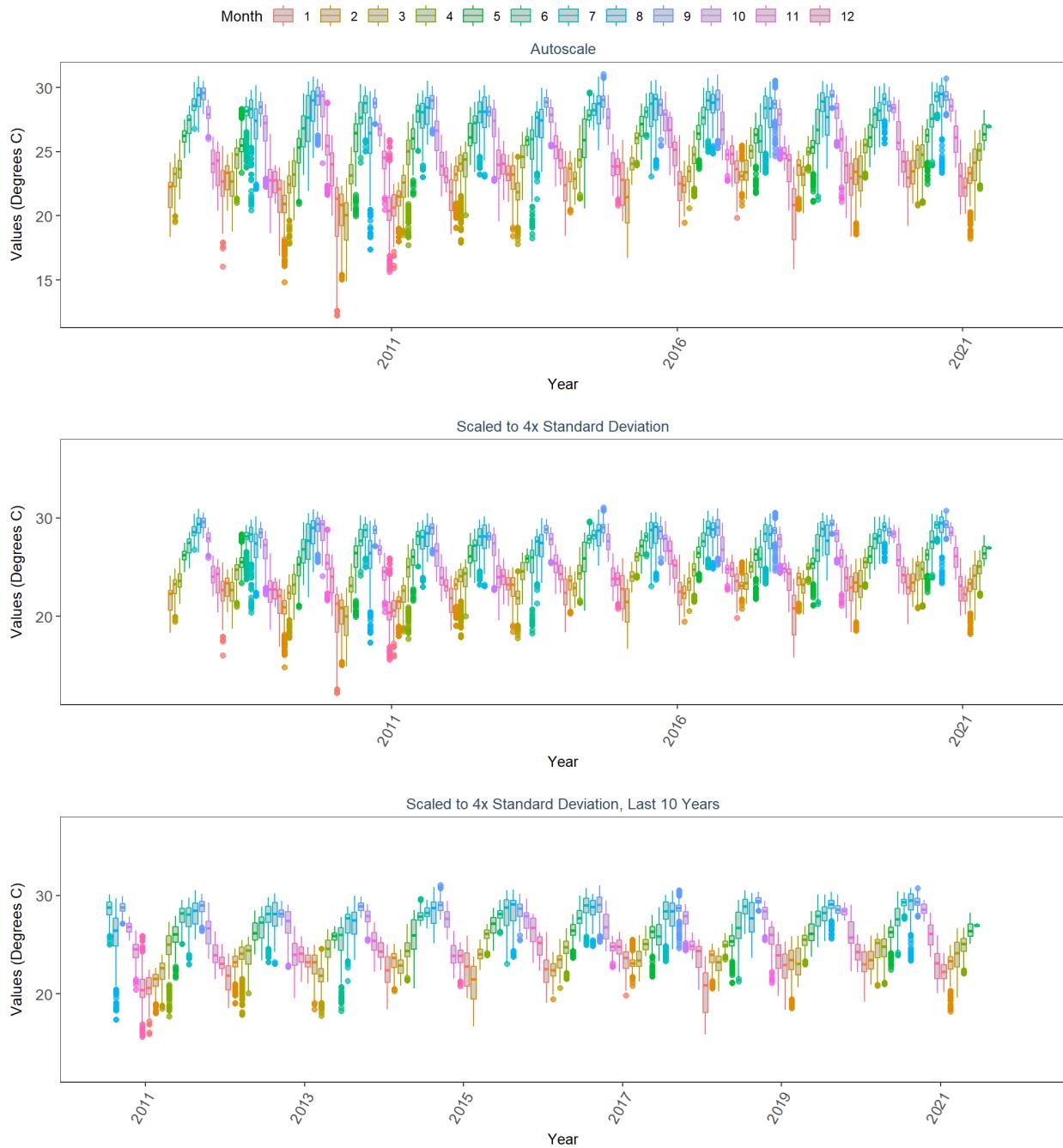
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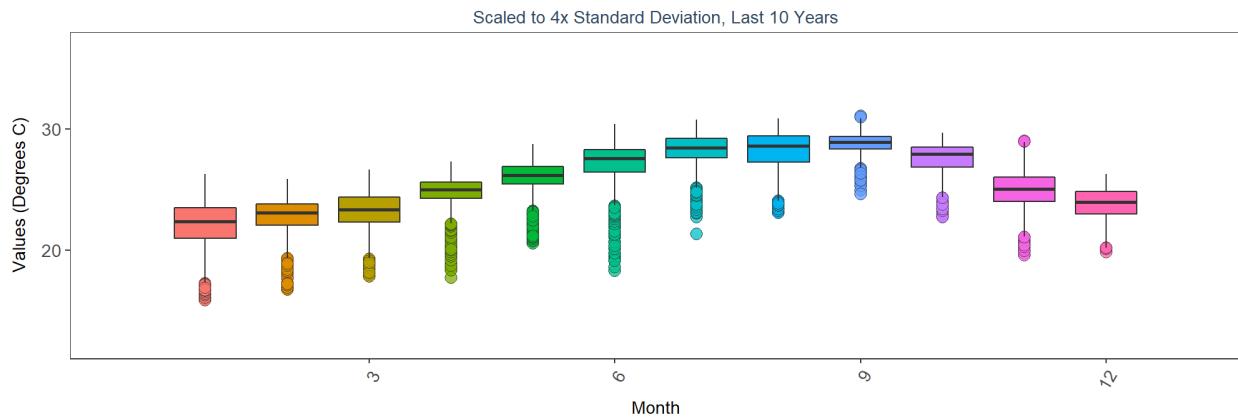
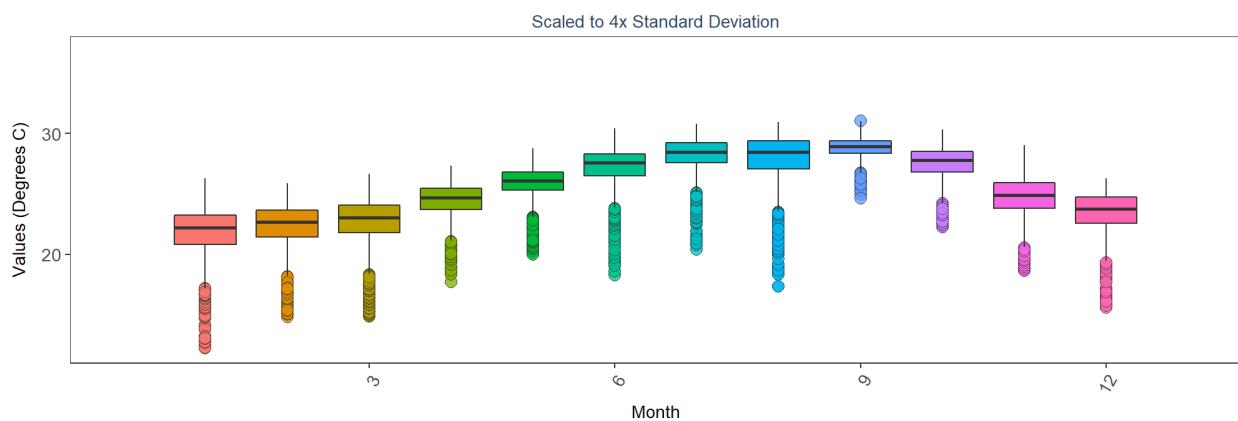
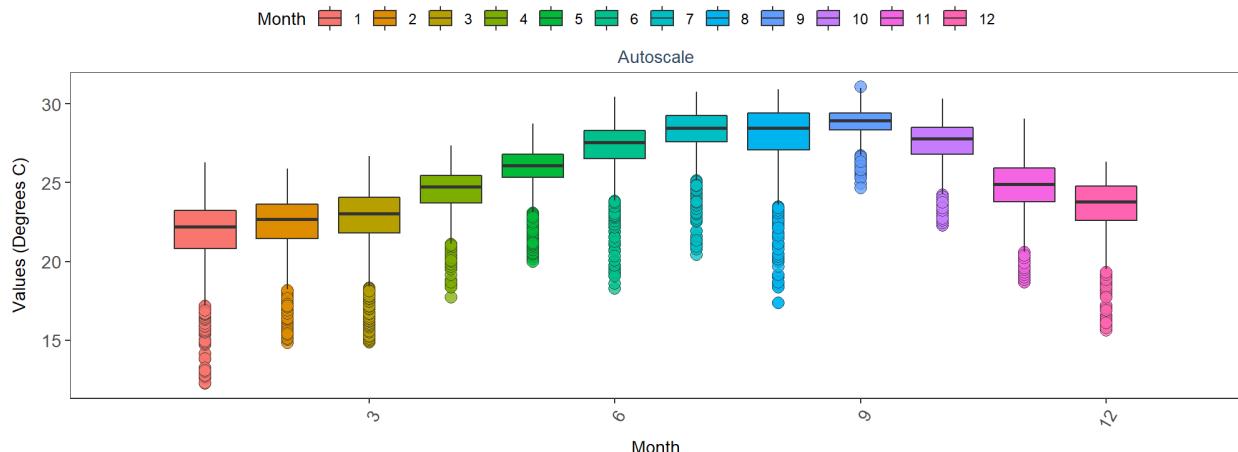
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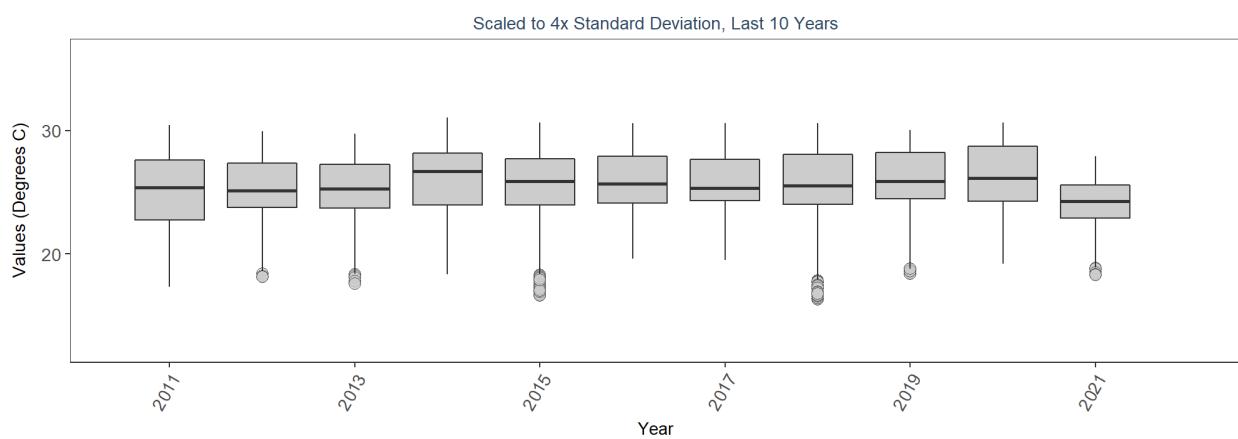
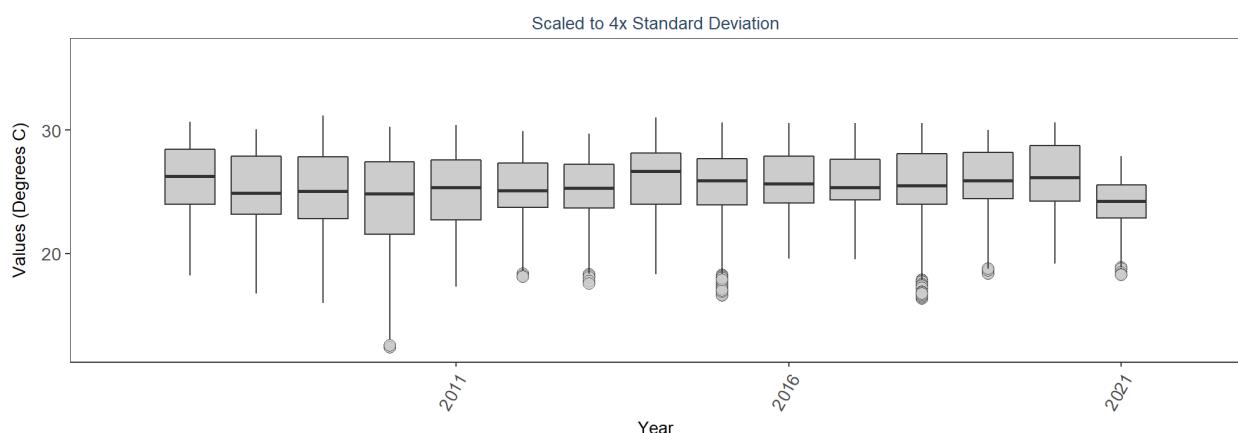
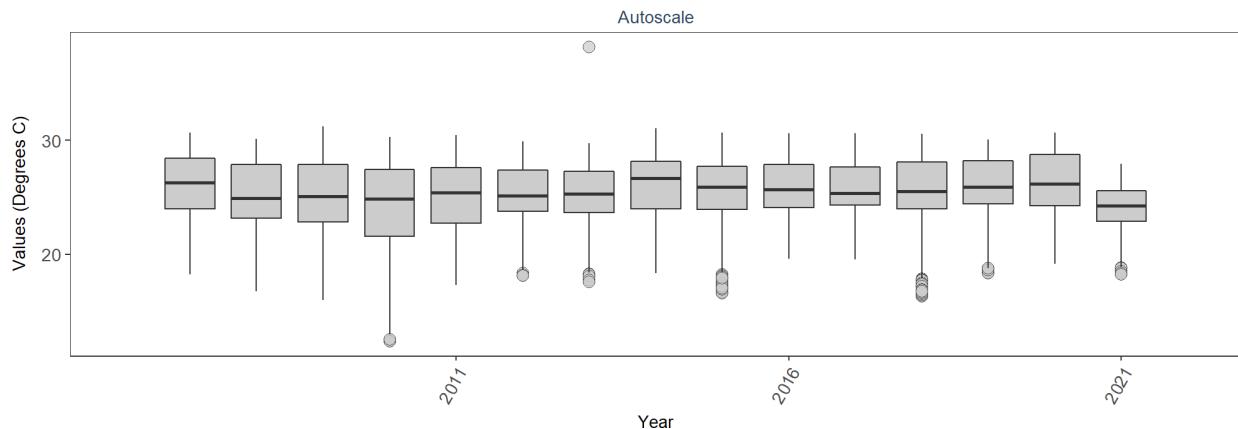
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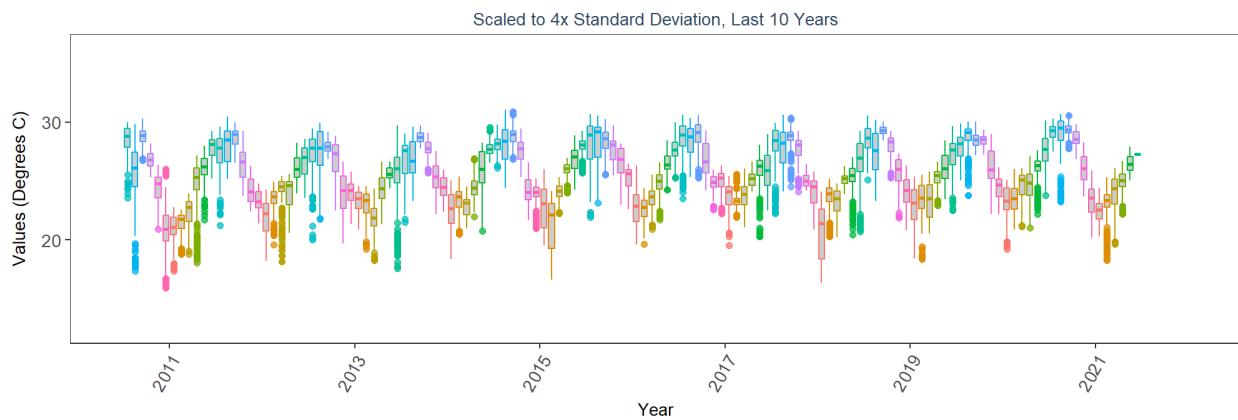
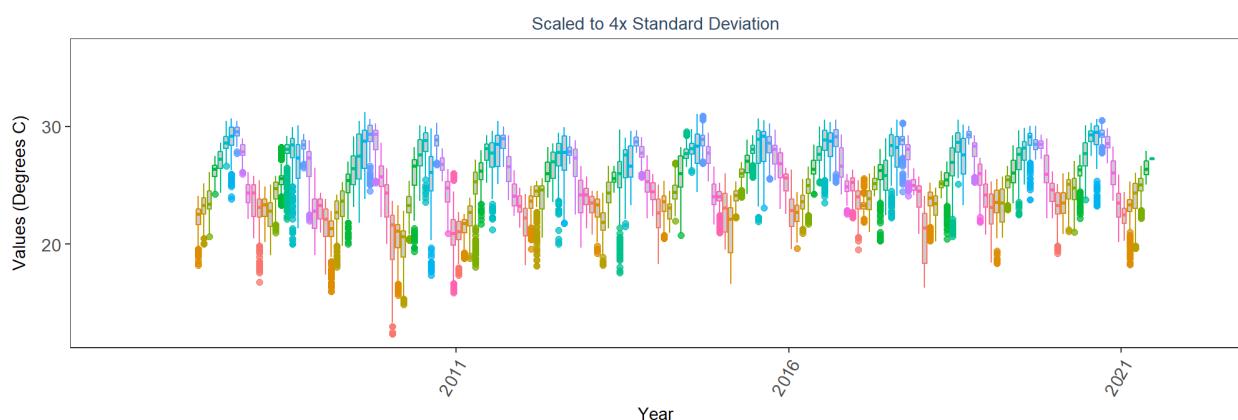
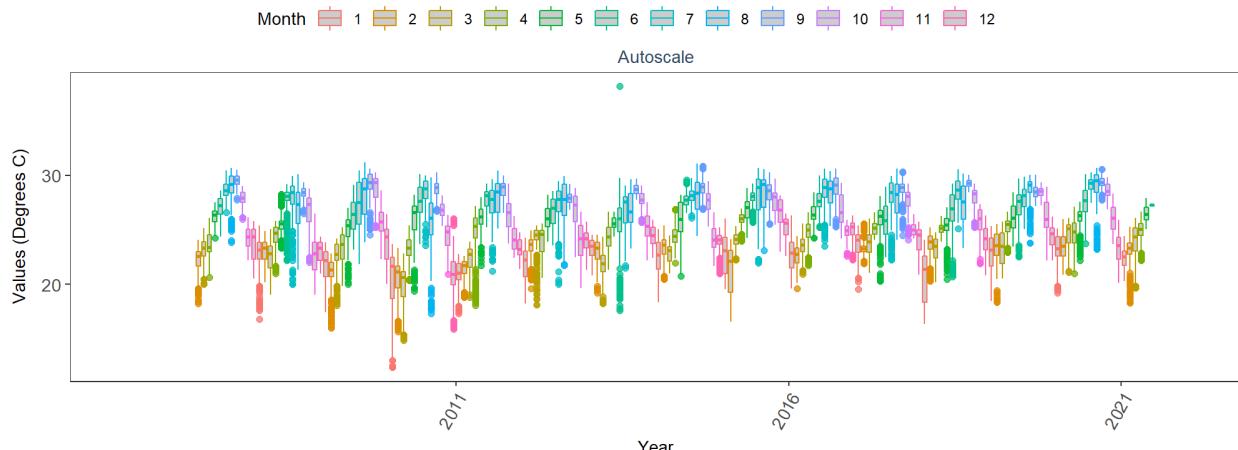
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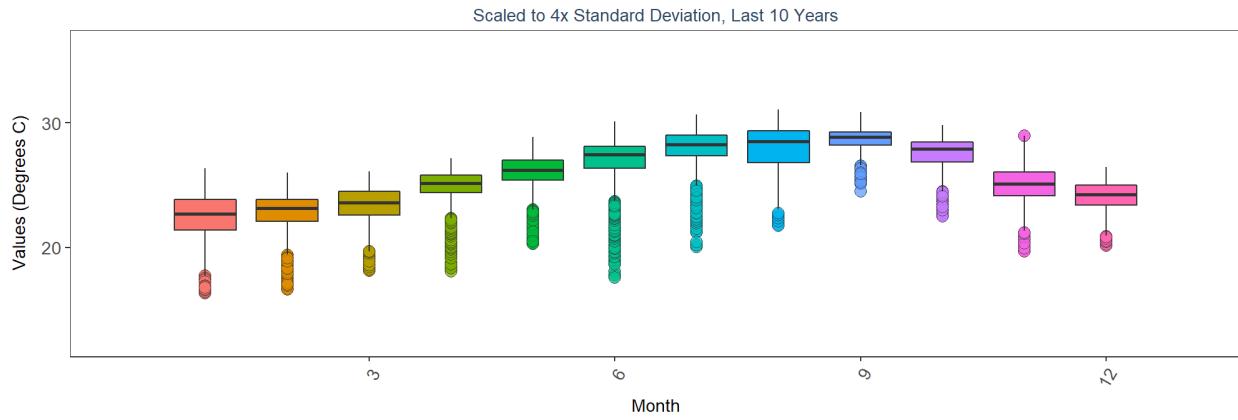
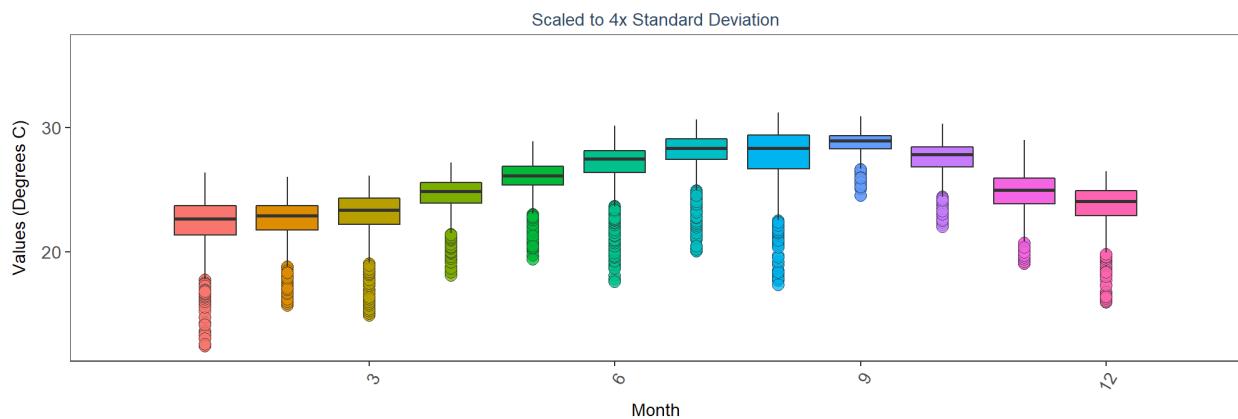
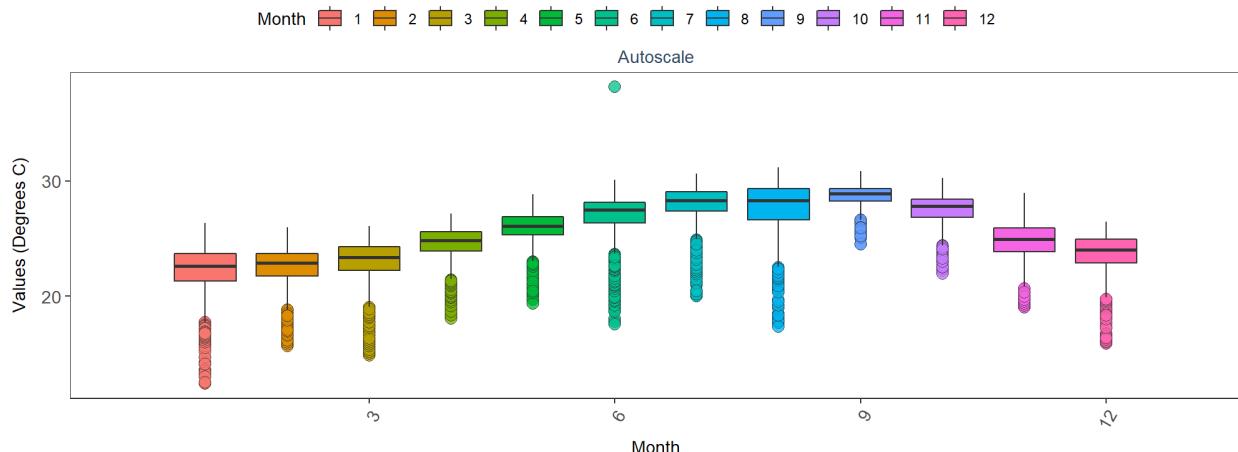
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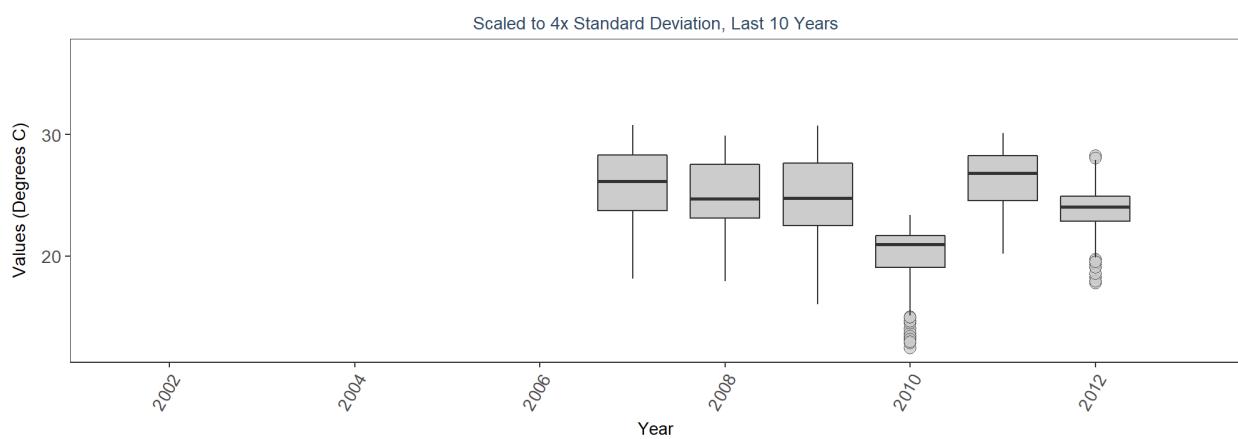
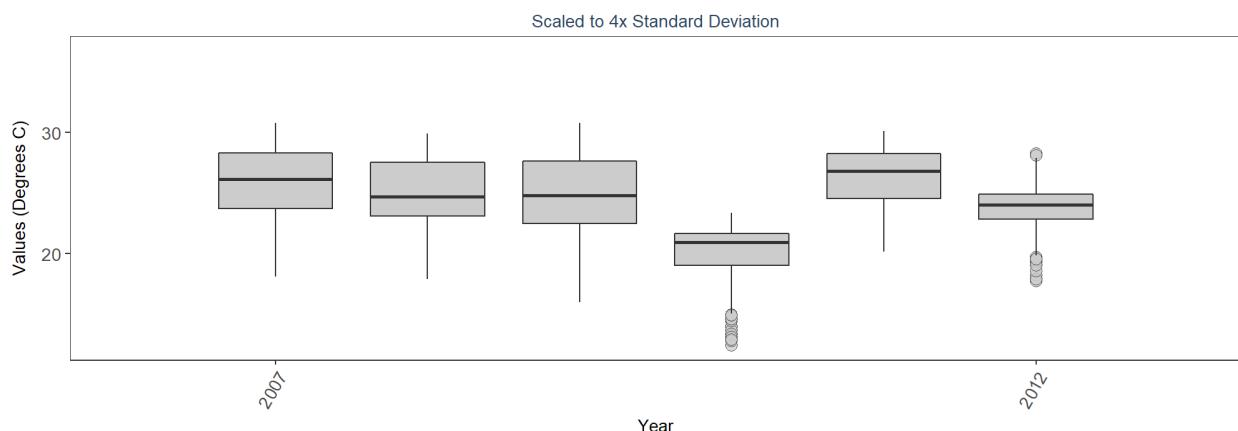
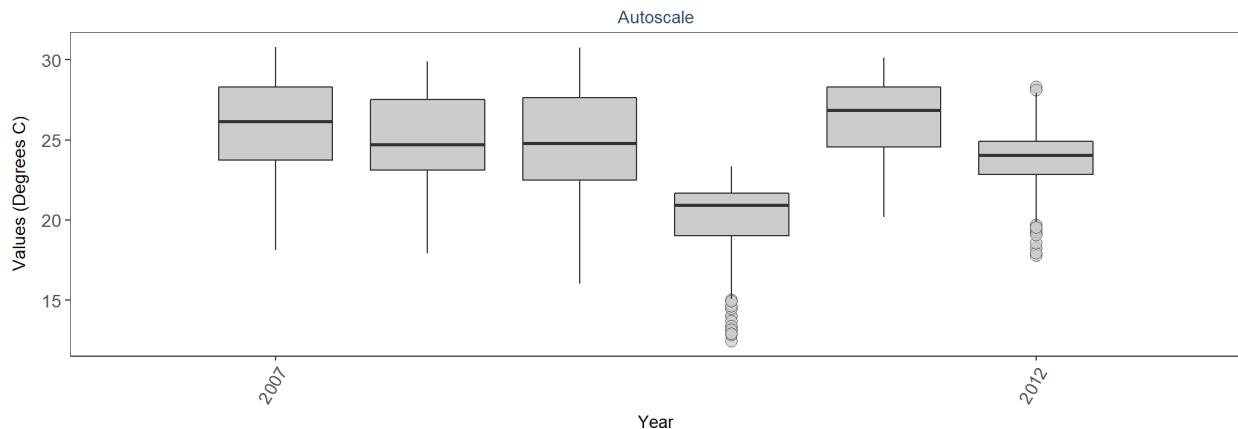
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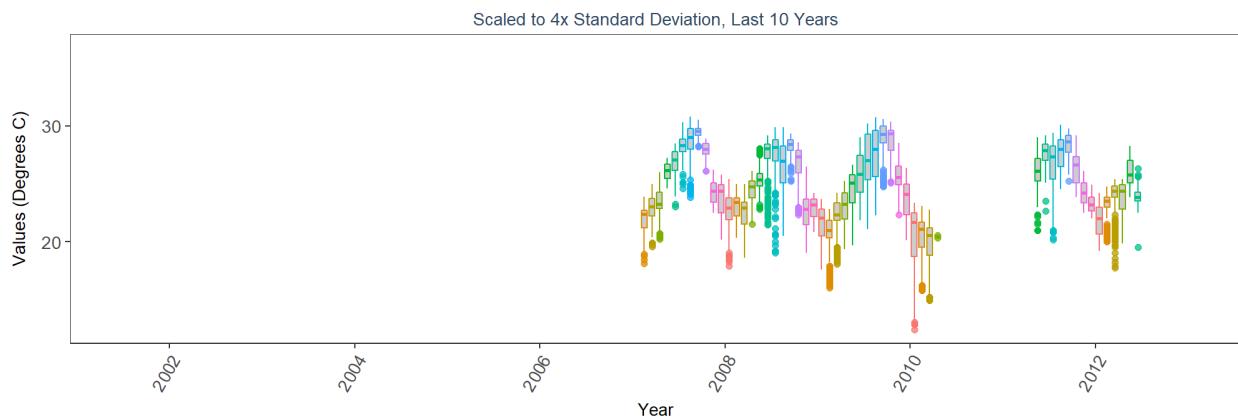
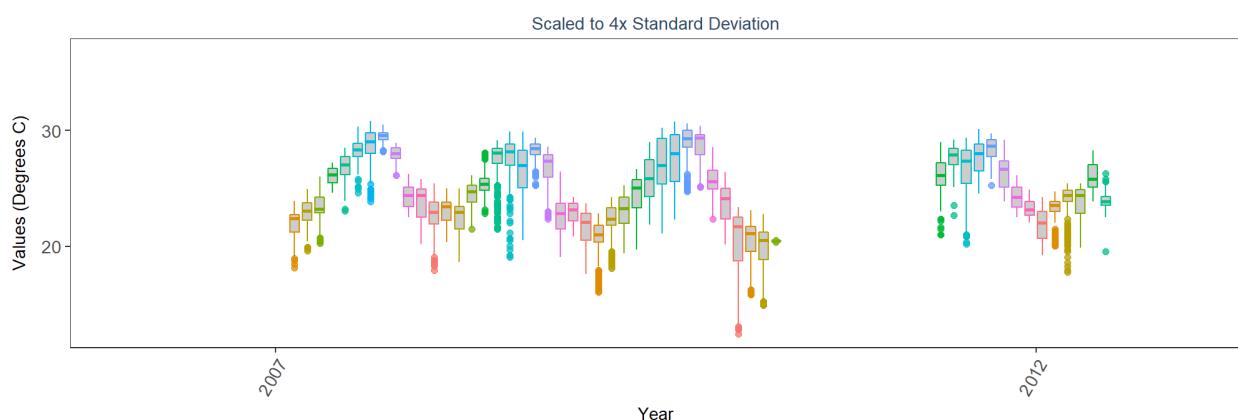
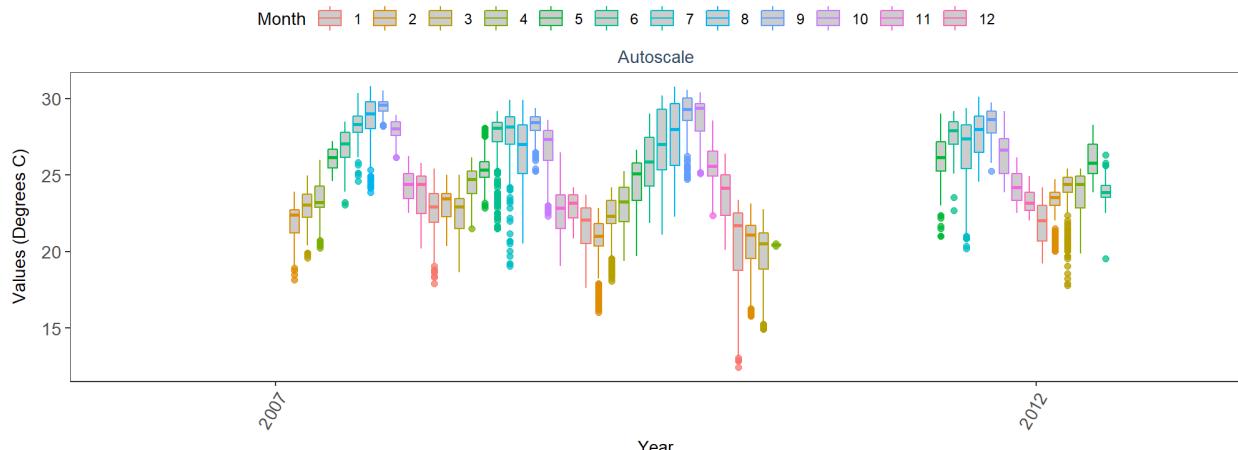
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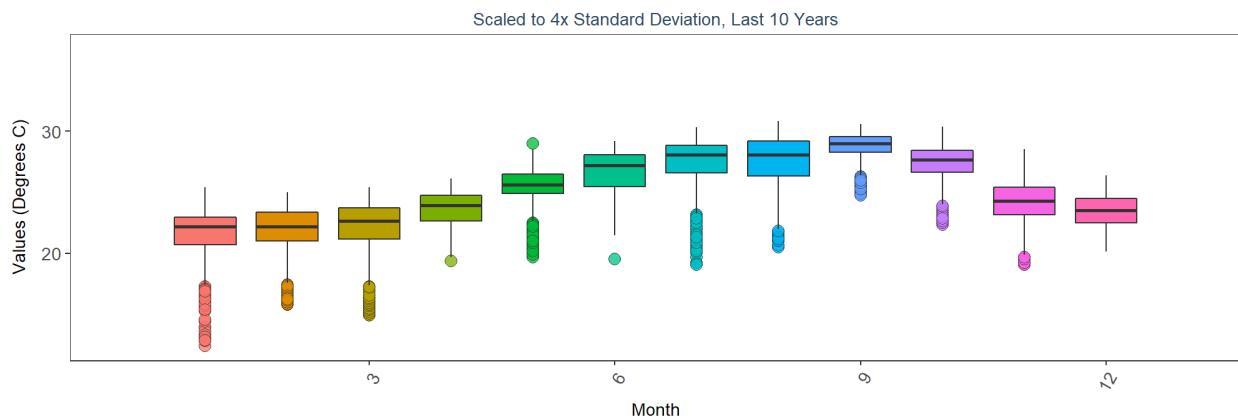
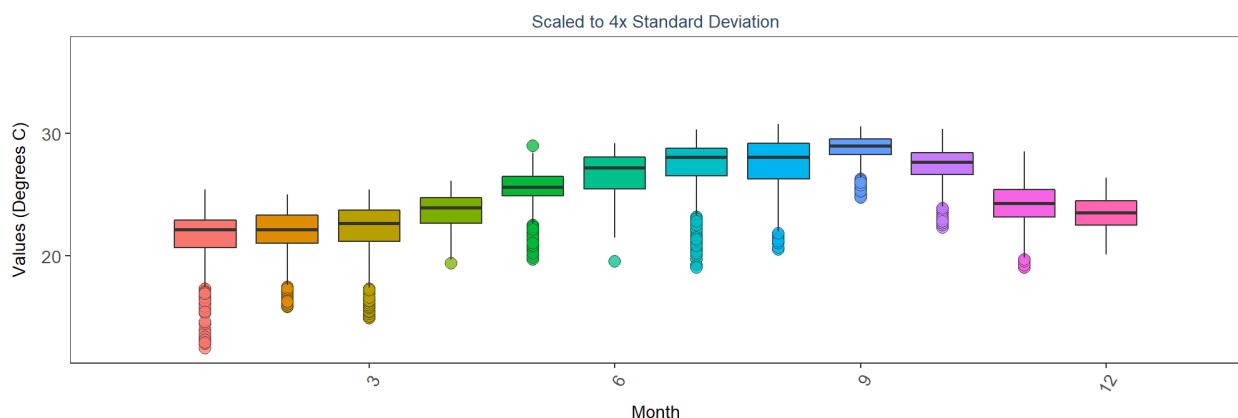
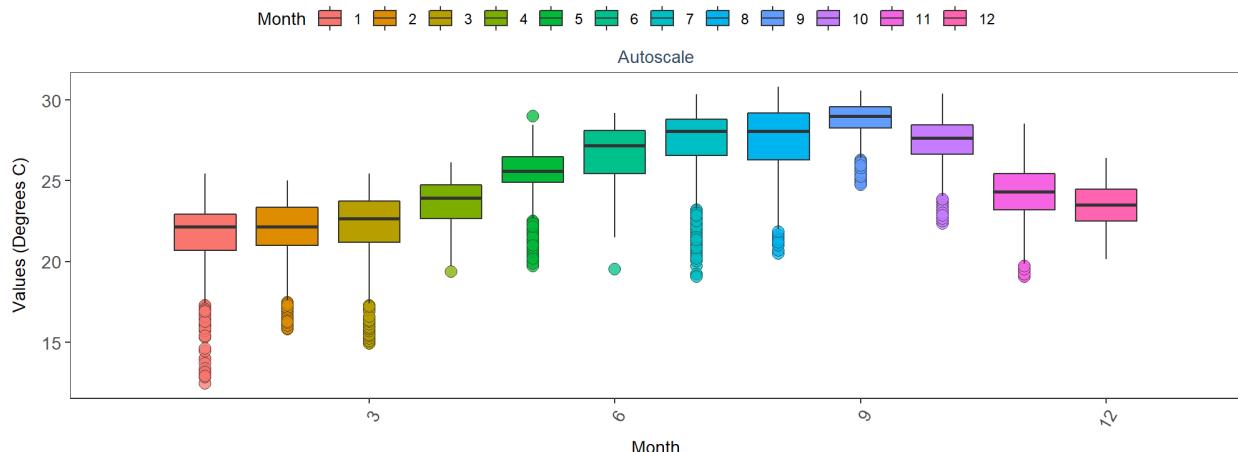
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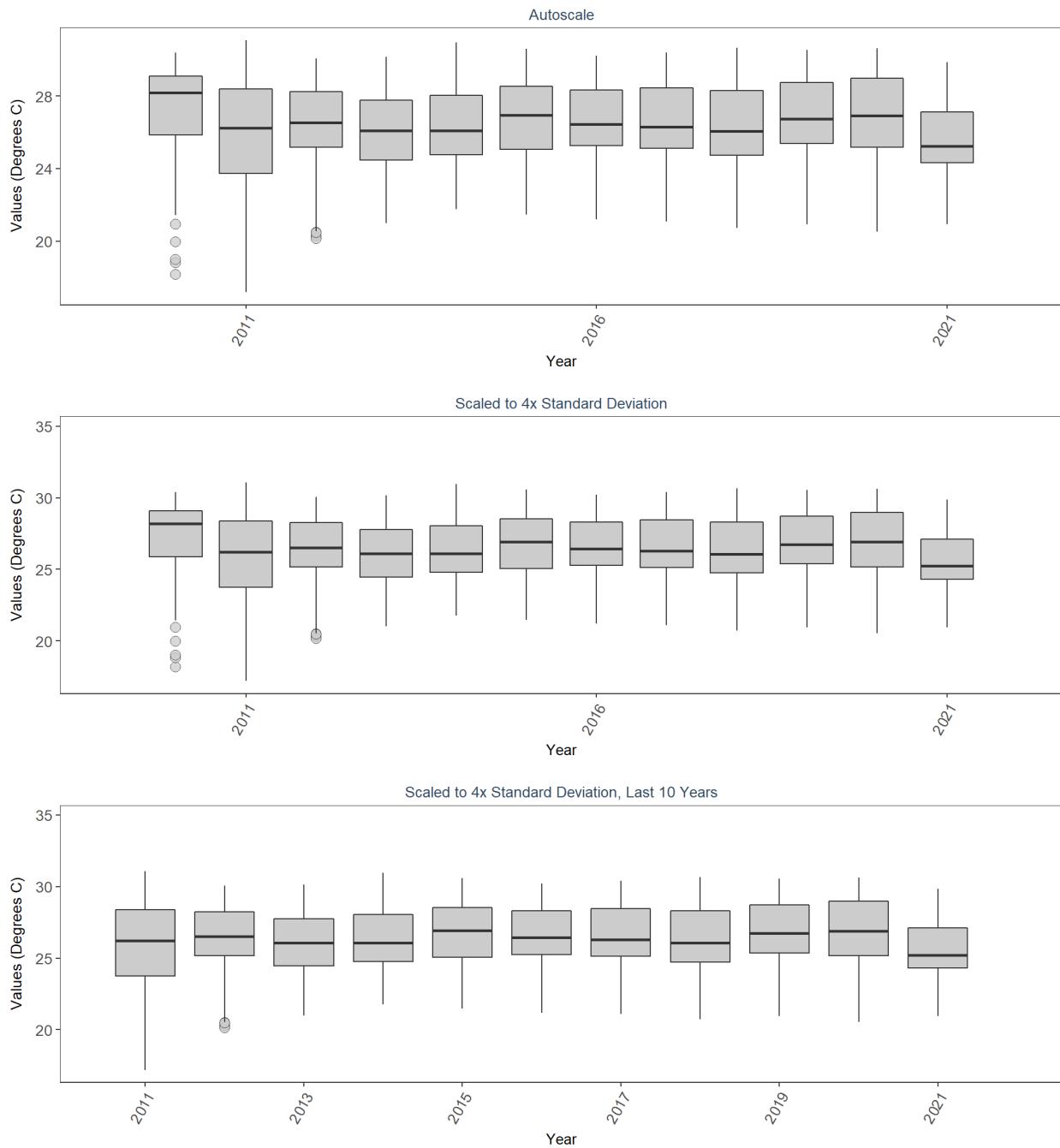
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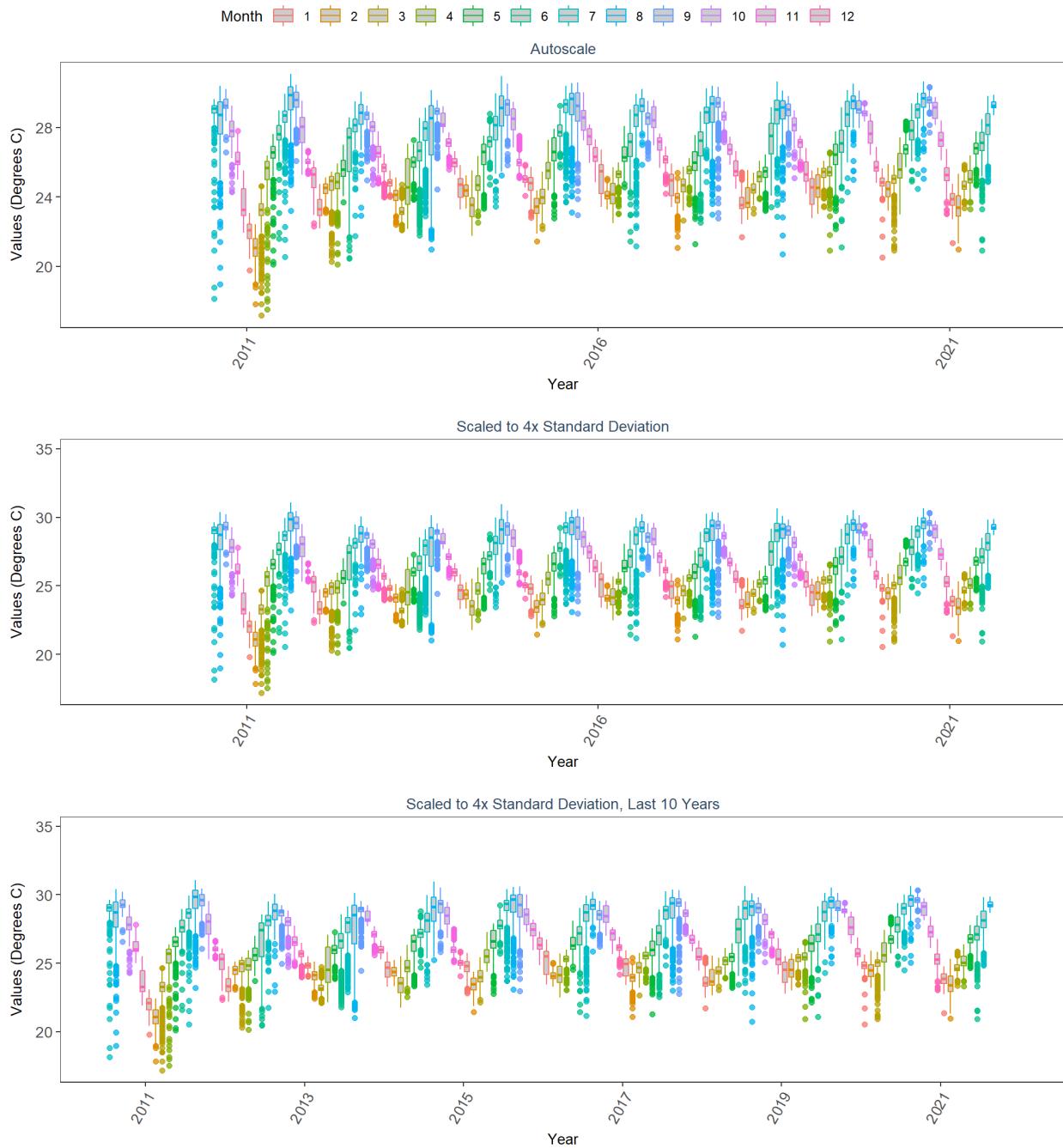
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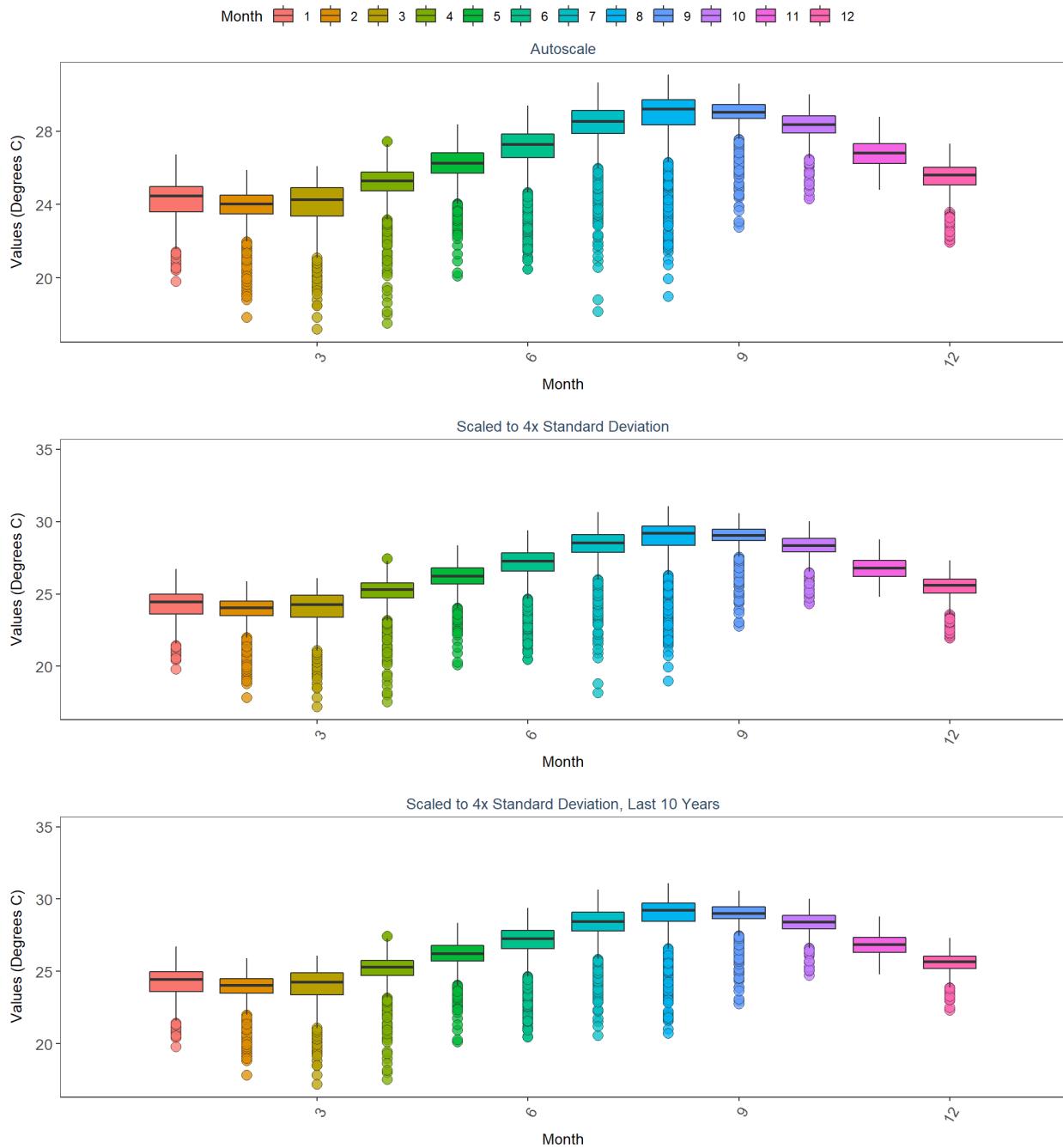
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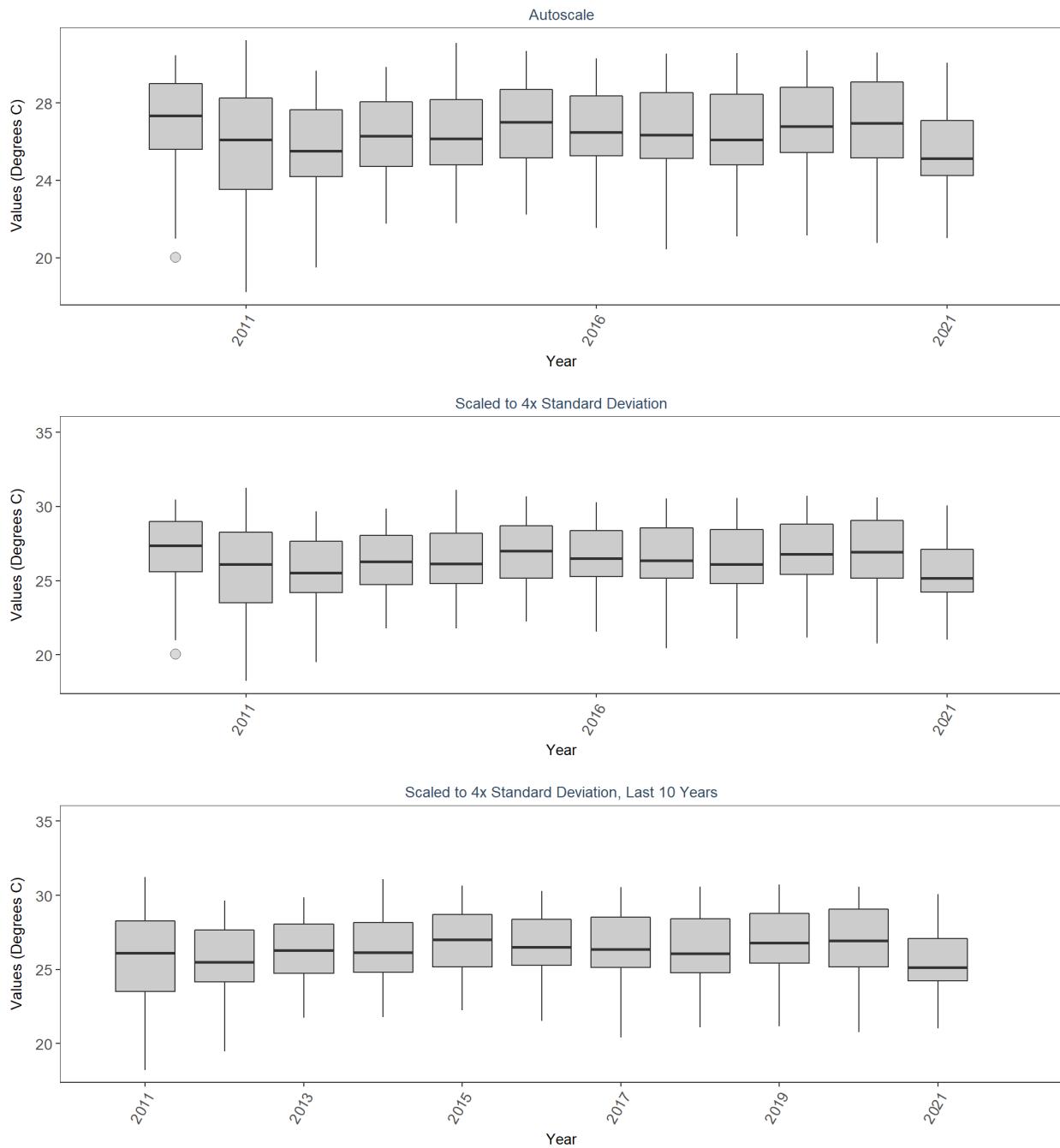
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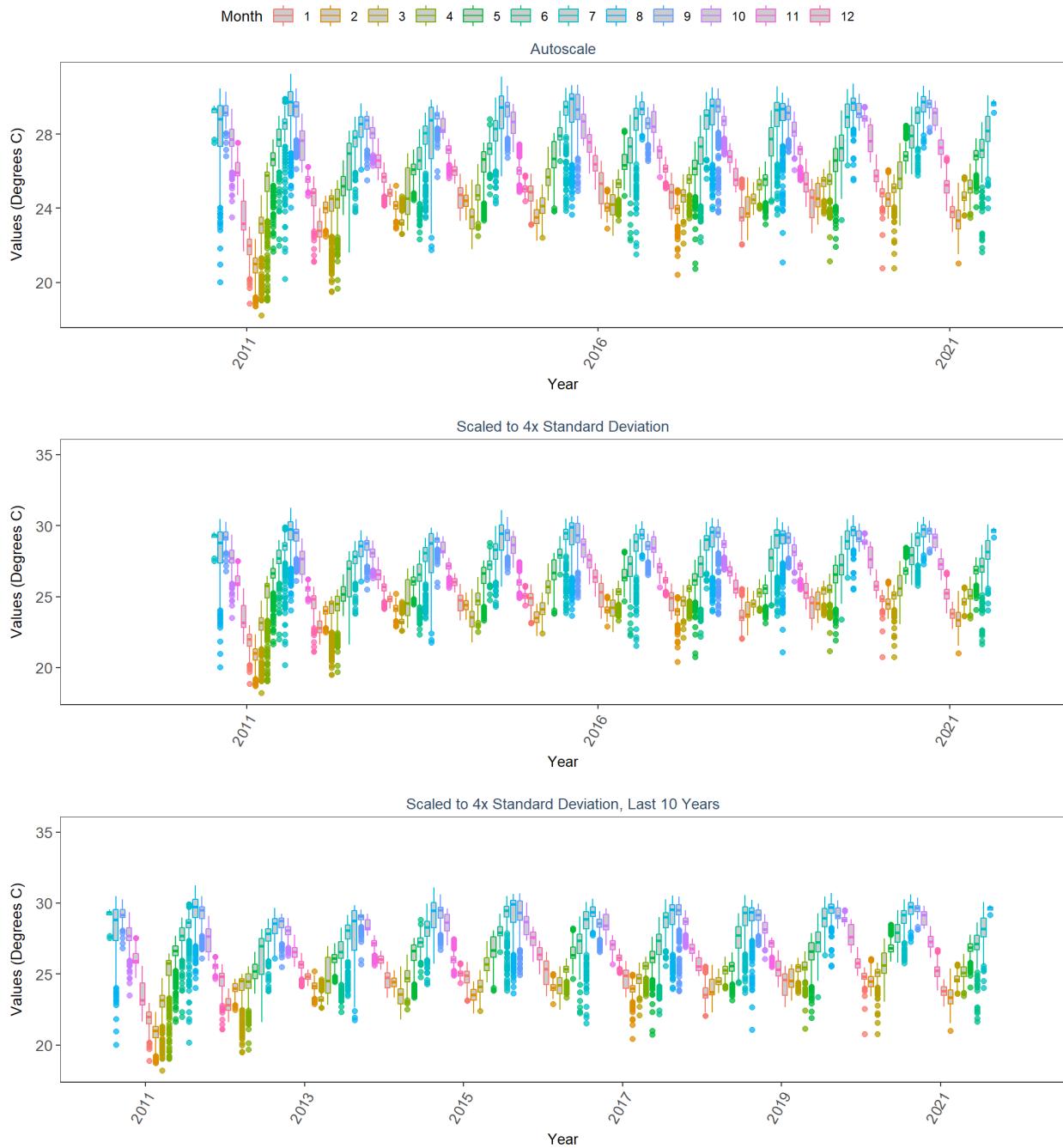
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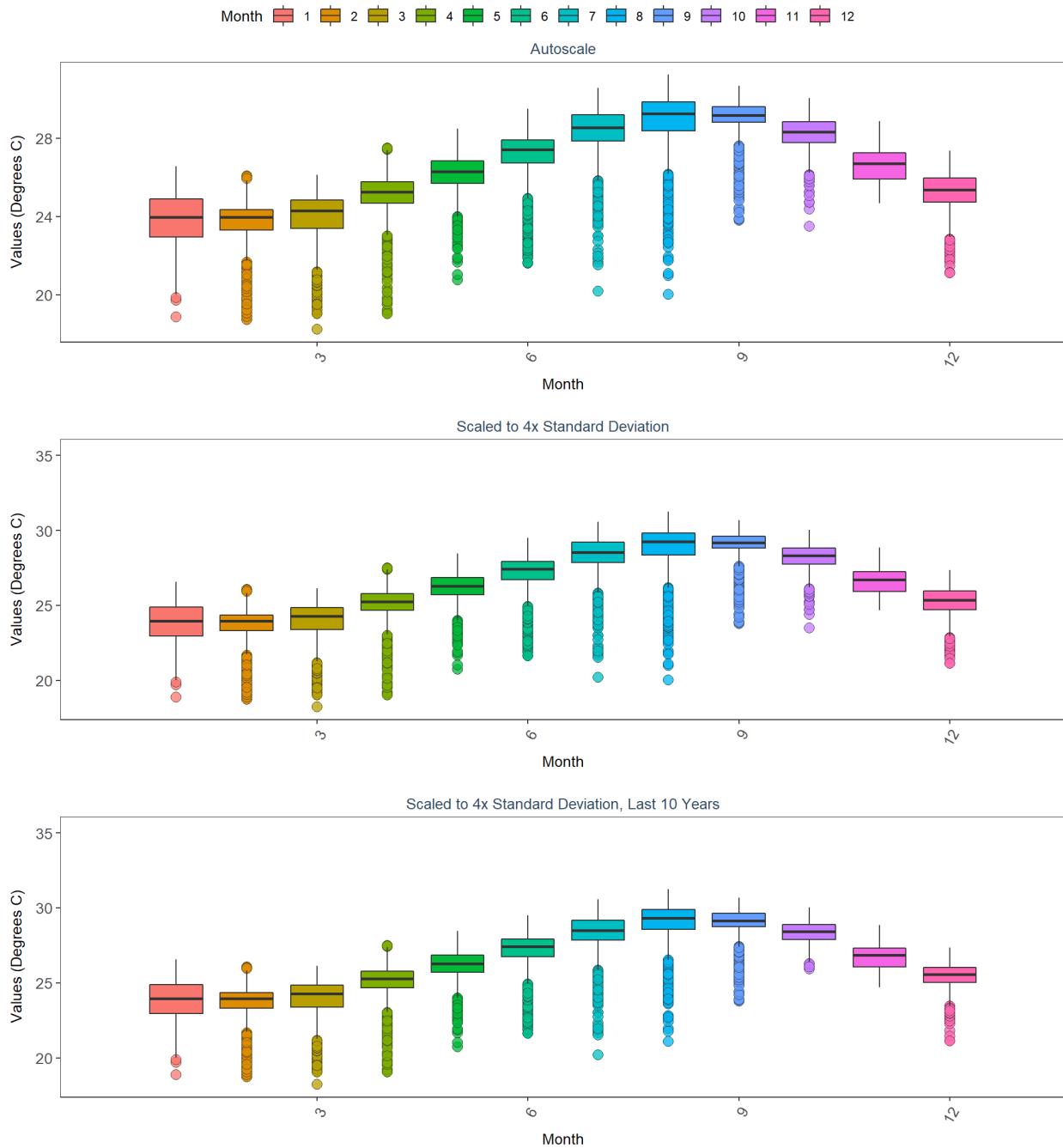
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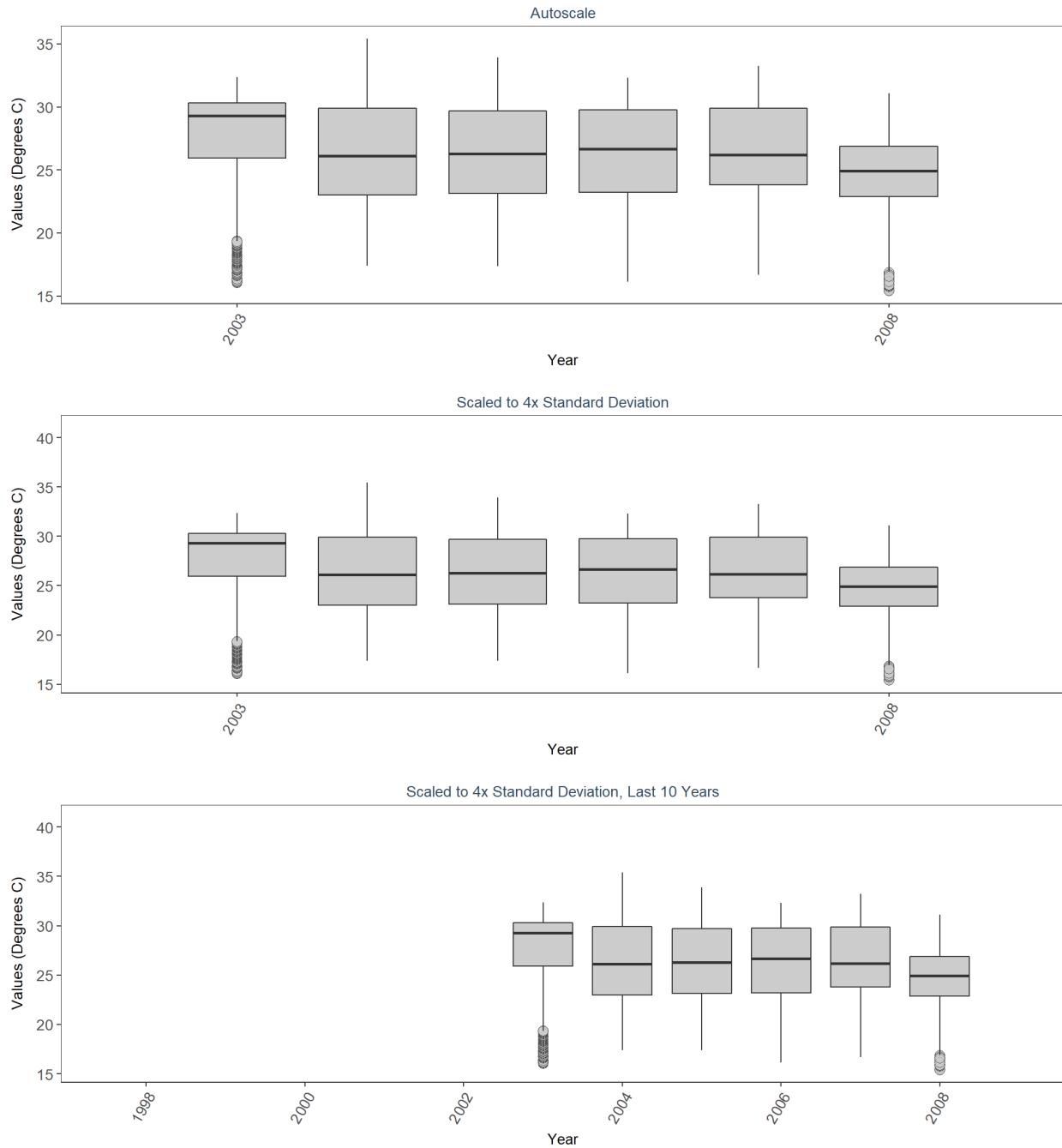
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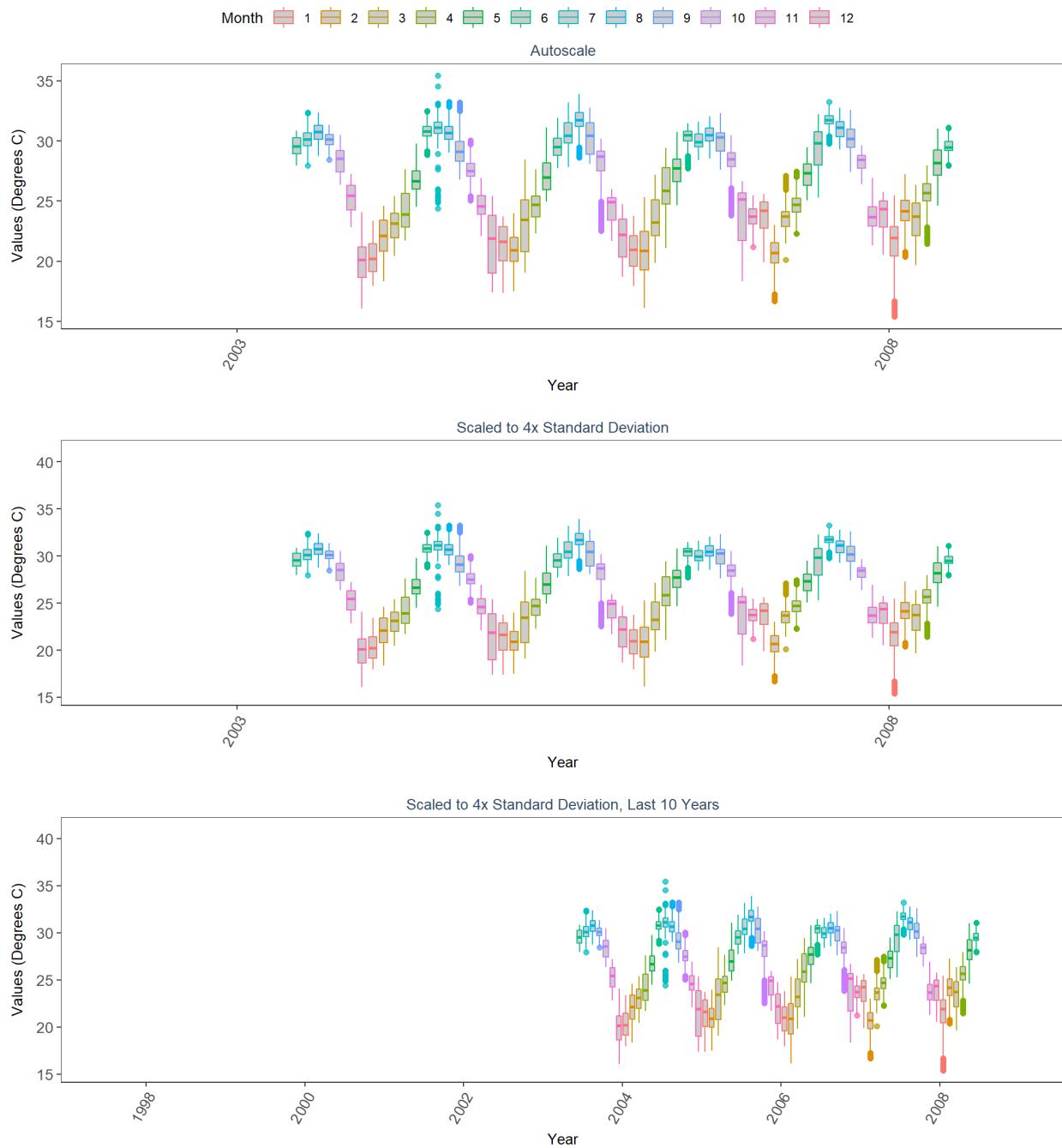
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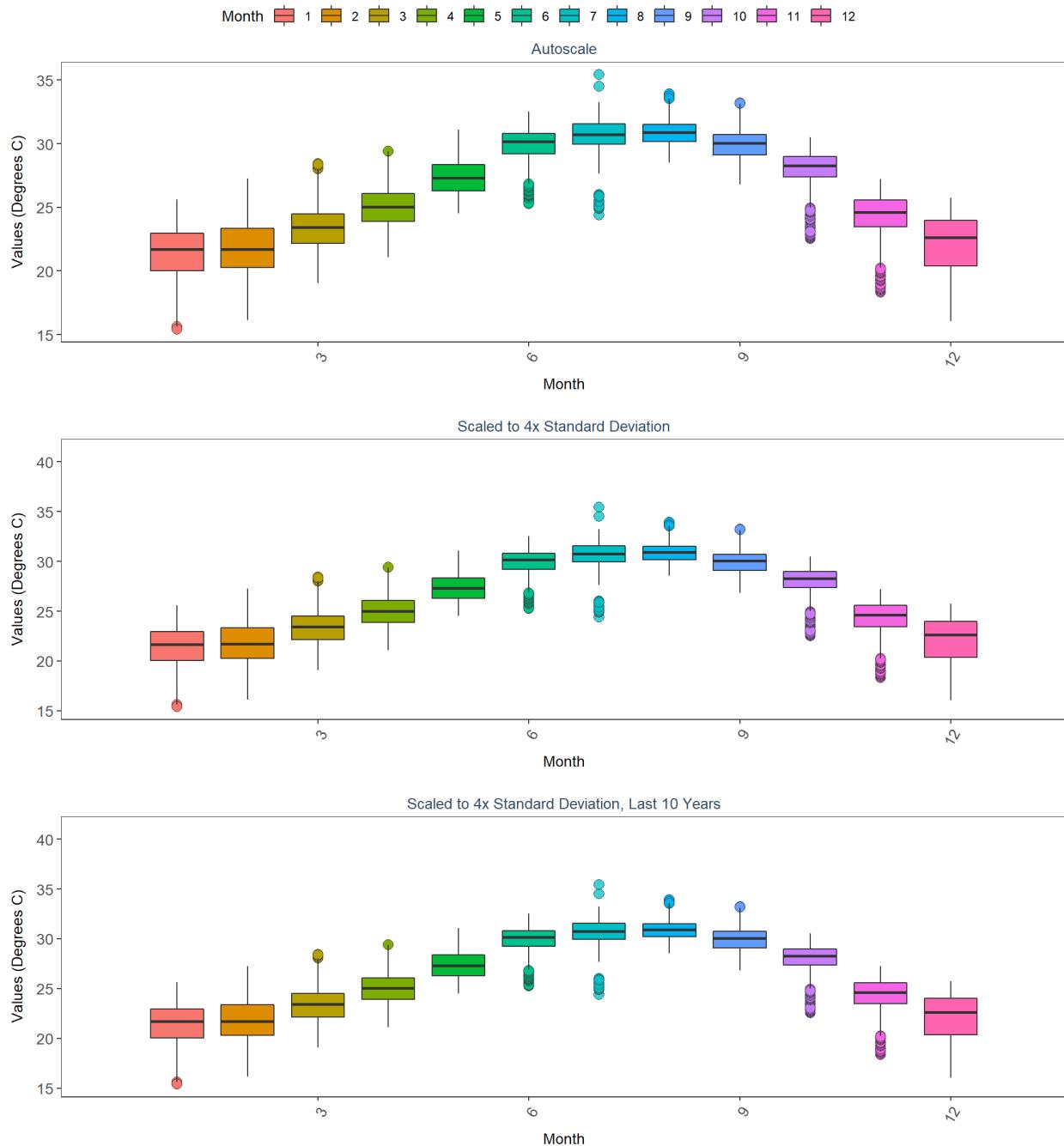
Florida Keys National Marine Sanctuary  
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 Atlantic Oceanographic and Meteorological Laboratory (AOML) South Florida Program Moored Instrument Array  
 1B  
 By Year



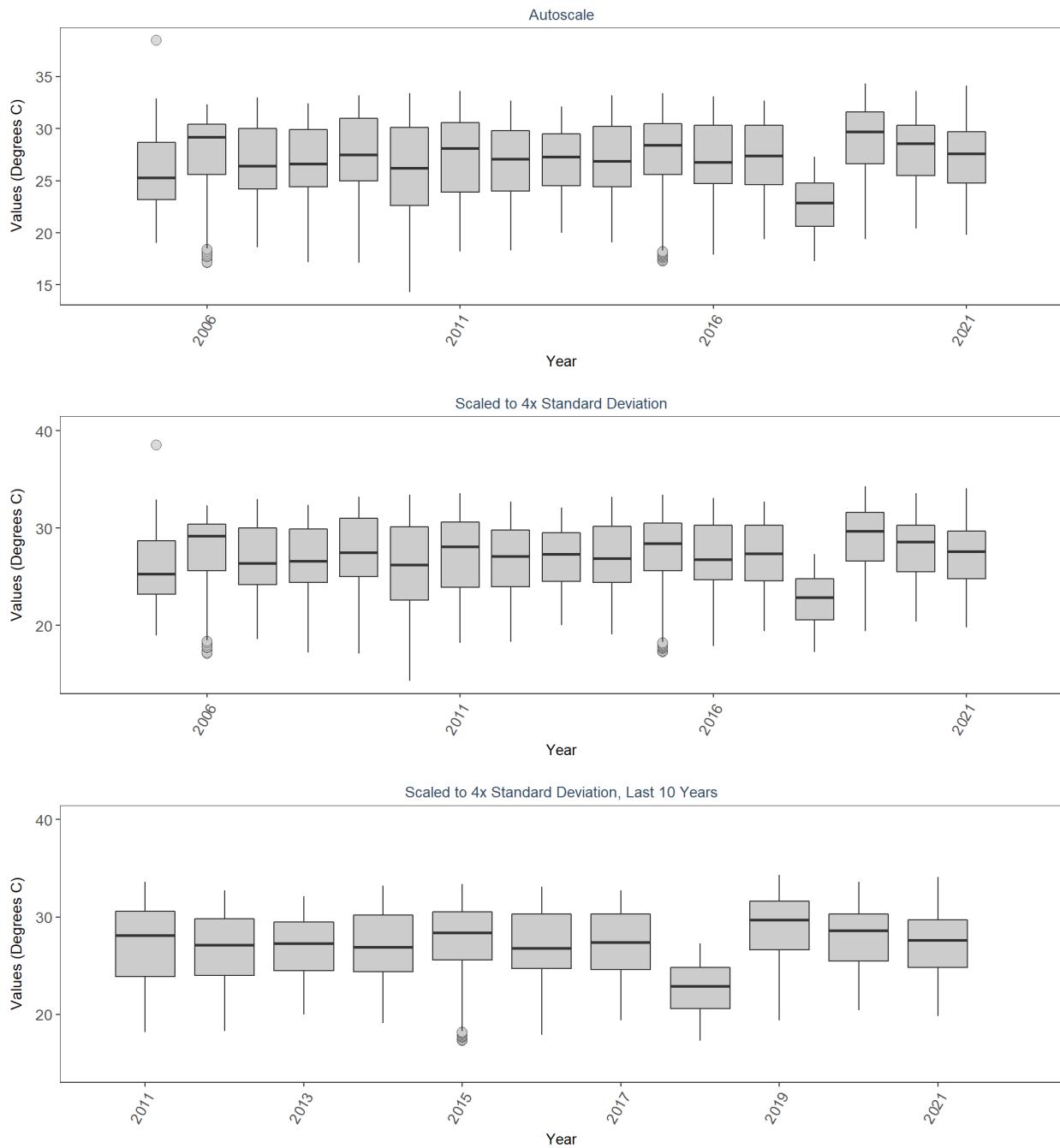
Florida Keys National Marine Sanctuary  
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 By Year & Month



Florida Keys National Marine Sanctuary  
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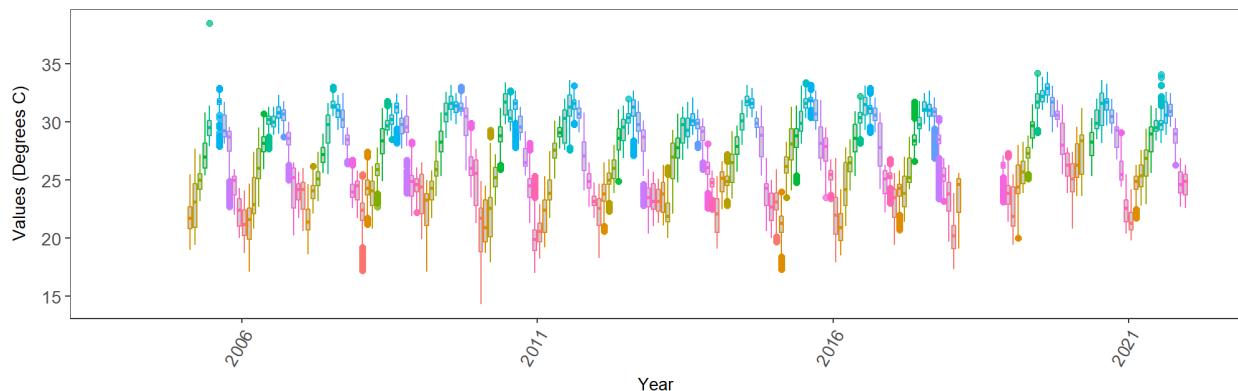
Florida Keys National Marine Sanctuary  
5  
National Data Buoy Center  
KYWF1  
By Year



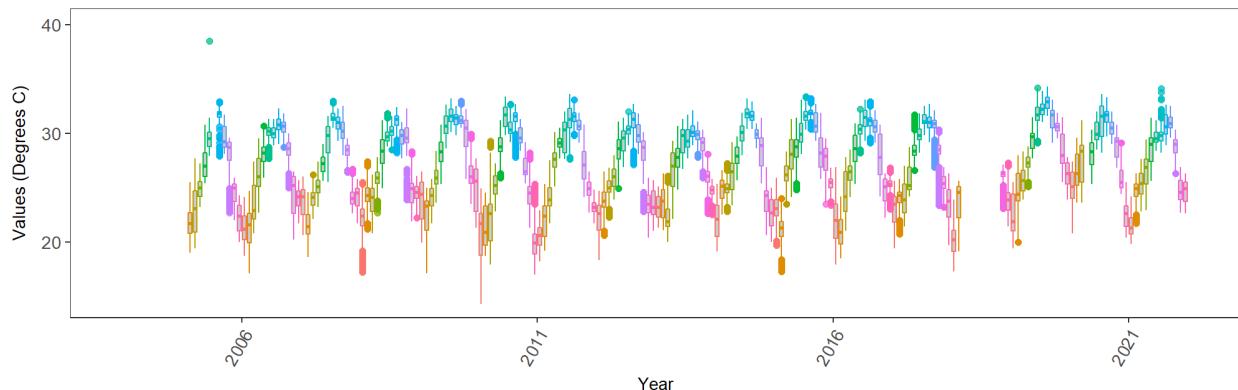
Florida Keys National Marine Sanctuary  
 5  
 National Data Buoy Center  
 KYWF1  
 By Year & Month

Month 1 2 3 4 5 6 7 8 9 10 11 12

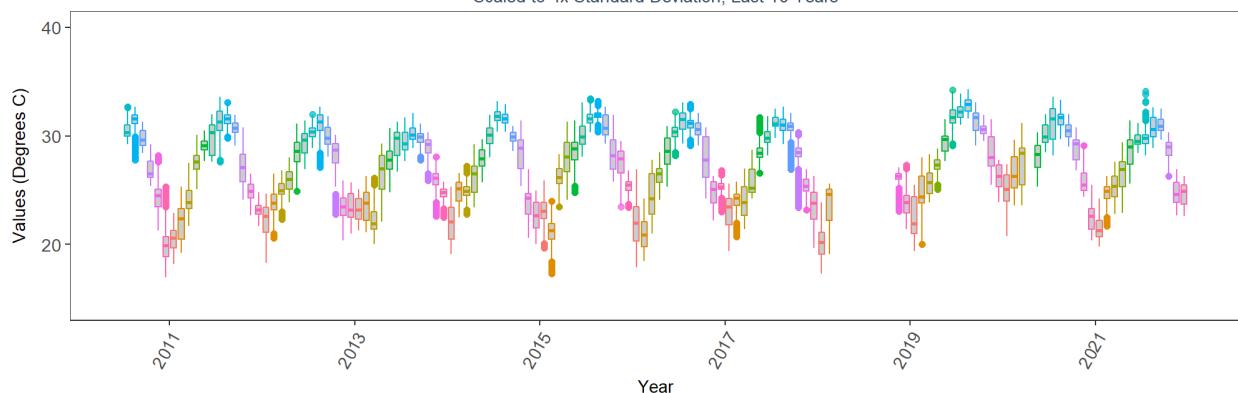
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Scaled to 4x Standard Deviation



Scaled to 4x Standard Deviation, Last 10 Years



Florida Keys National Marine Sanctuary

5

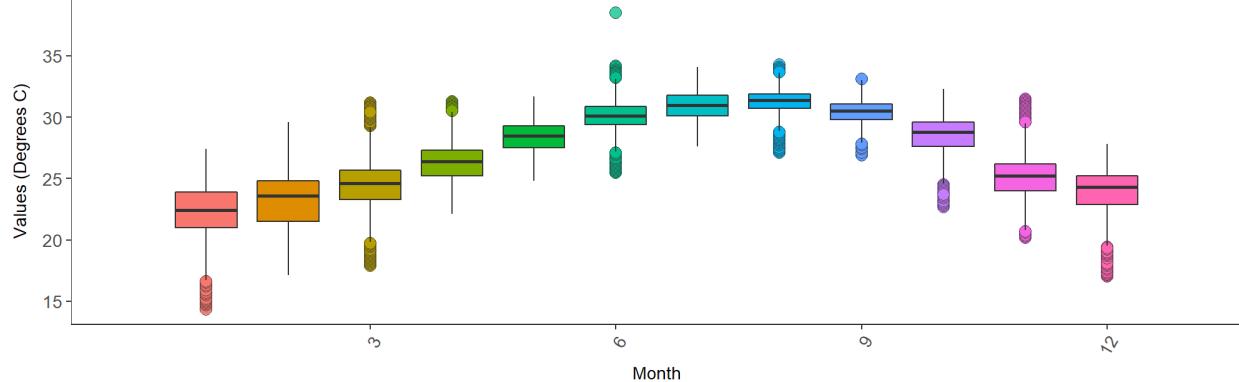
National Data Buoy Center

KYWF1

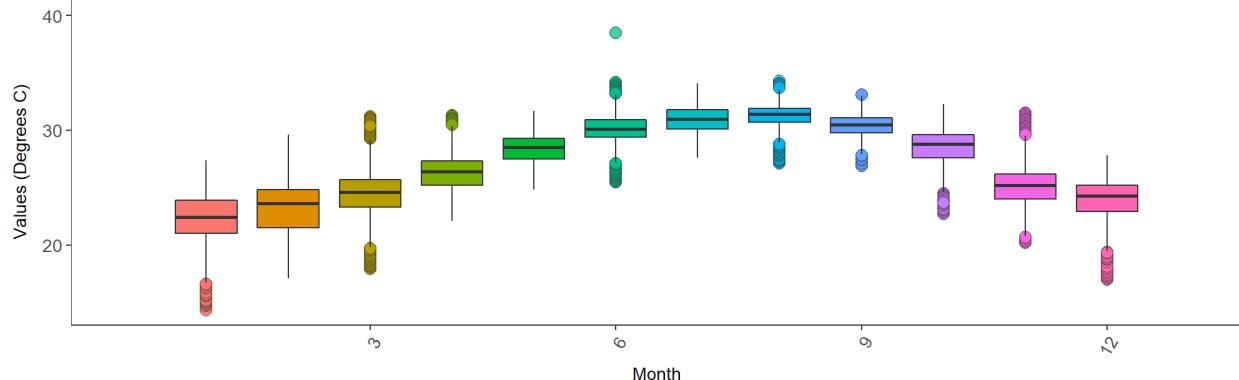
By Month

Month 1 2 3 4 5 6 7 8 9 10 11 12

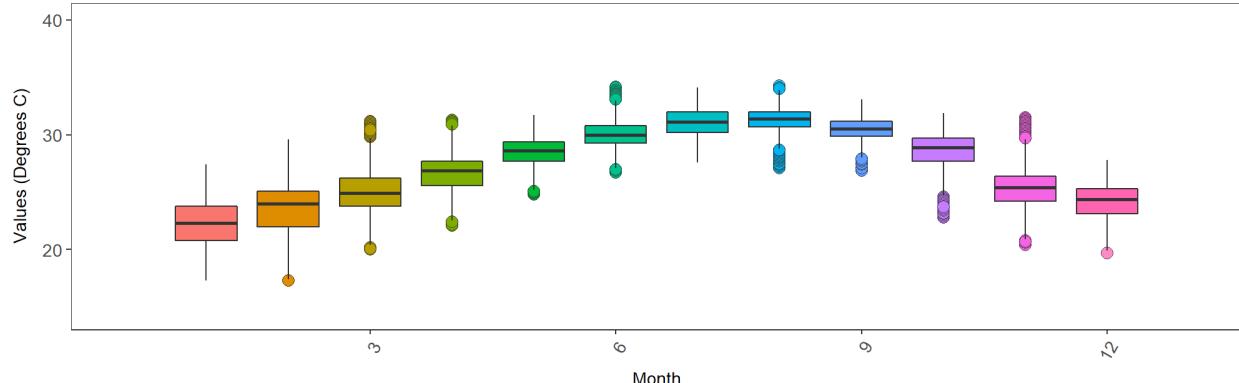
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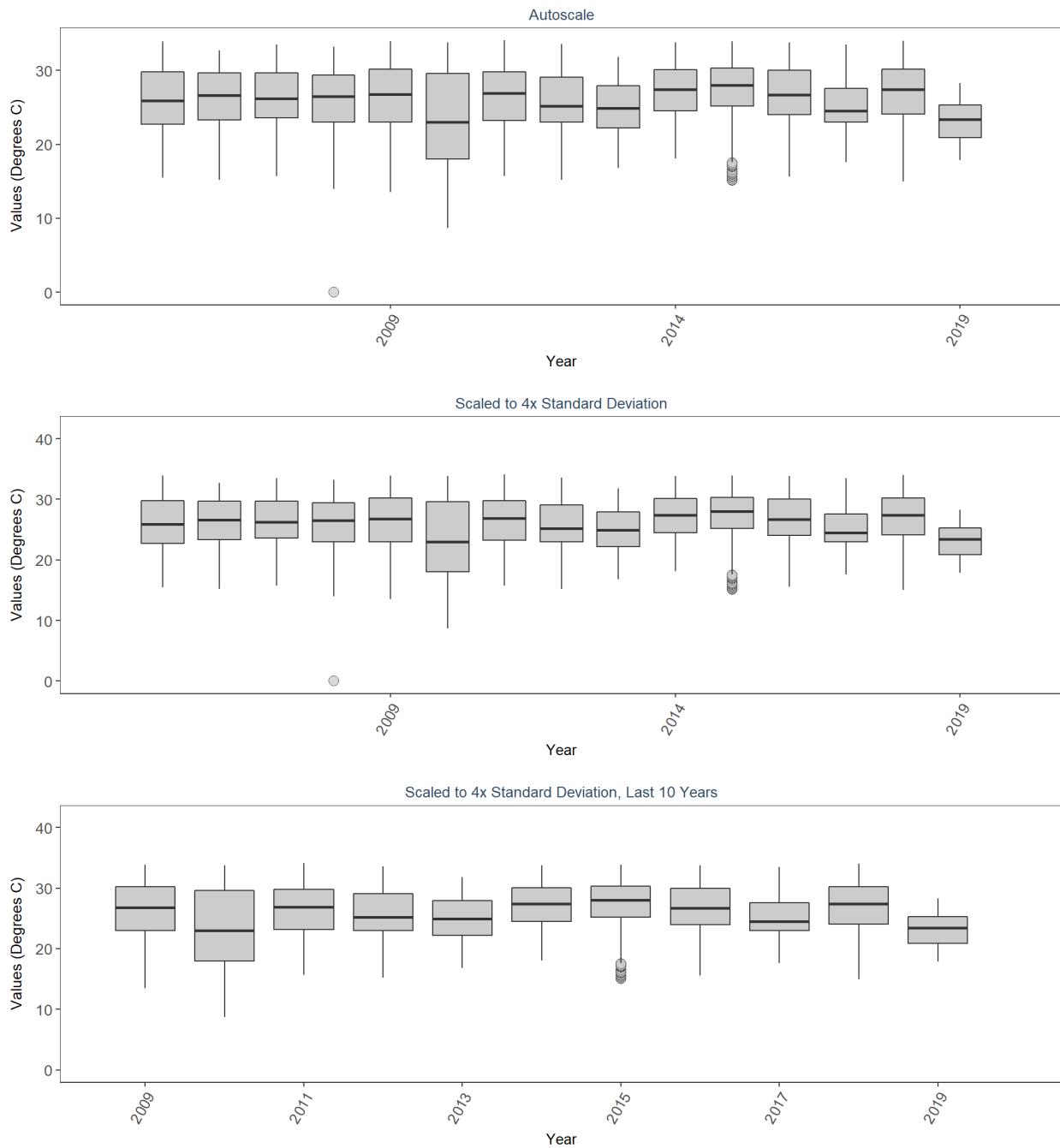
Scaled to 4x Standard Deviation



Scaled to 4x Standard Deviation, Last 10 Years



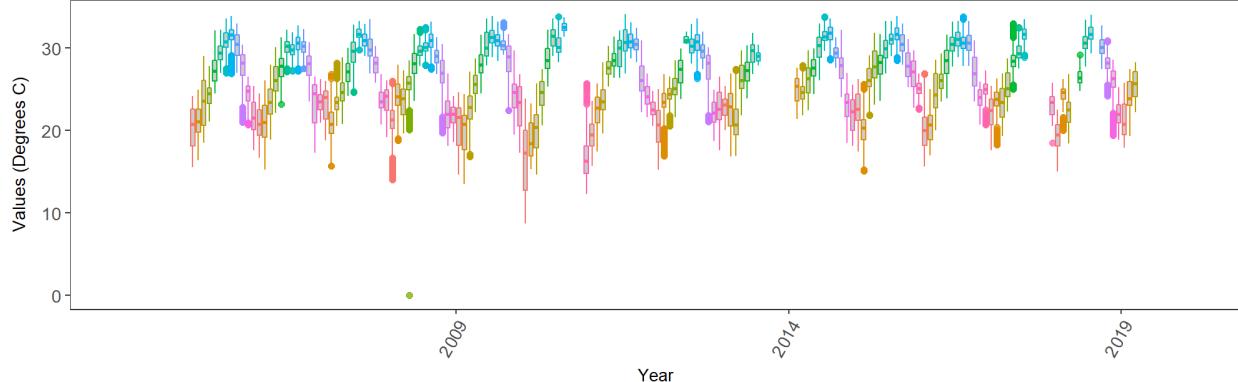
Florida Keys National Marine Sanctuary  
5  
National Data Buoy Center  
LONF1  
By Year



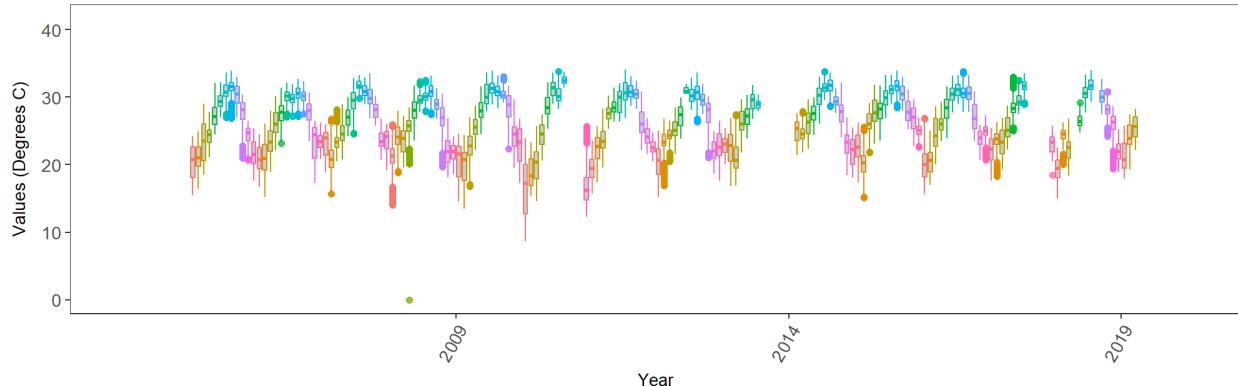
Florida Keys National Marine Sanctuary  
 5  
 National Data Buoy Center  
 LONF1  
 By Year & Month

Month 1 2 3 4 5 6 7 8 9 10 11 12

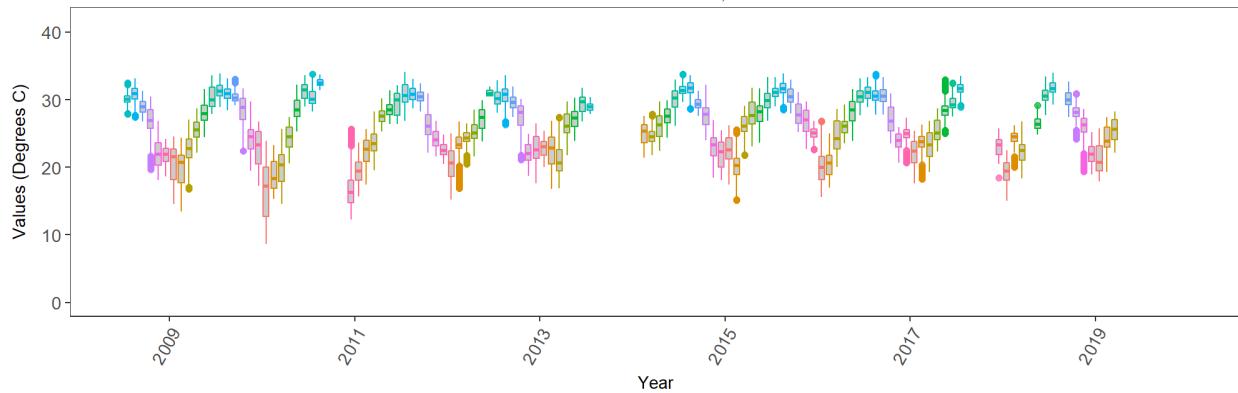
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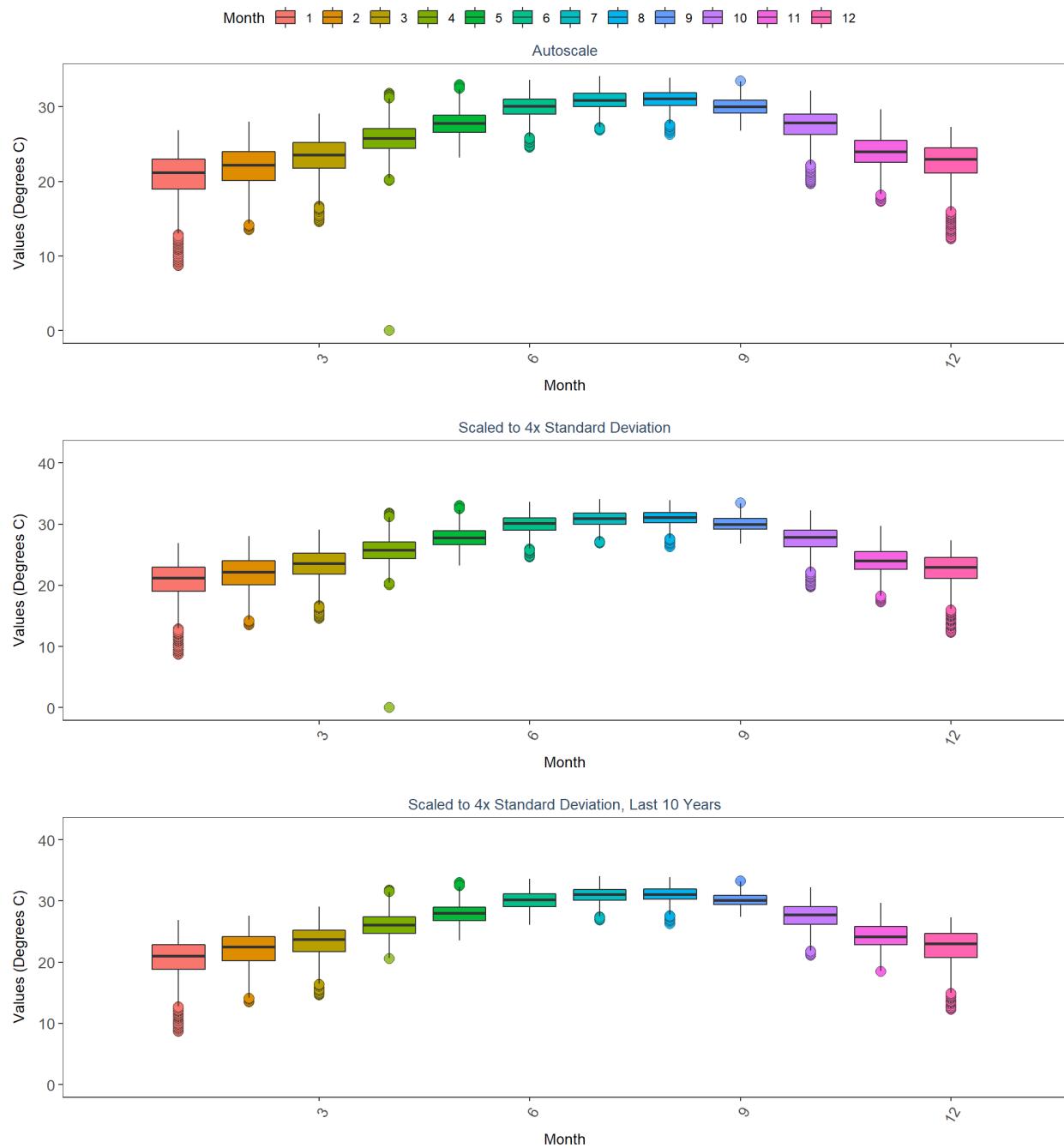
Scaled to 4x Standard Deviation



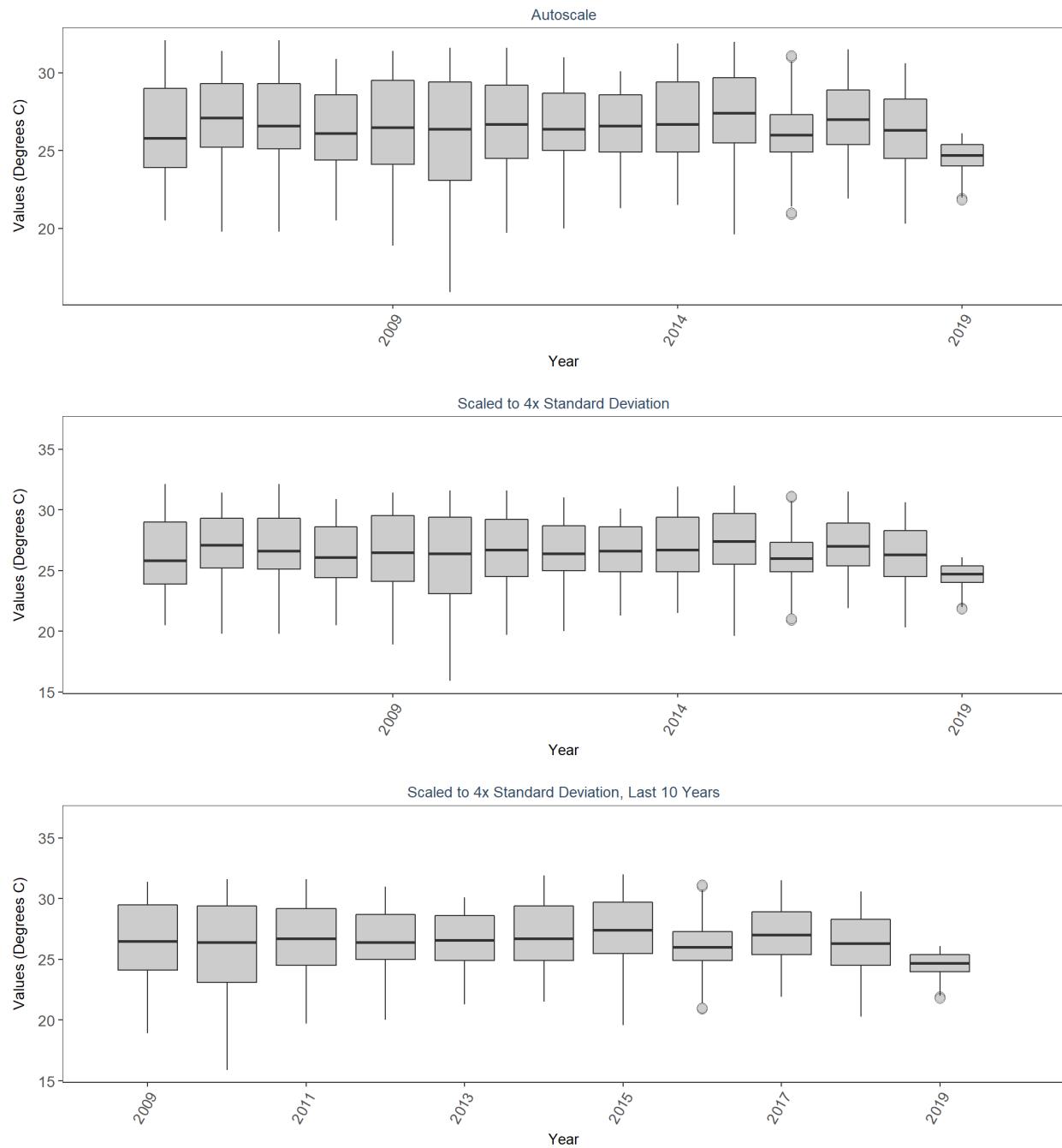
Scaled to 4x Standard Deviation, Last 10 Years



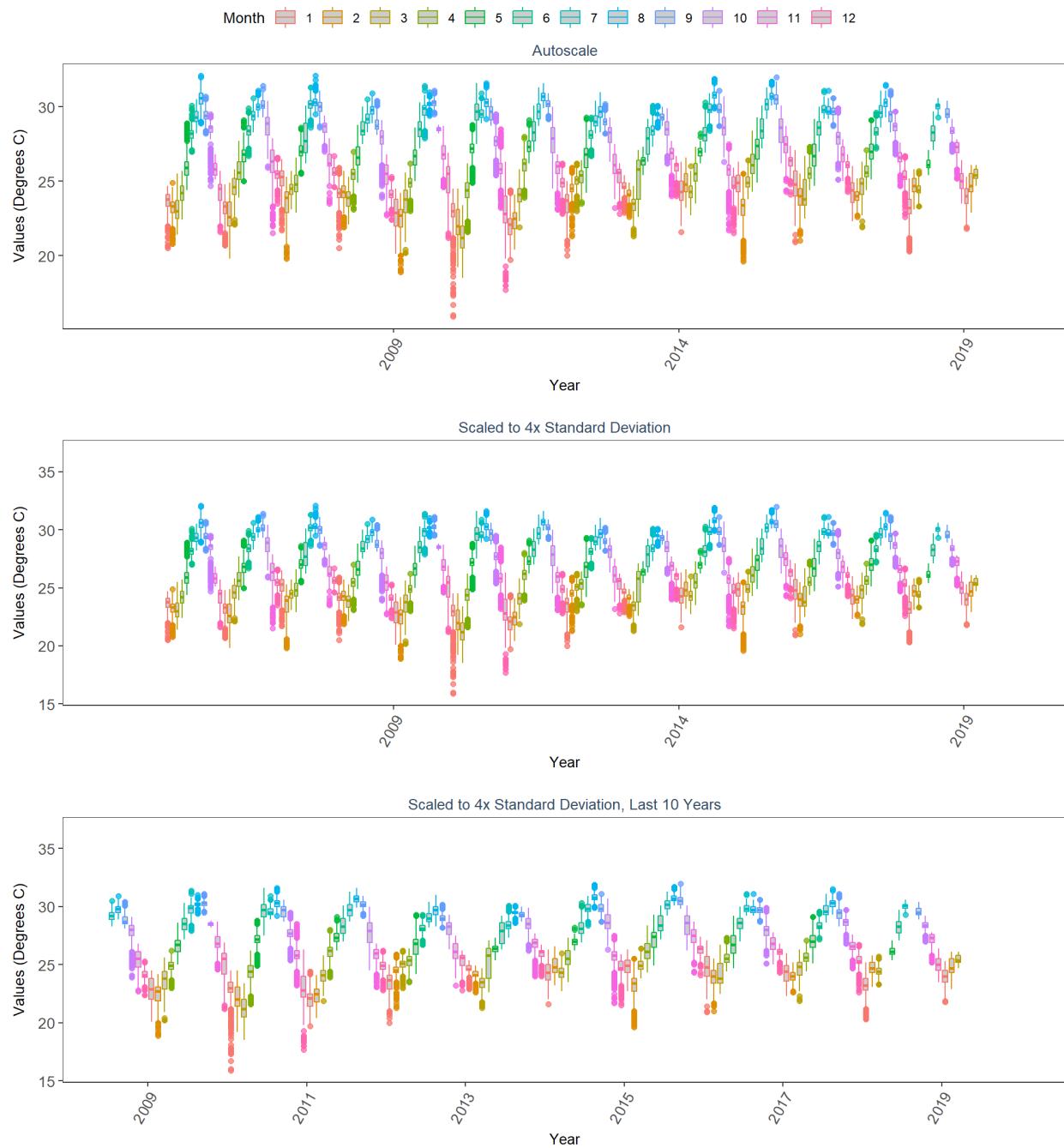
Florida Keys National Marine Sanctuary  
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National Data Buoy Center  
LONF1  
By Month



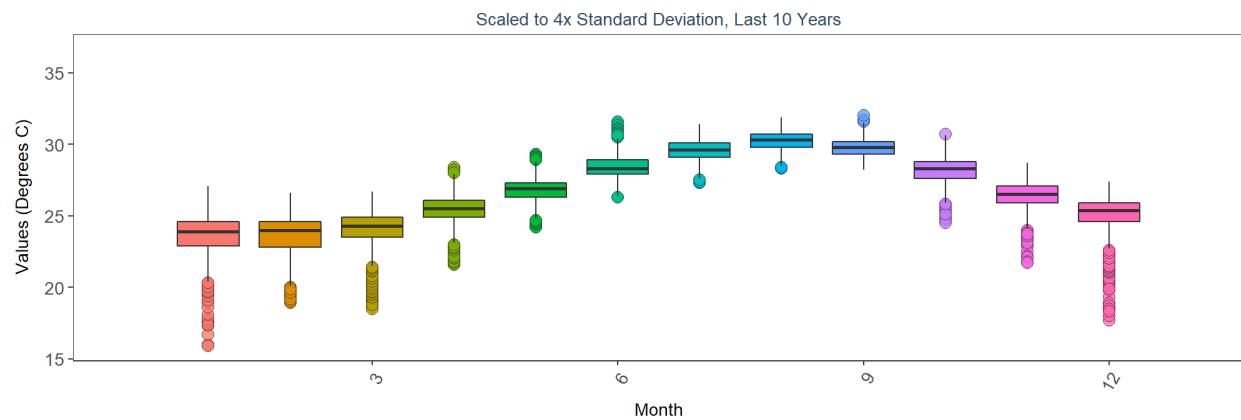
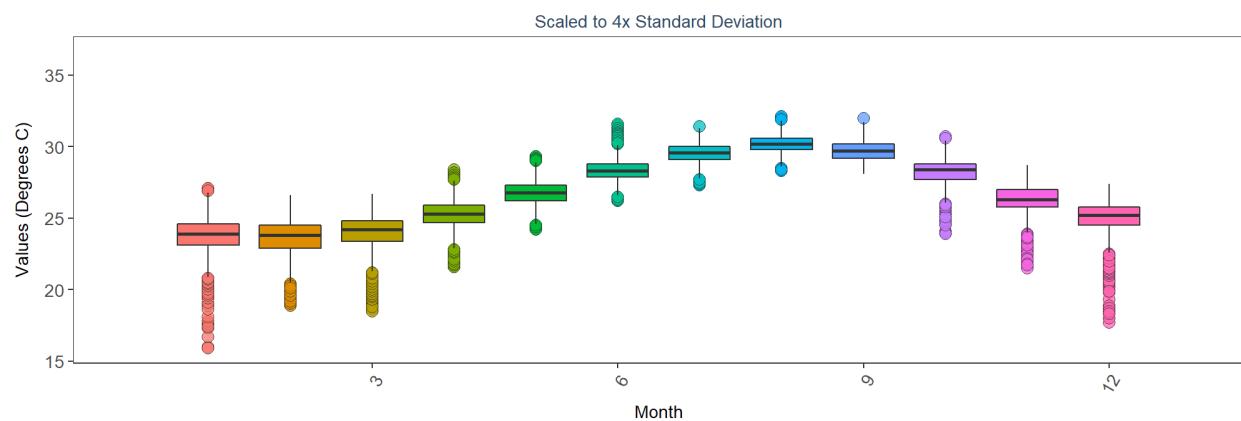
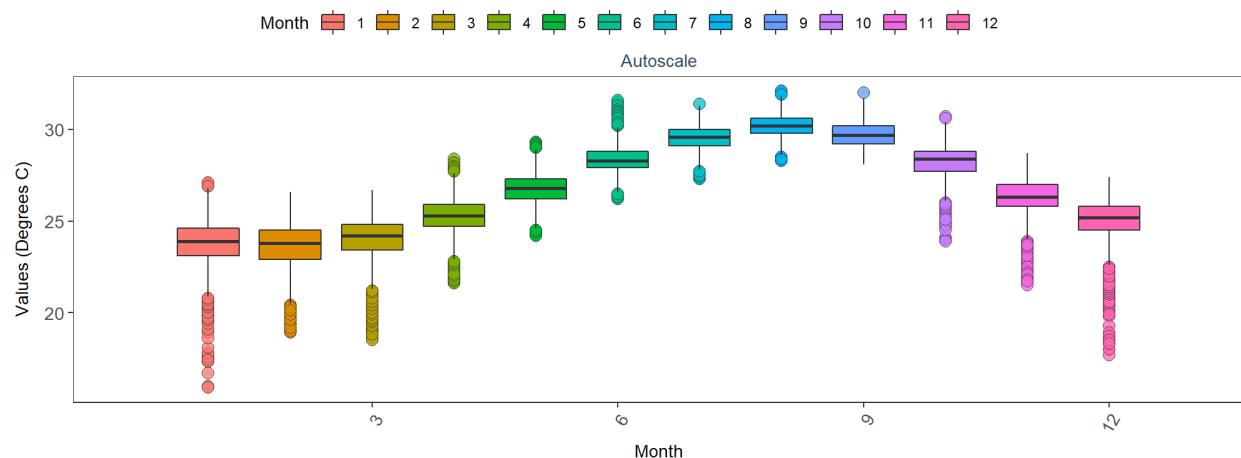
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MLRF1  
By Year



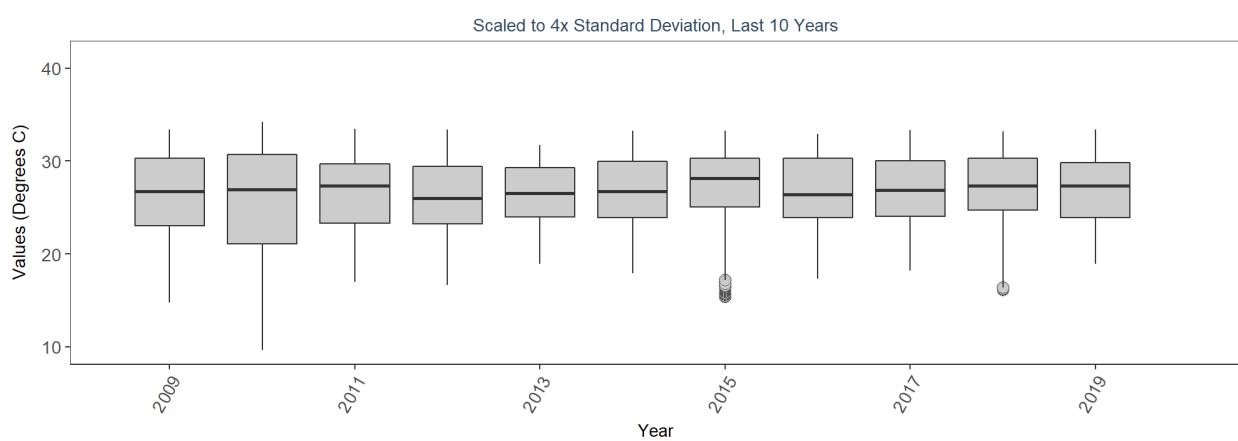
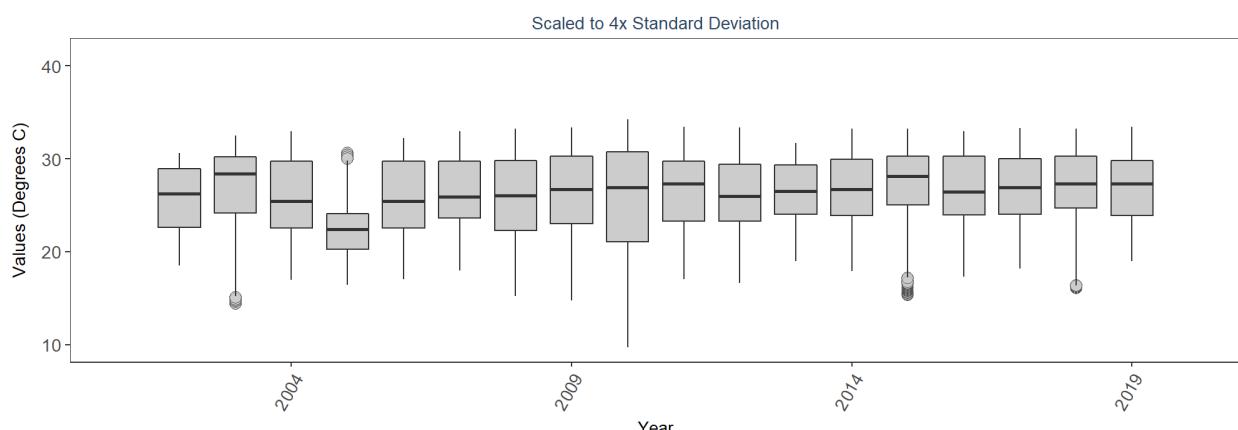
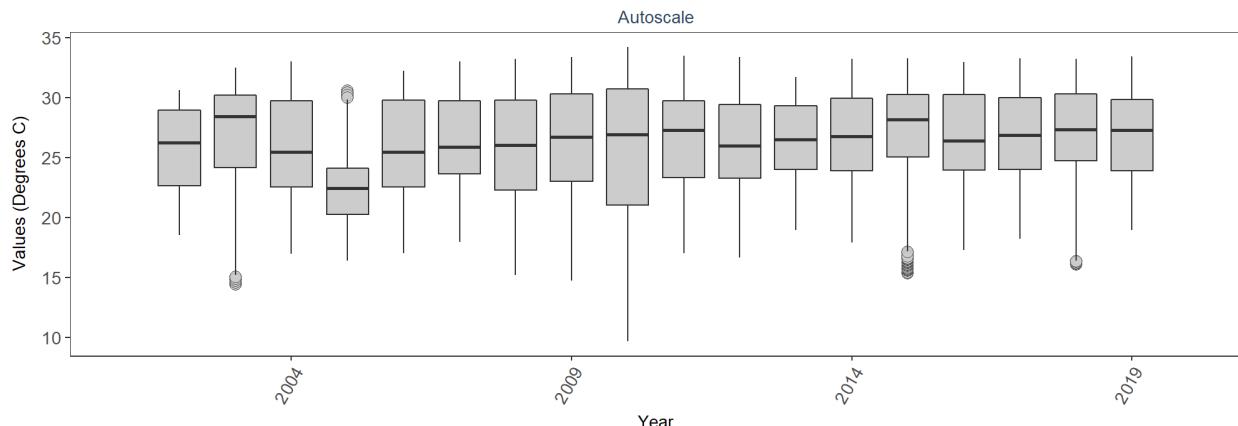
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 By Year & Month



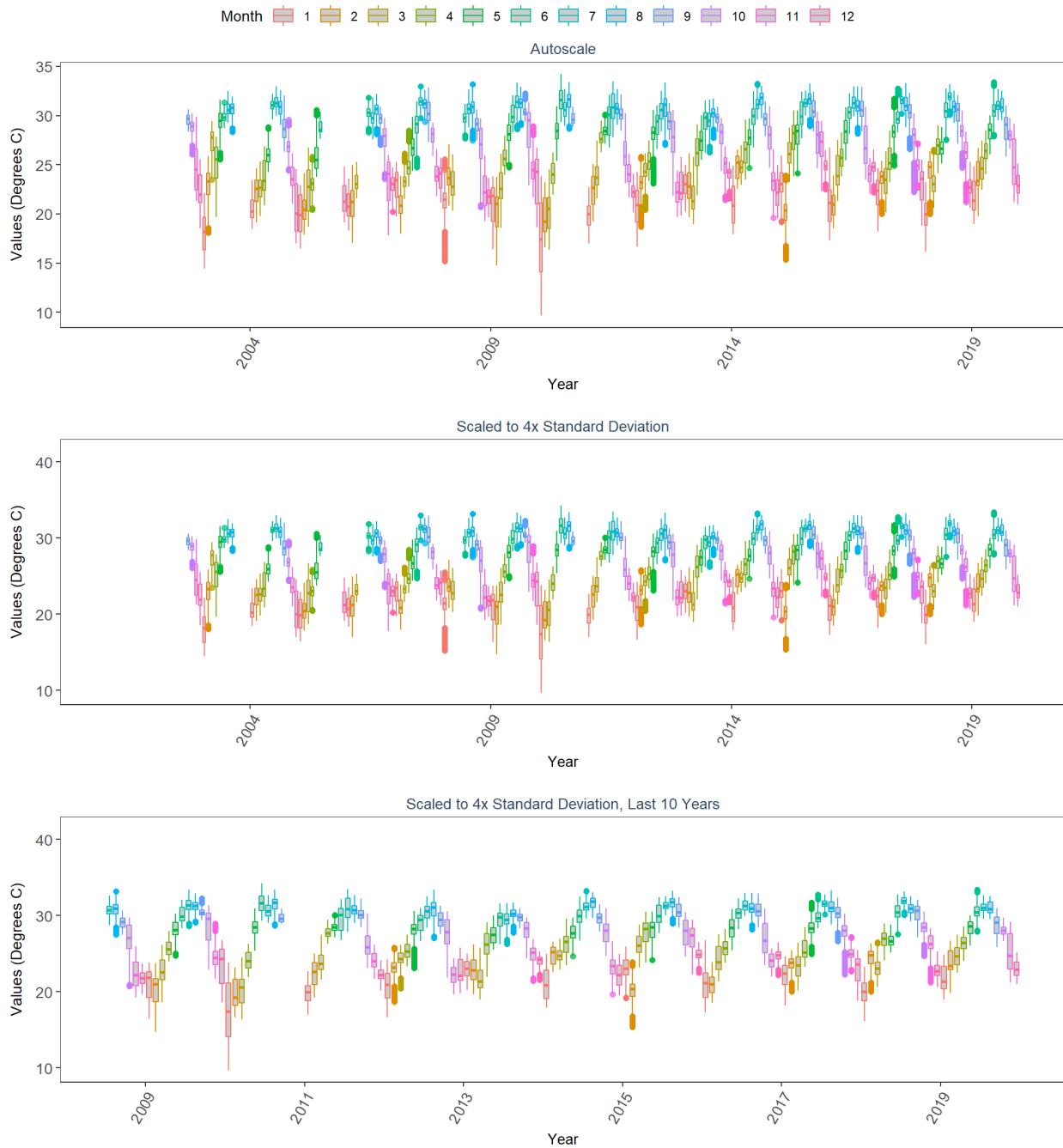
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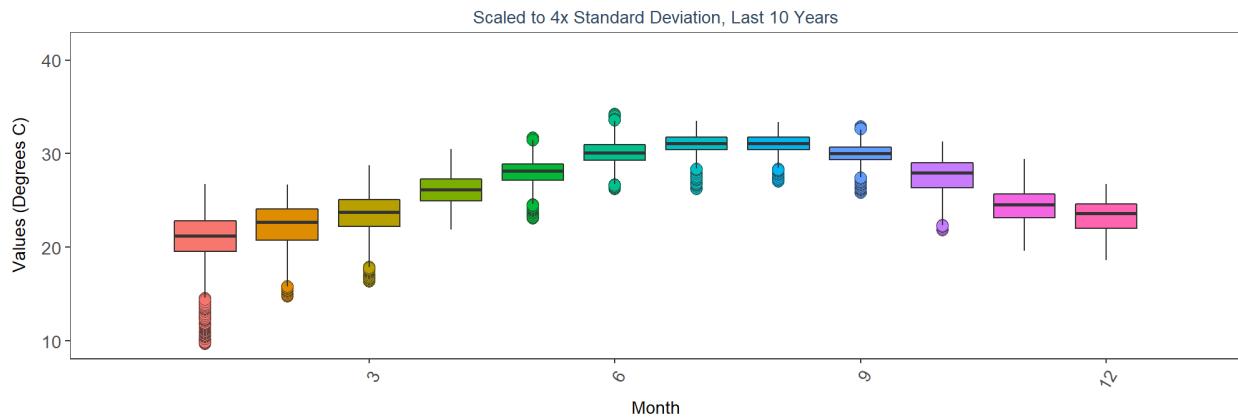
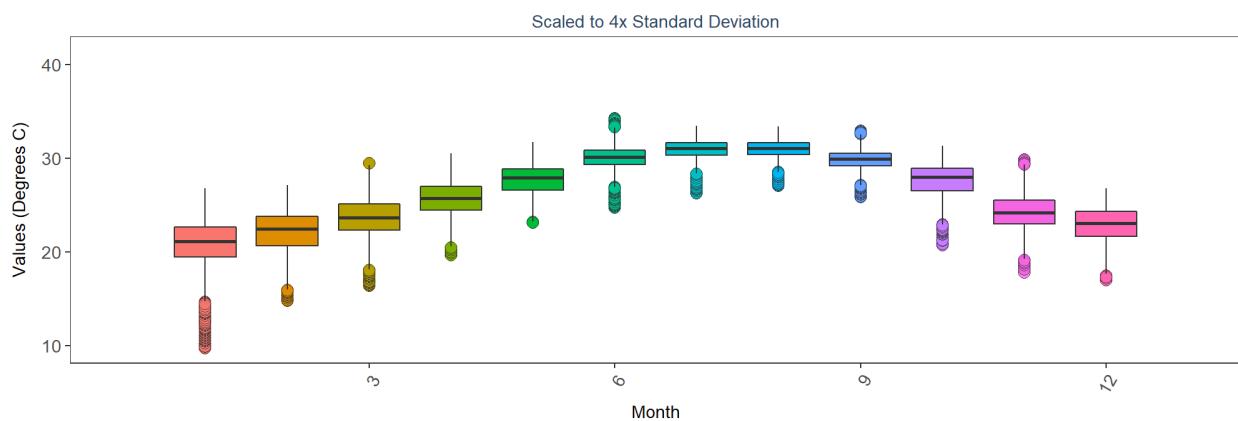
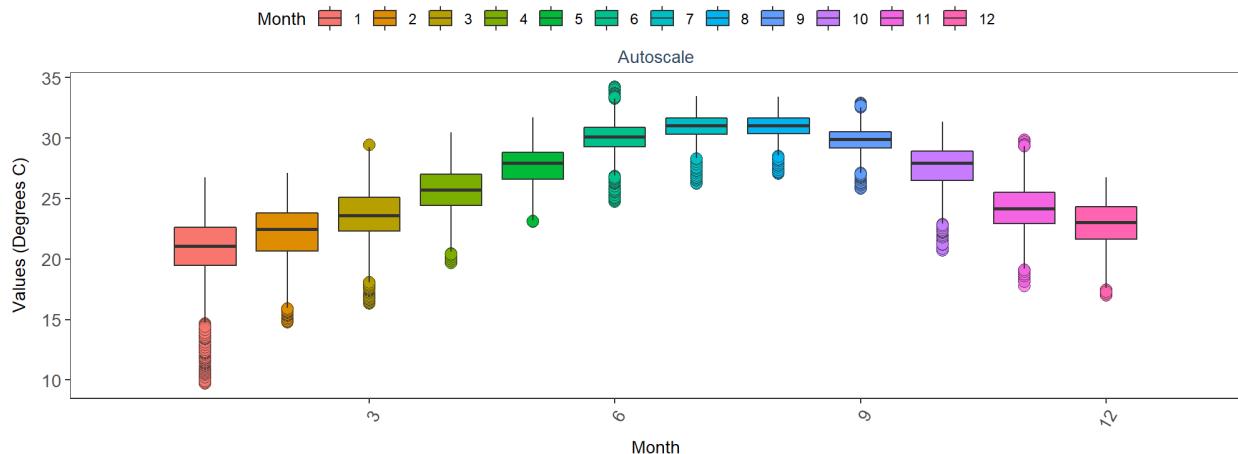
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 By Year



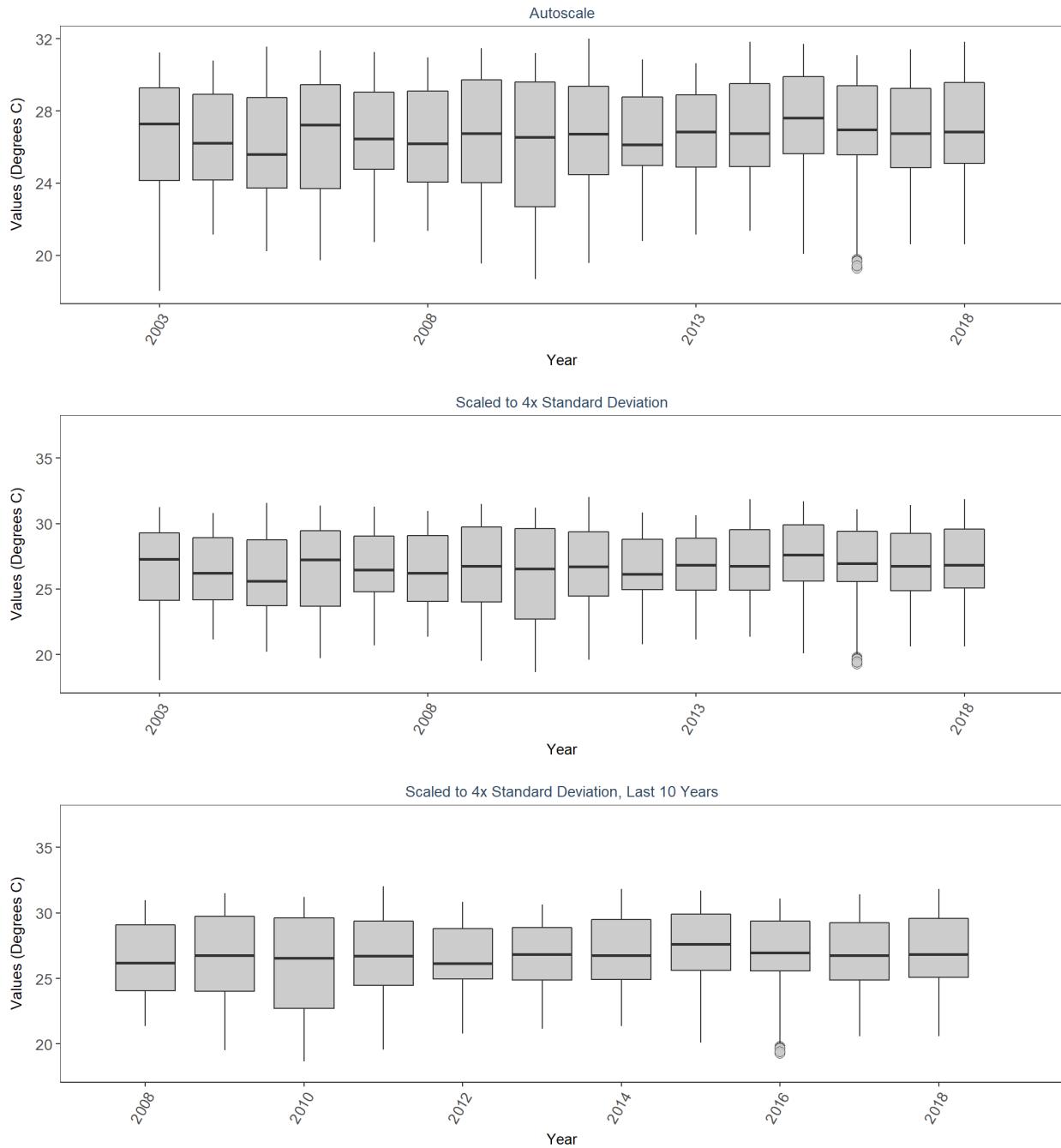
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 By Year & Month



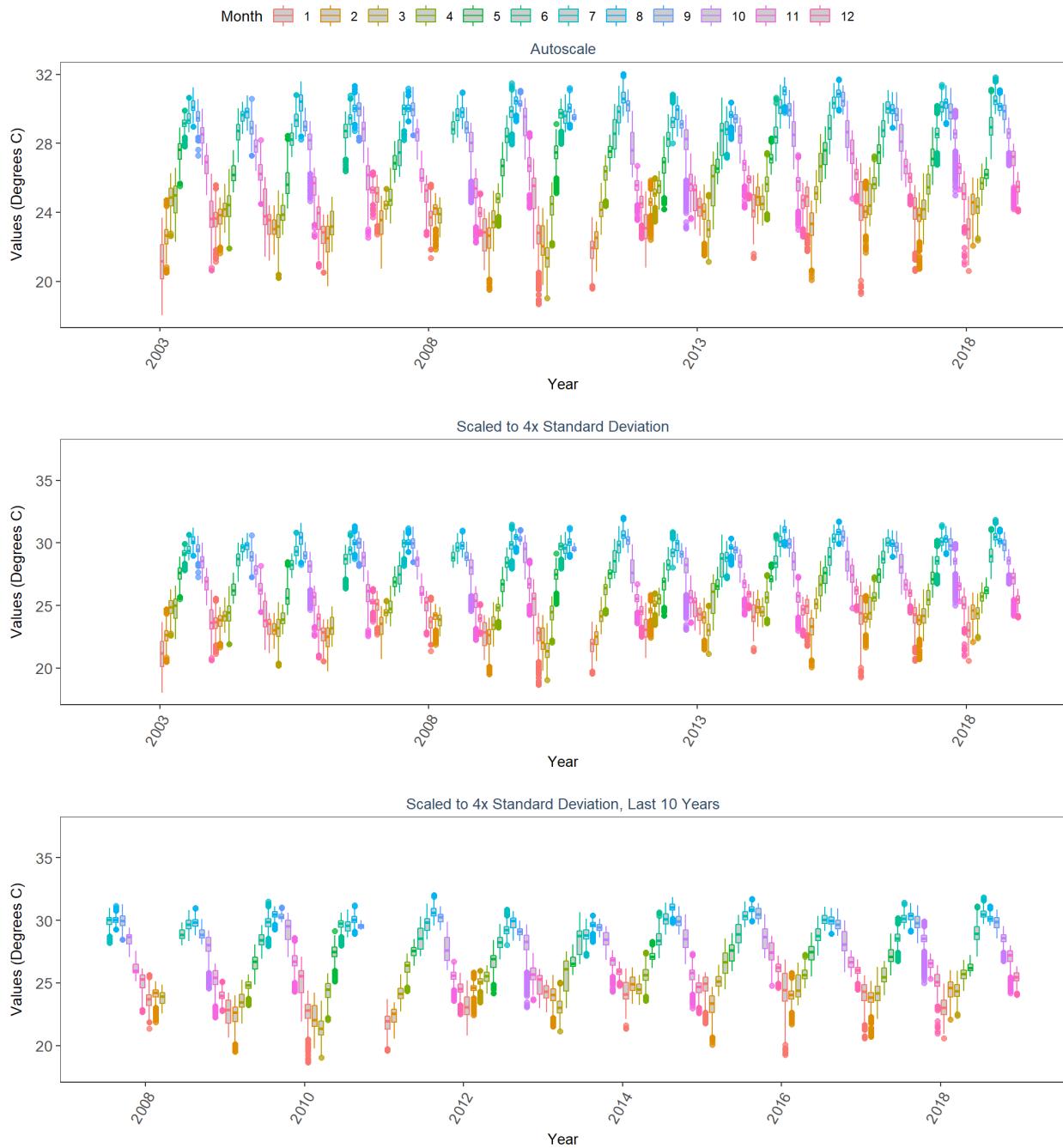
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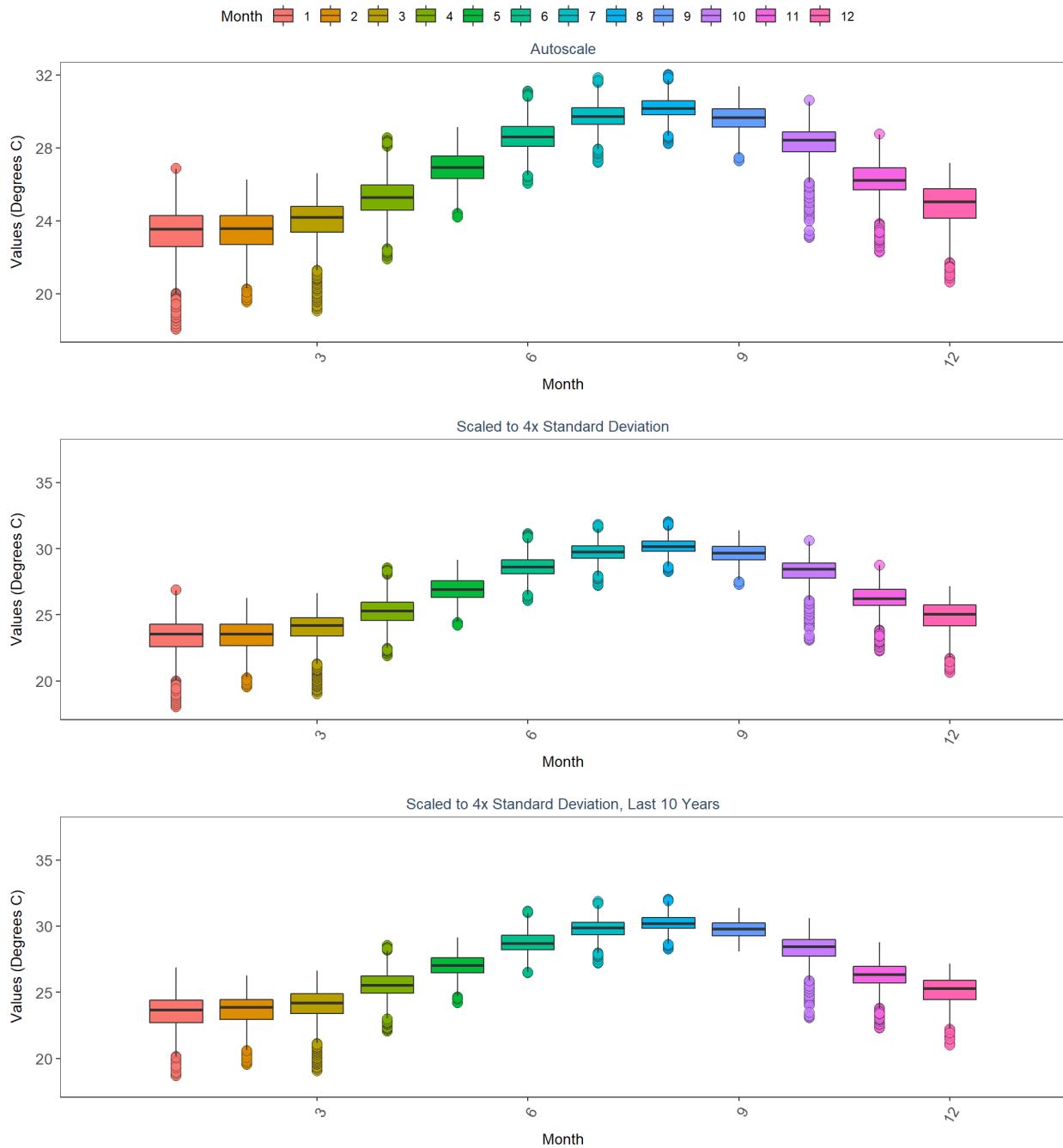
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 By Year



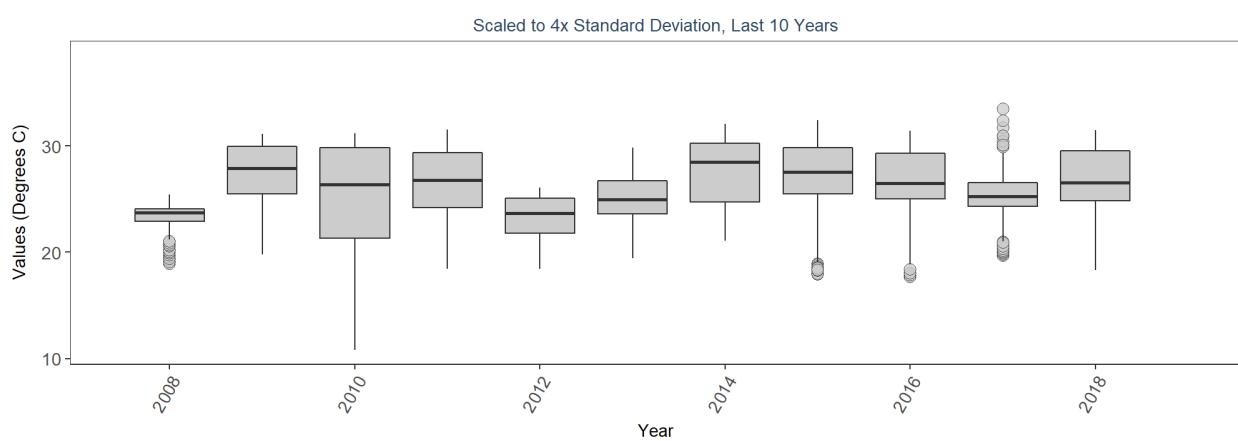
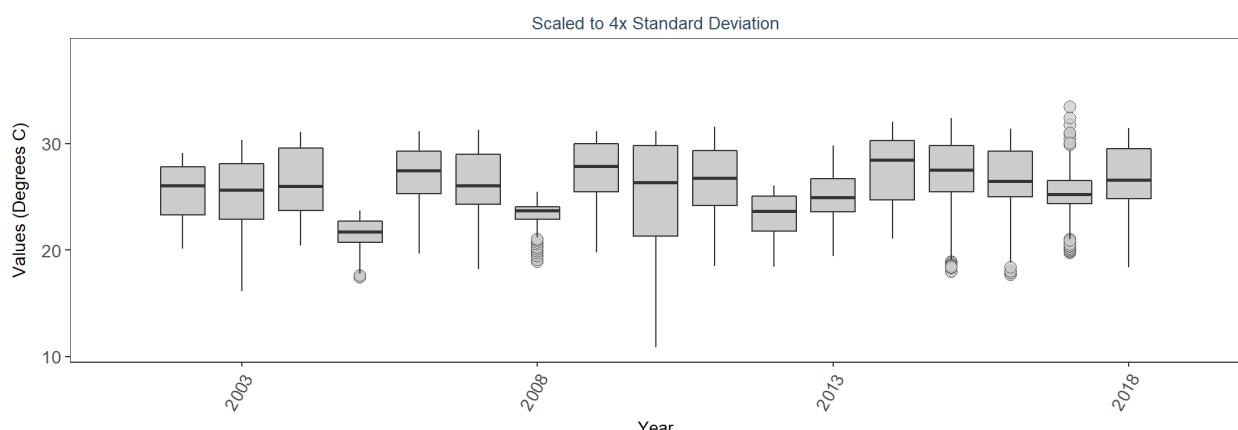
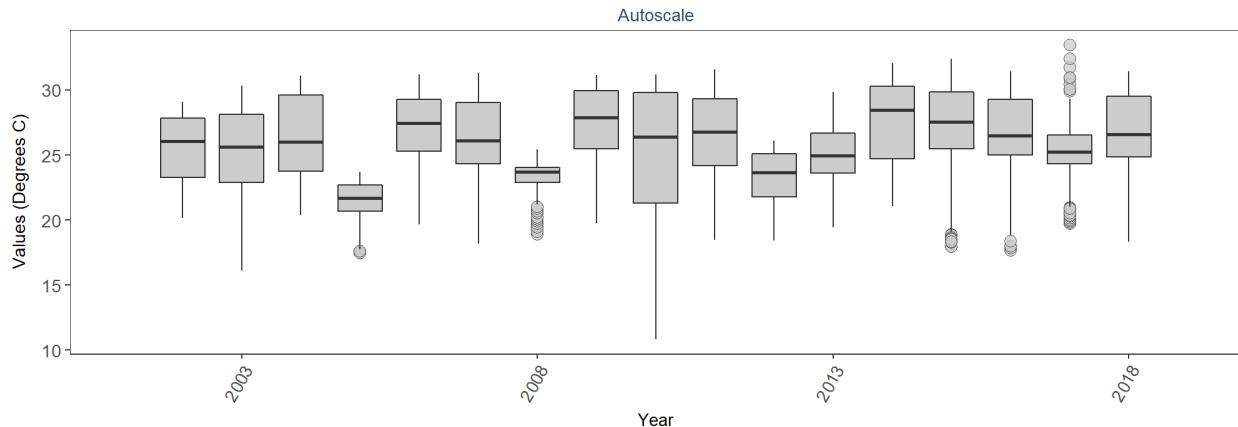
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 By Year & Month



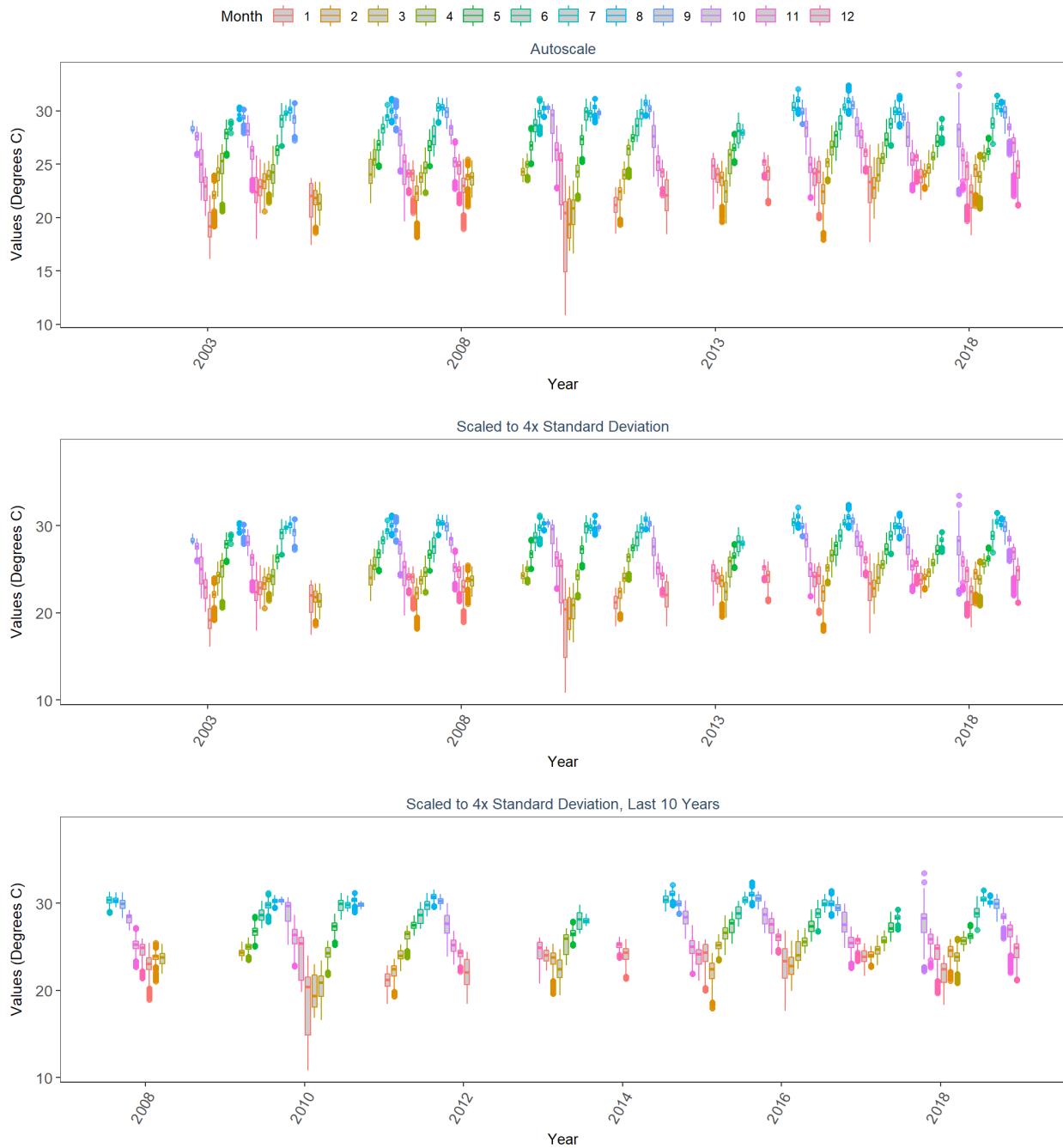
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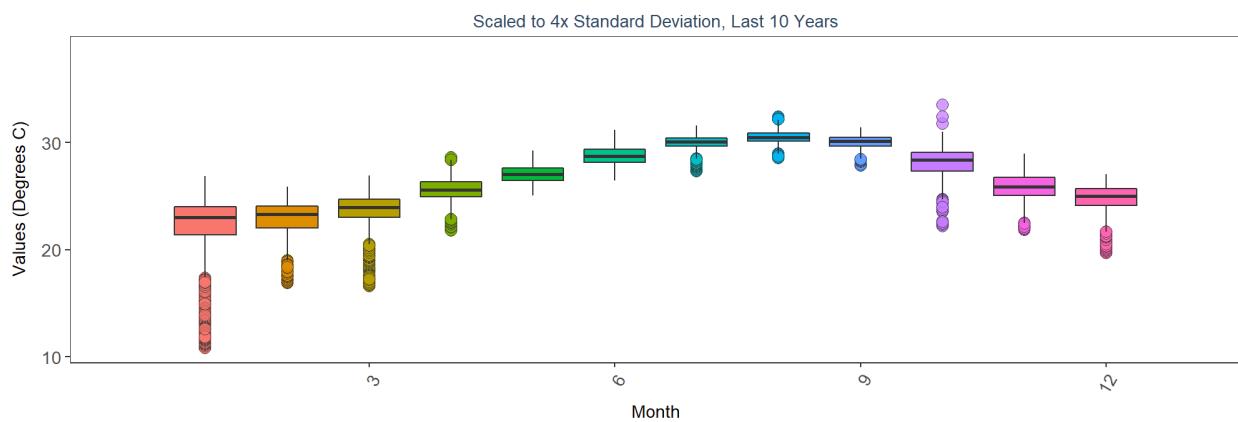
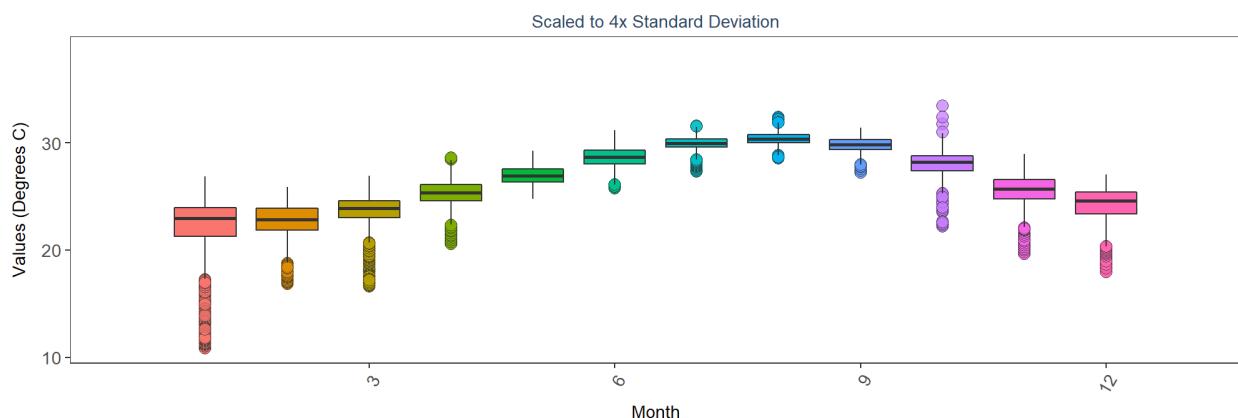
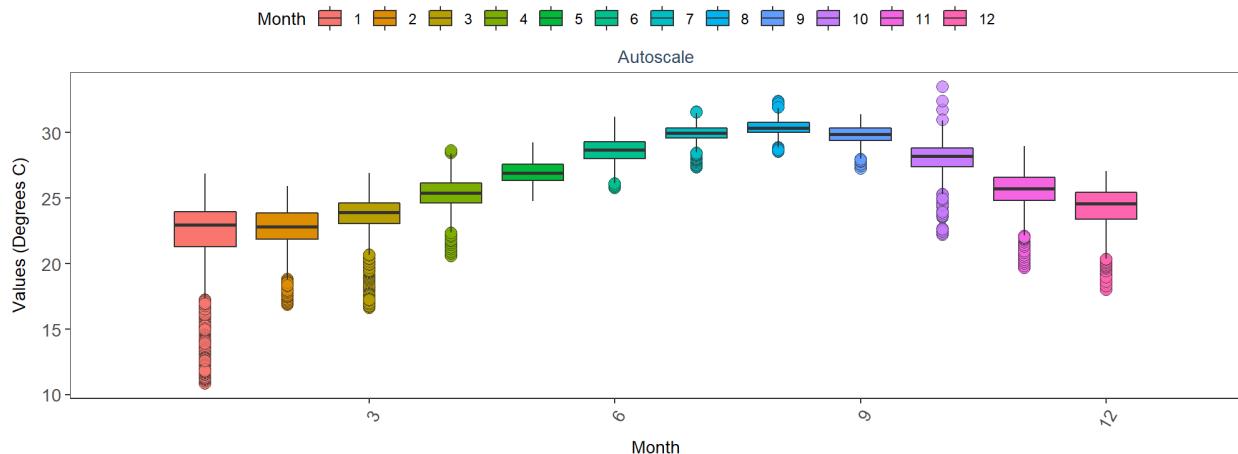
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 By Year



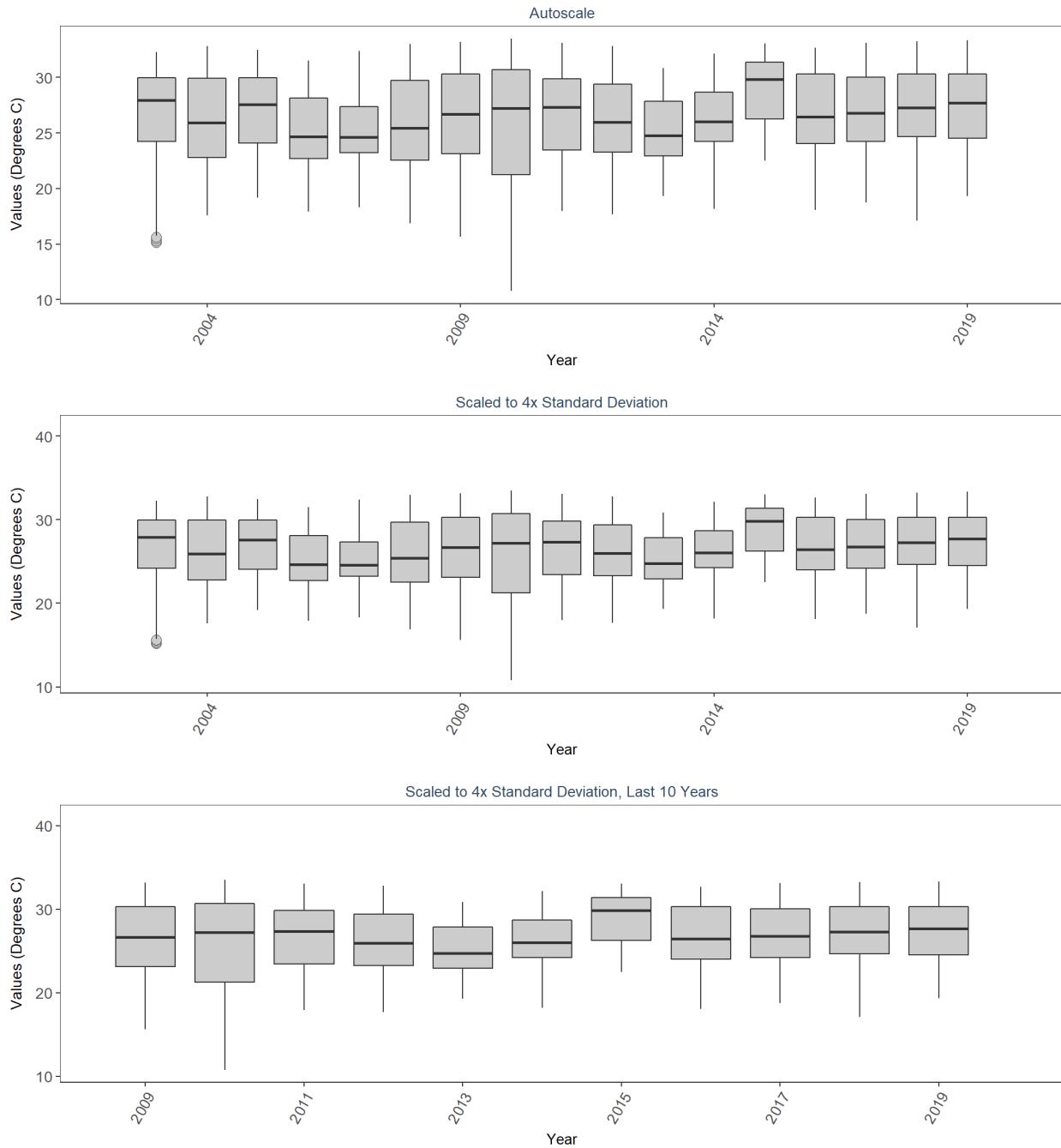
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 By Year & Month



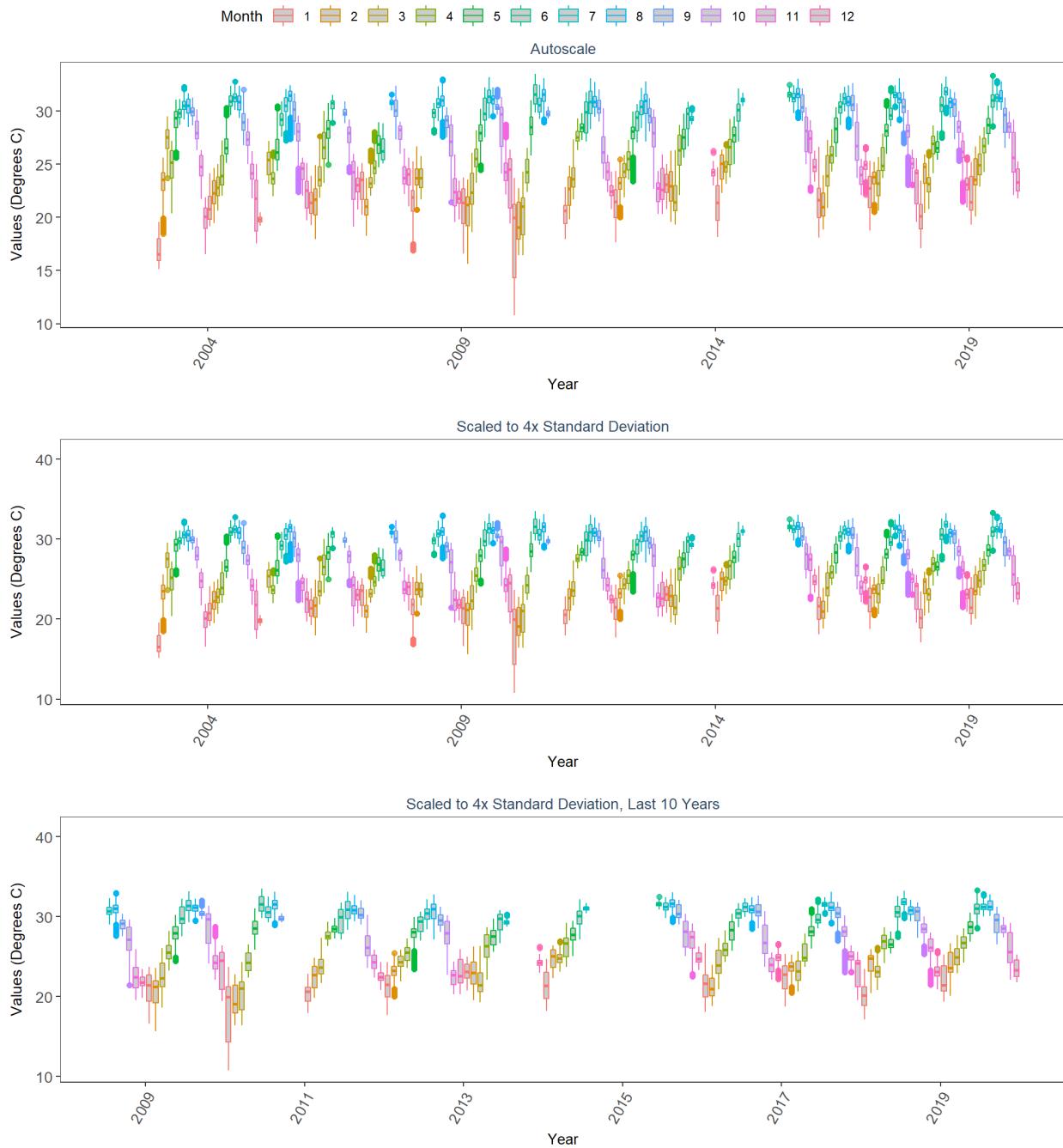
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 By Month



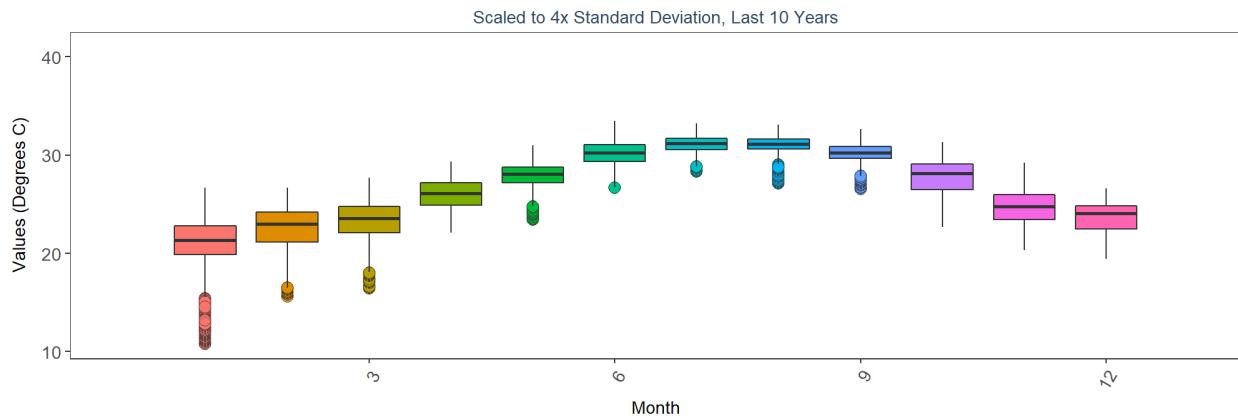
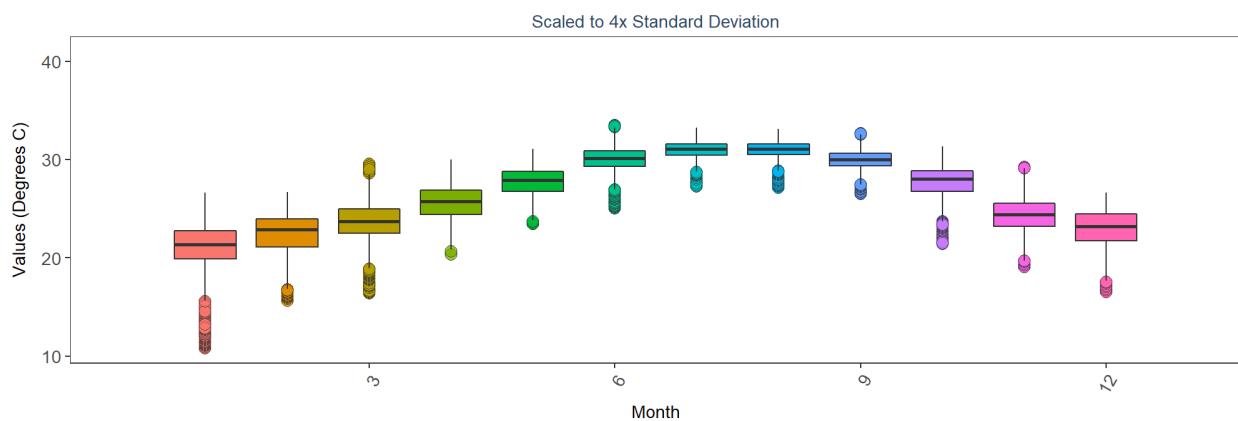
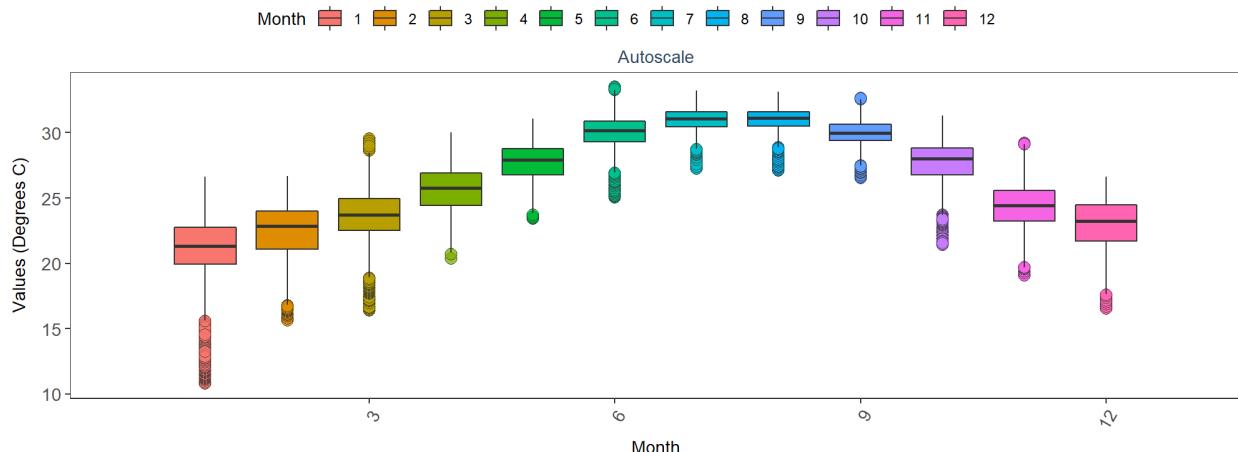
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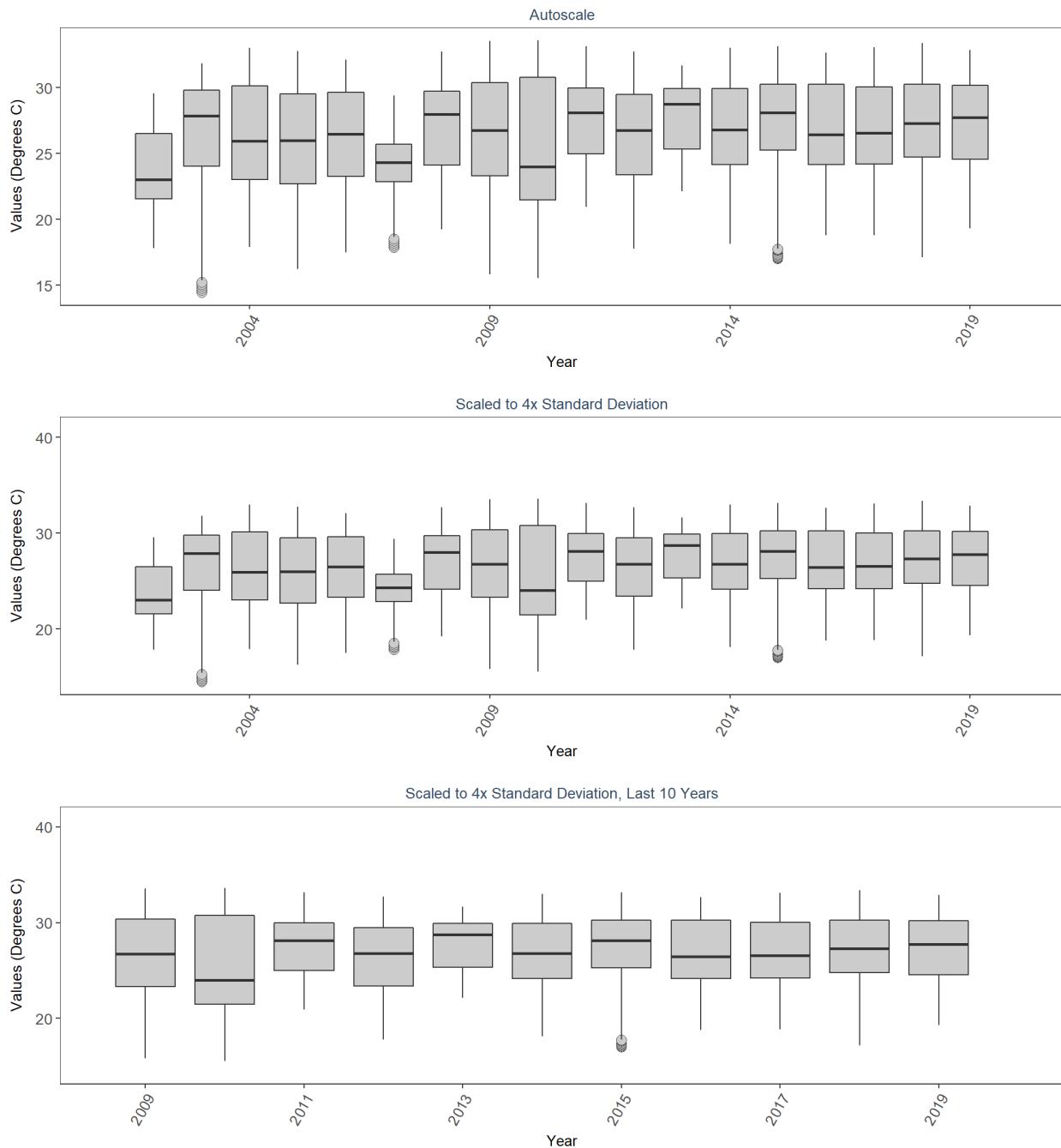
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 By Year & Month



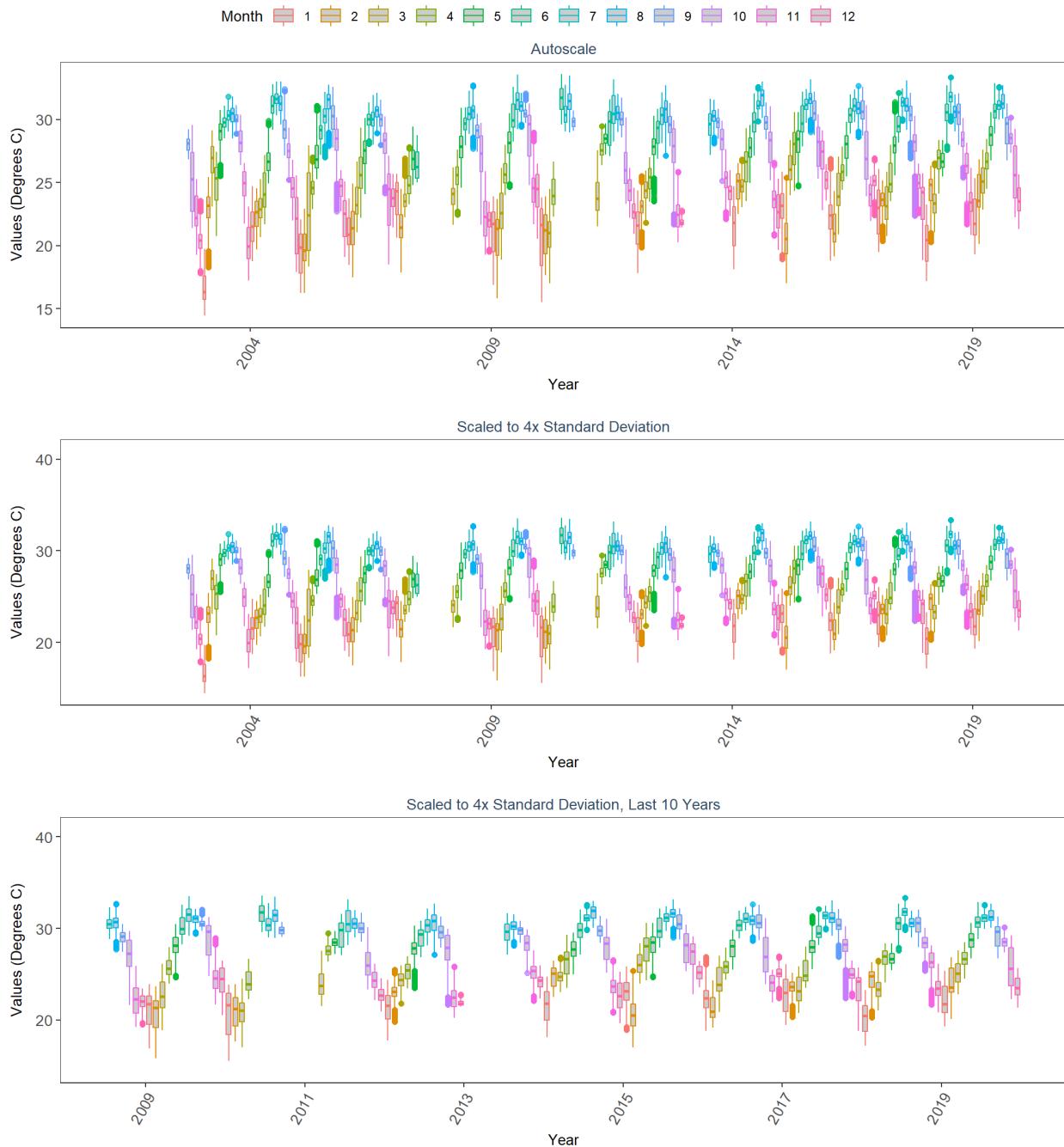
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 By Month



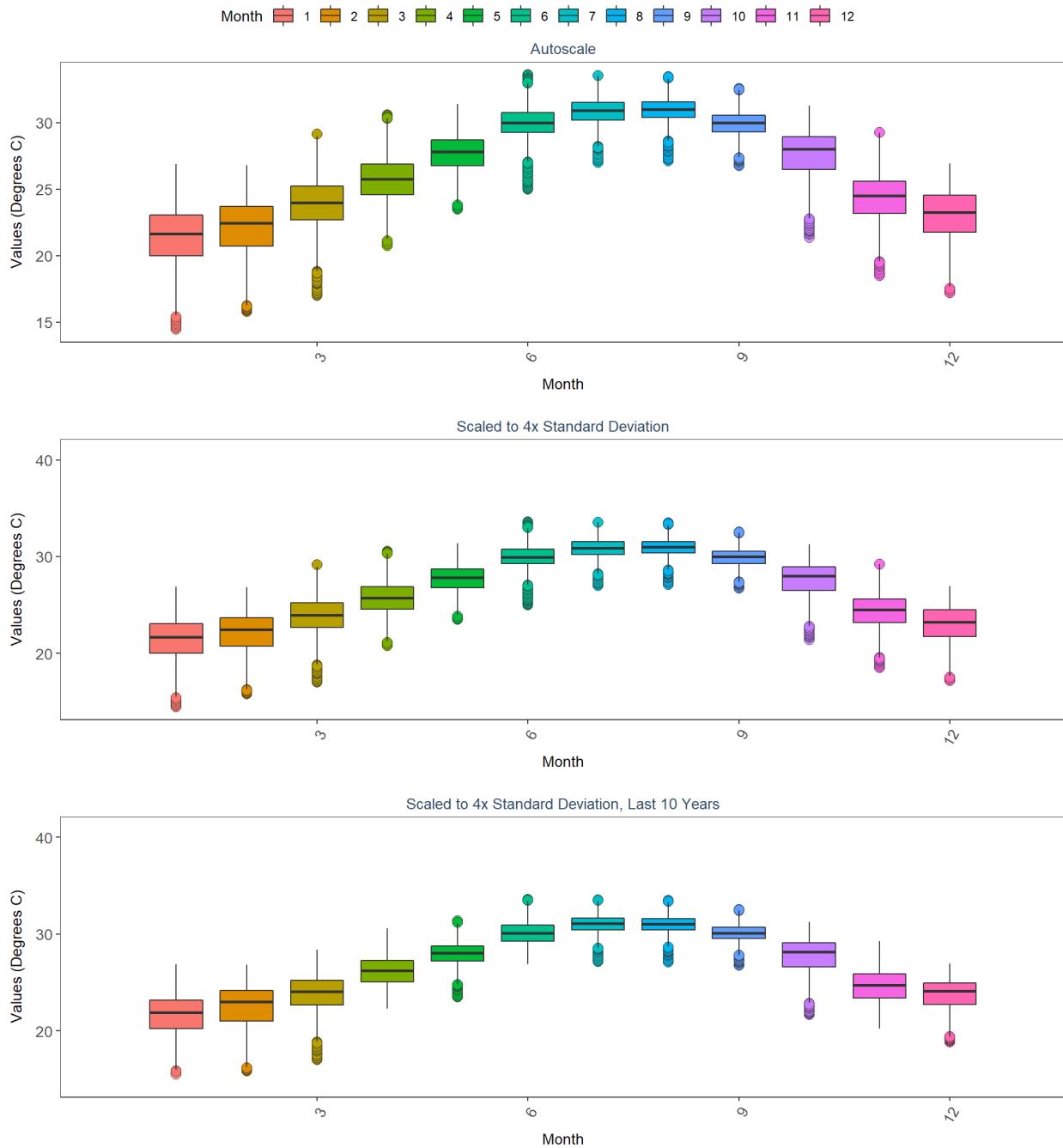
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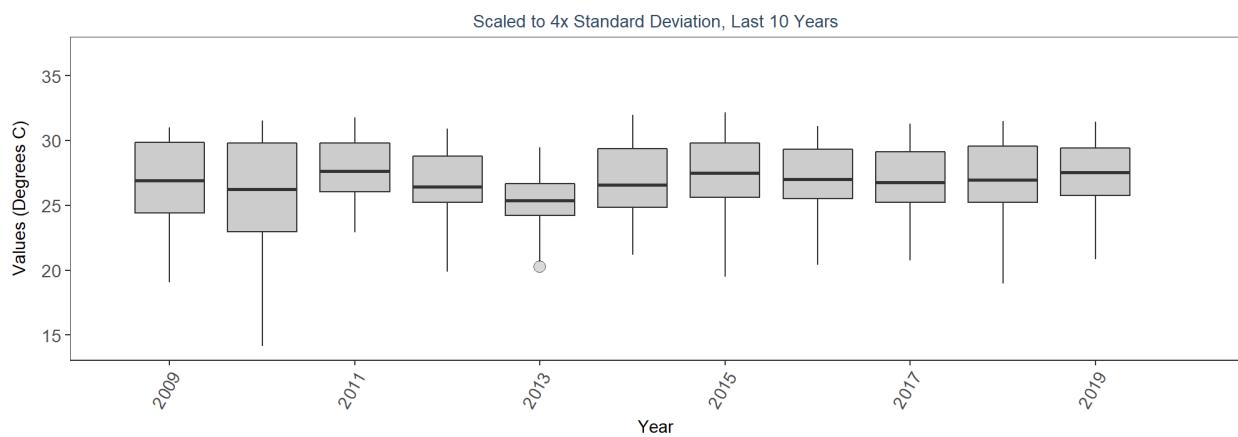
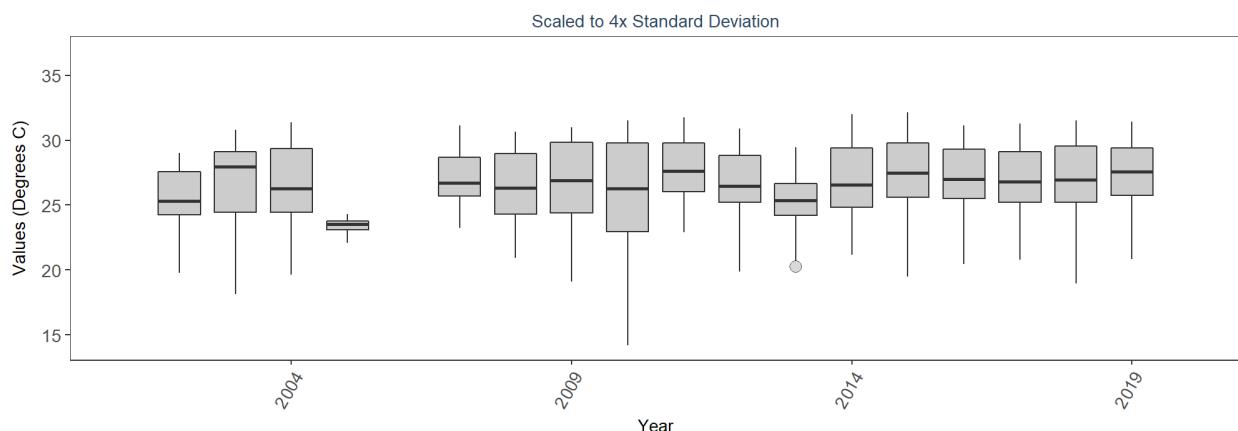
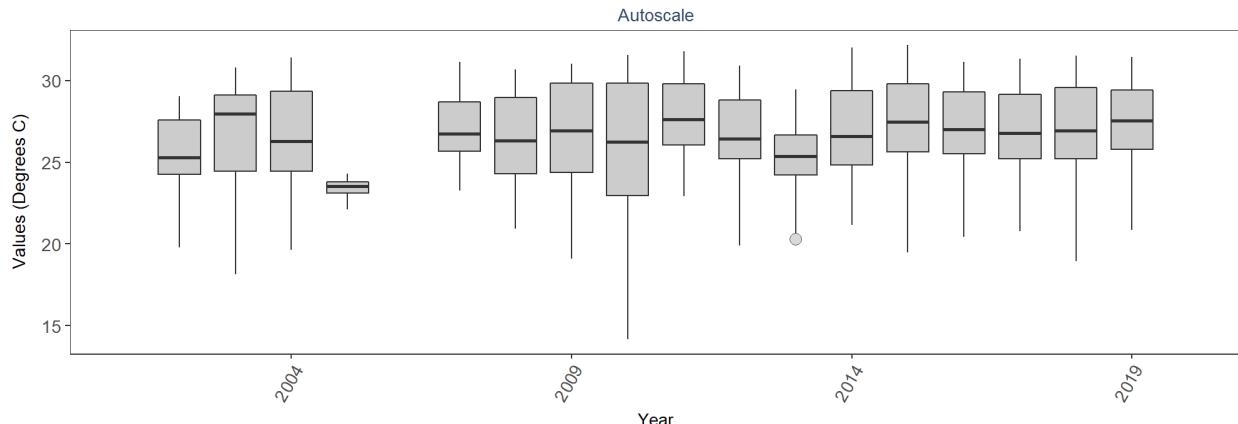
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 By Year & Month



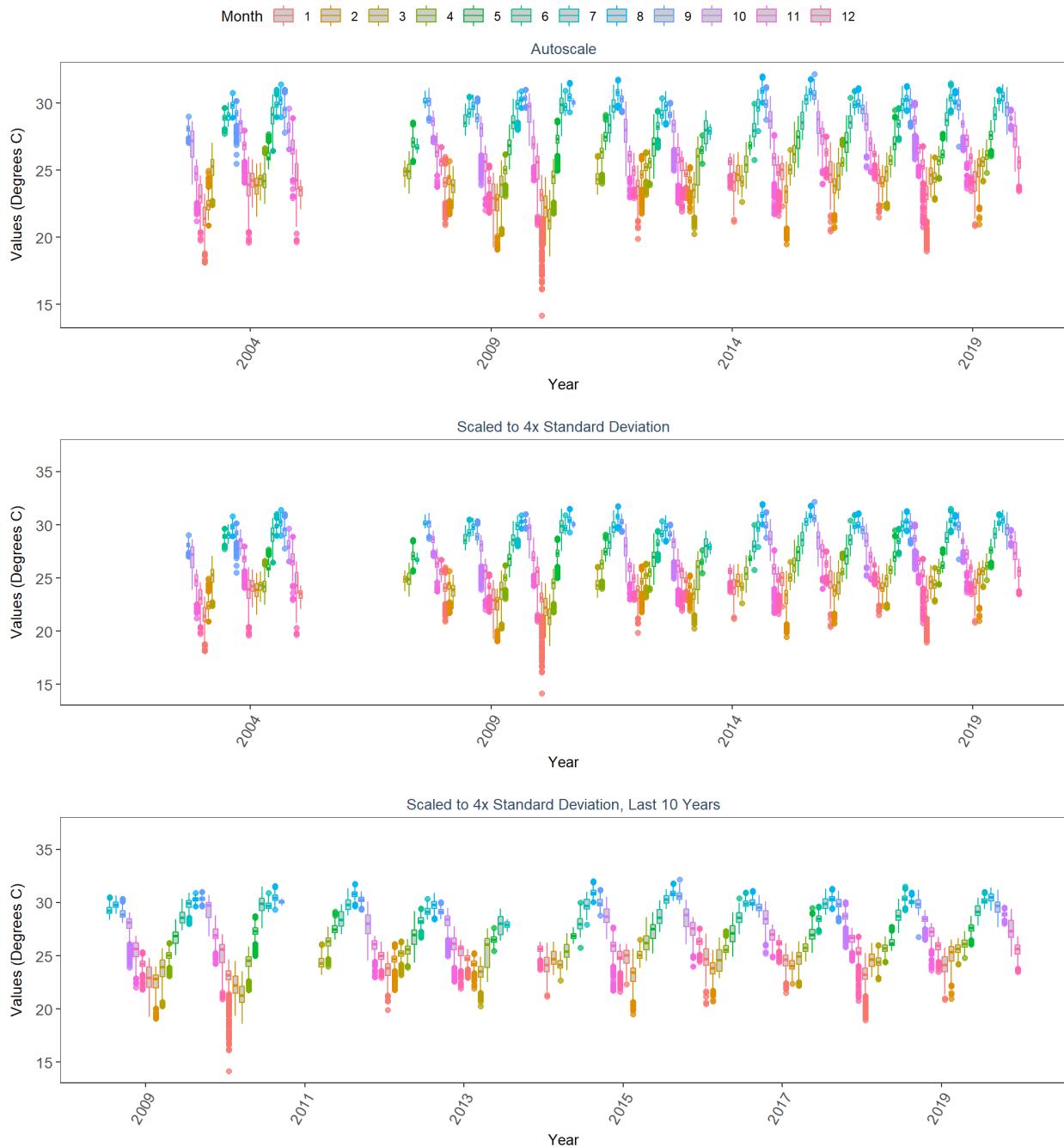
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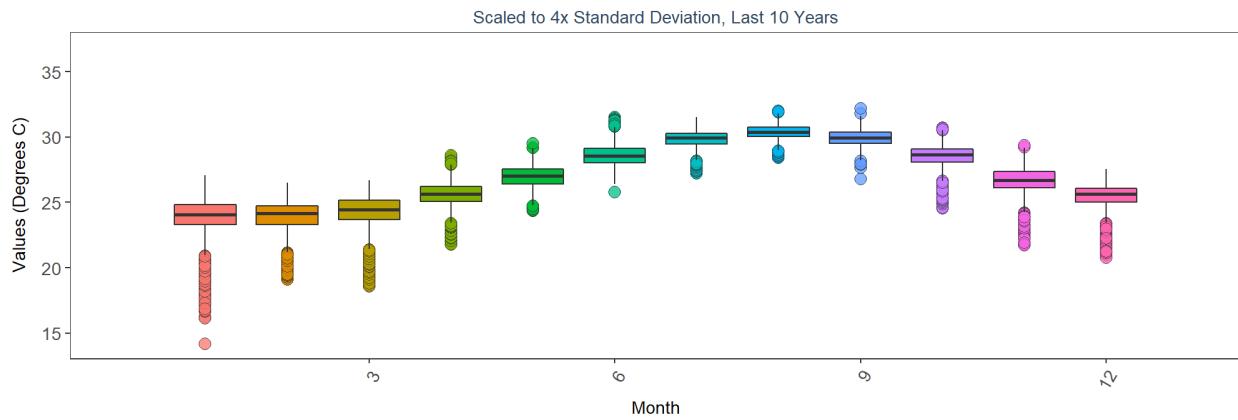
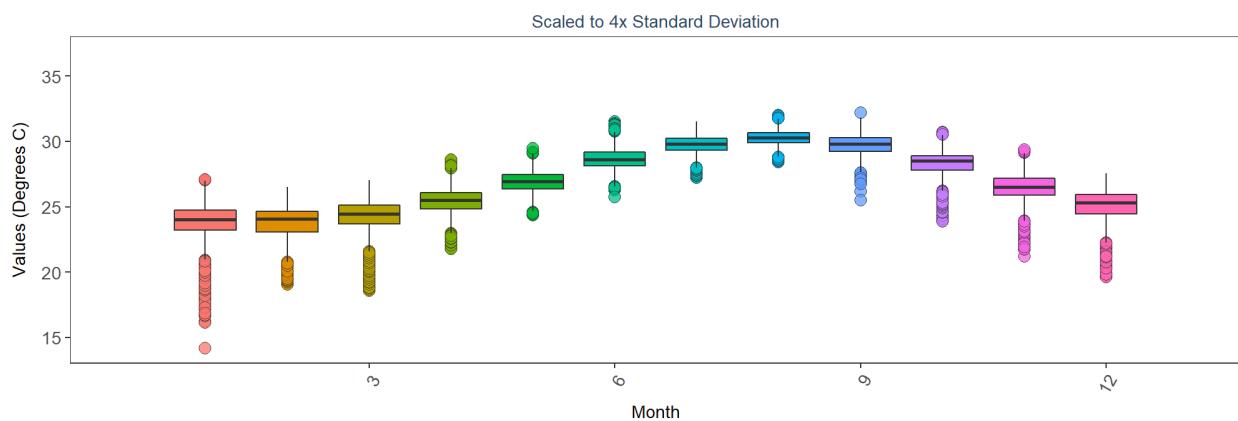
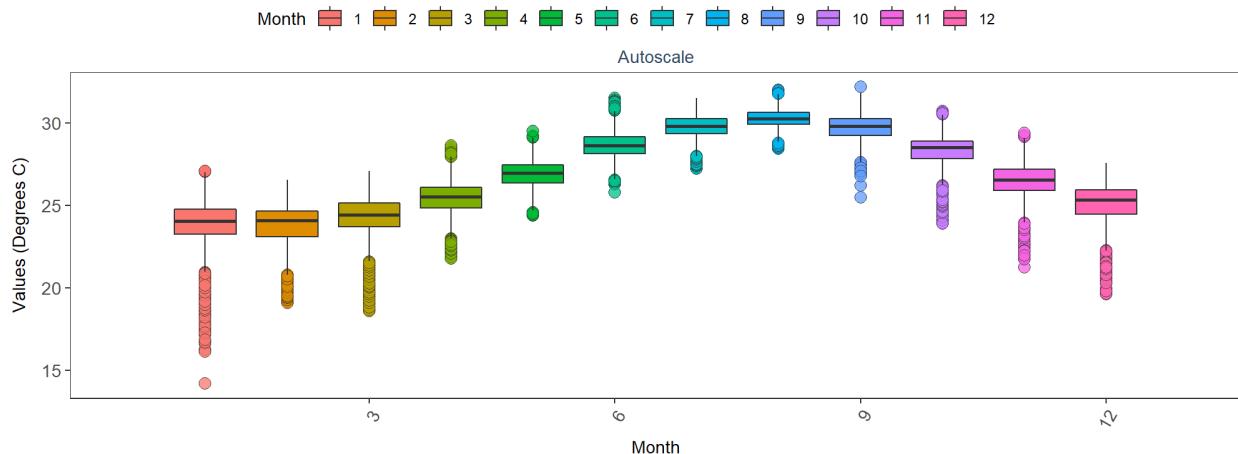
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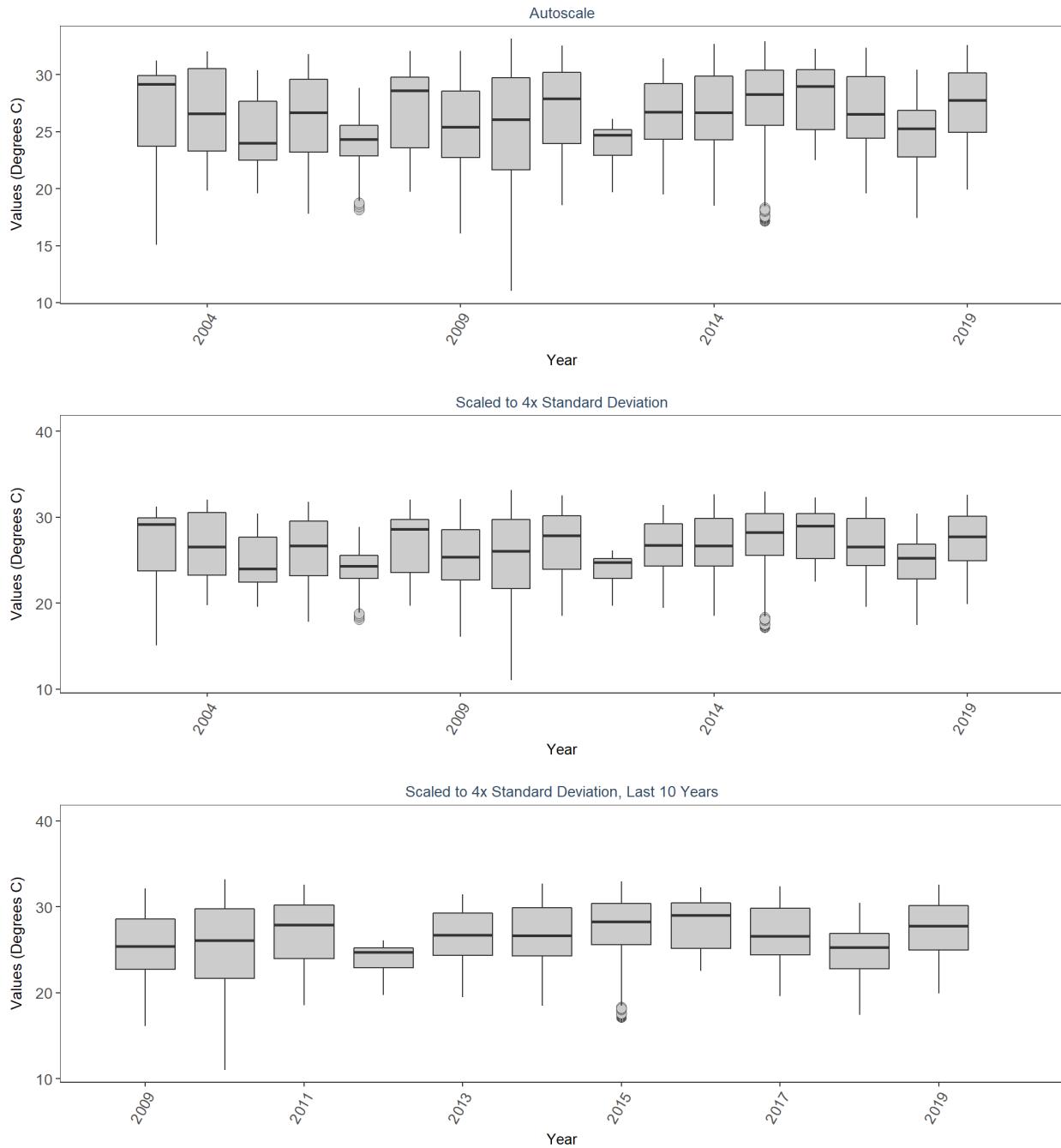
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 By Year & Month



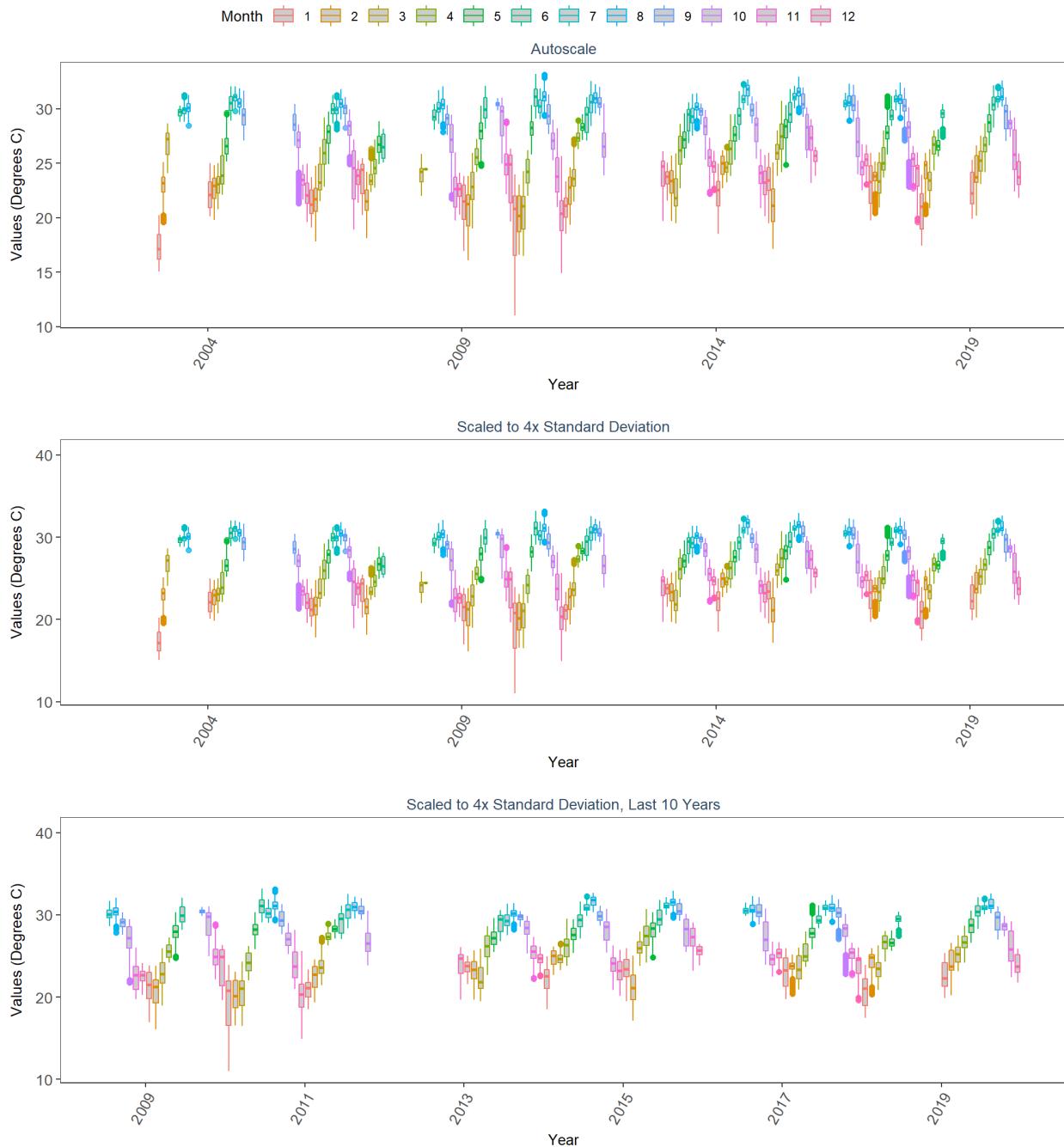
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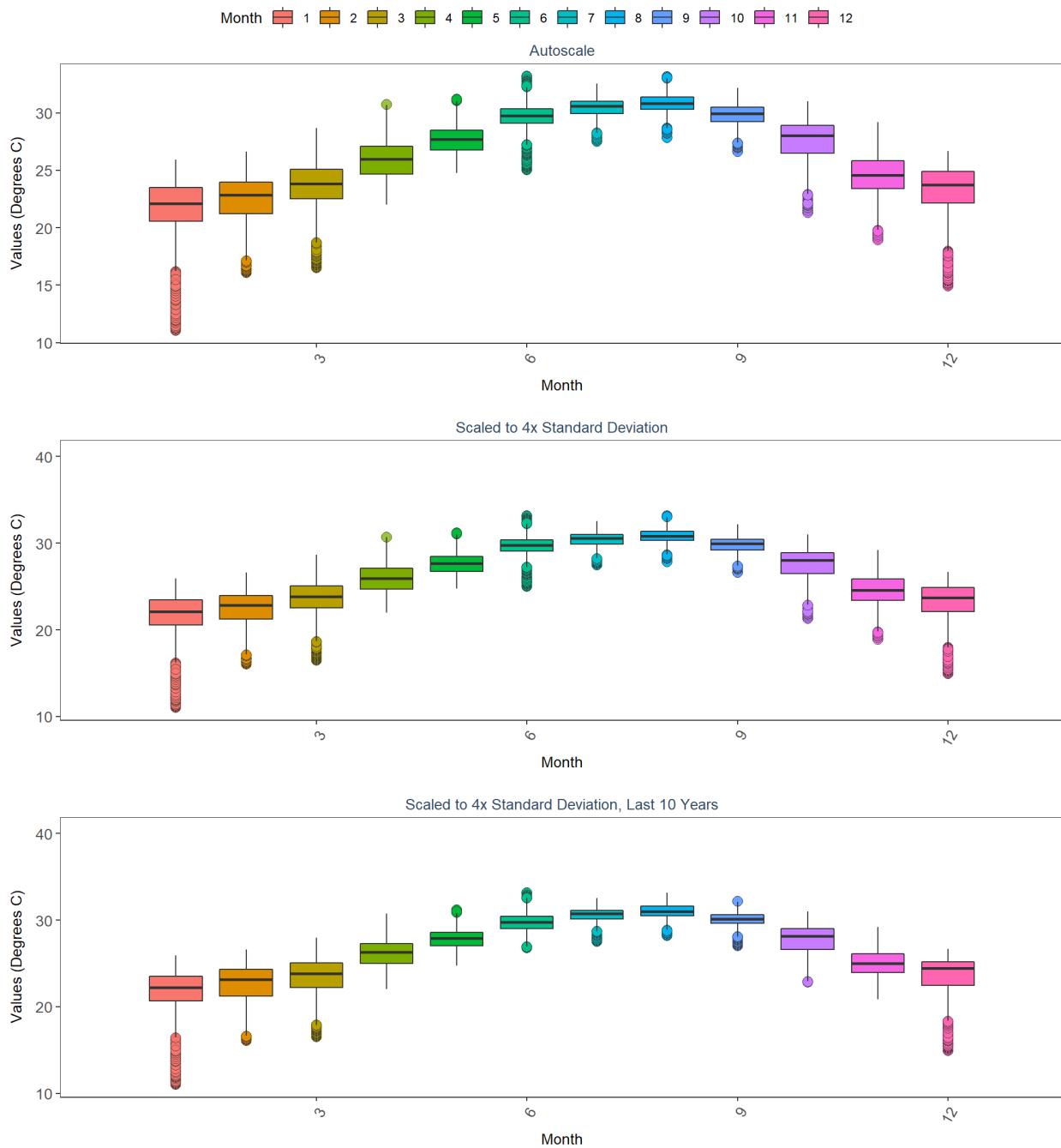
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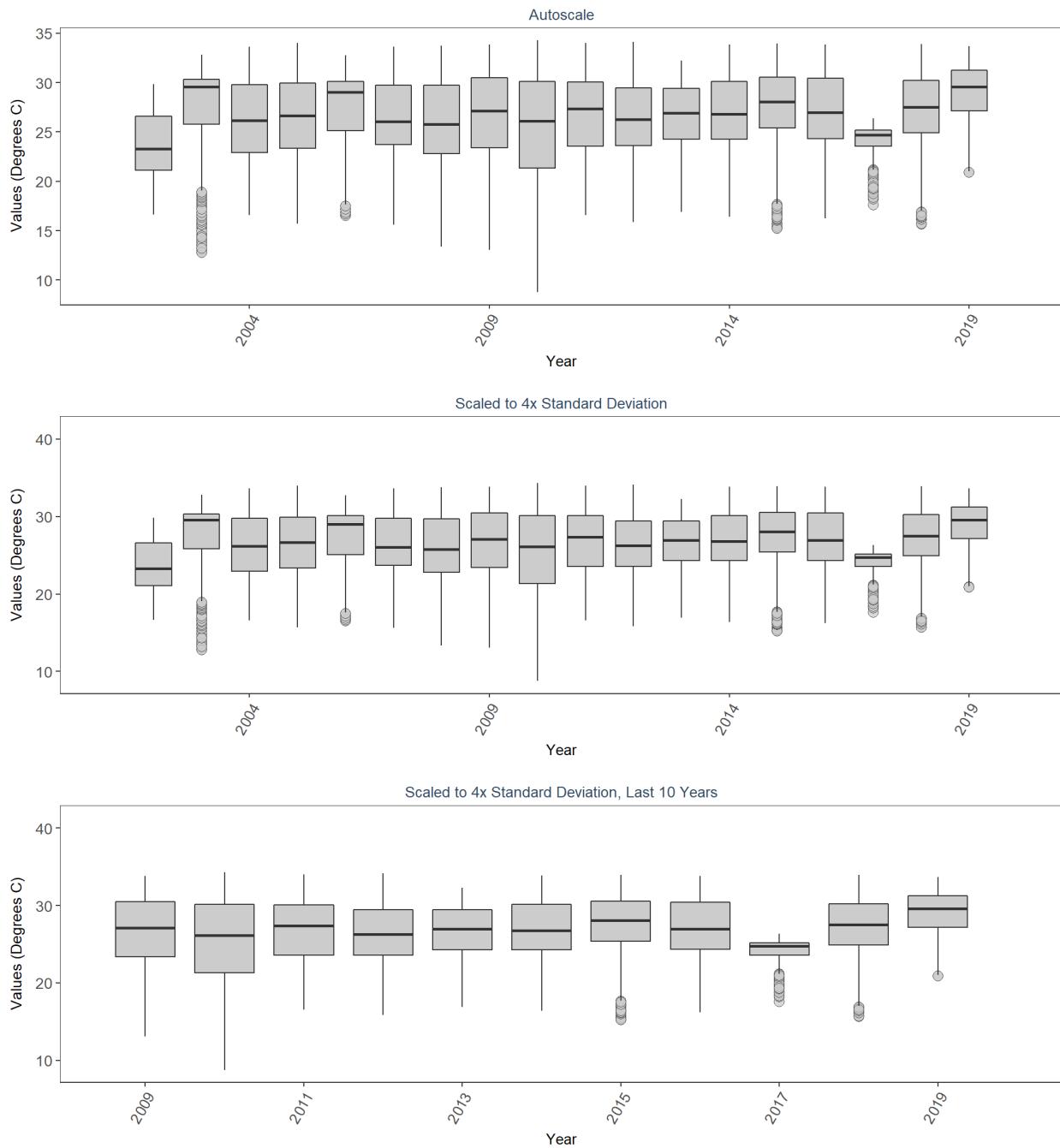
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 By Year & Month



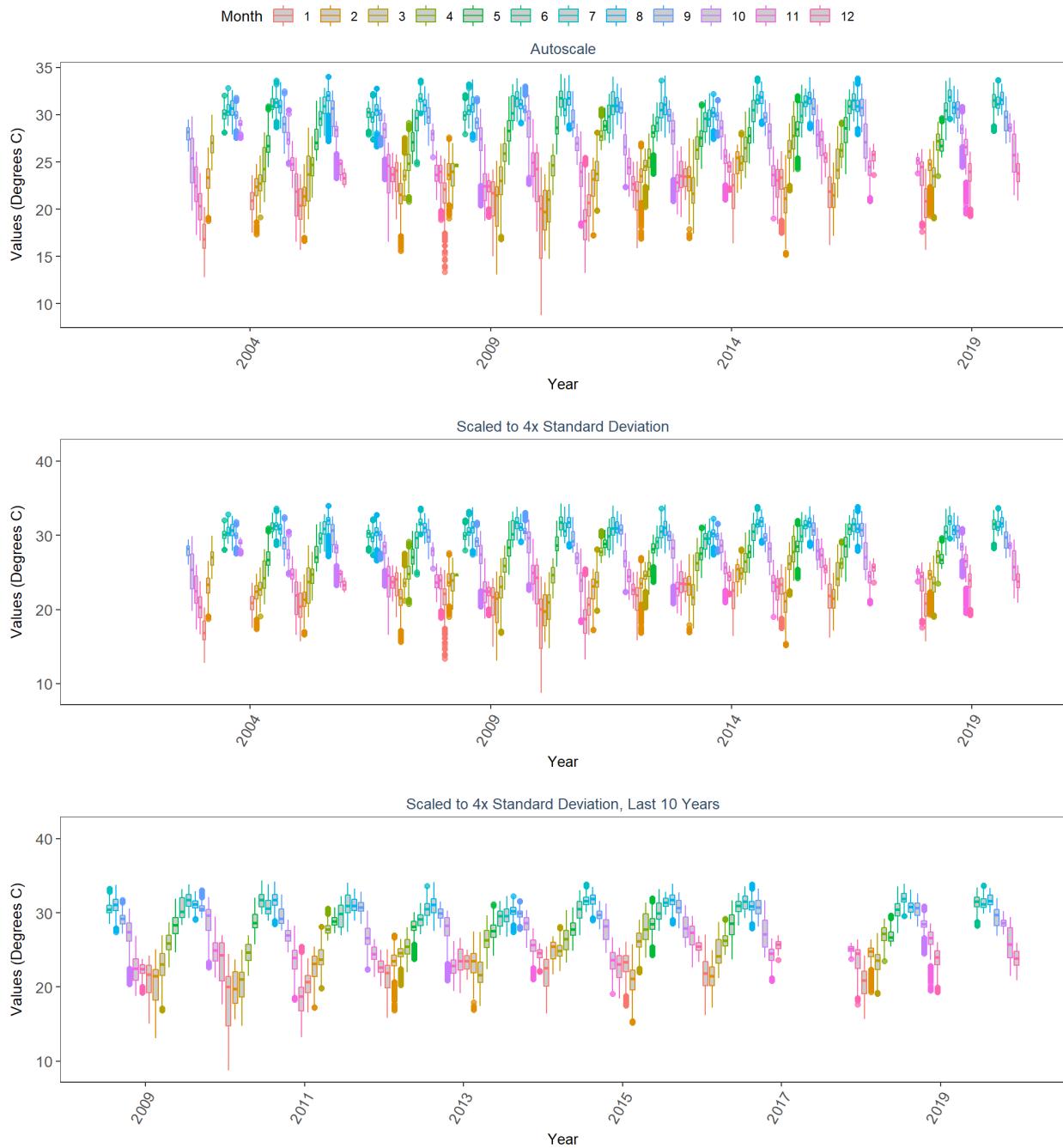
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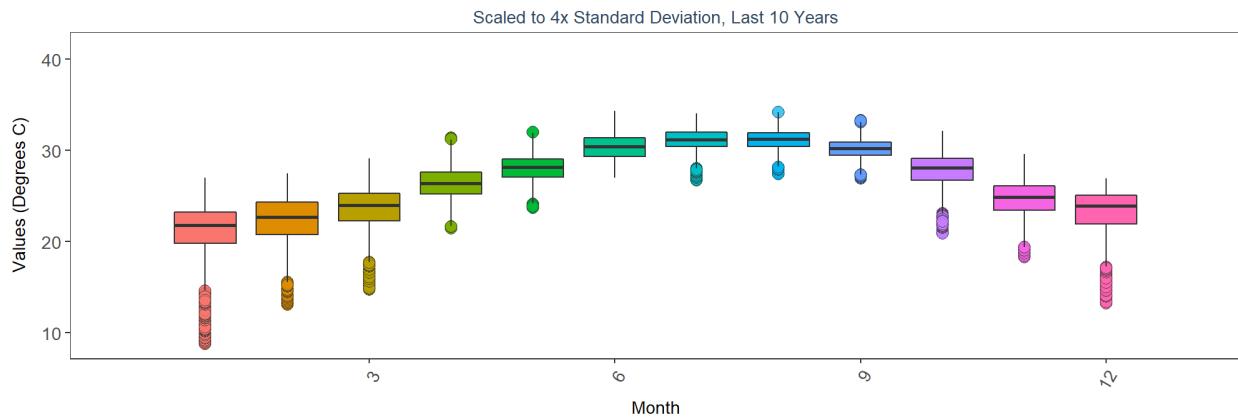
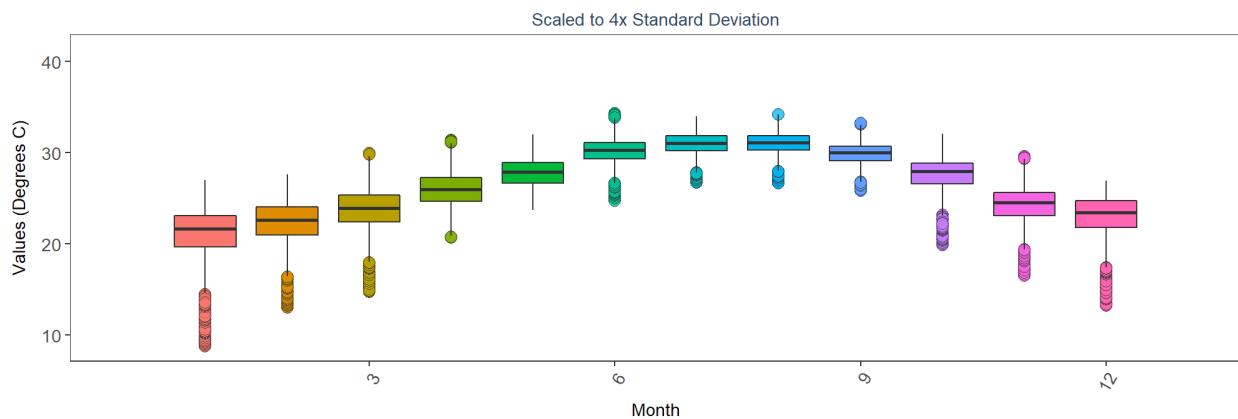
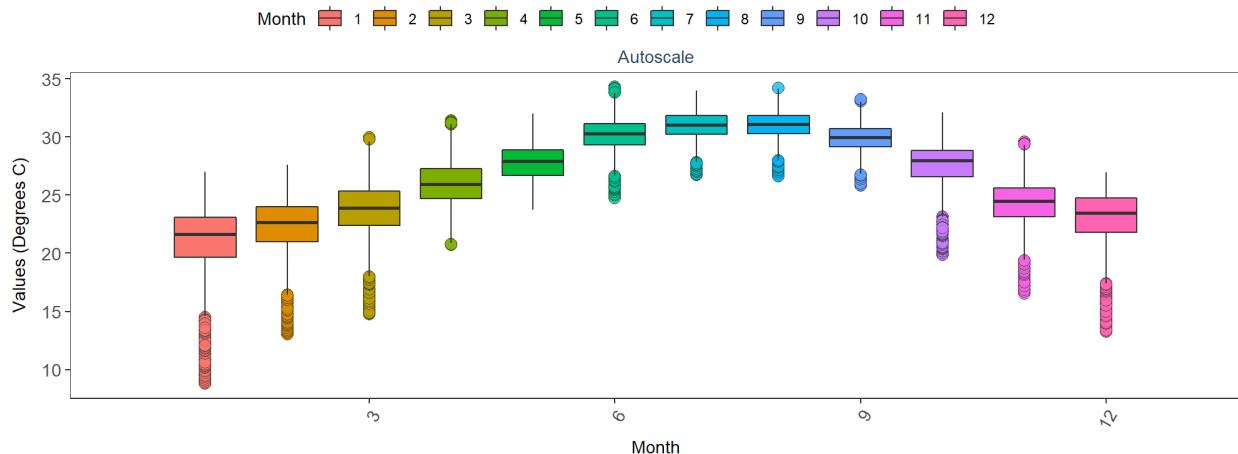
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 By Year



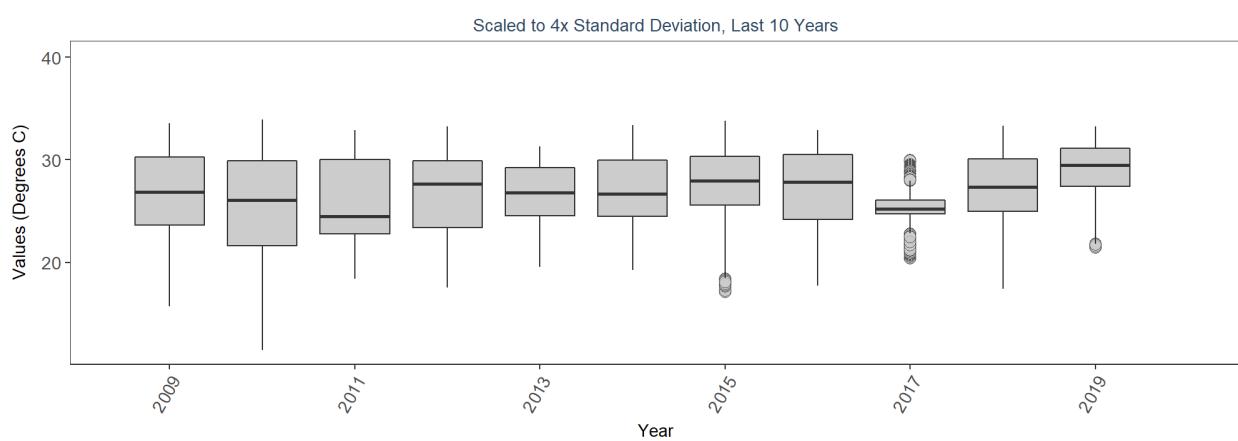
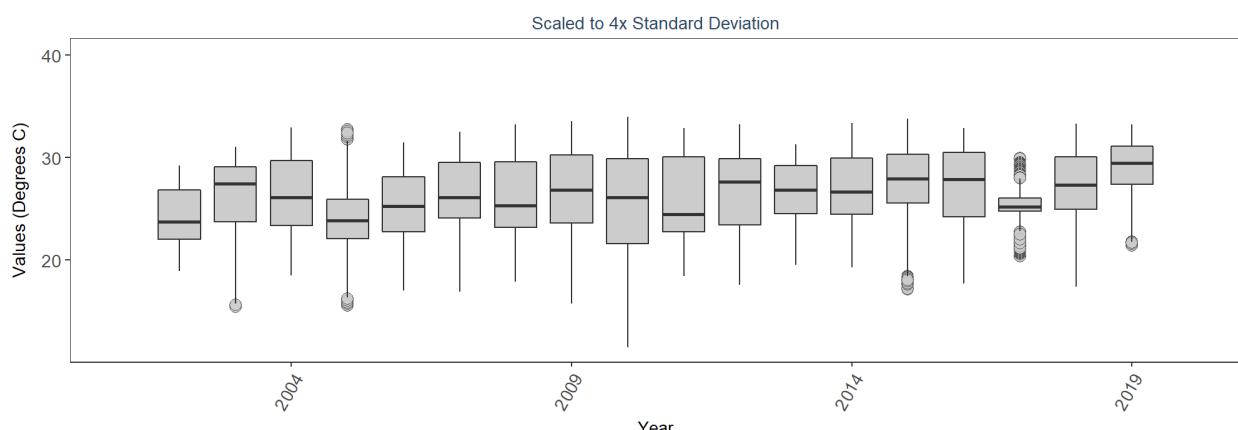
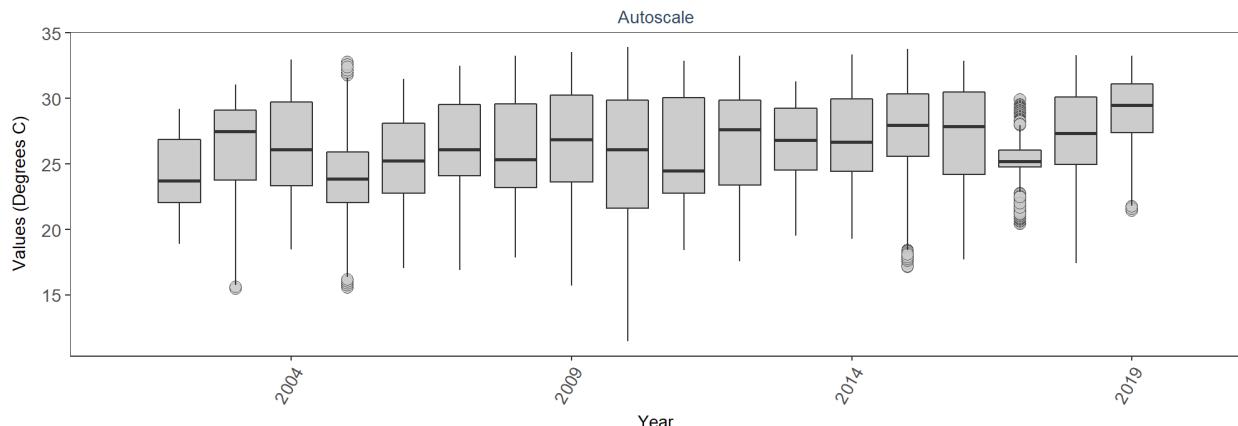
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 By Year & Month



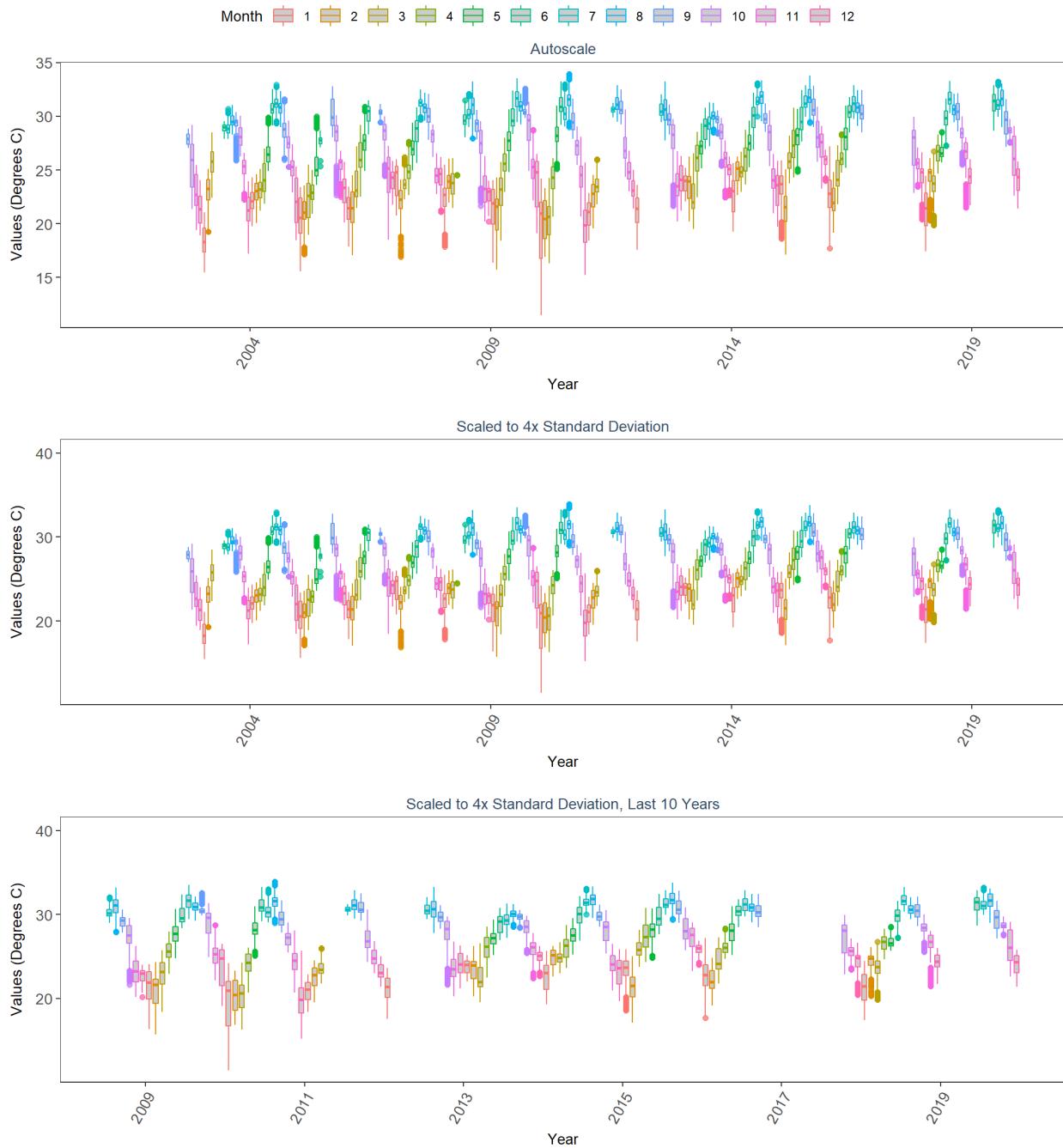
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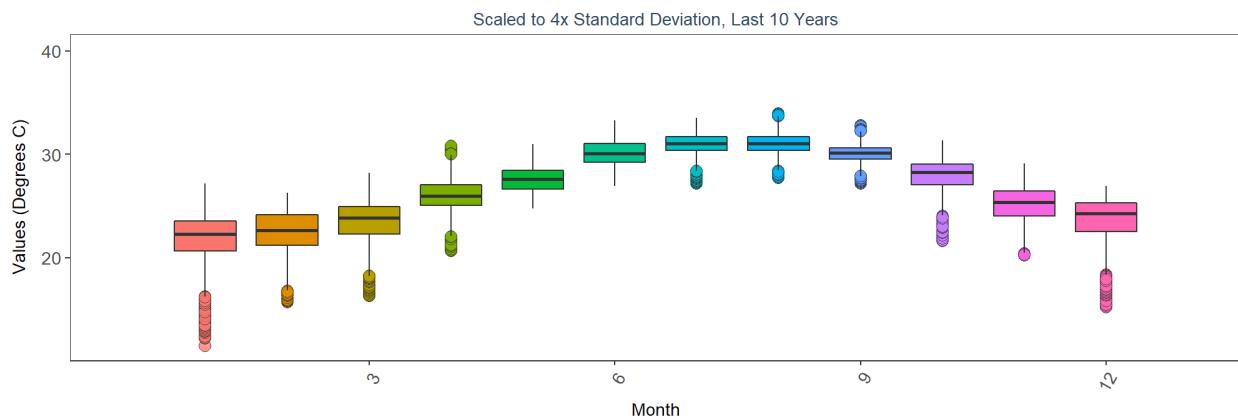
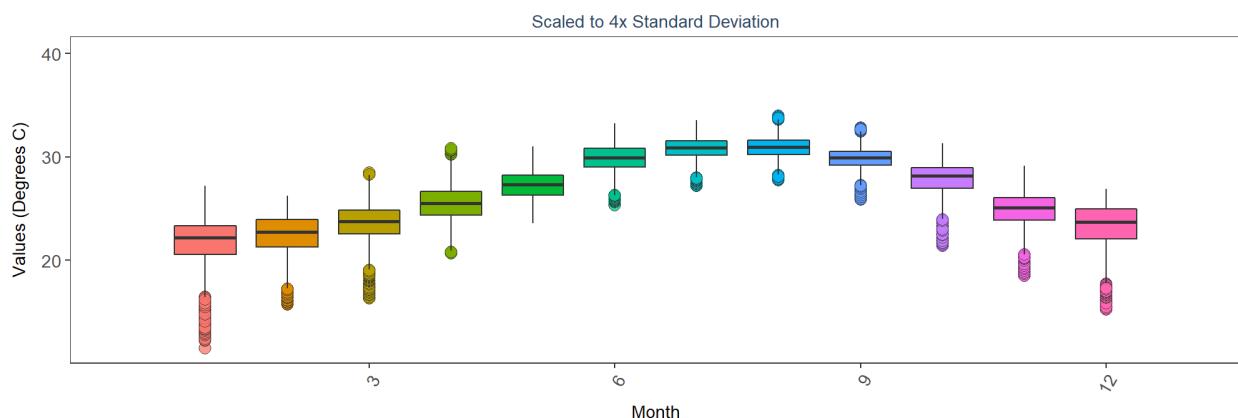
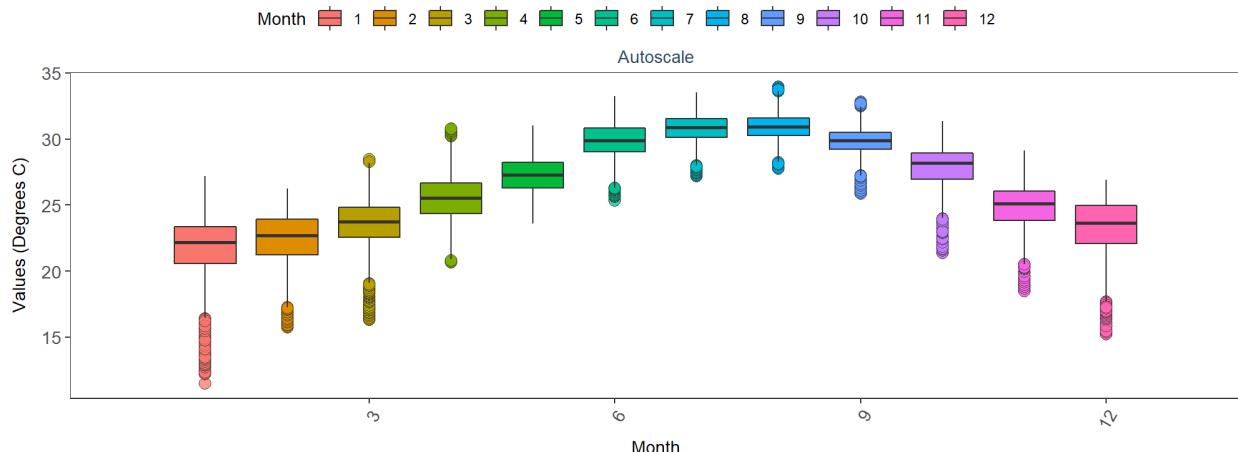
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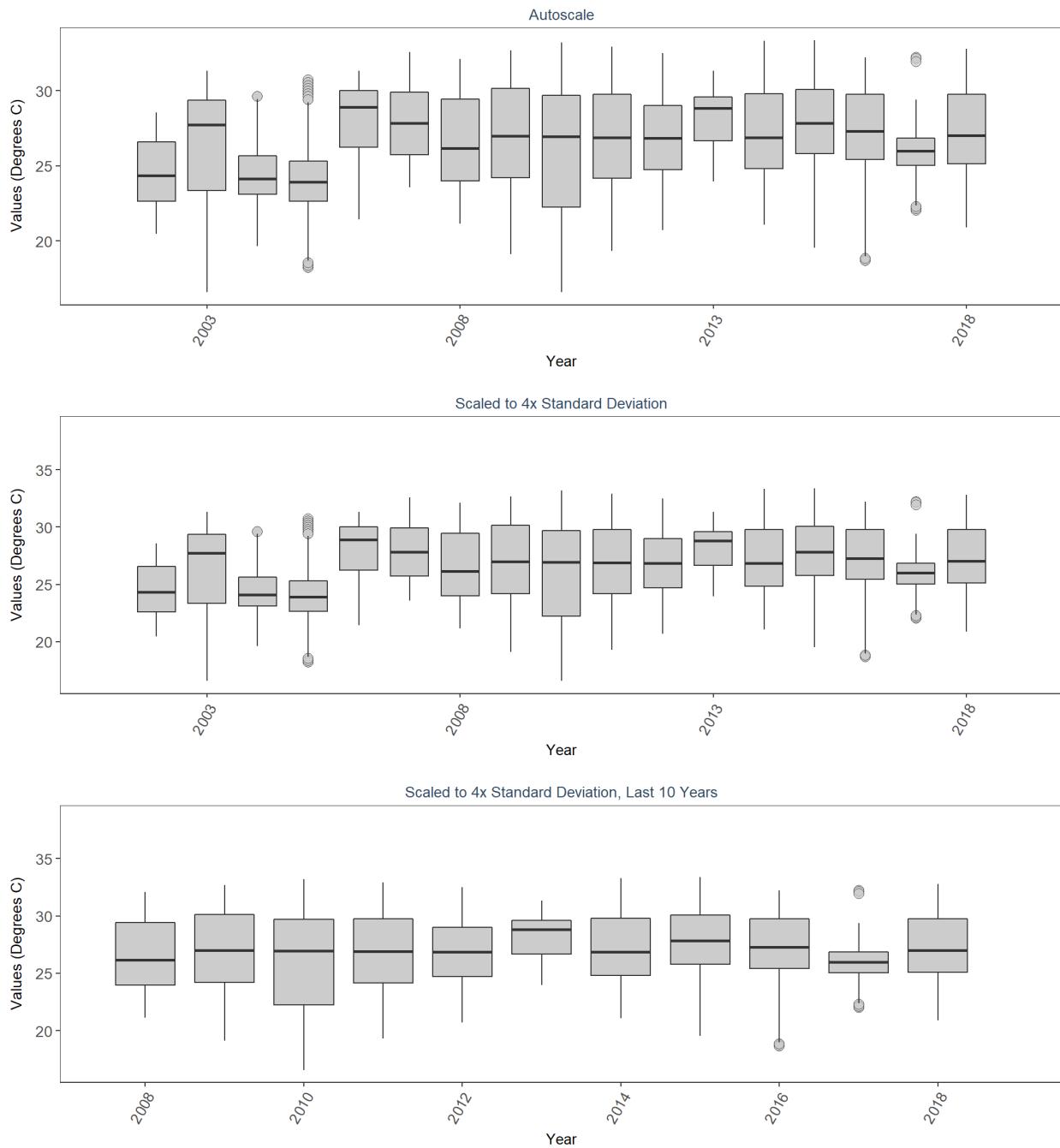
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 By Year & Month



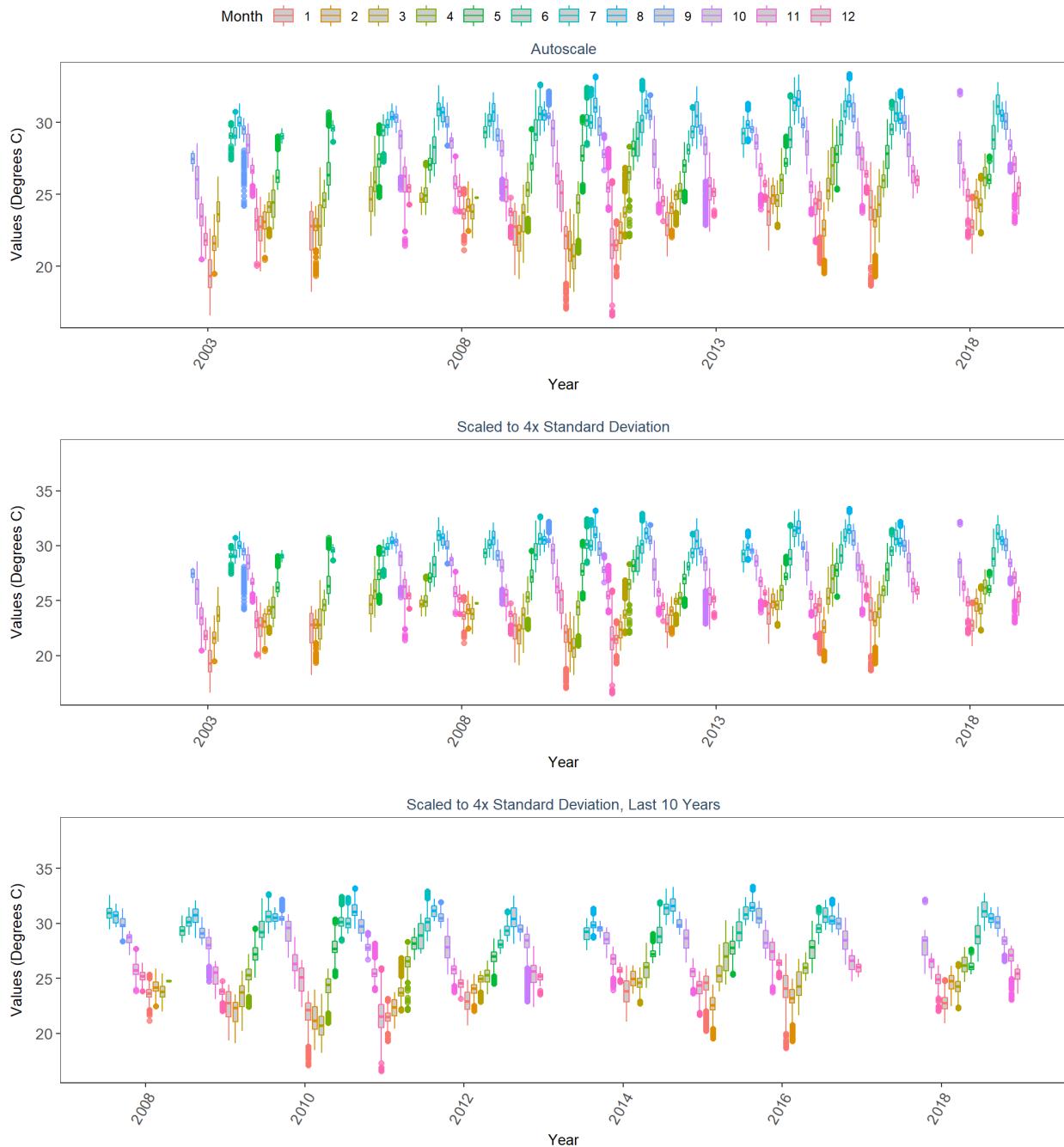
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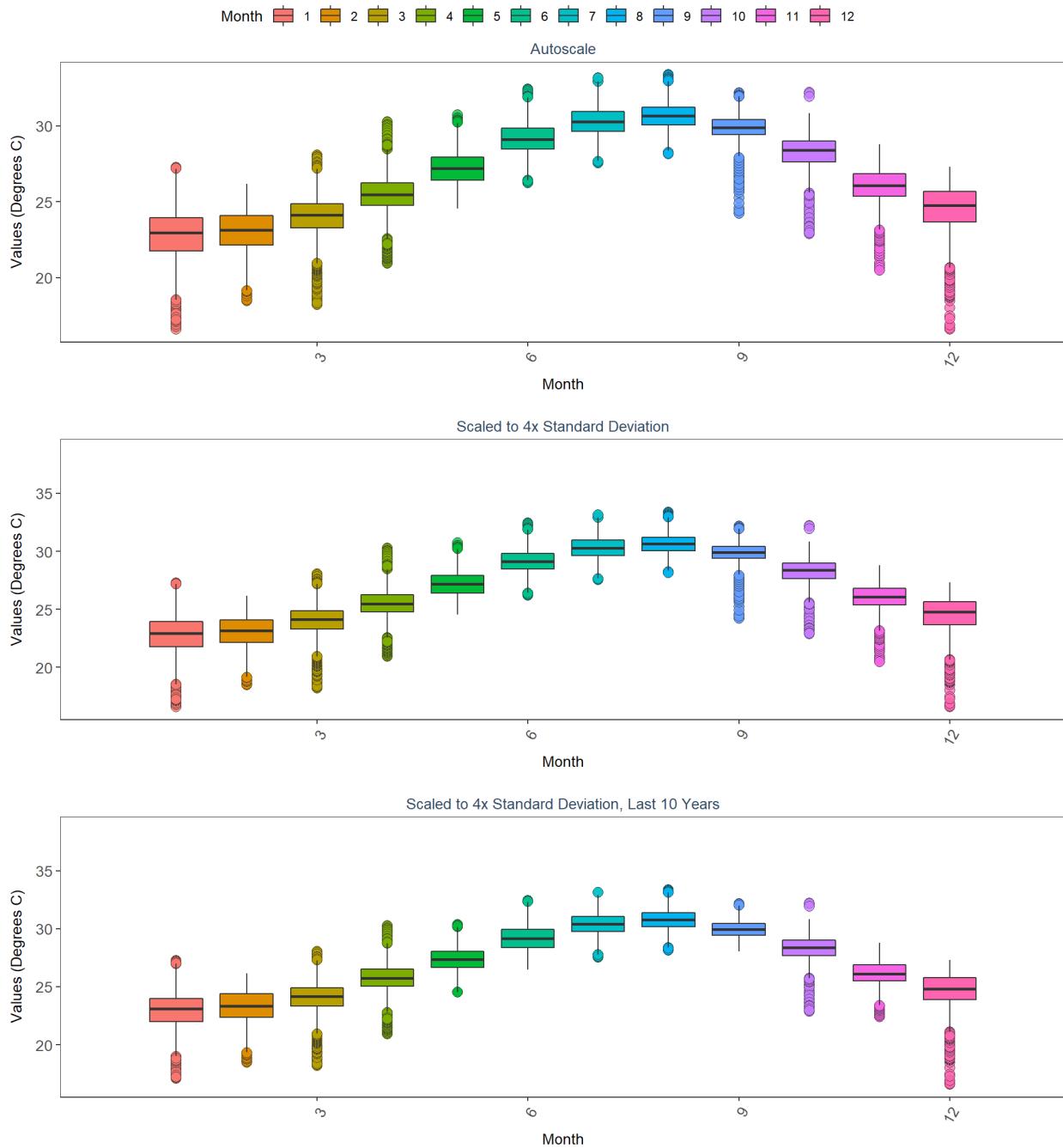
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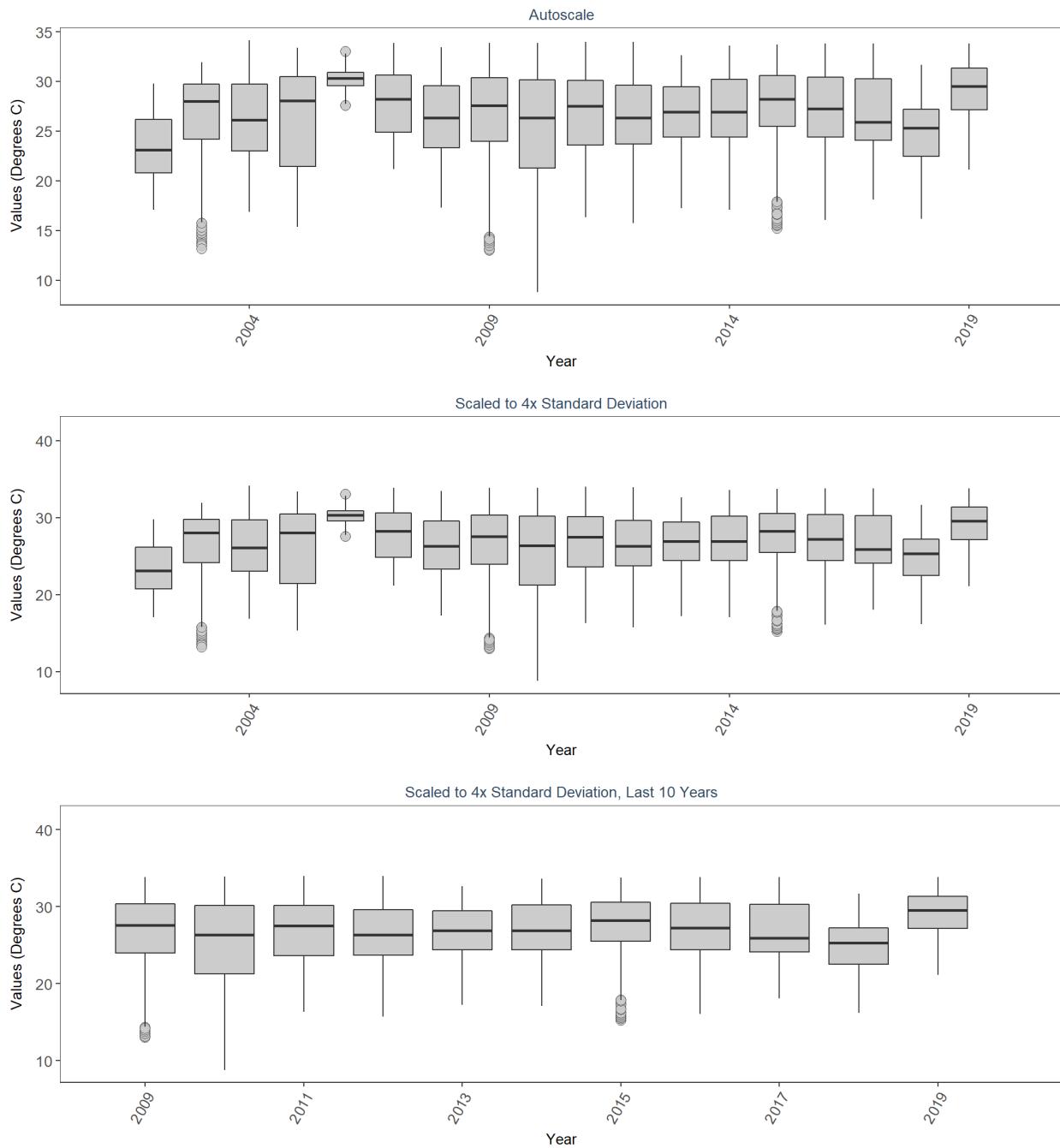
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 By Year & Month



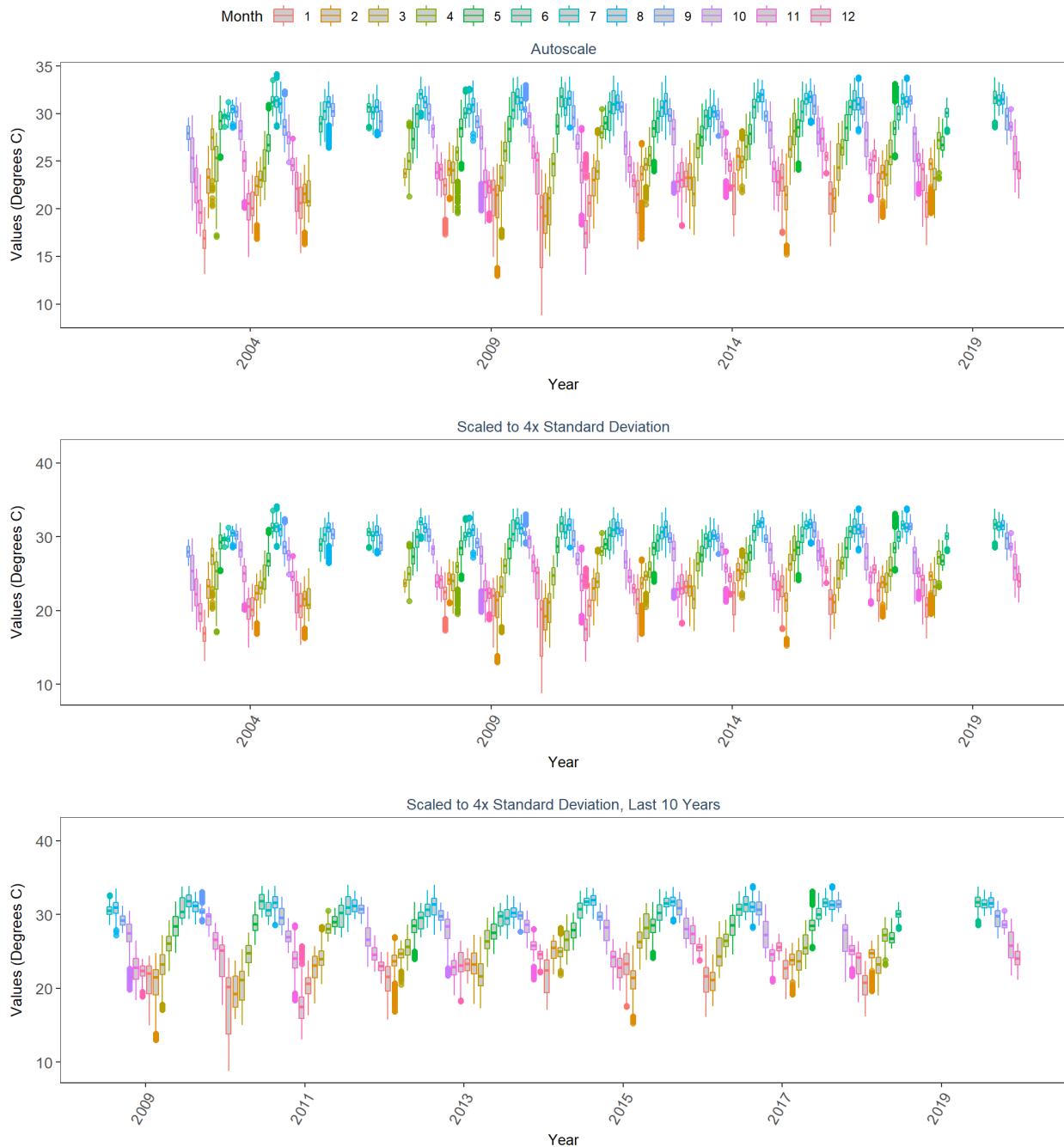
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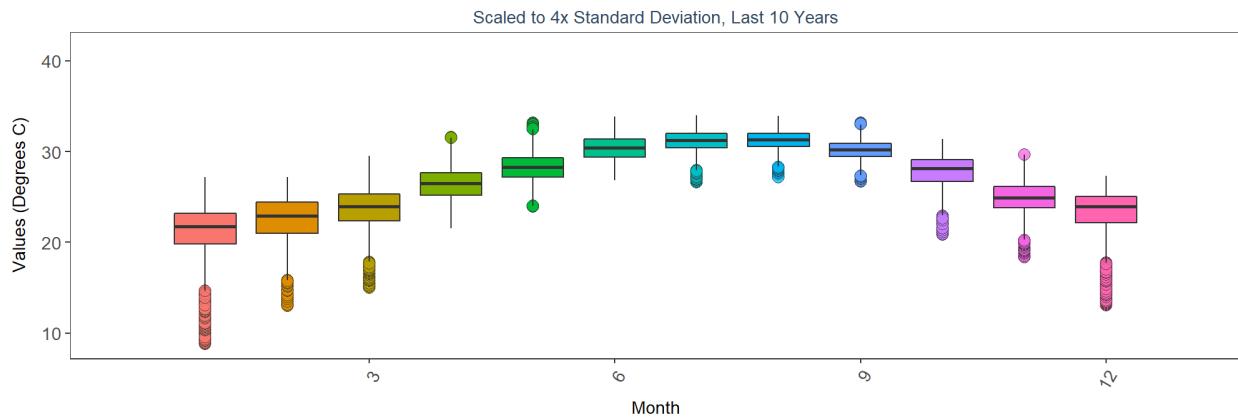
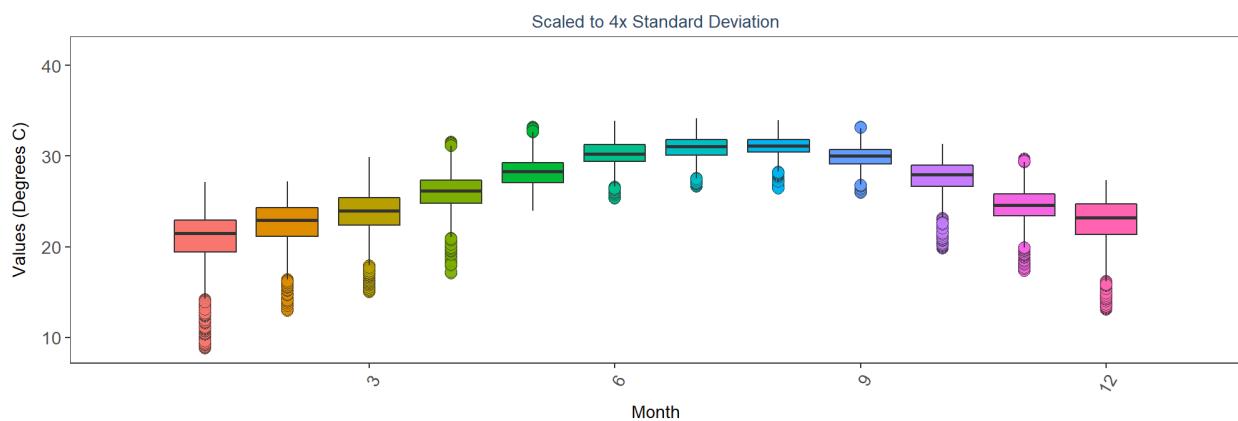
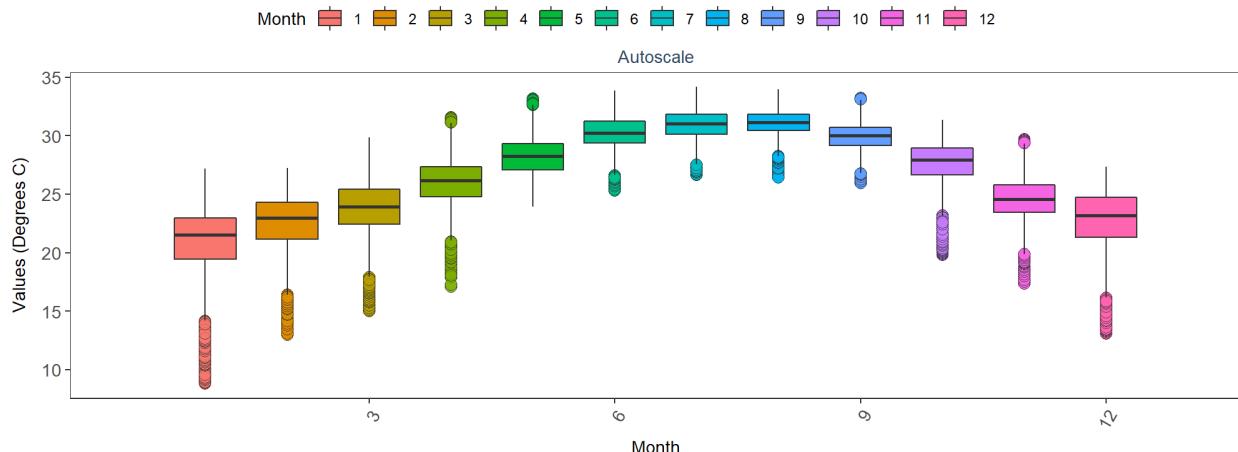
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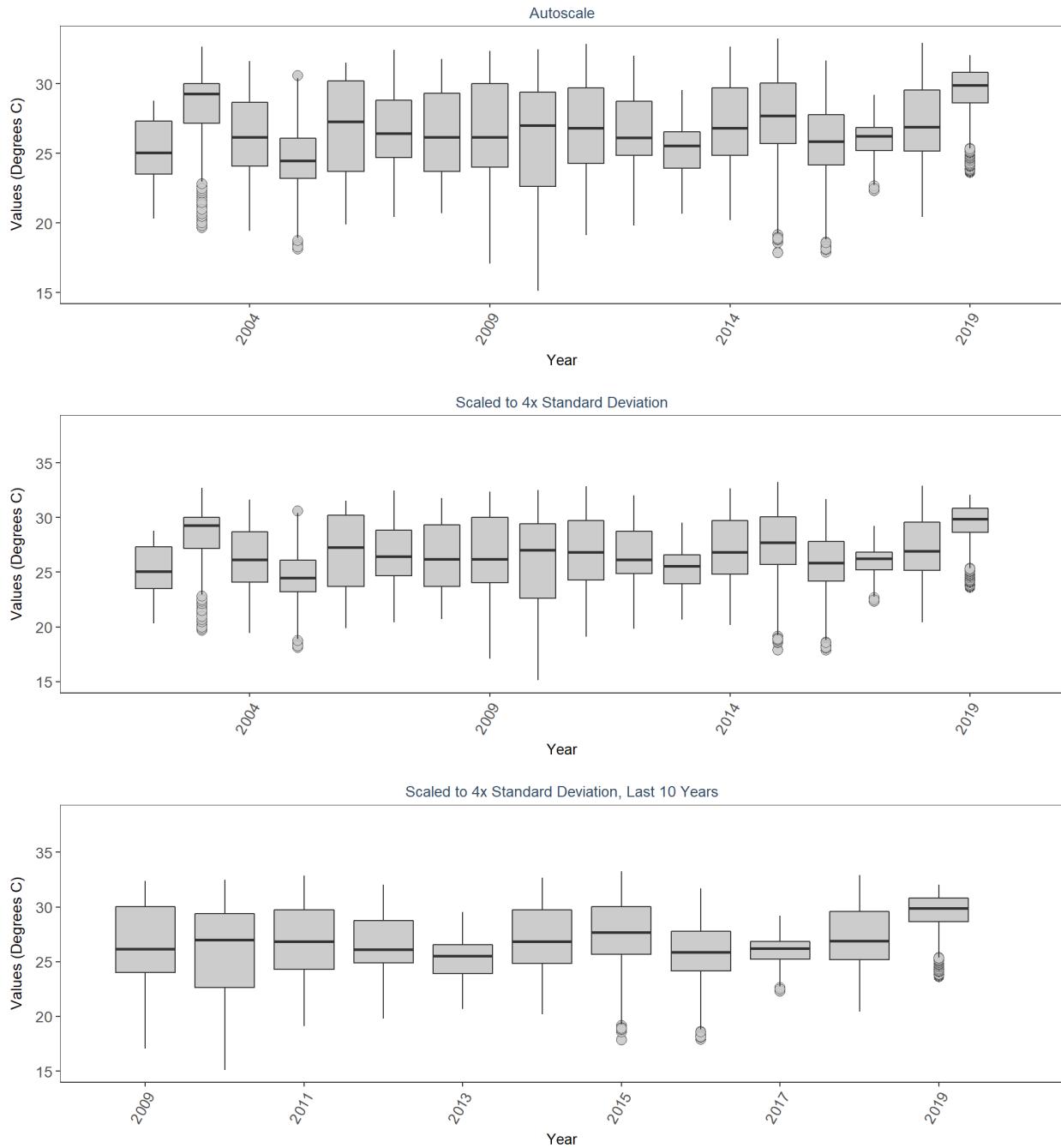
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 By Year & Month



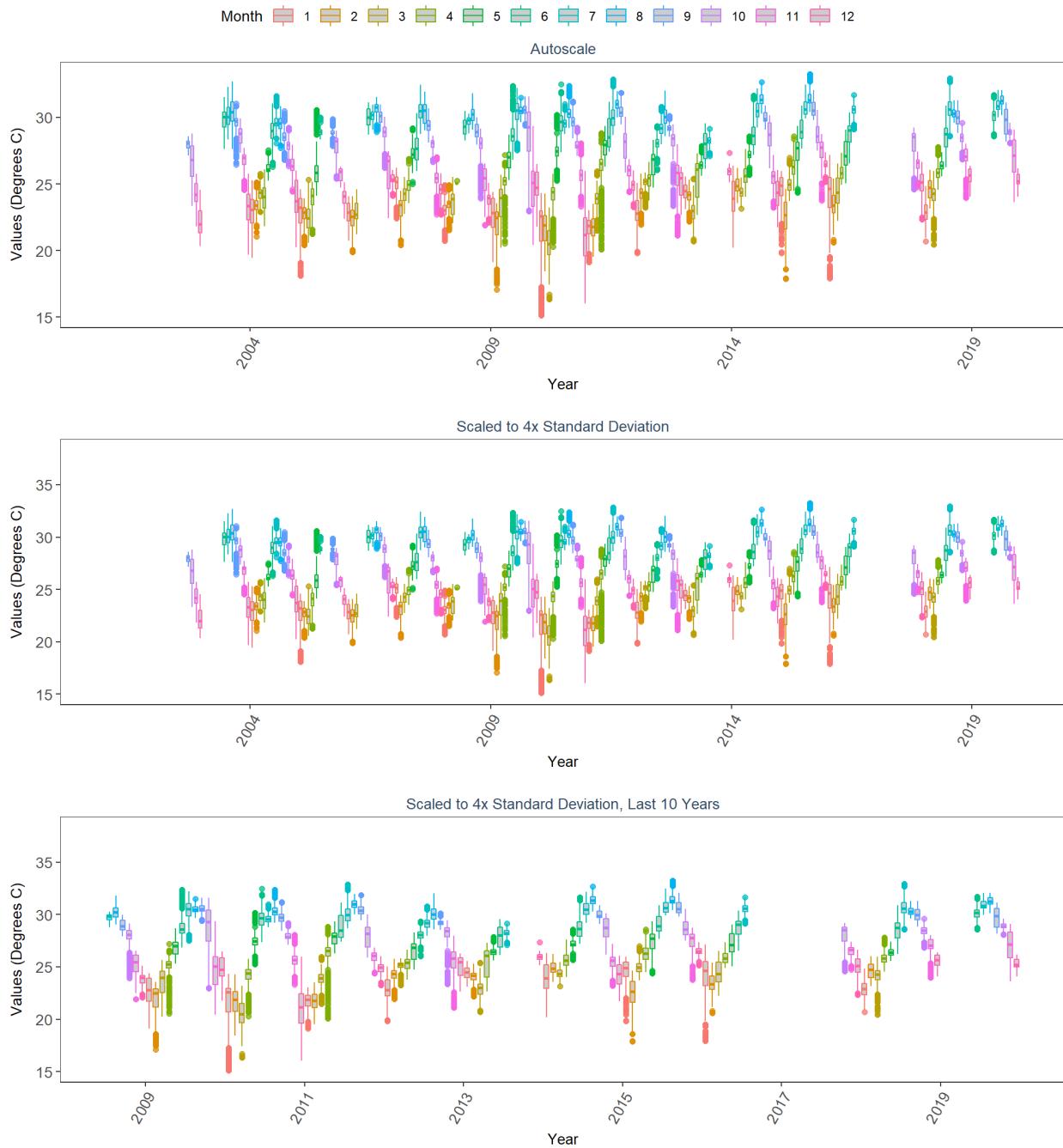
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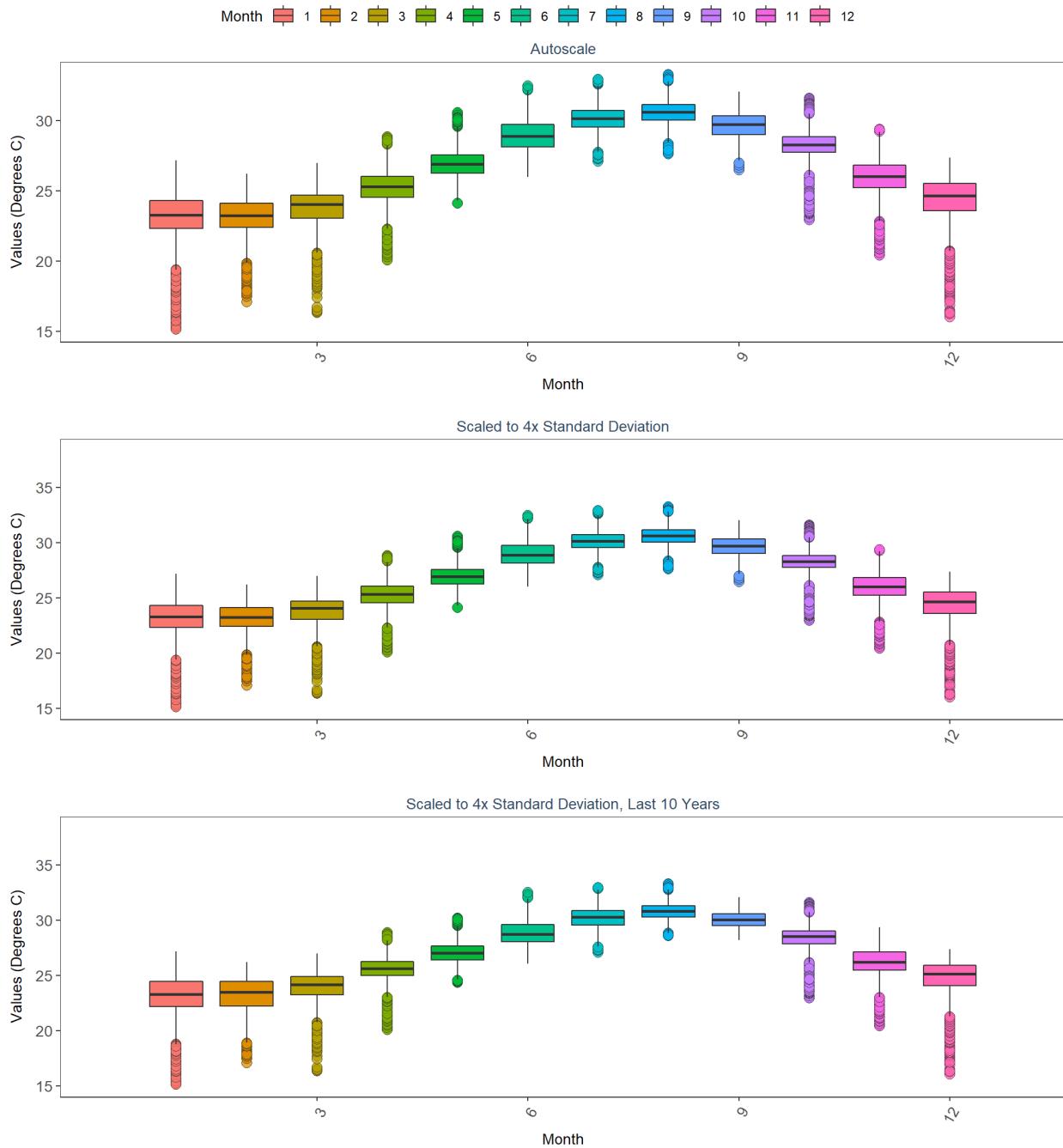
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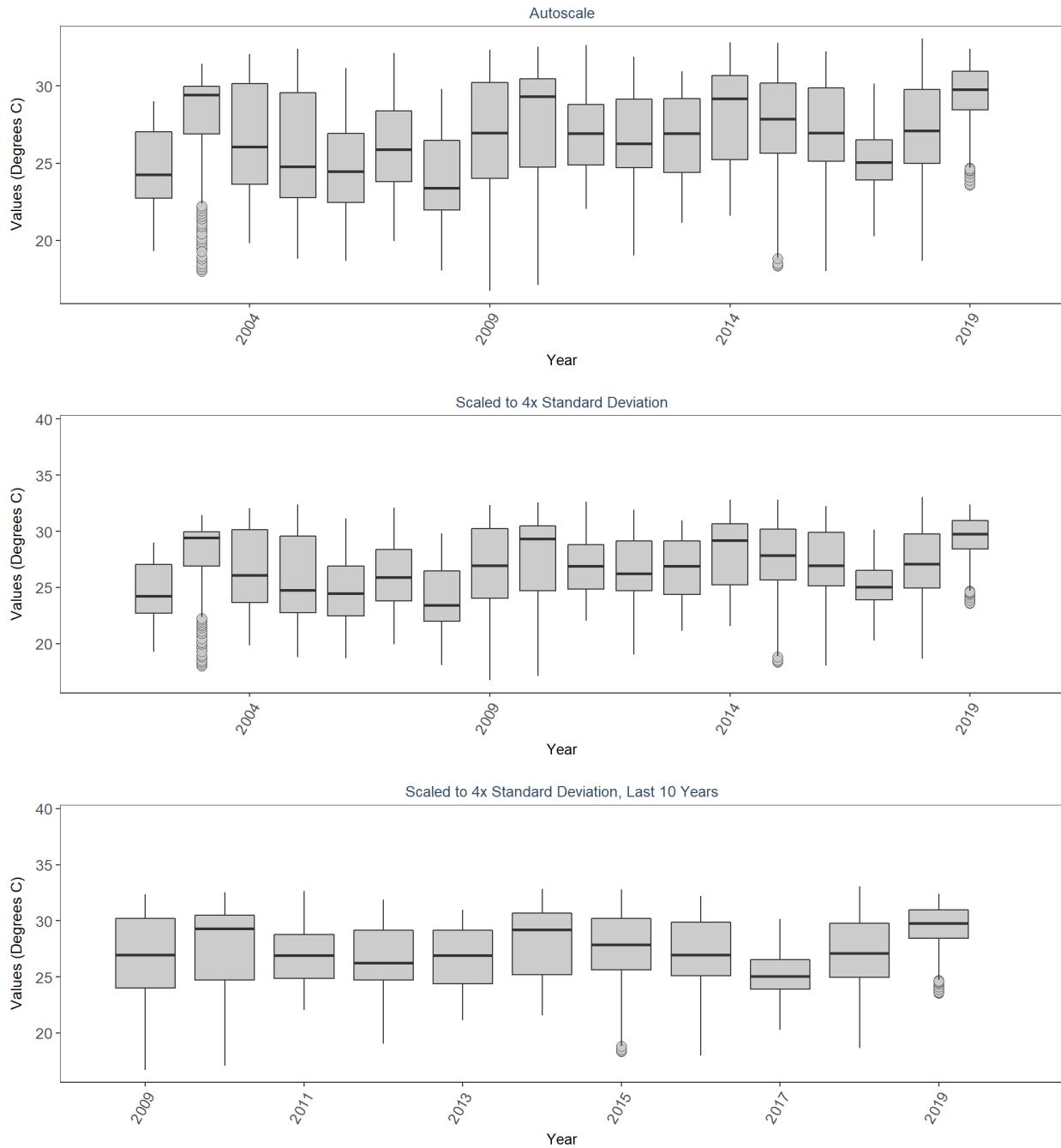
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 By Year & Month



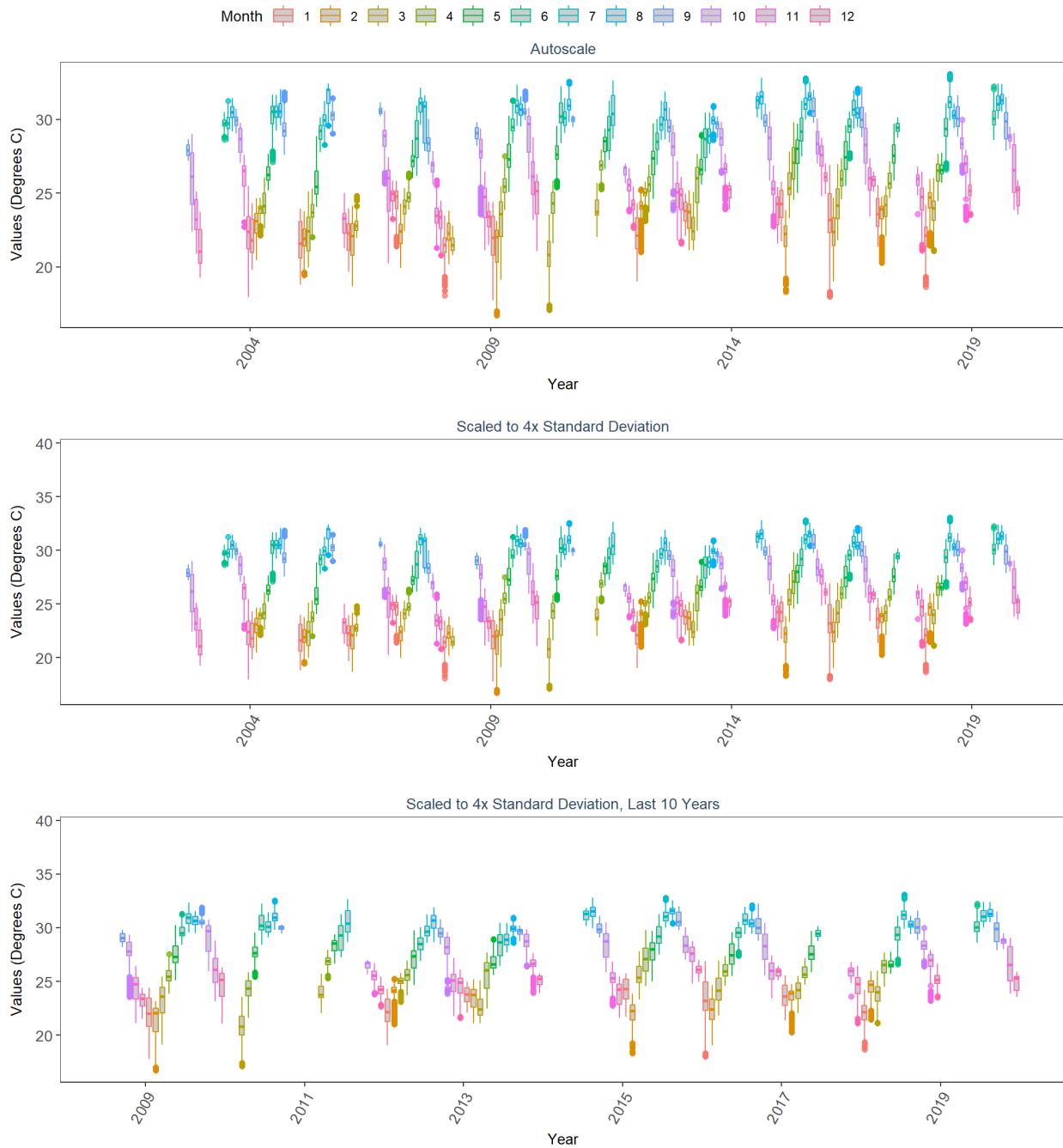
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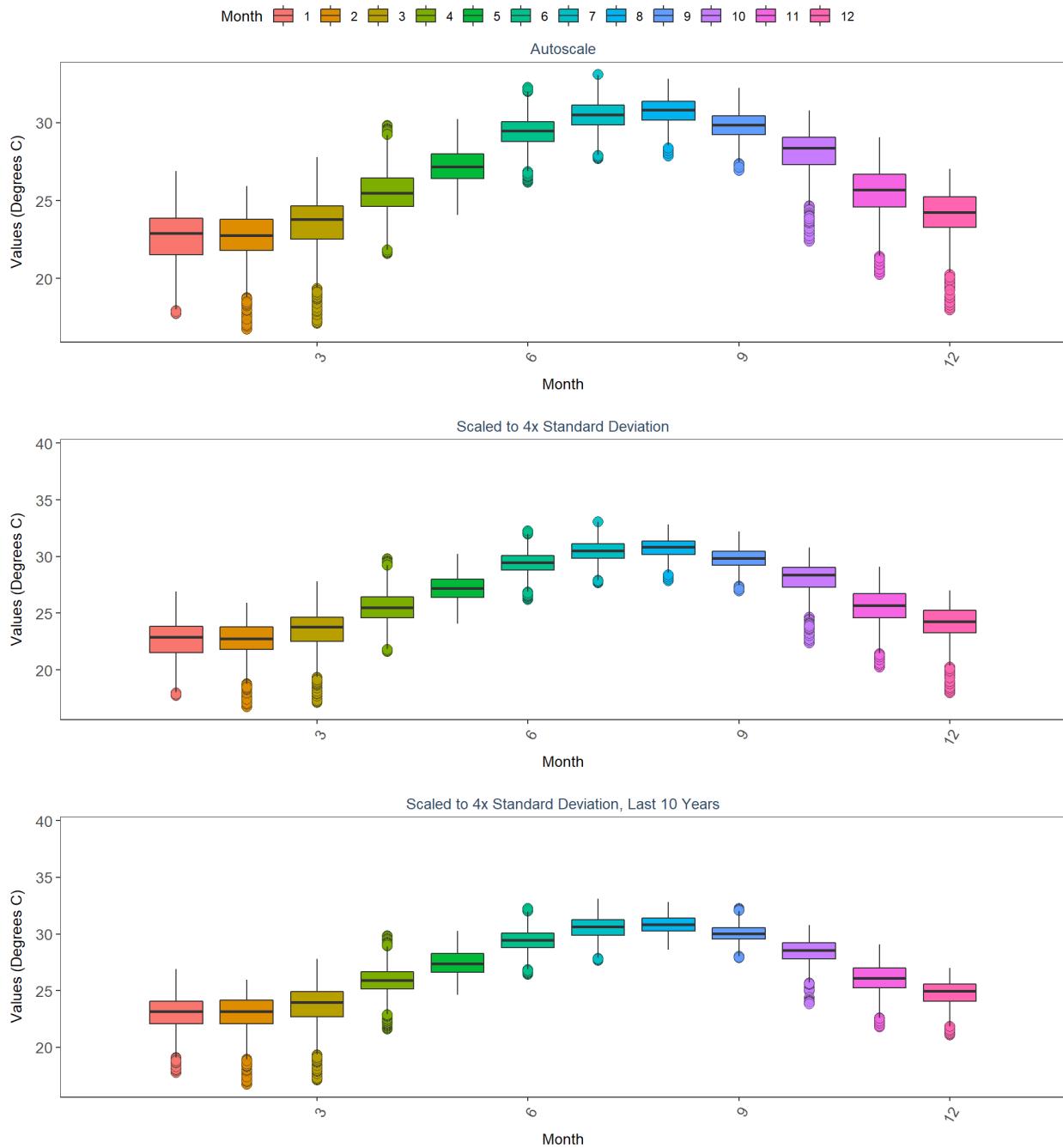
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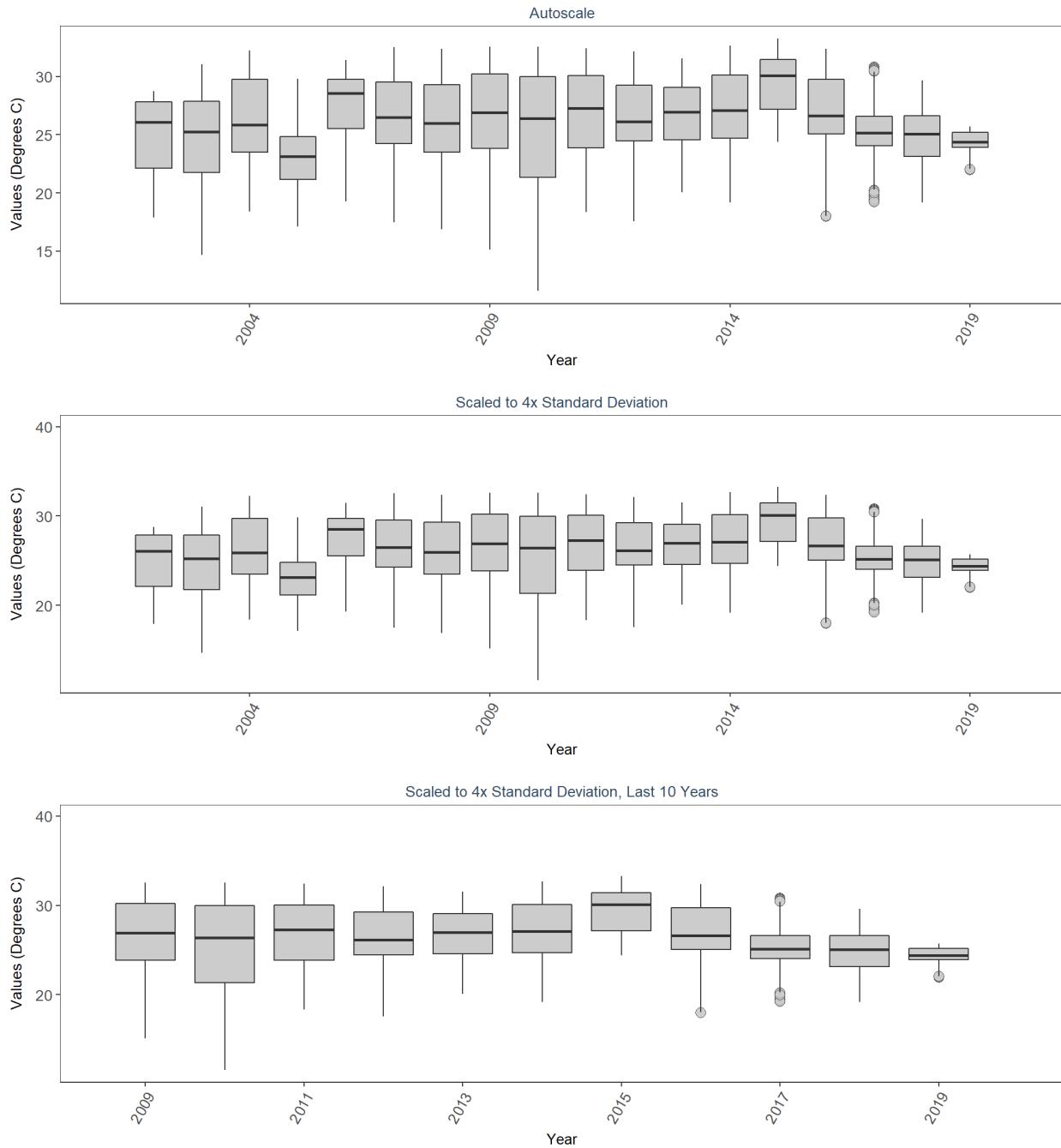
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 By Year & Month



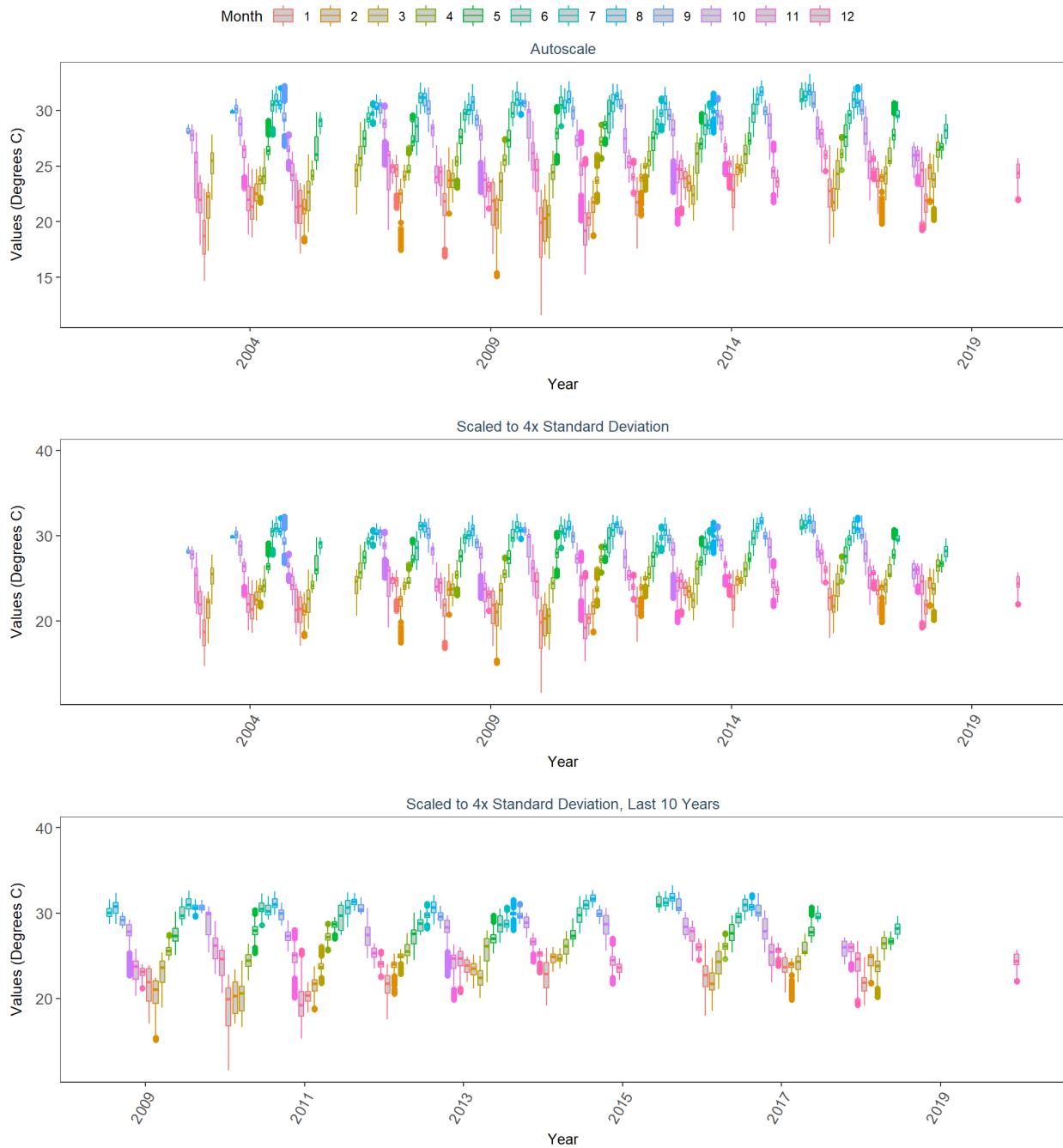
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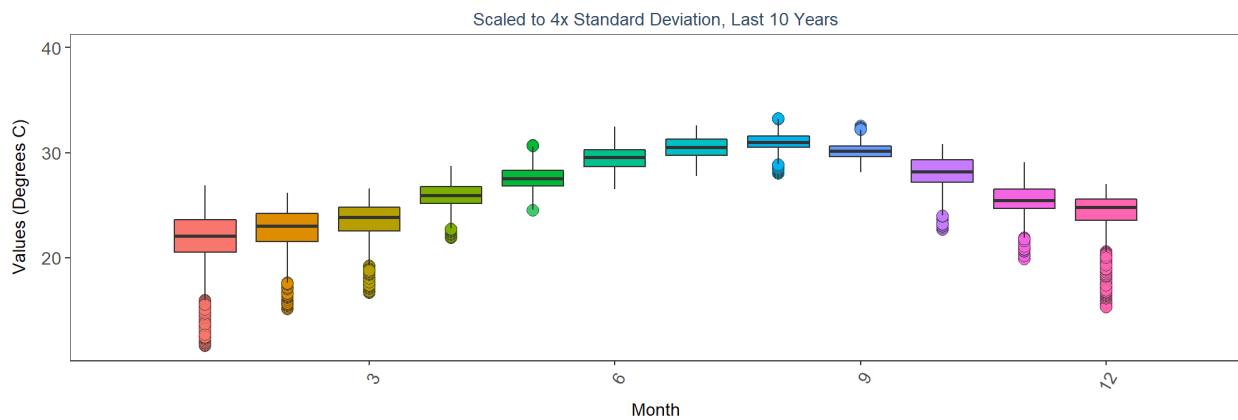
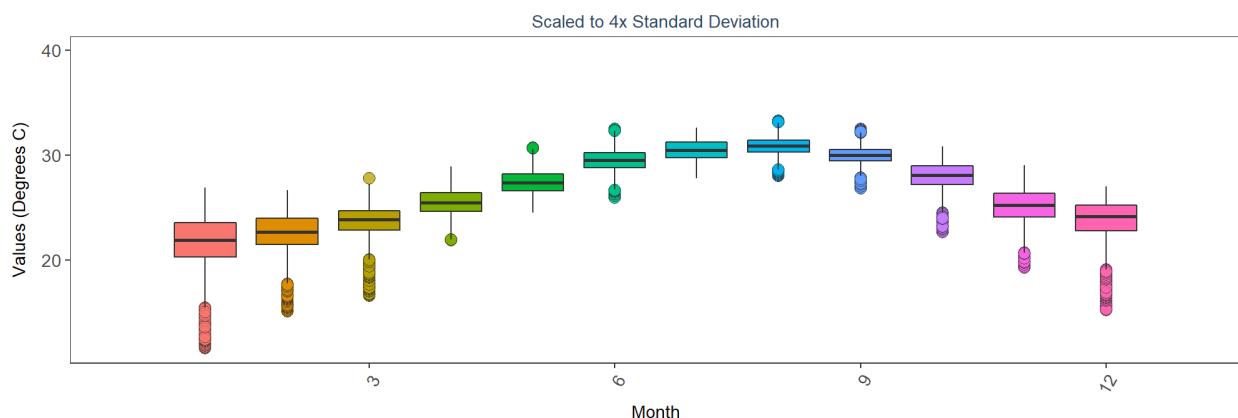
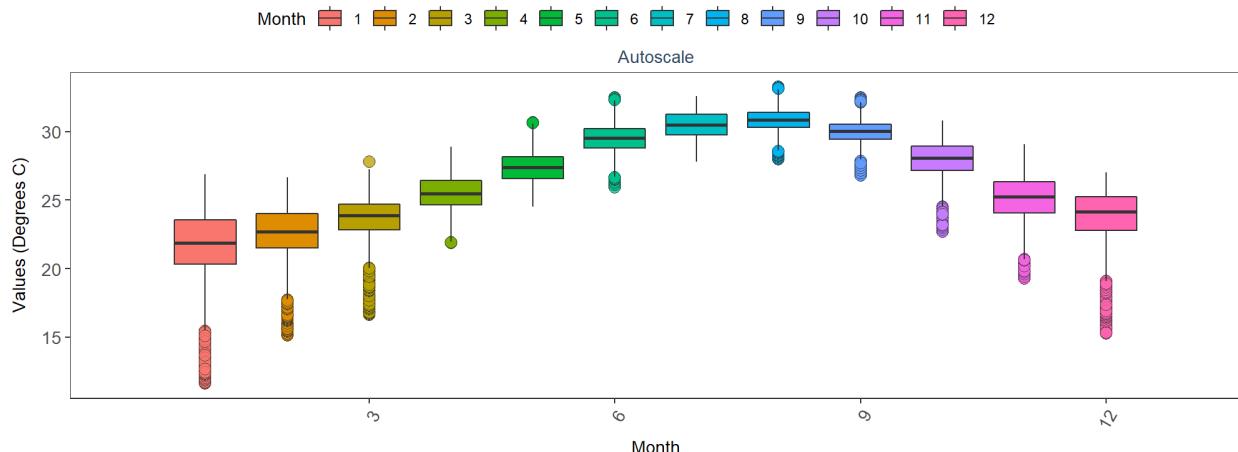
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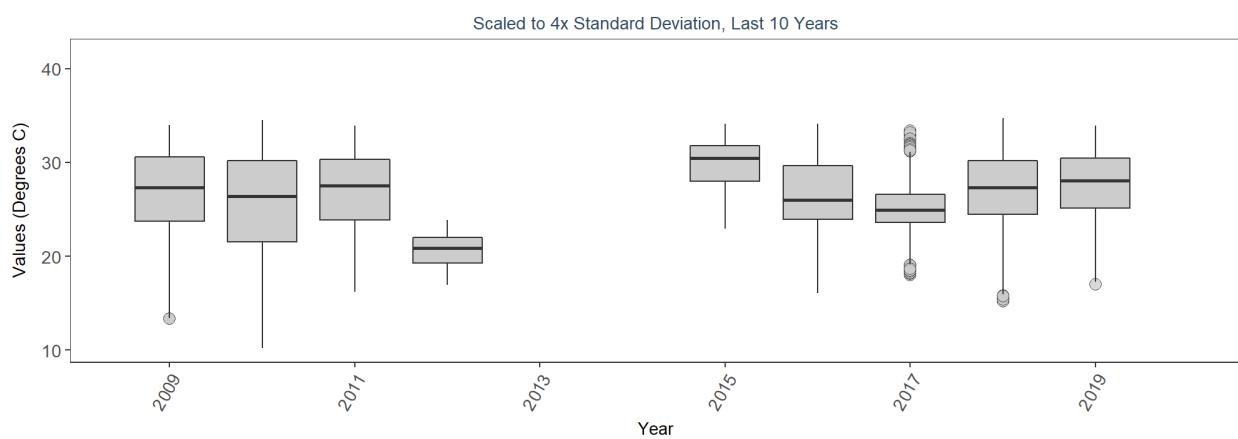
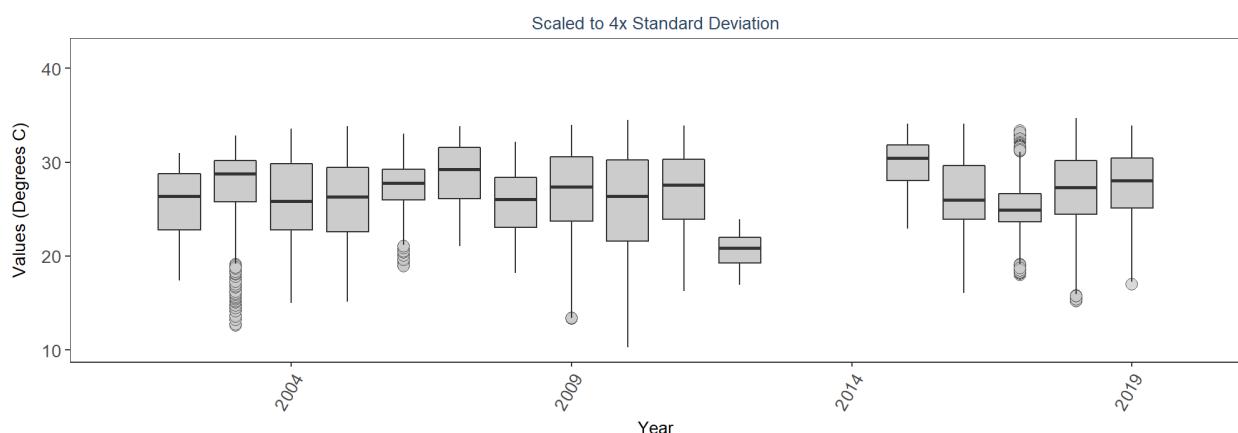
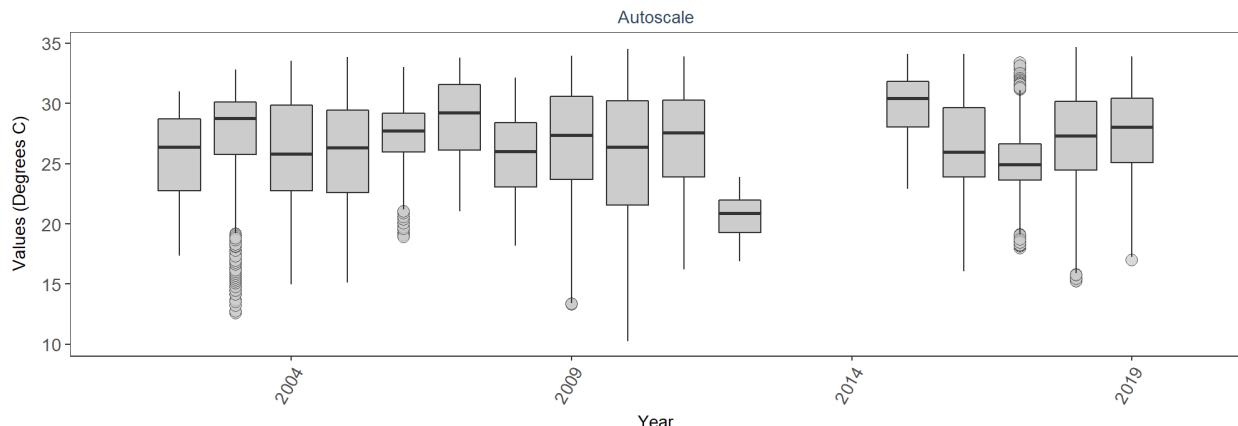
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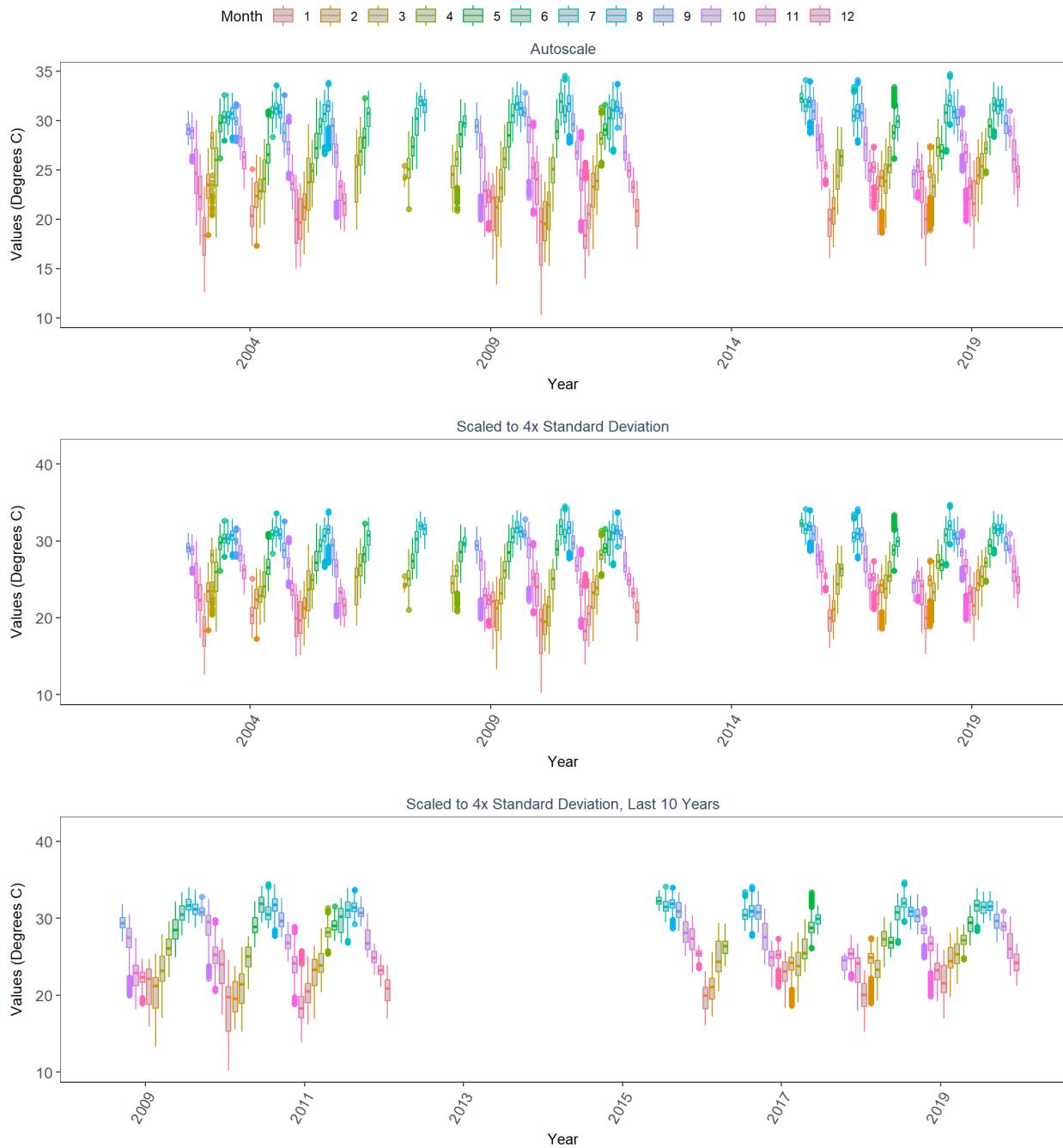
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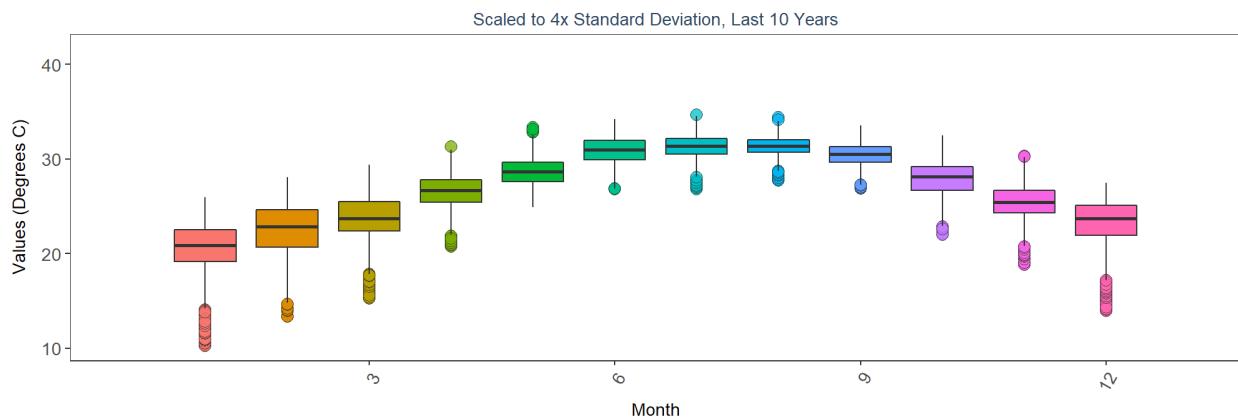
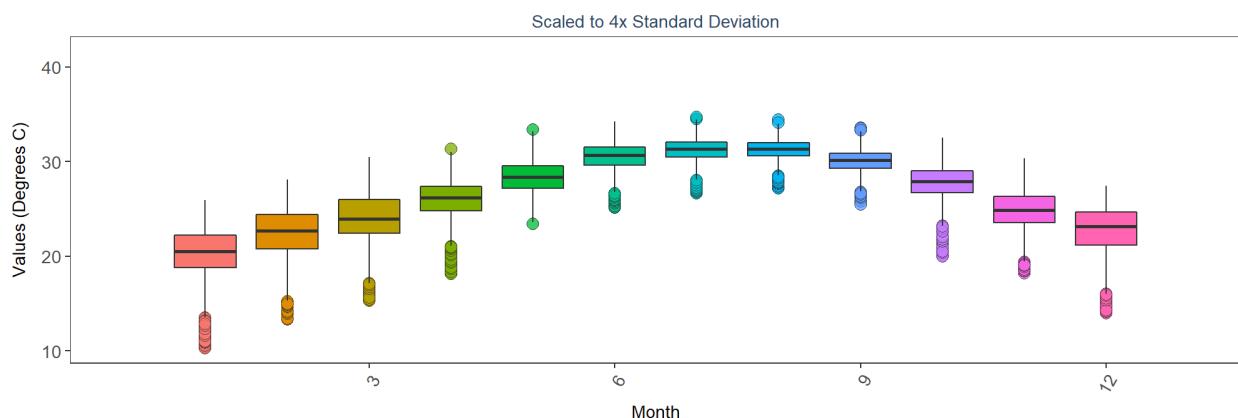
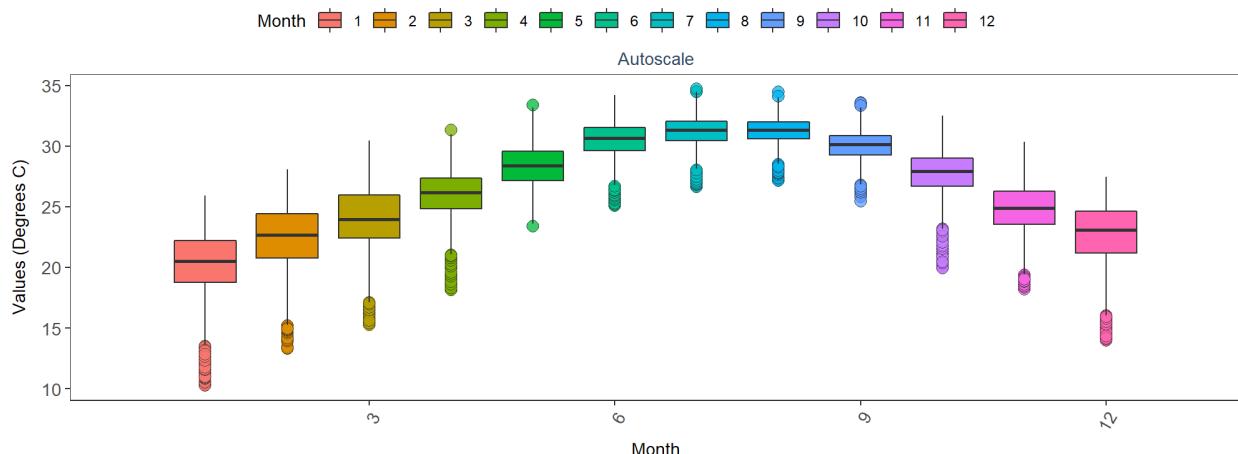
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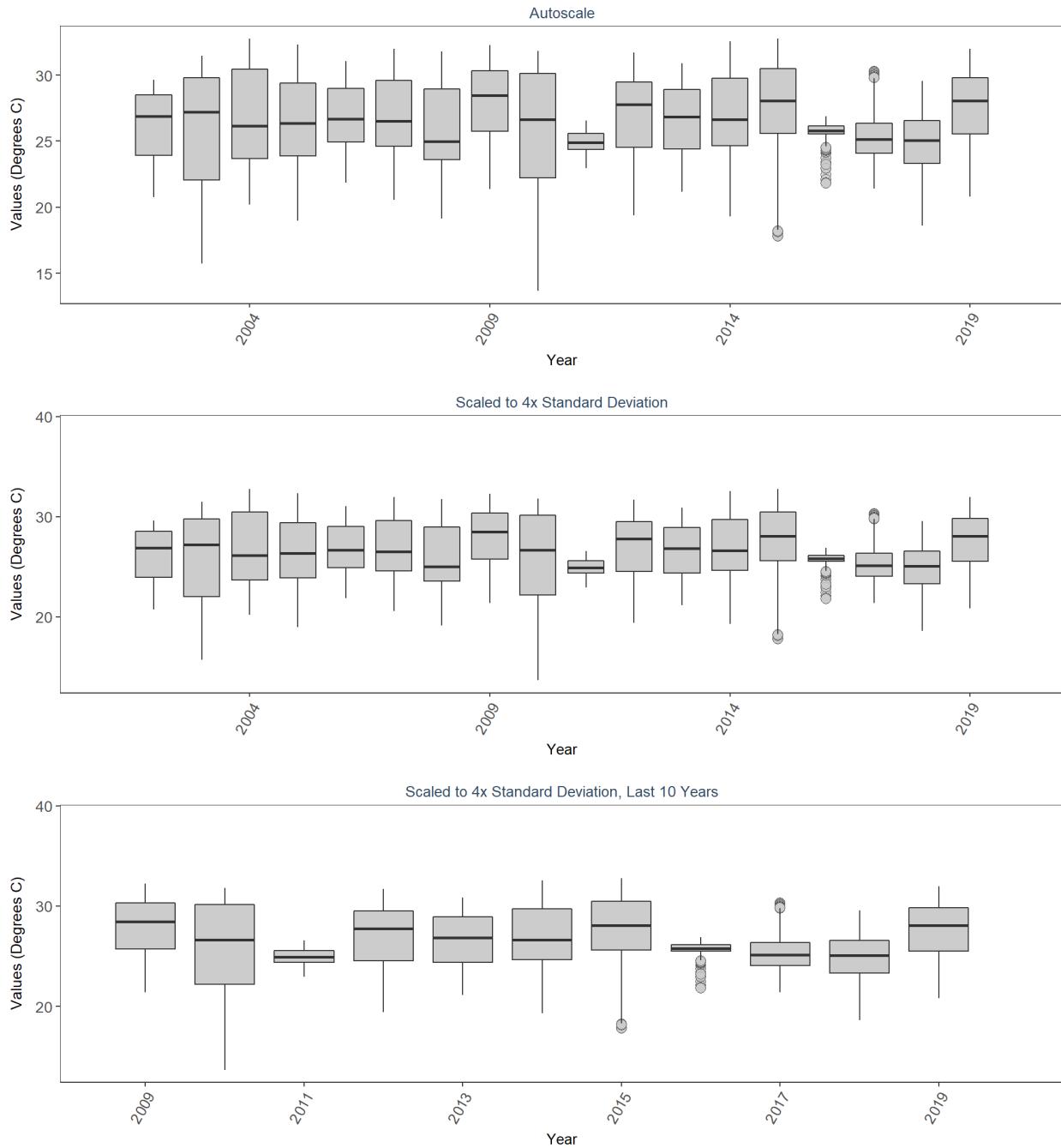
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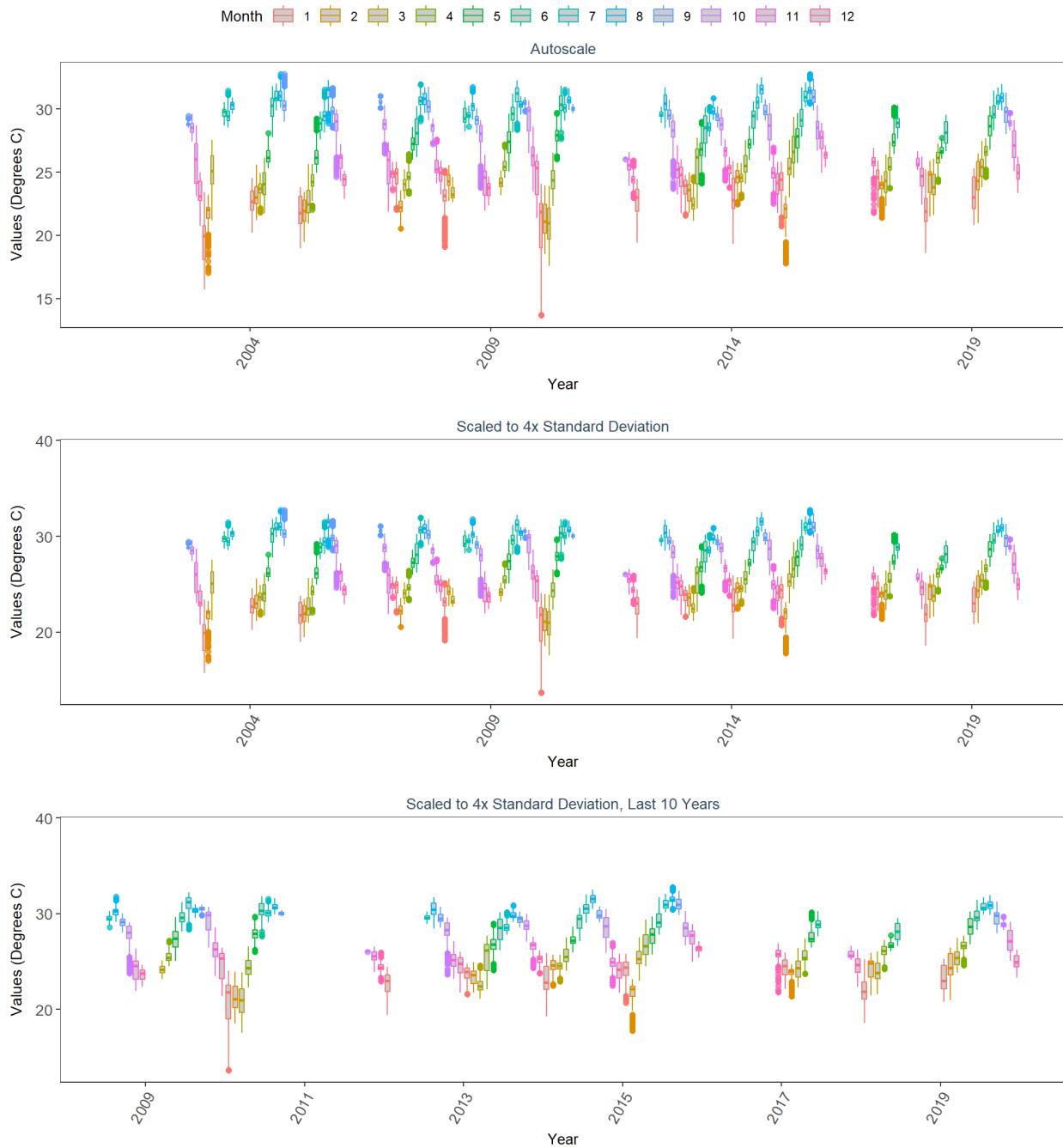
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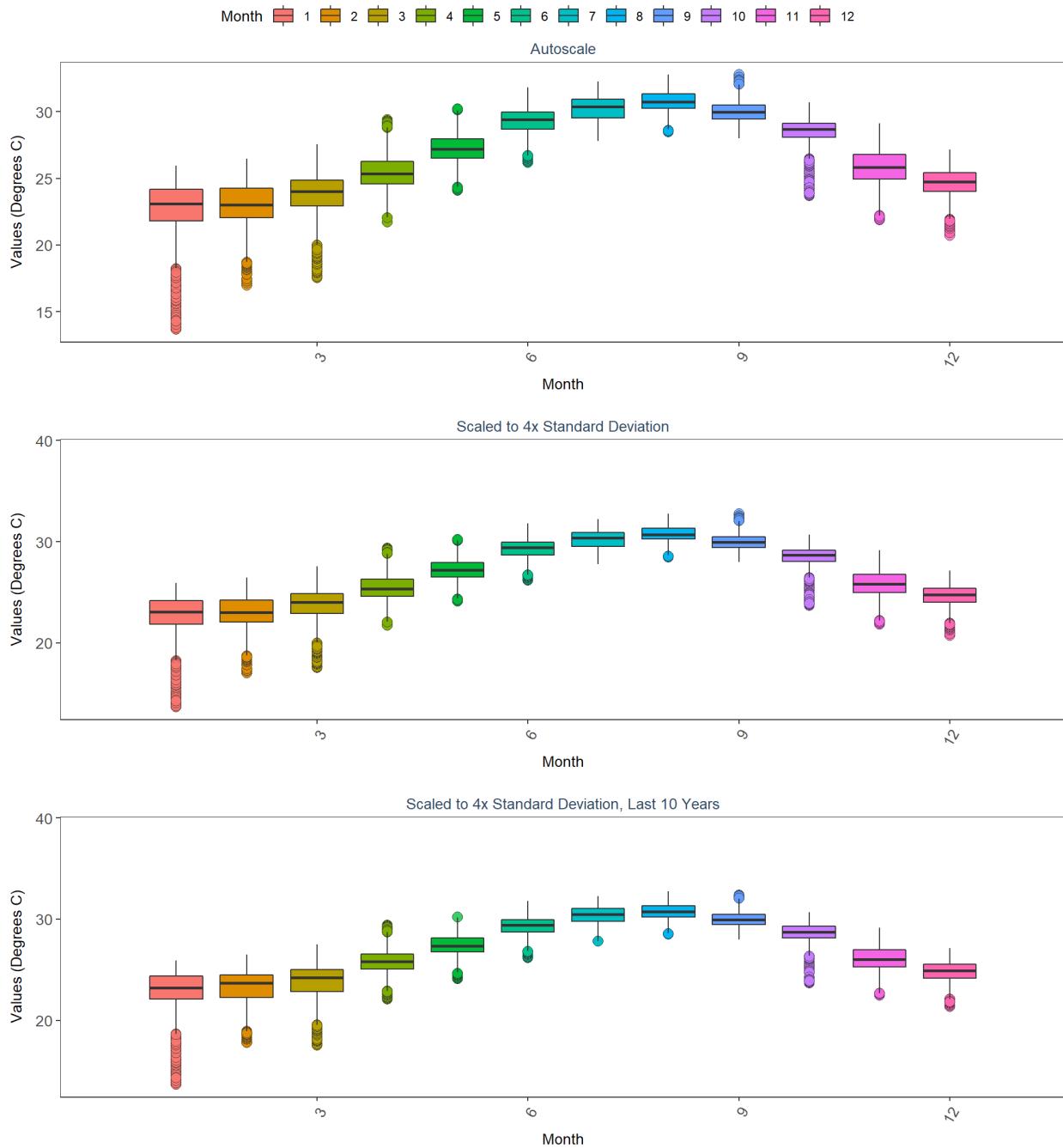
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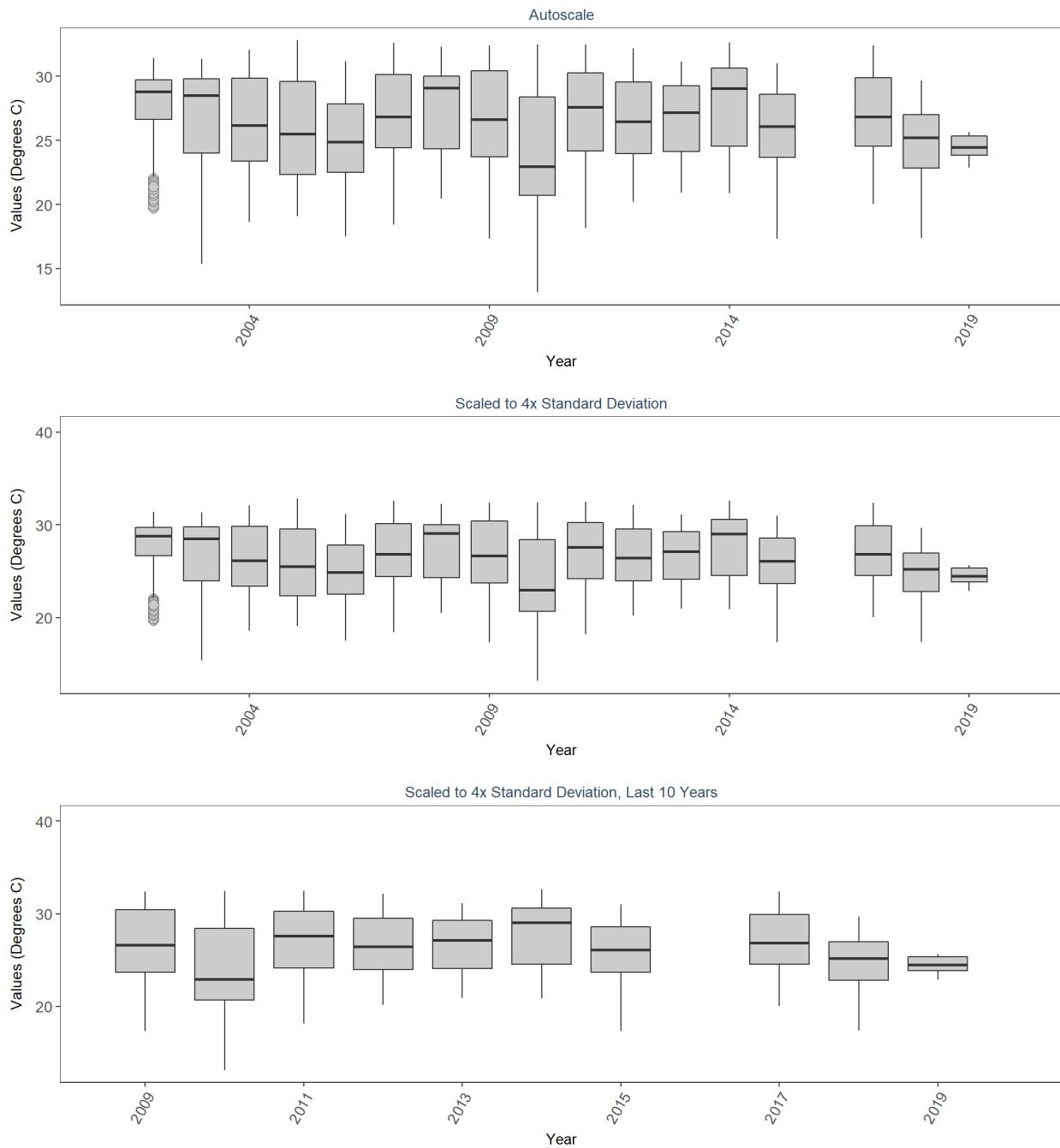
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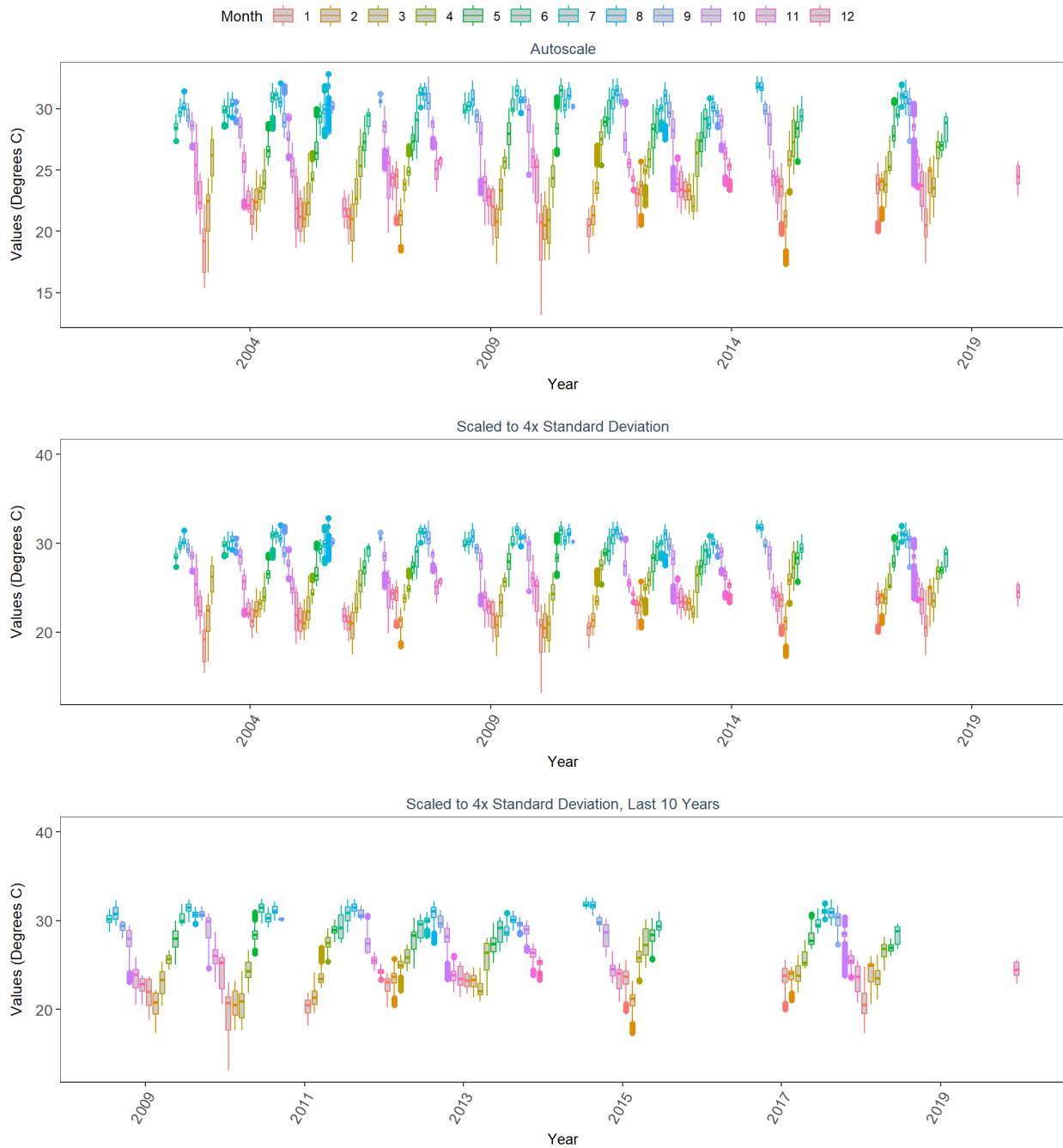
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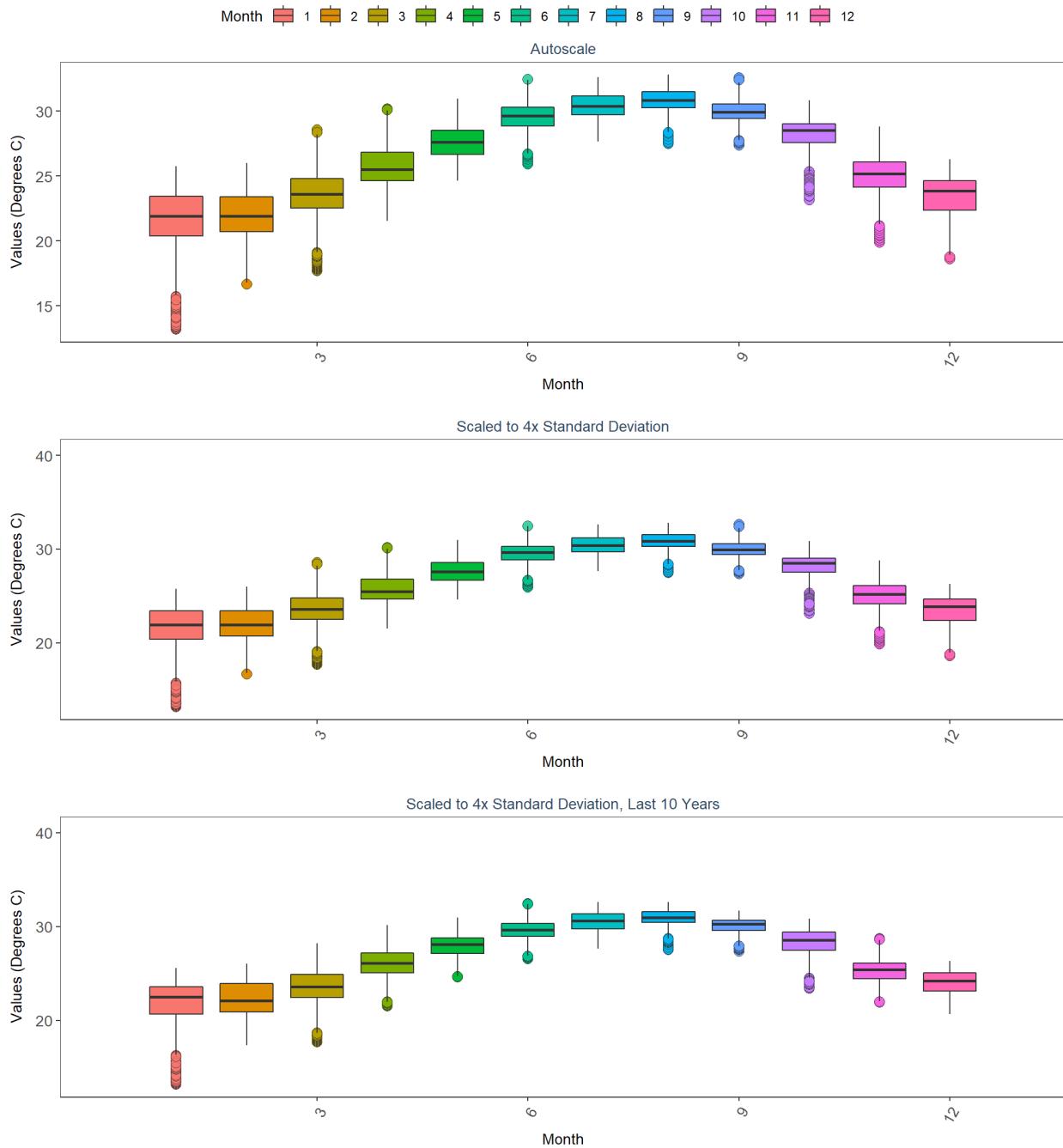
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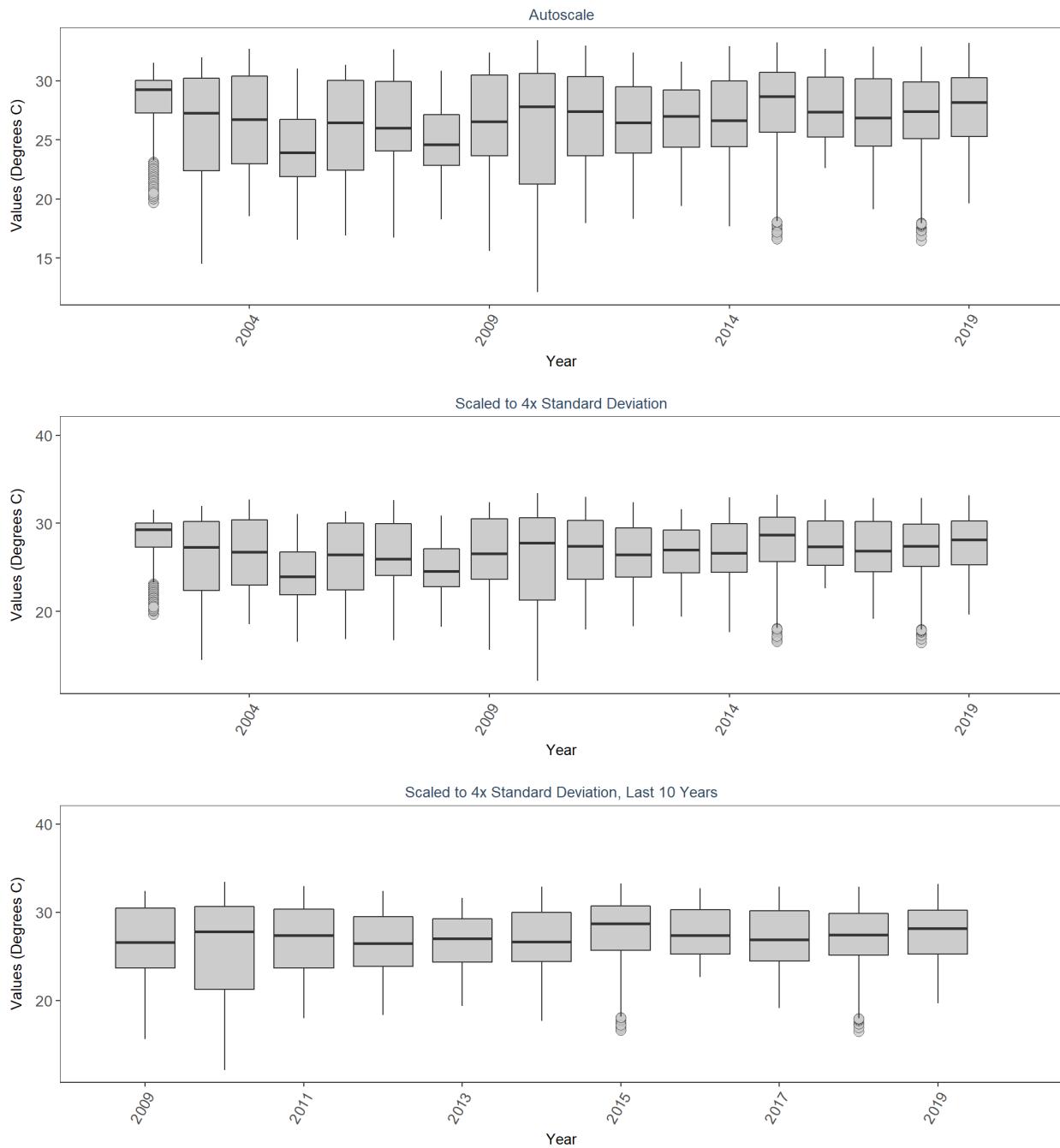
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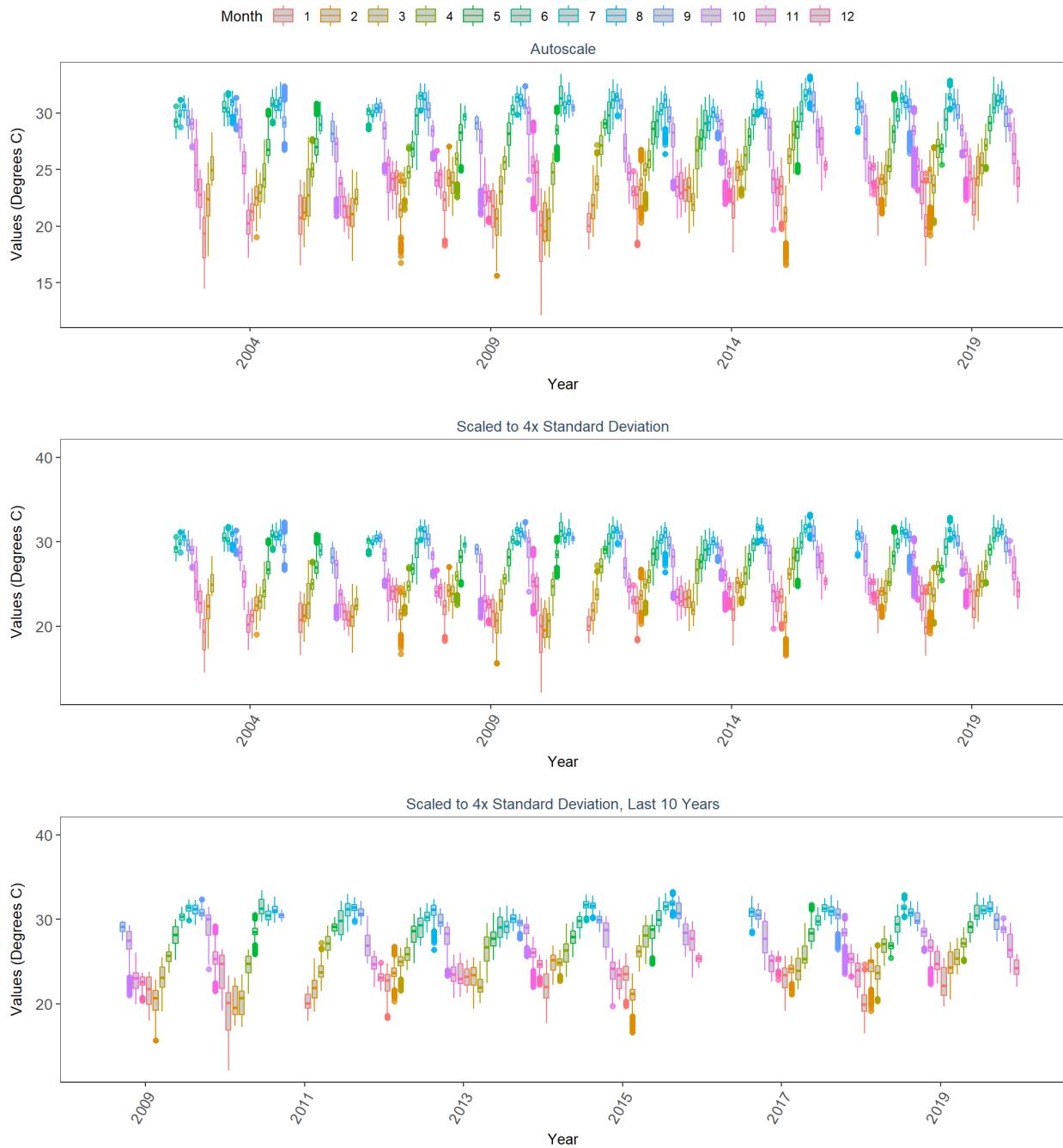
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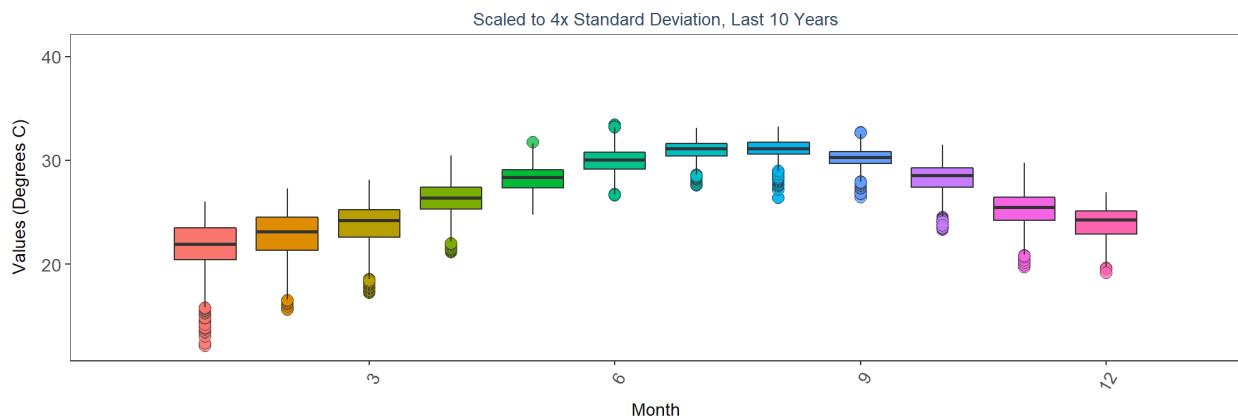
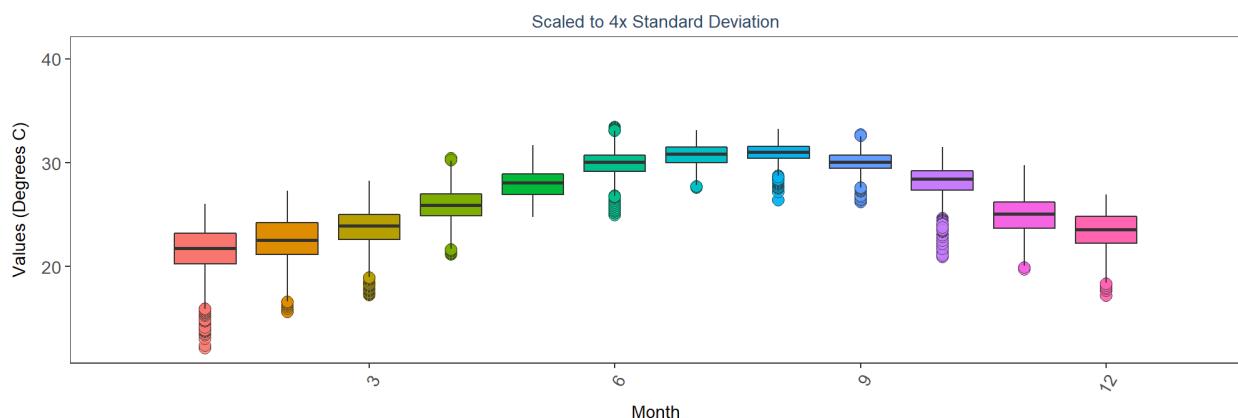
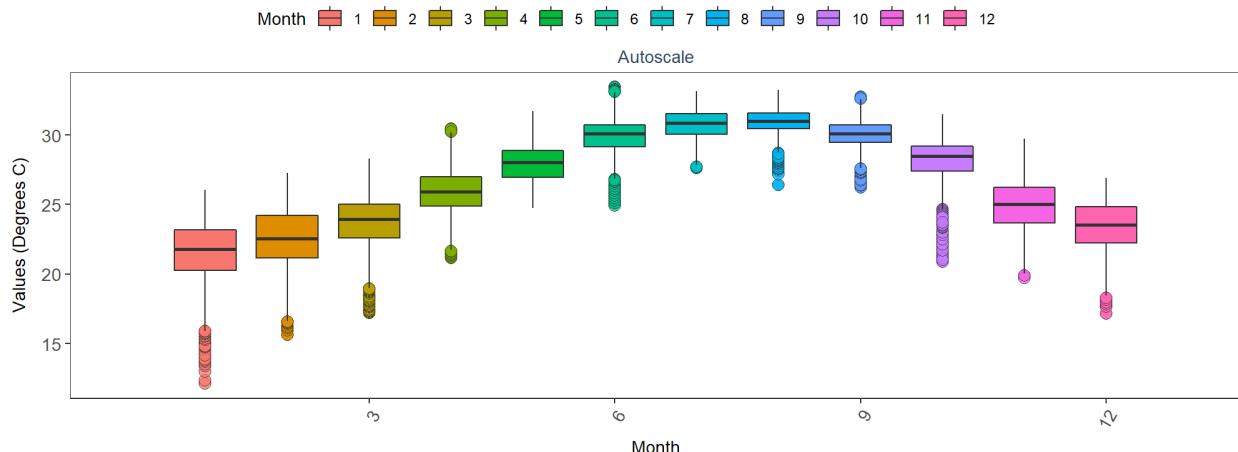
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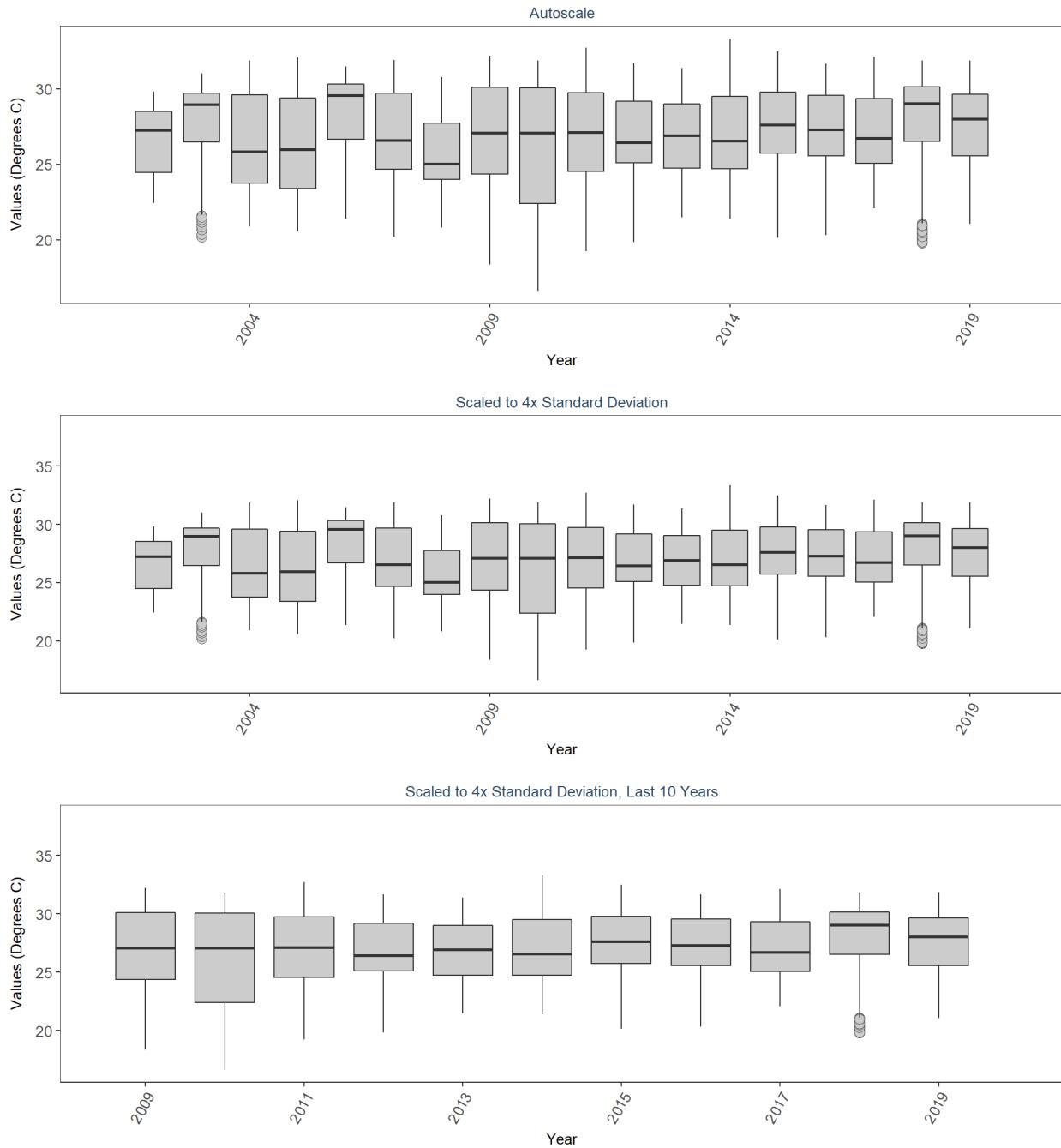
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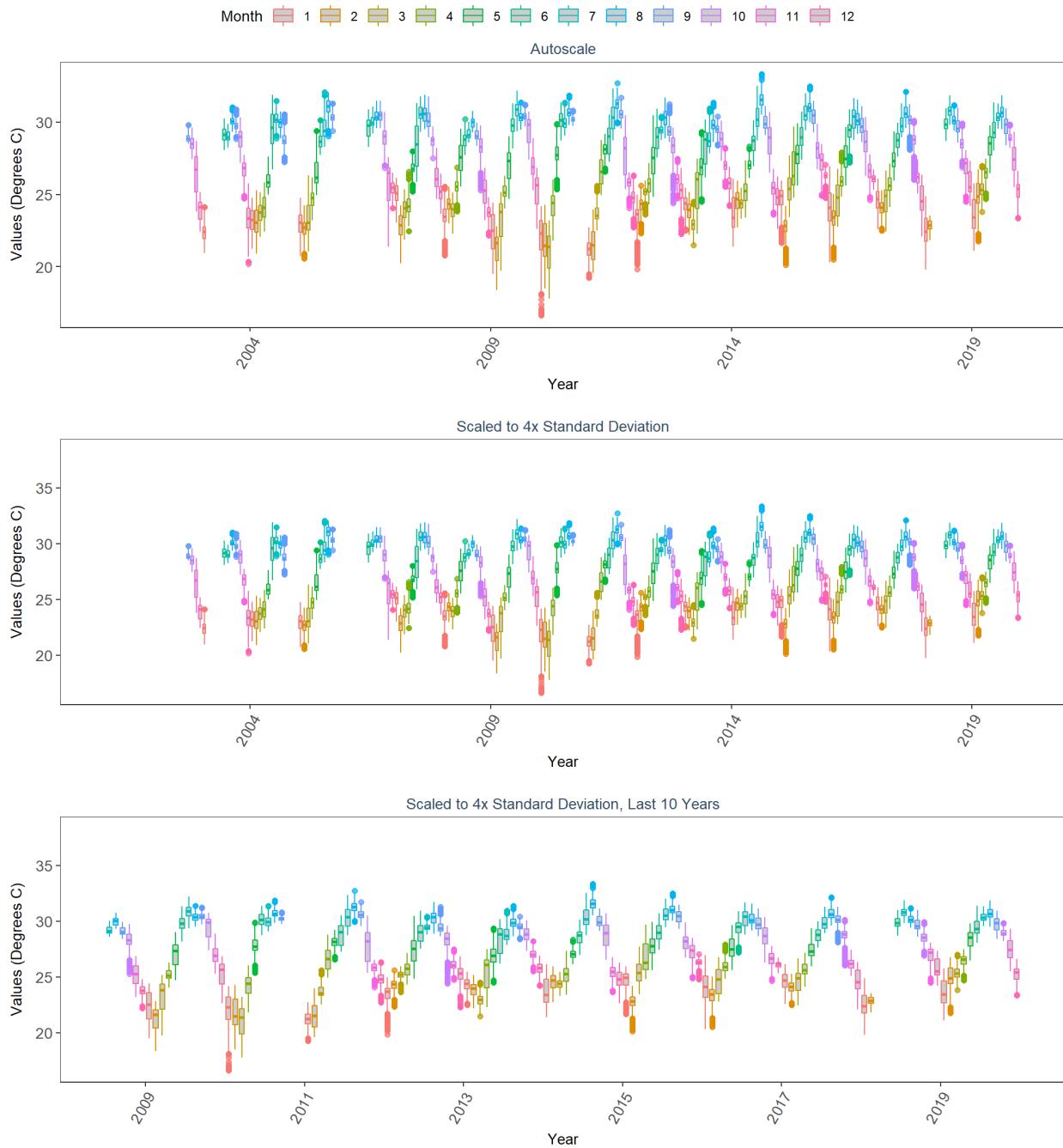
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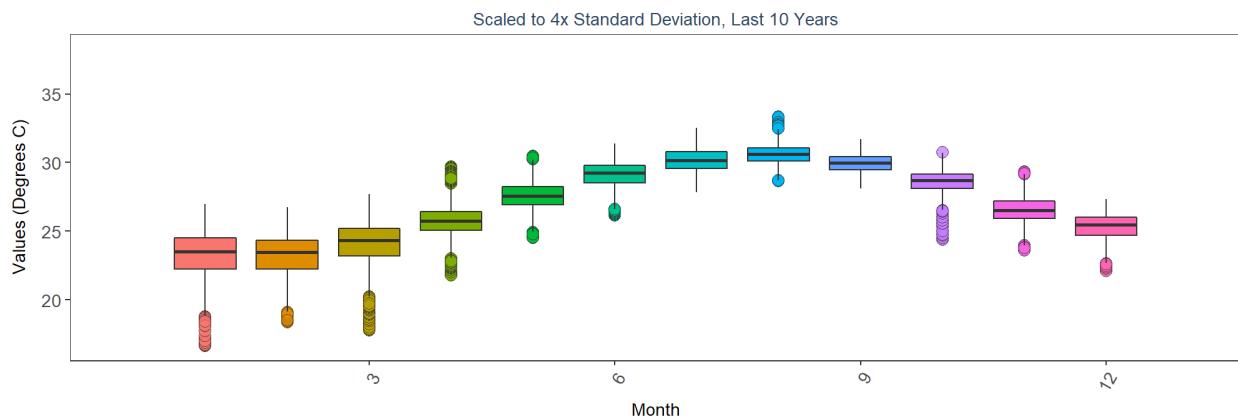
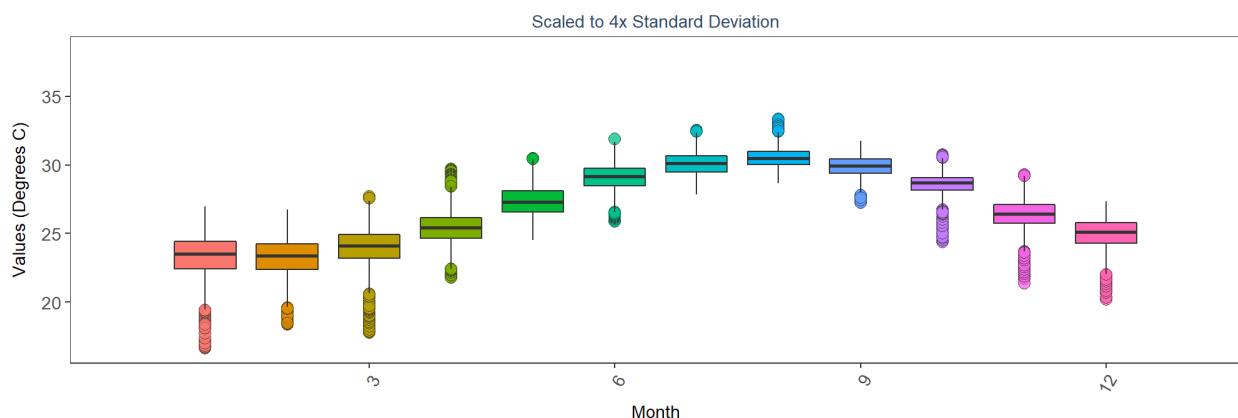
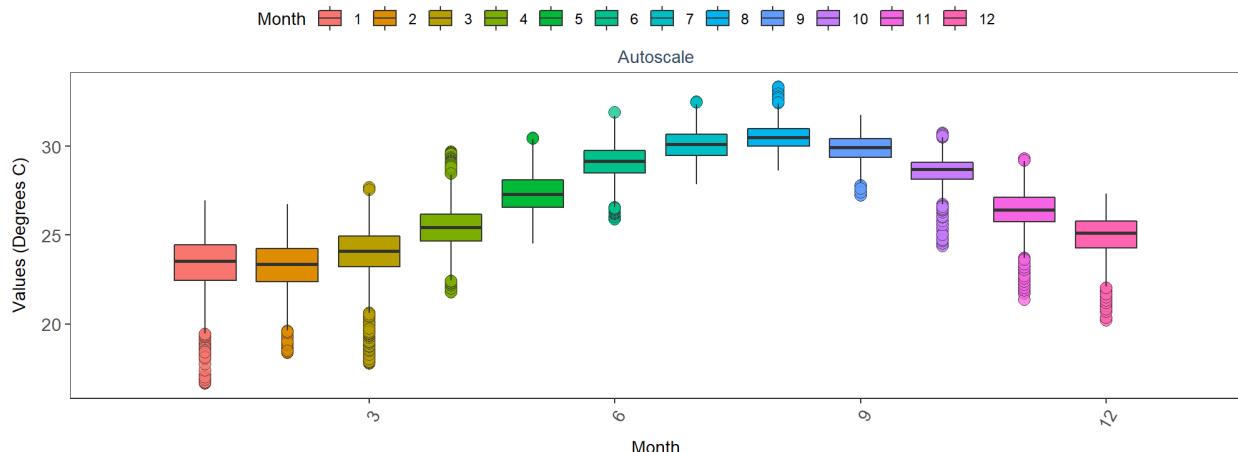
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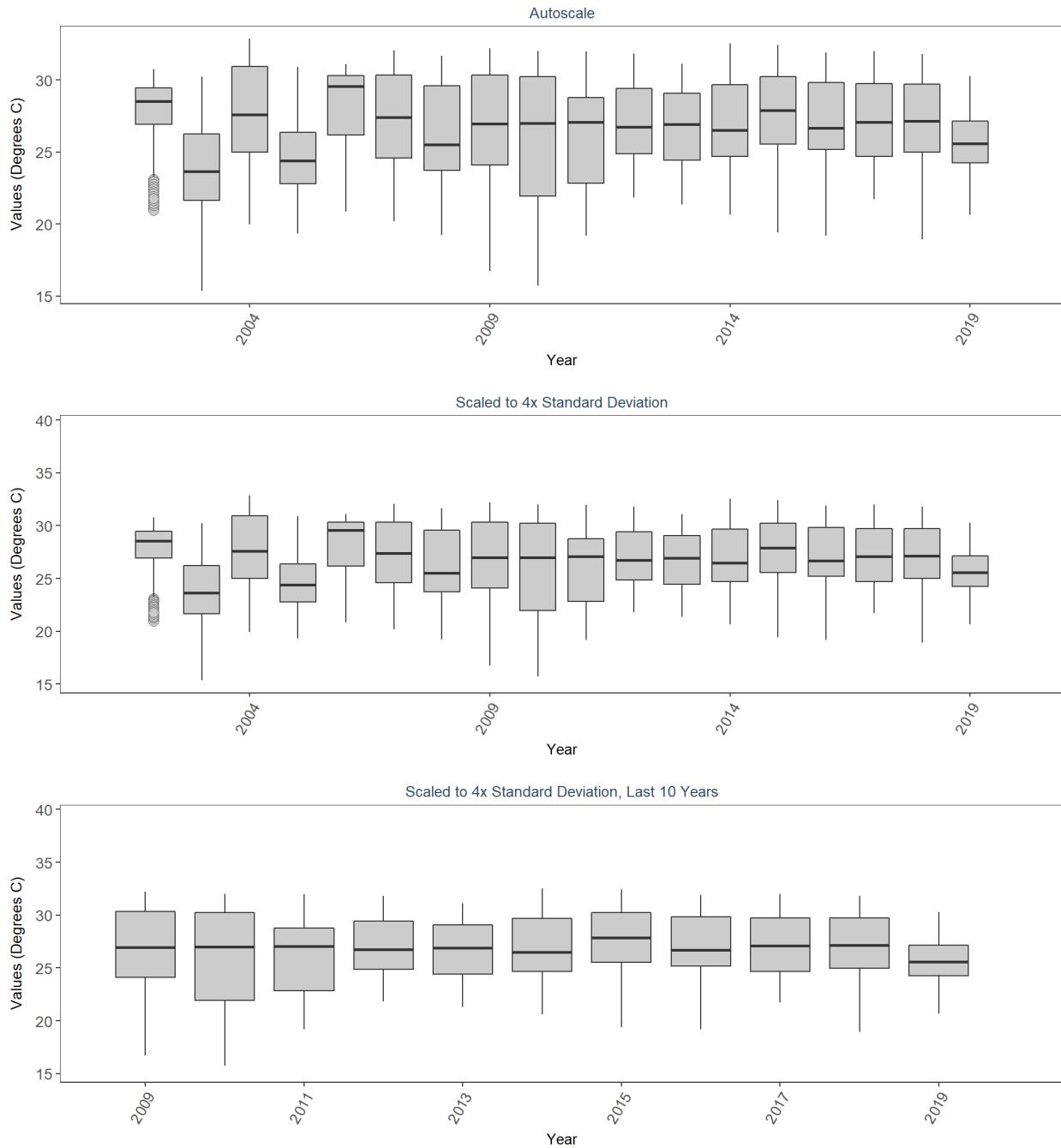
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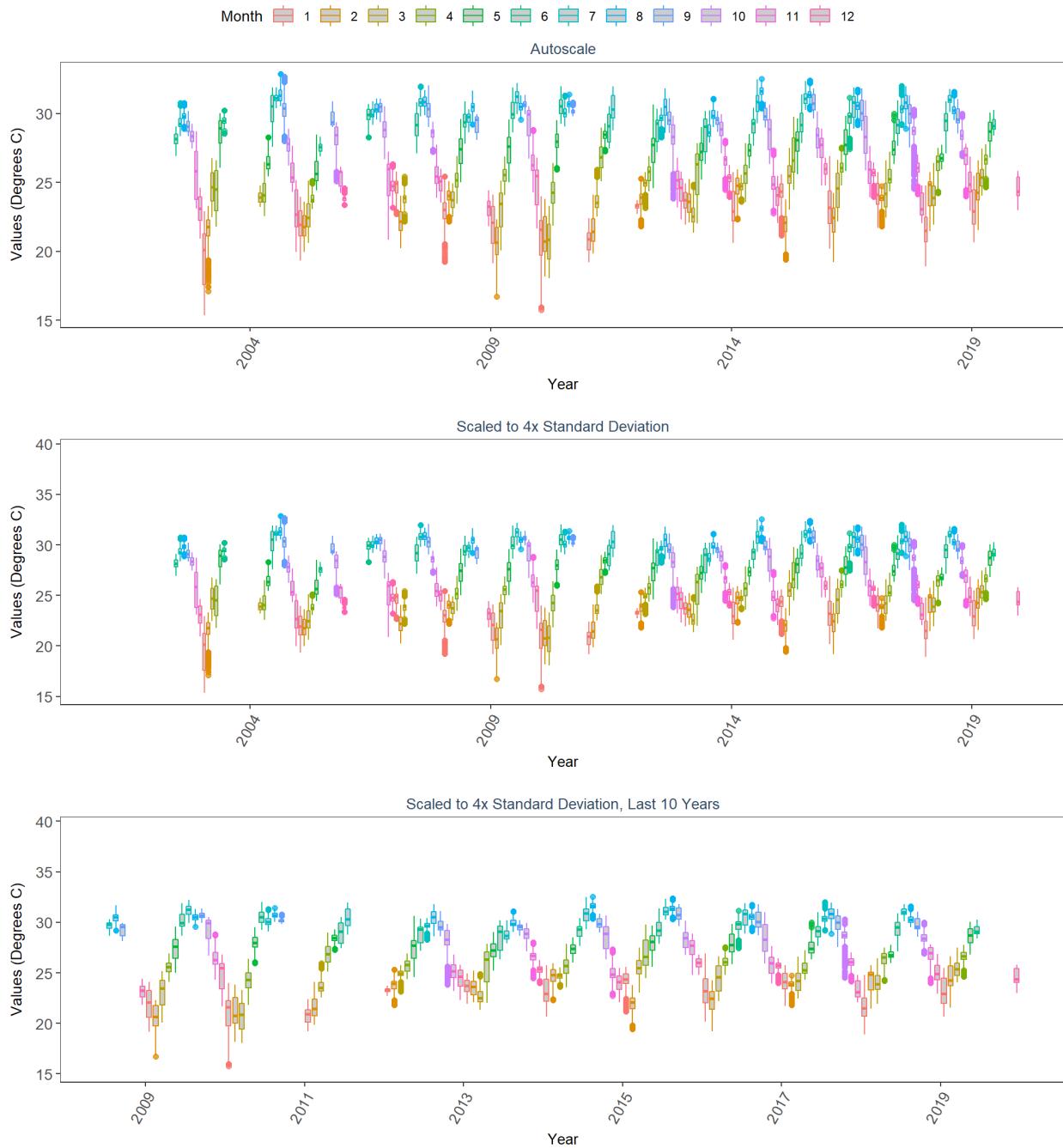
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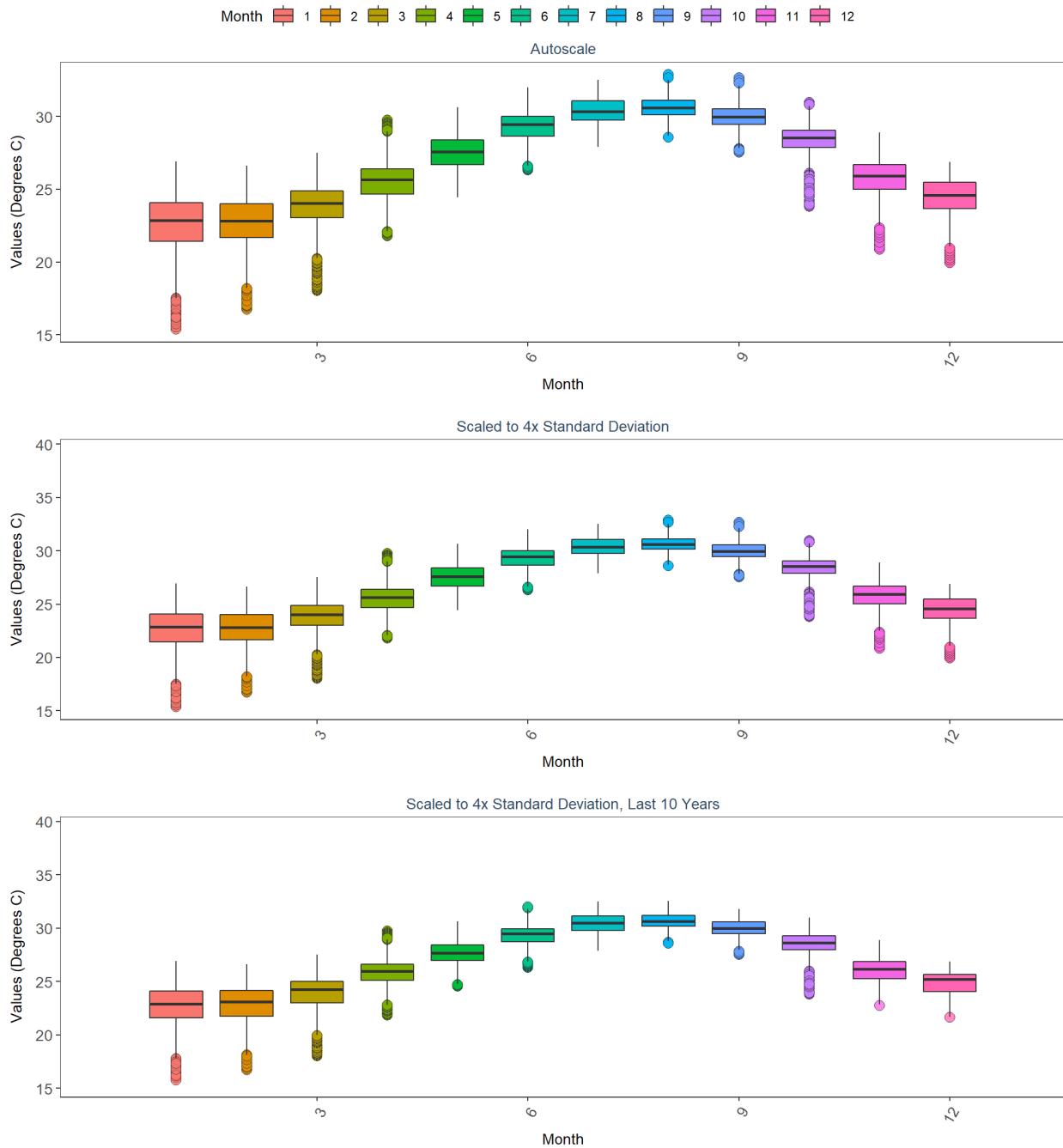
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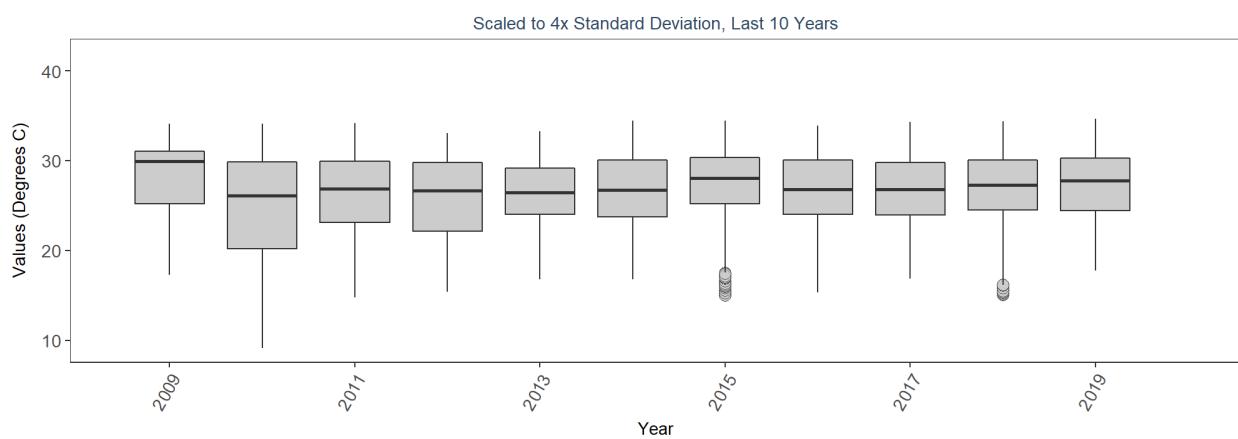
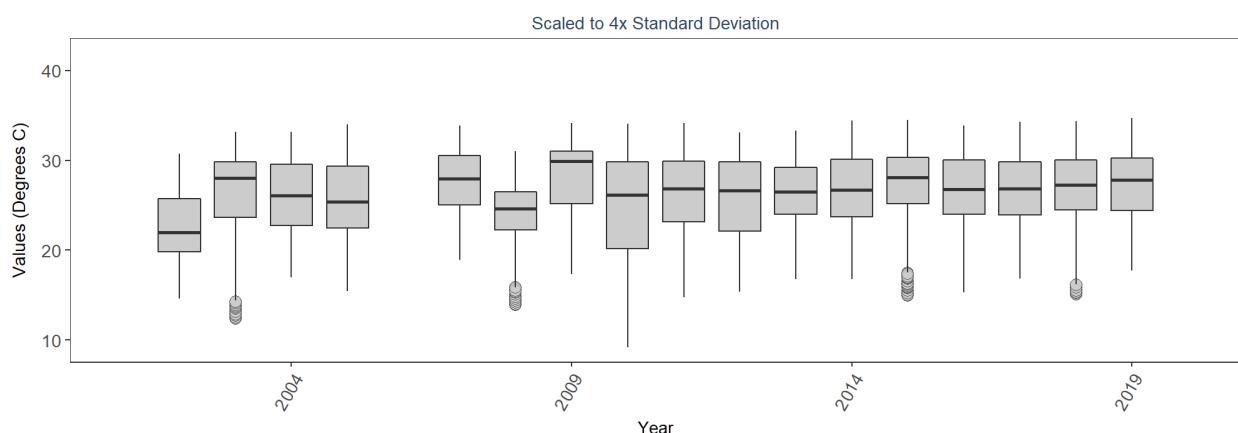
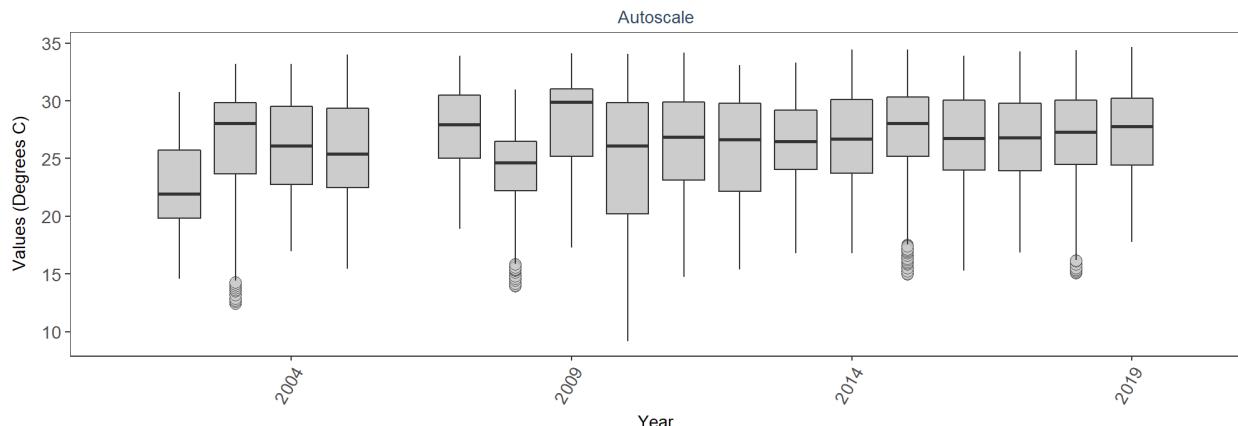
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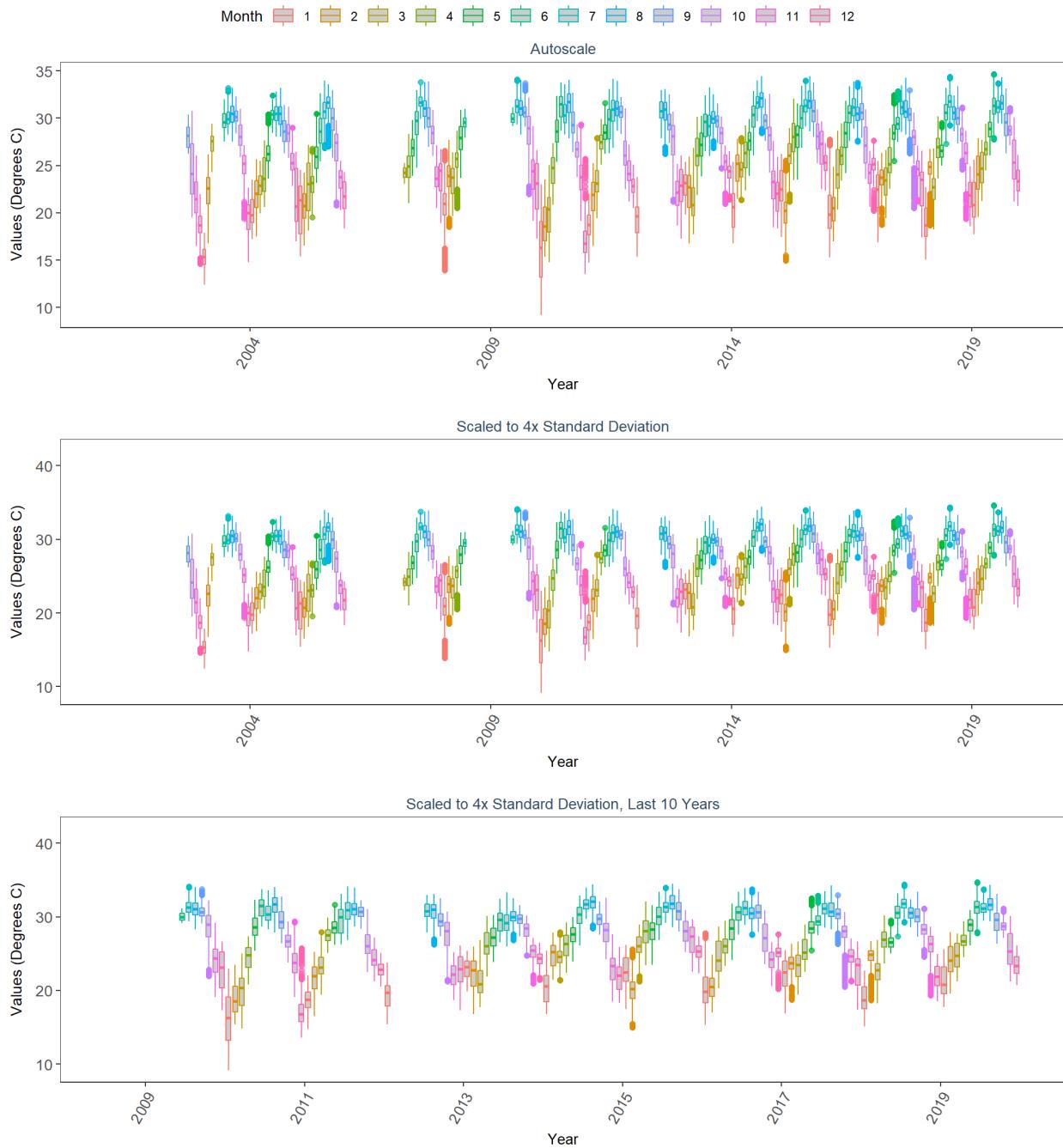
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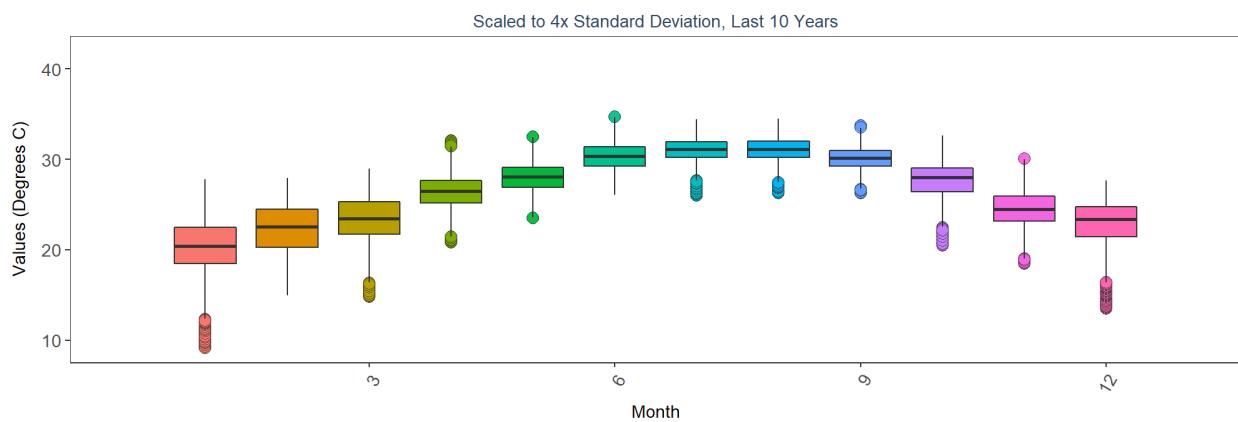
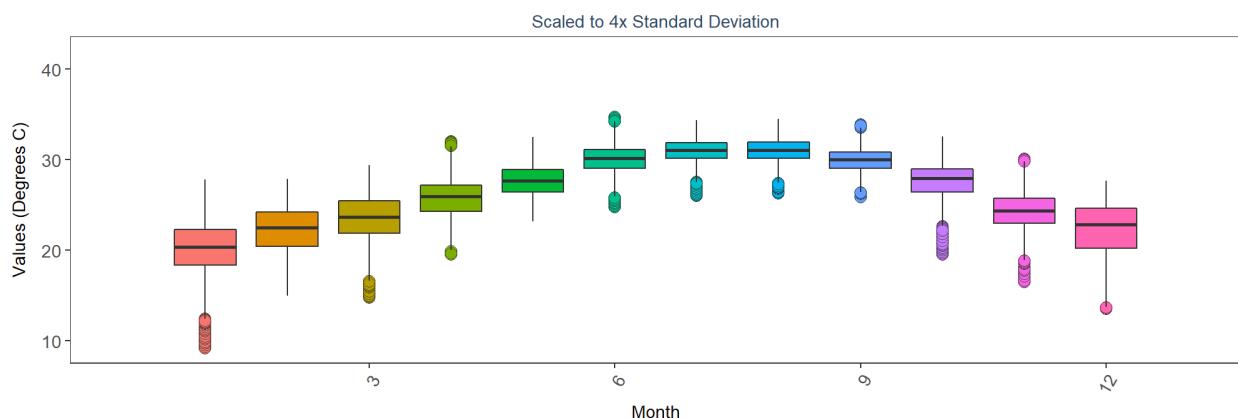
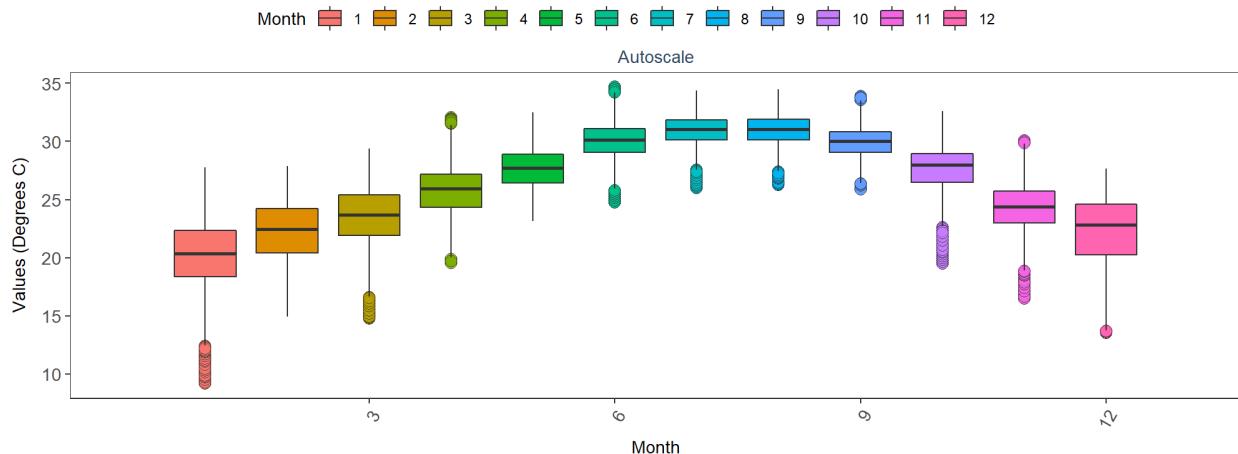
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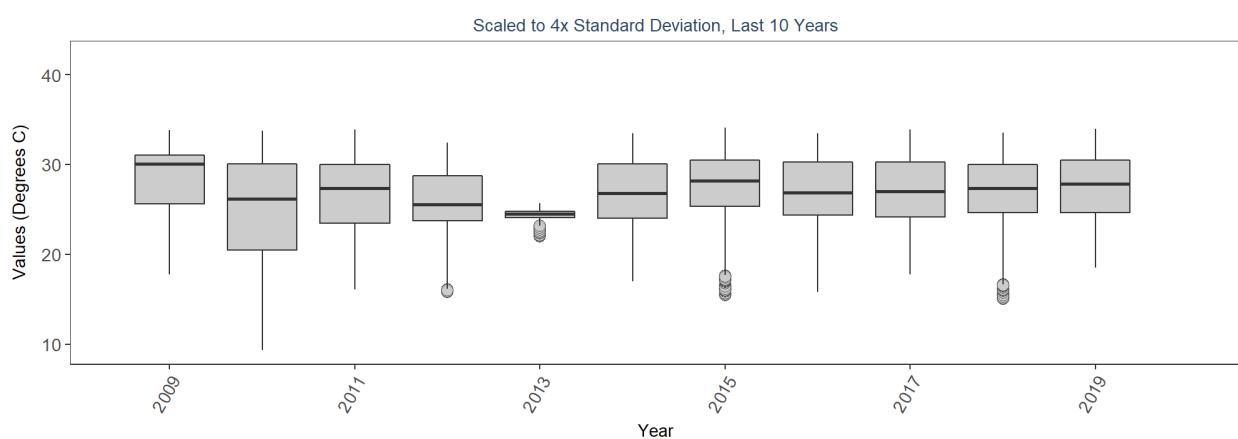
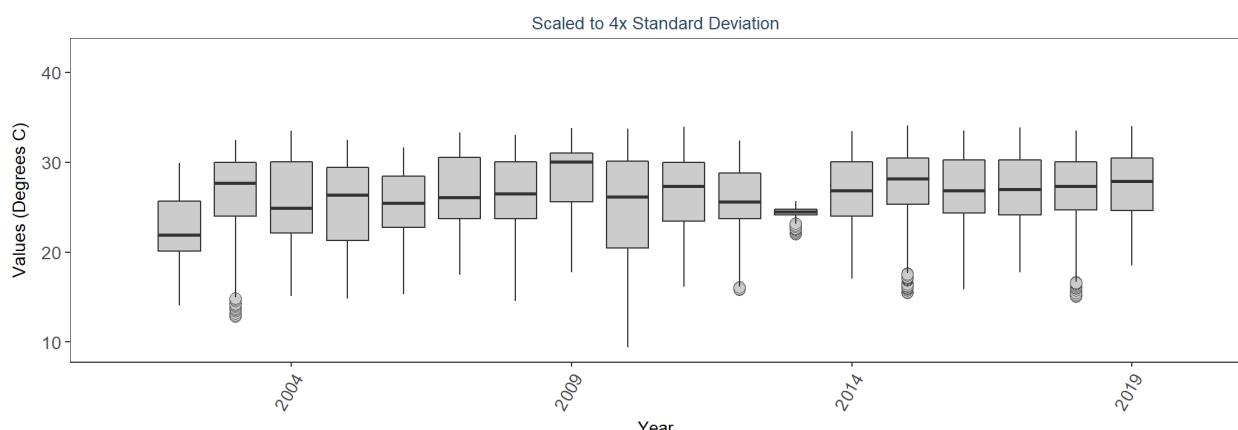
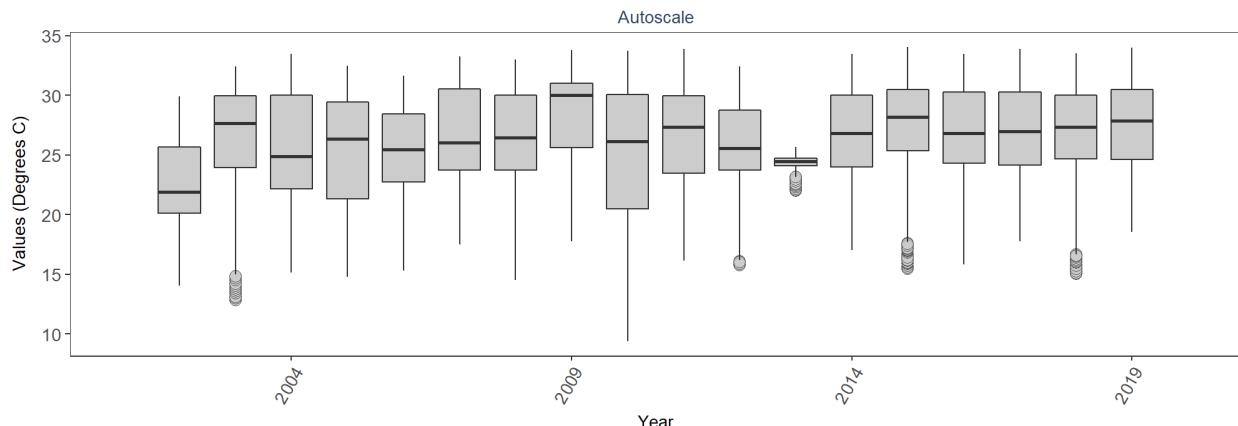
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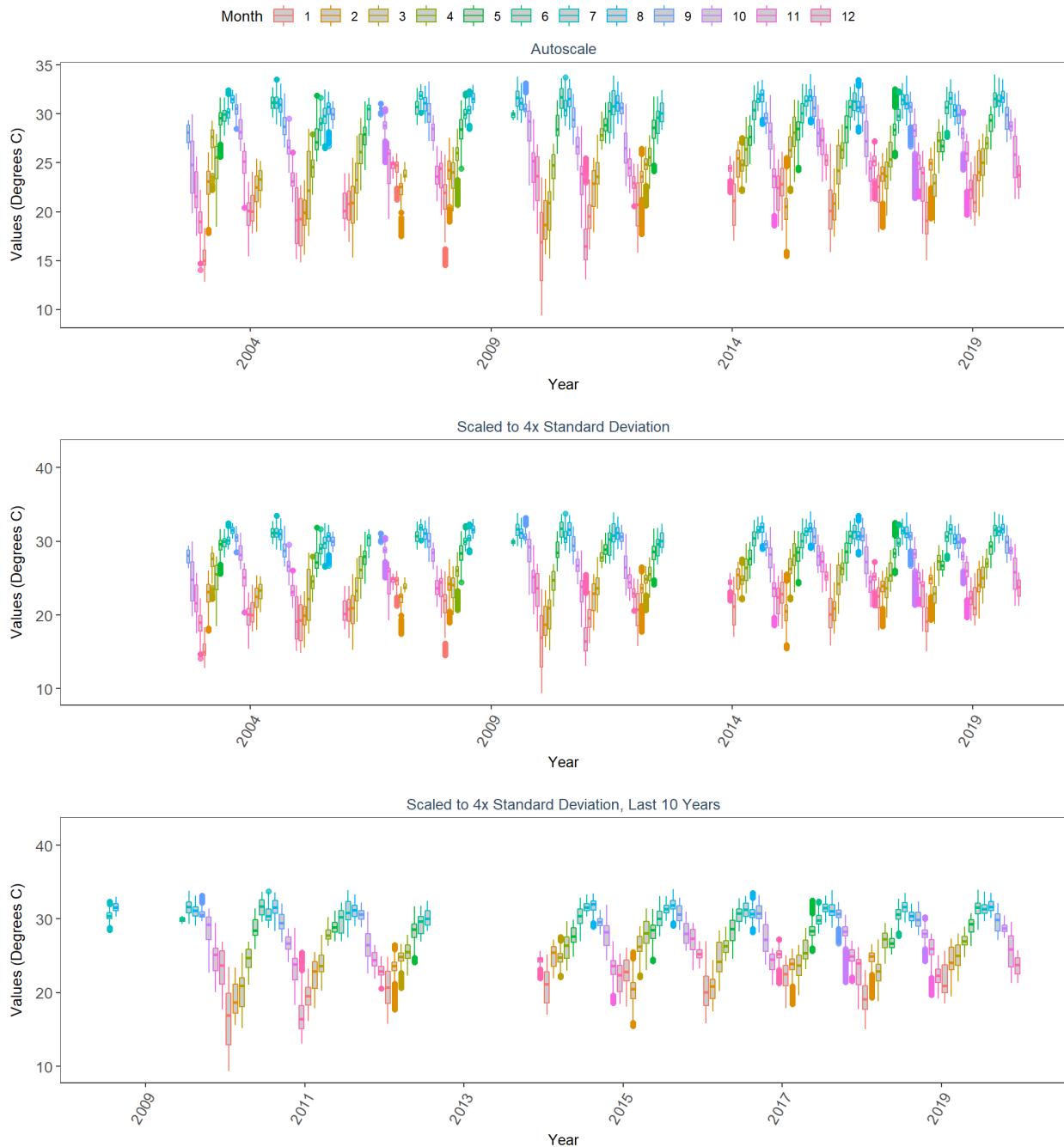
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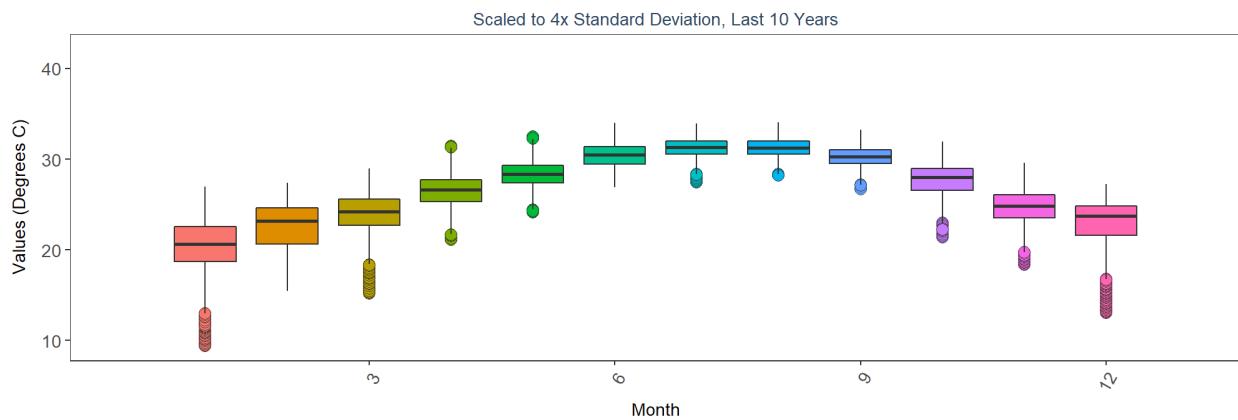
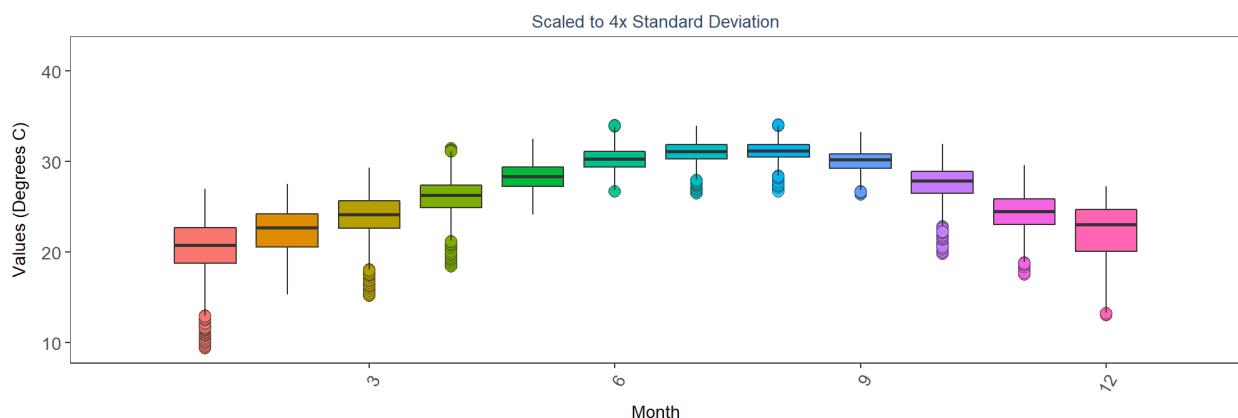
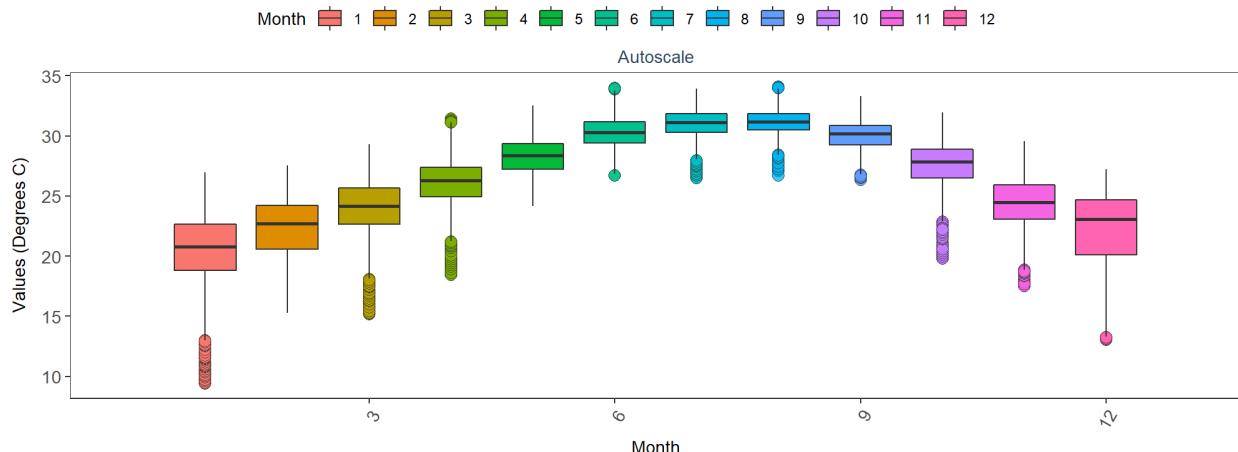
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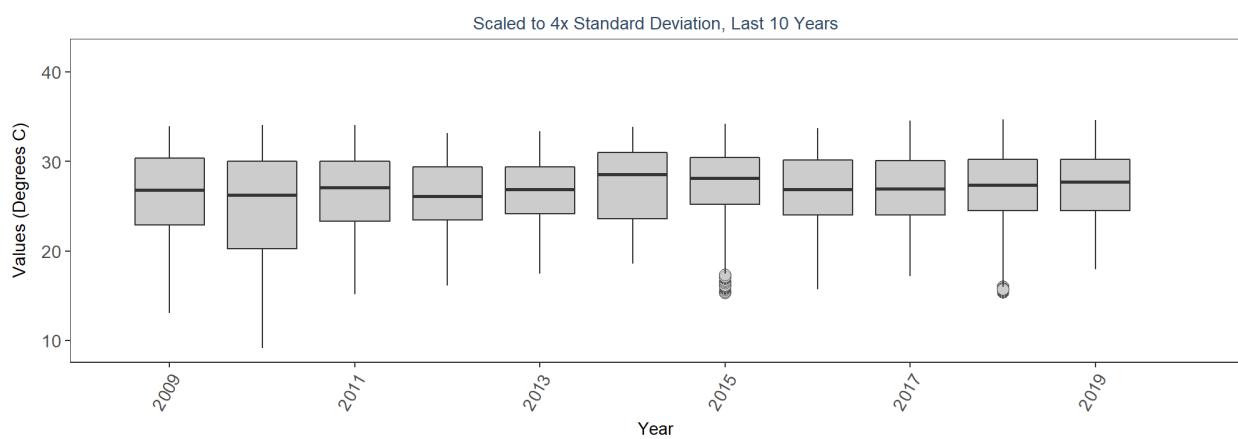
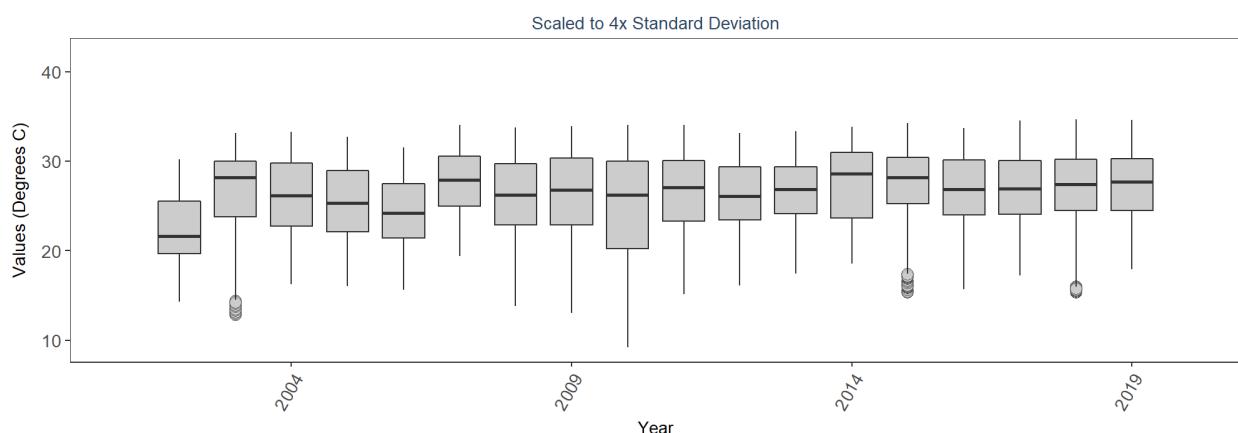
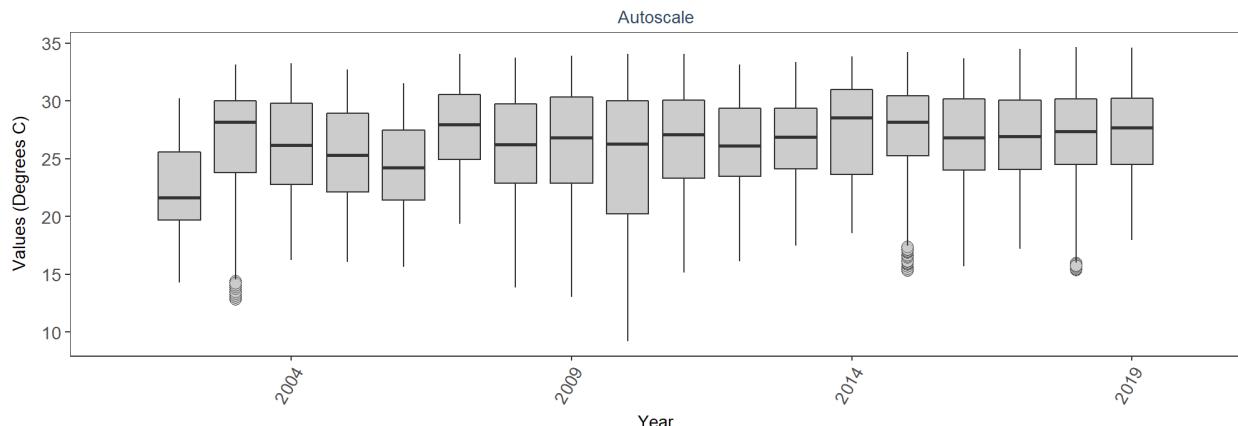
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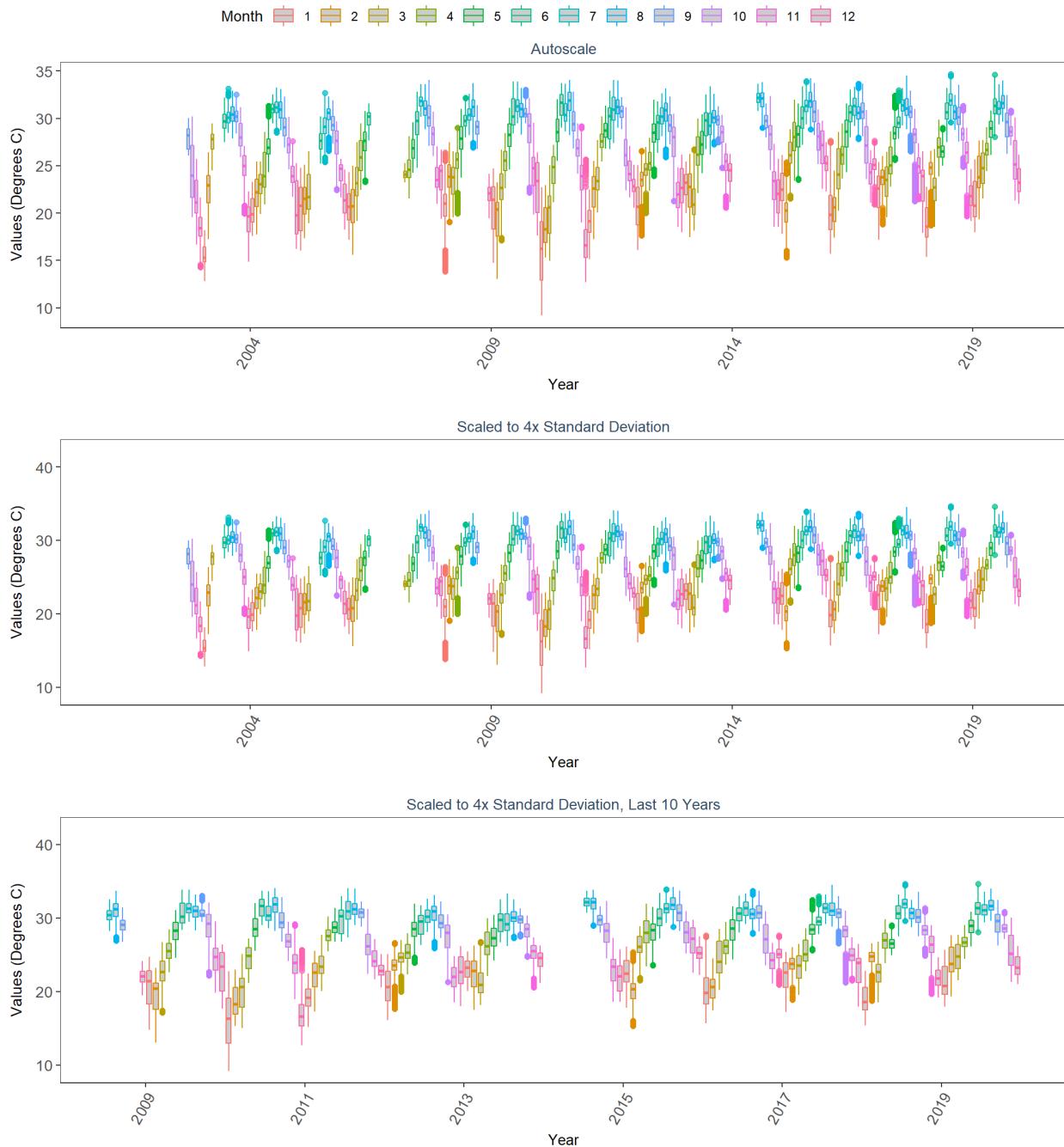
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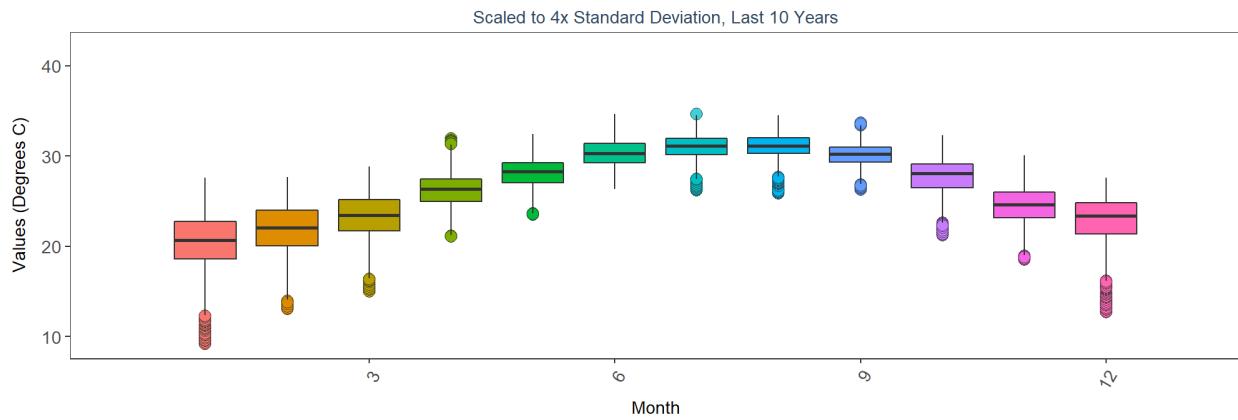
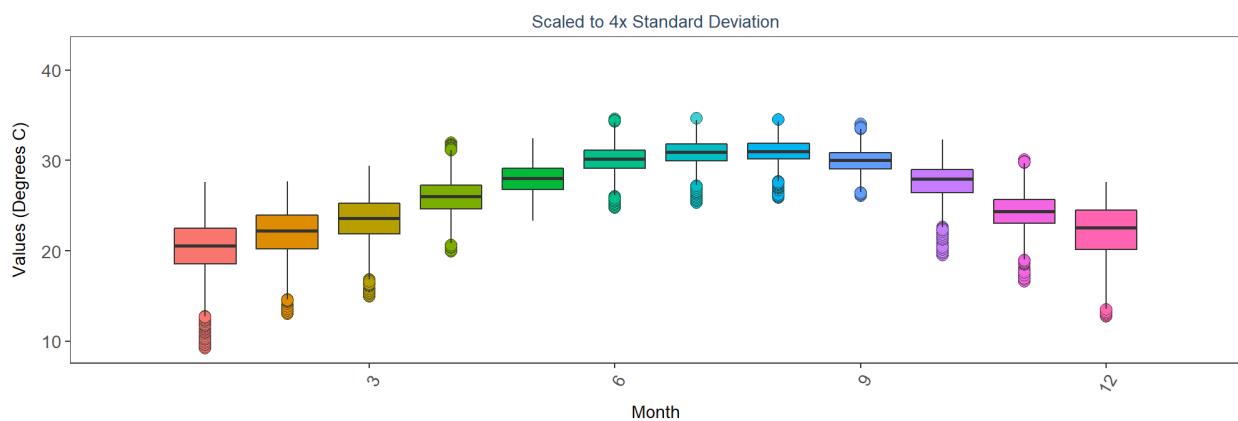
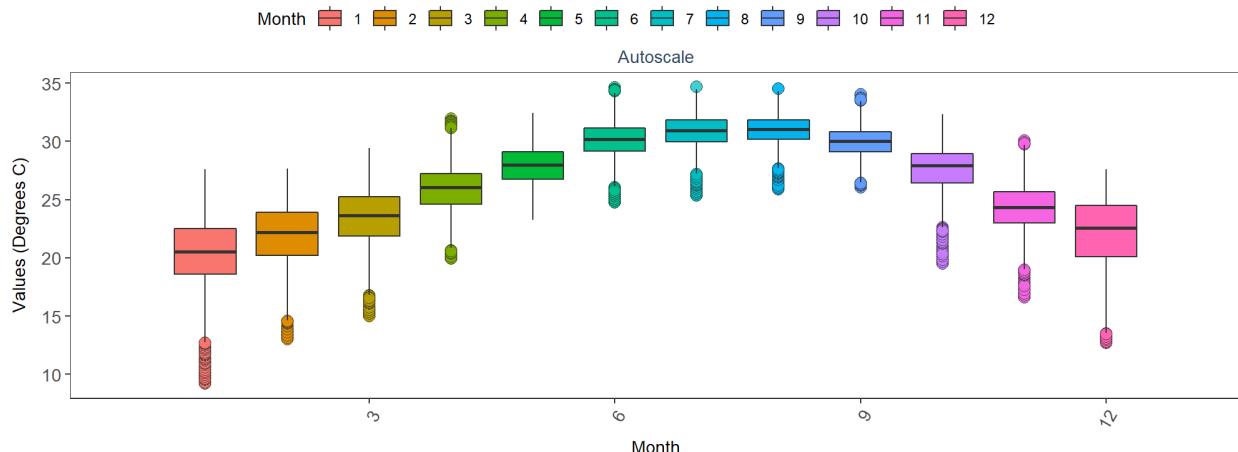
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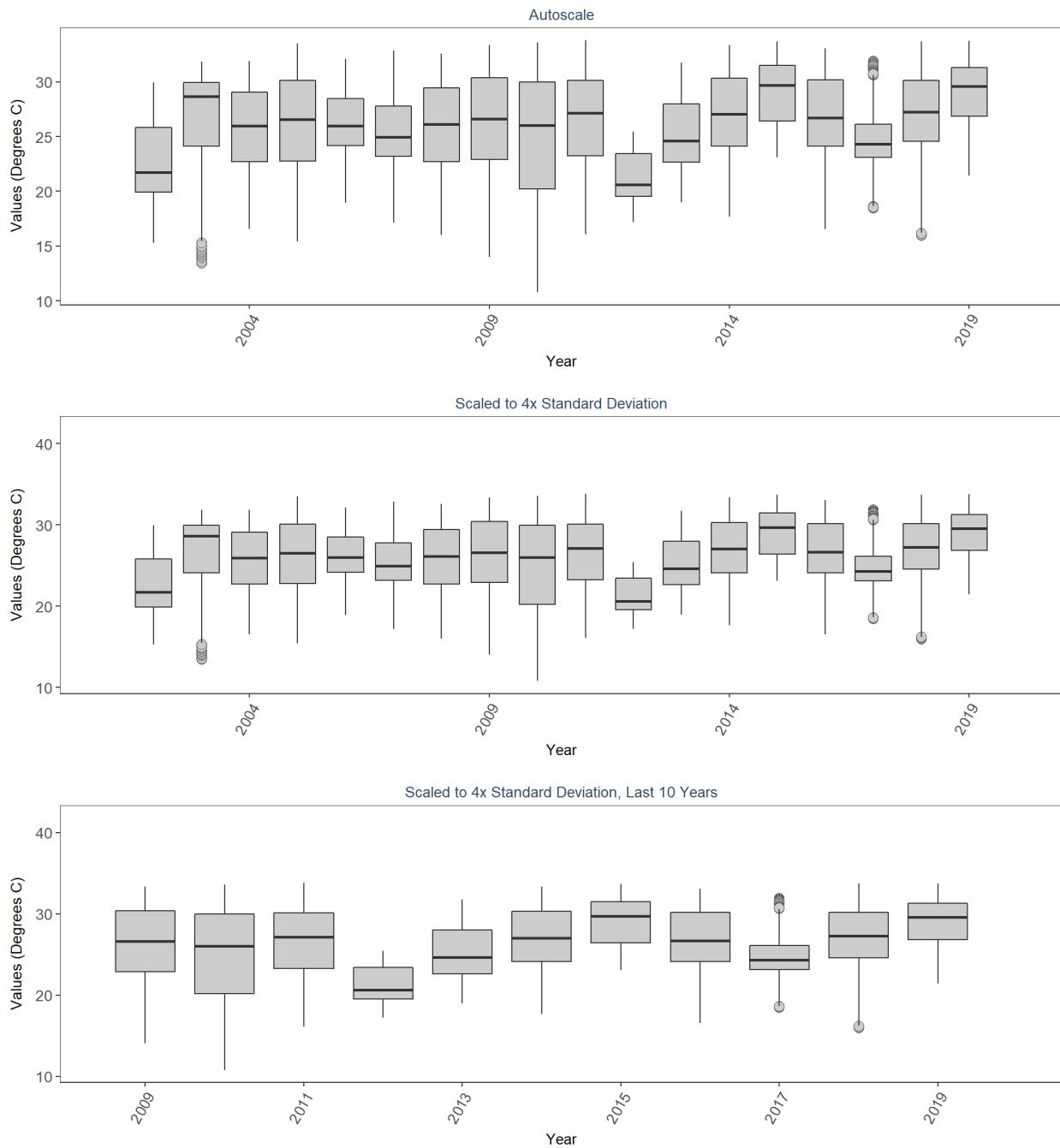
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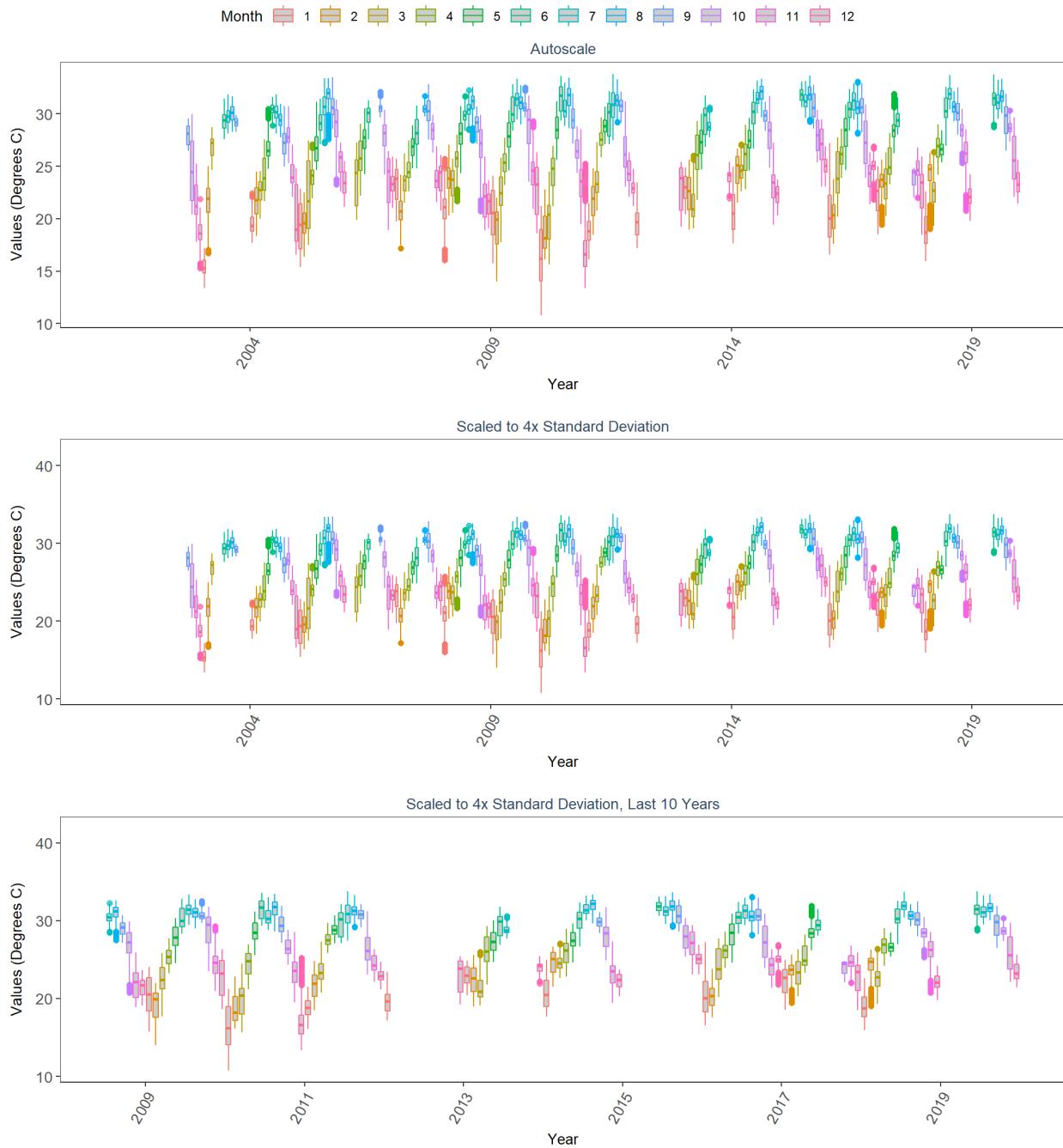
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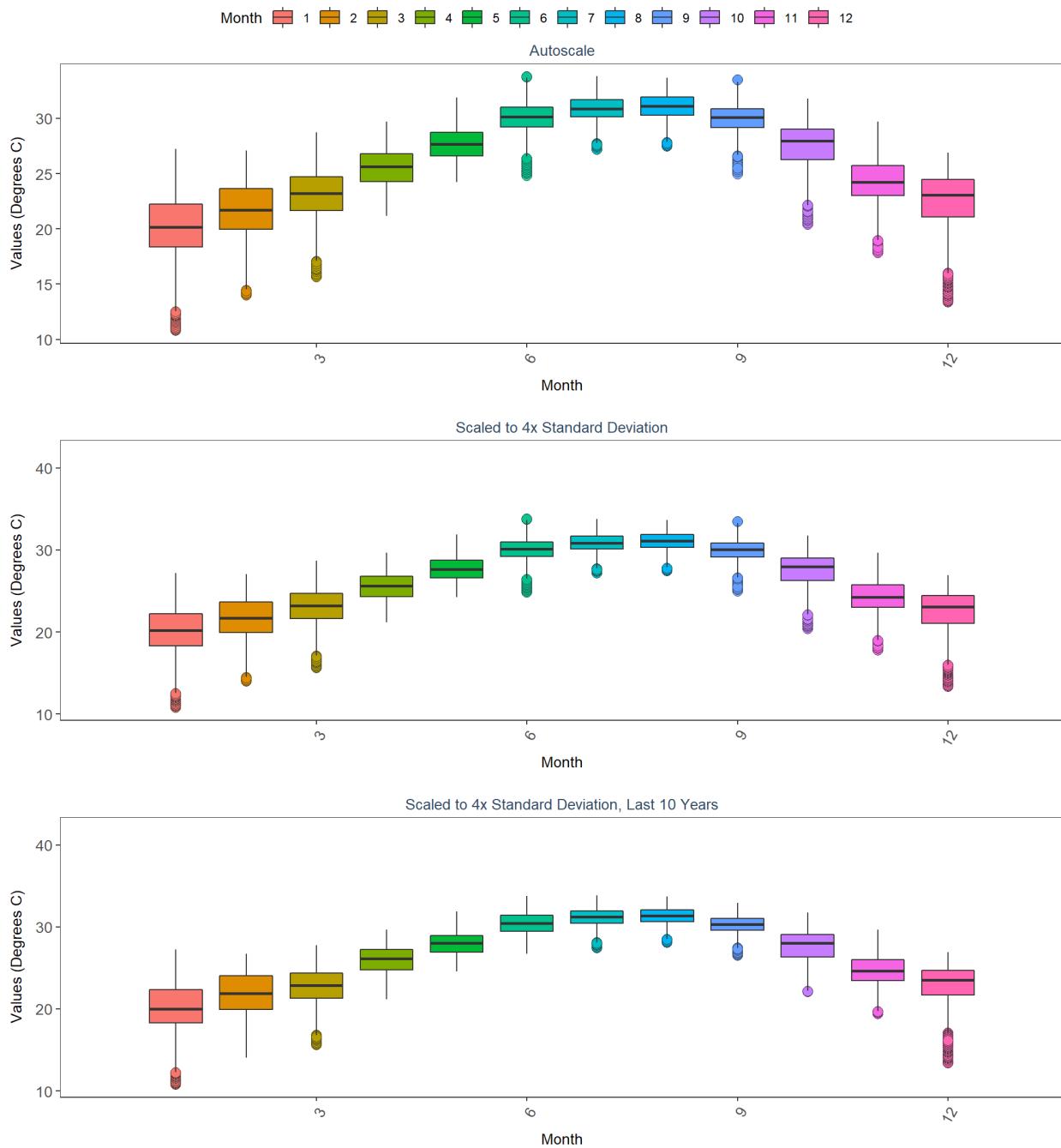
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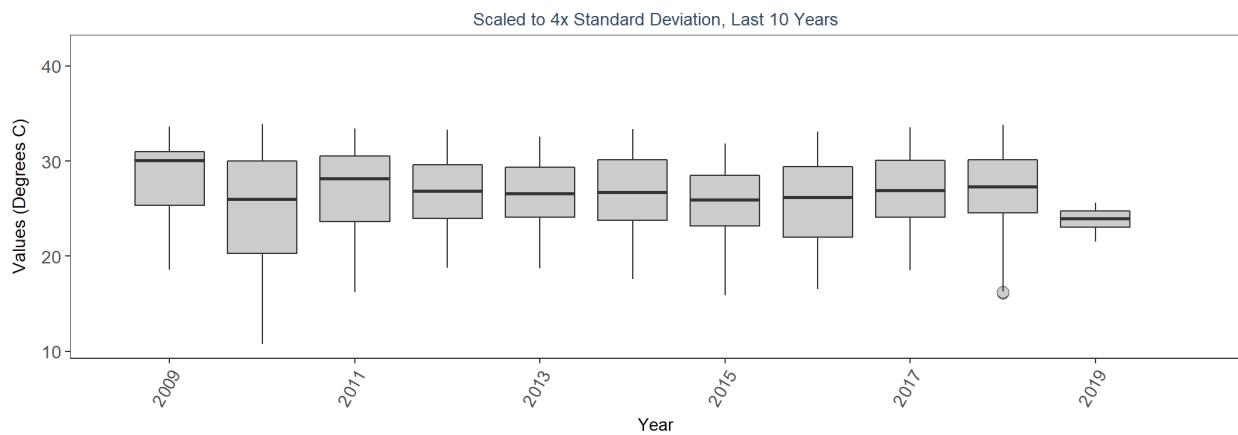
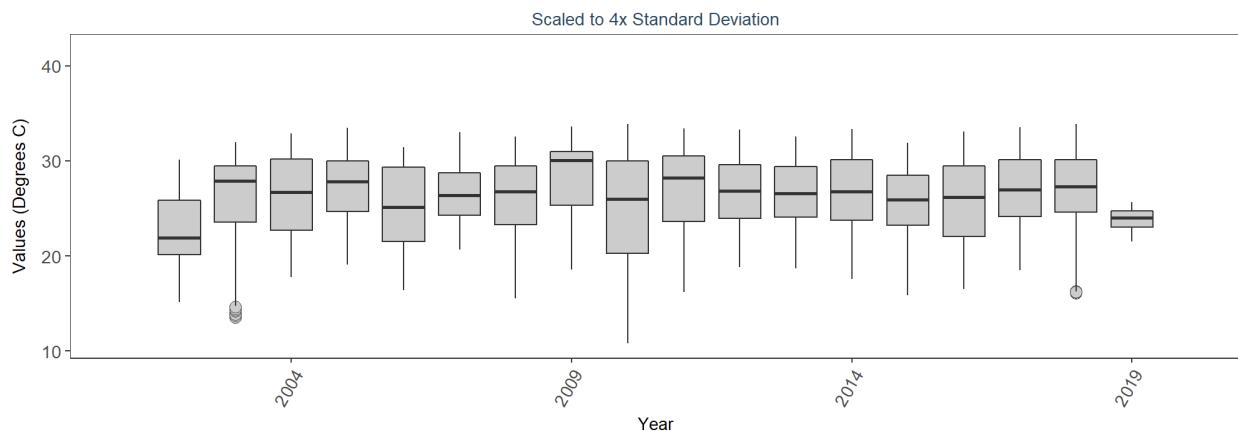
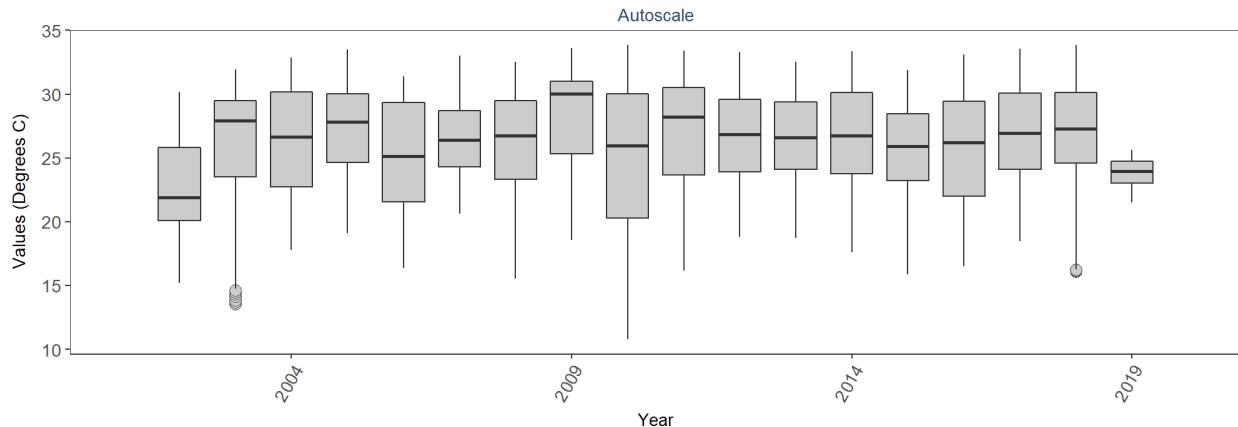
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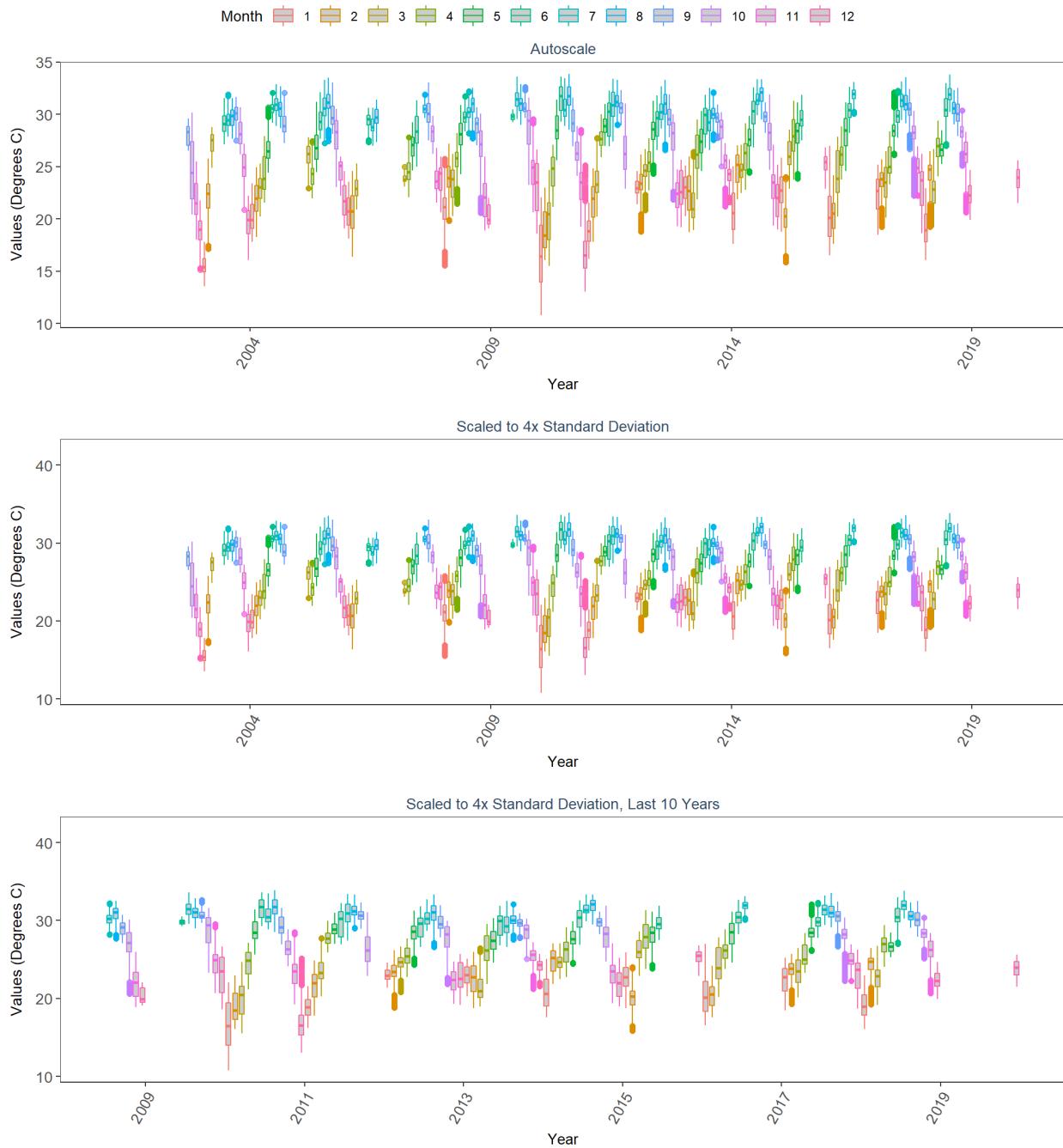
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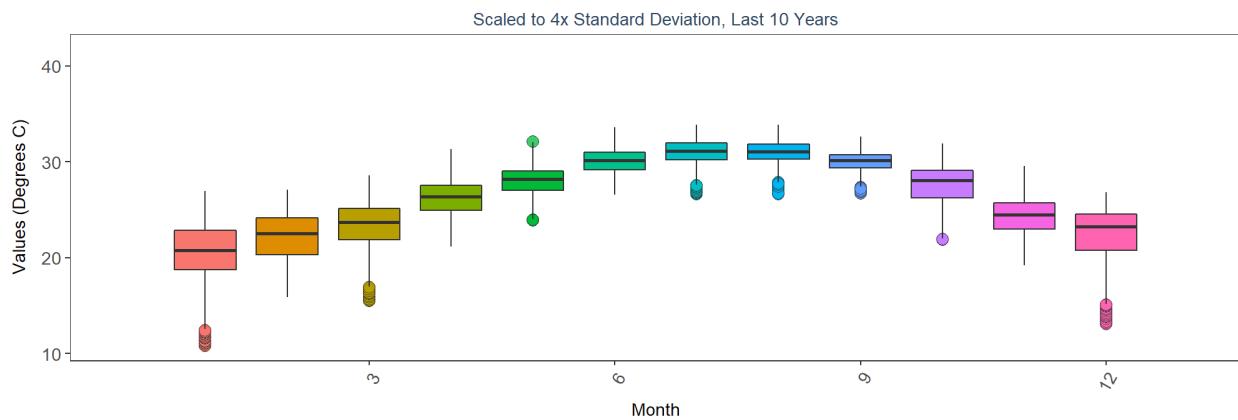
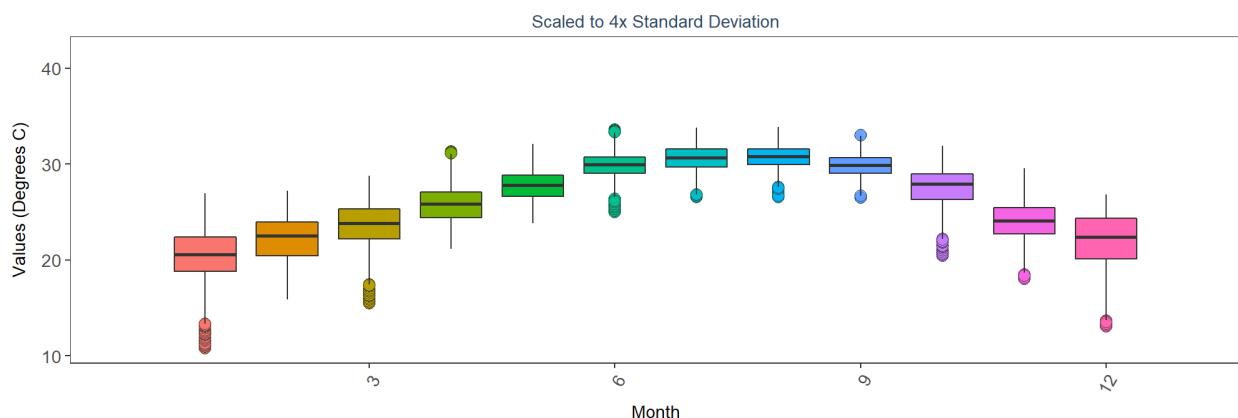
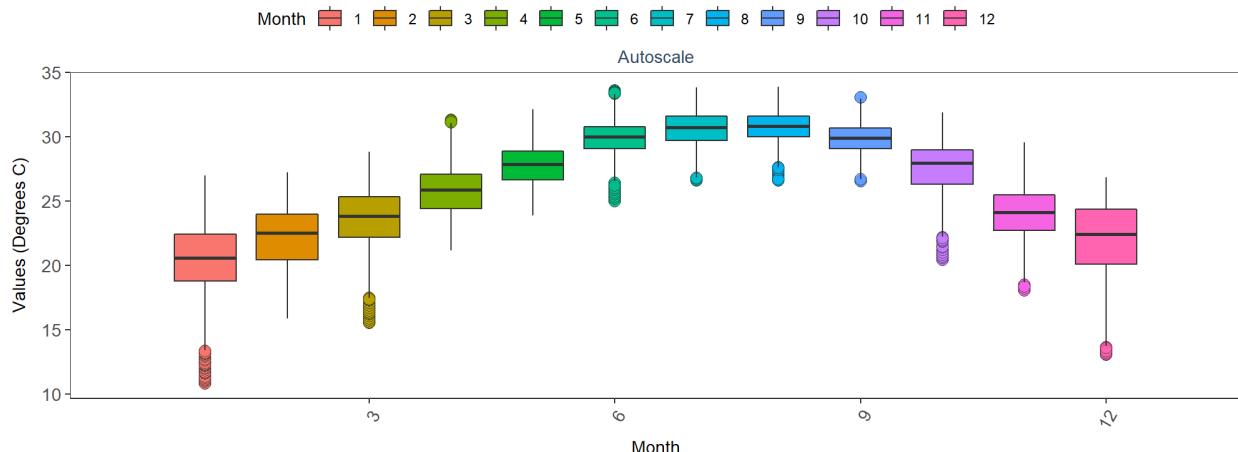
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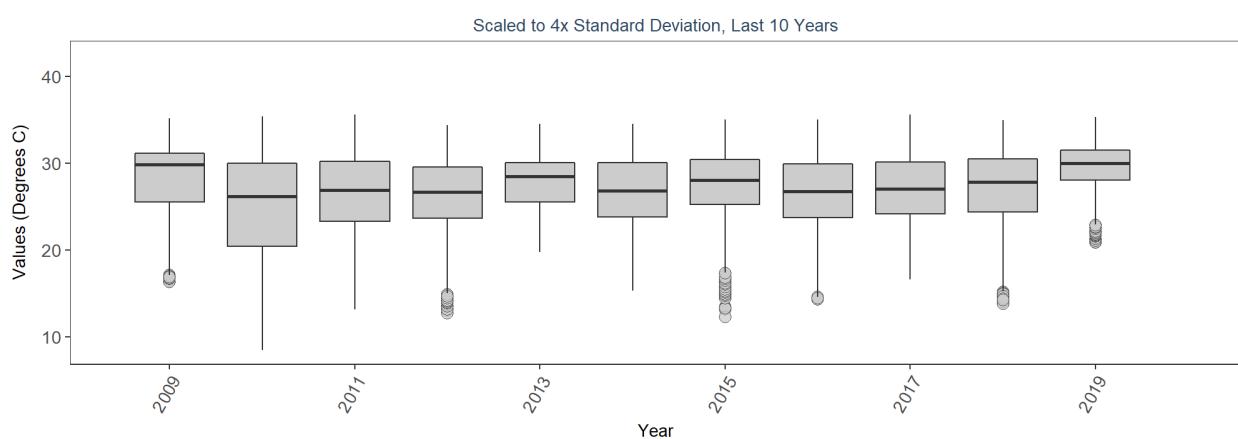
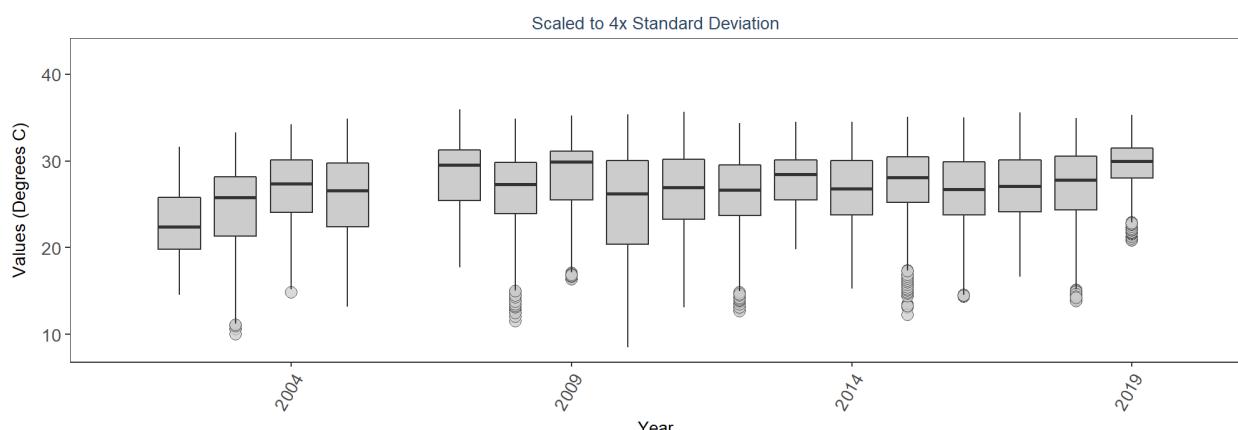
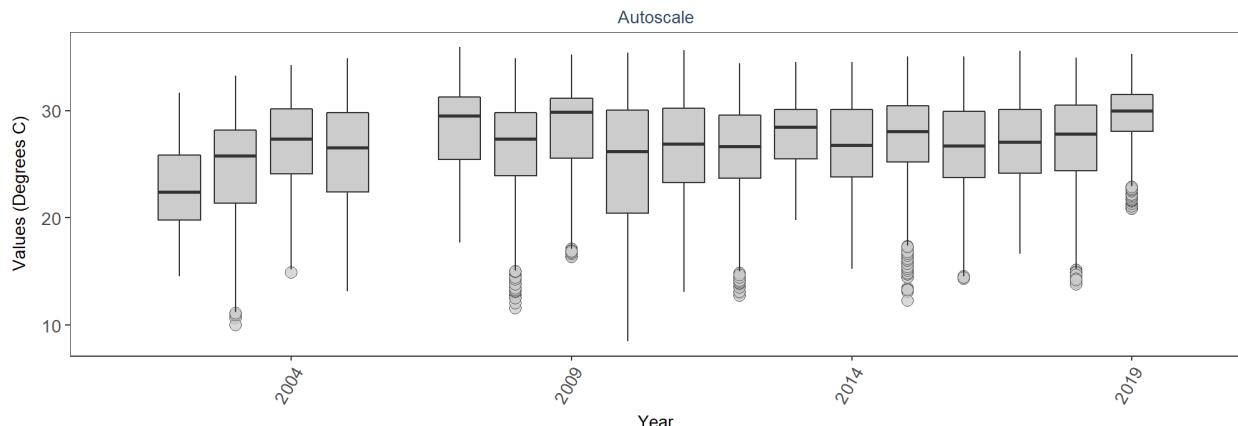
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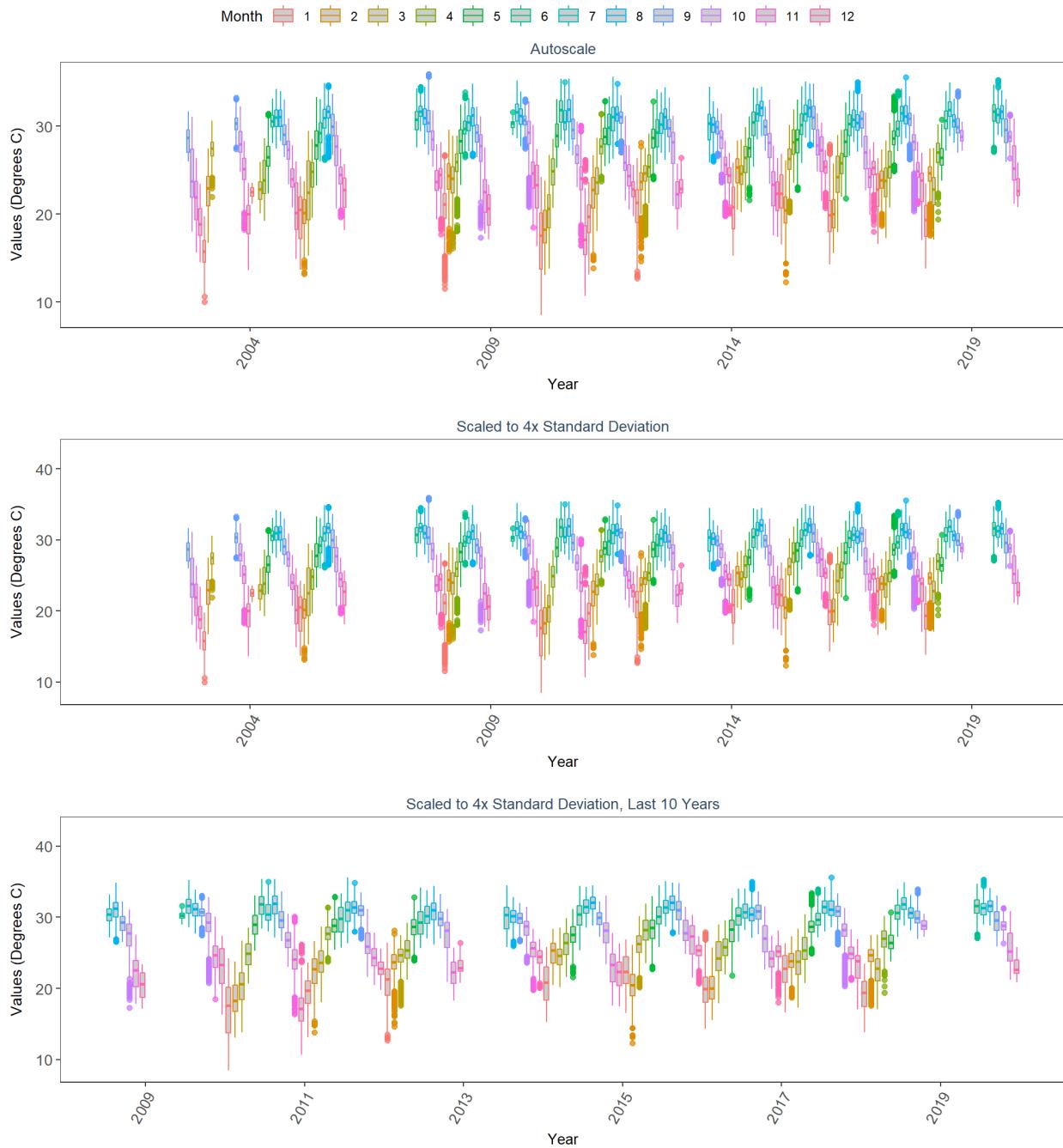
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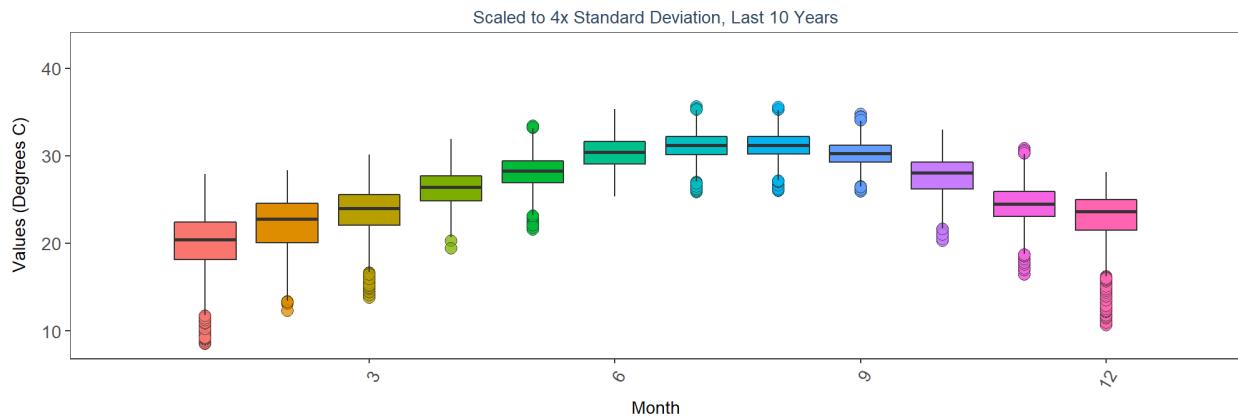
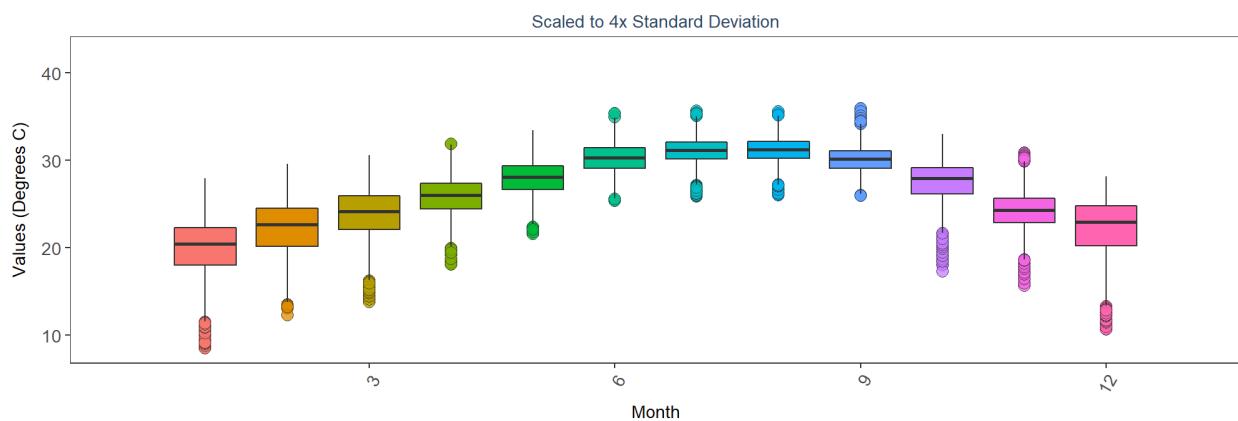
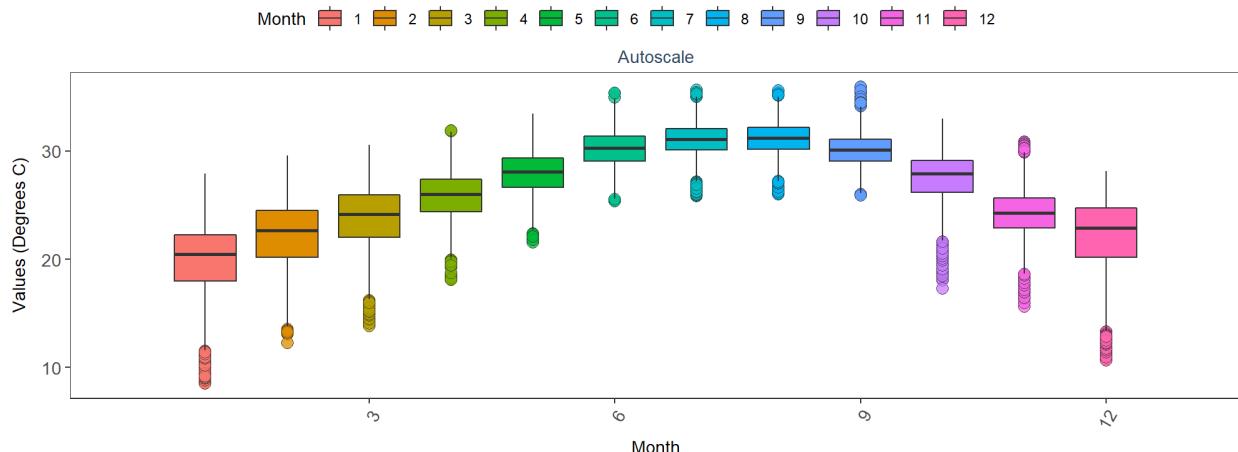
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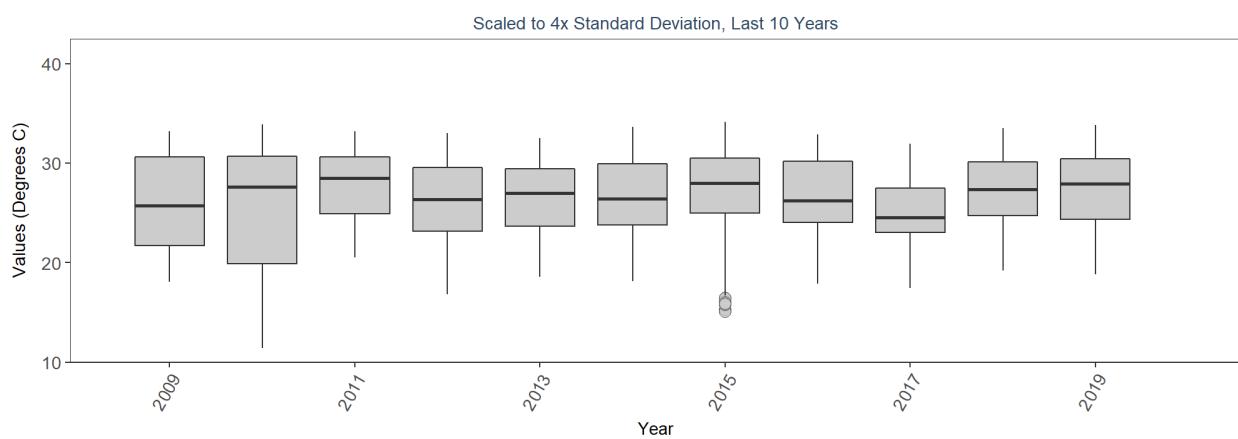
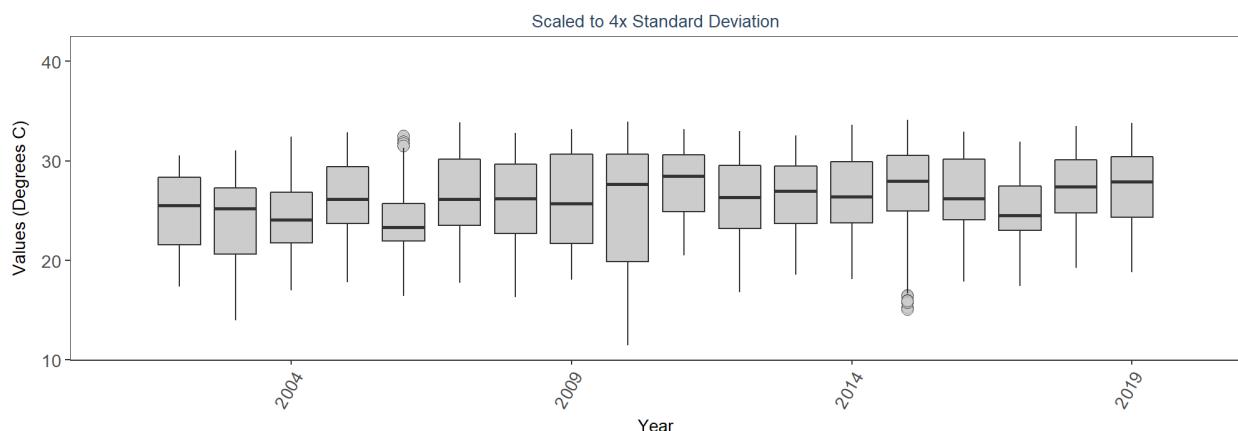
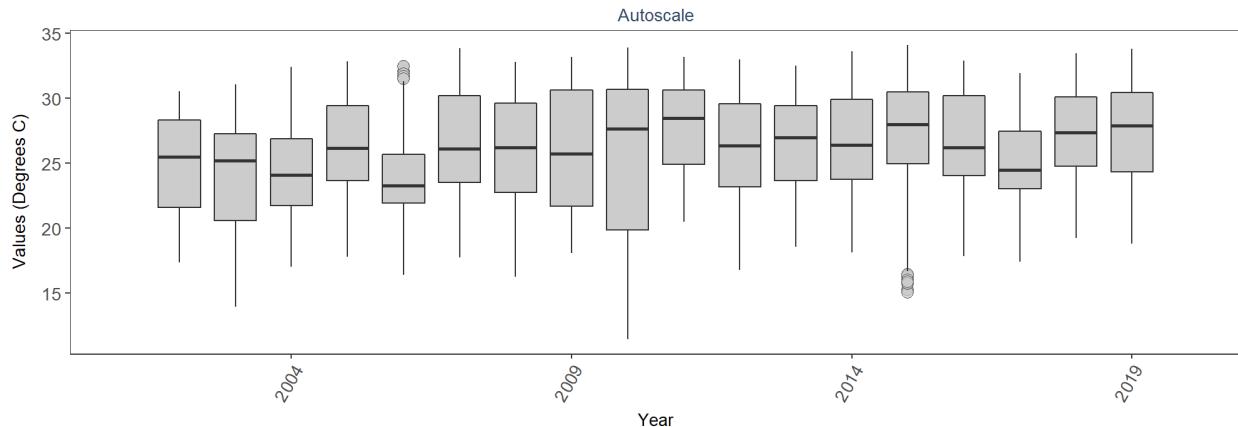
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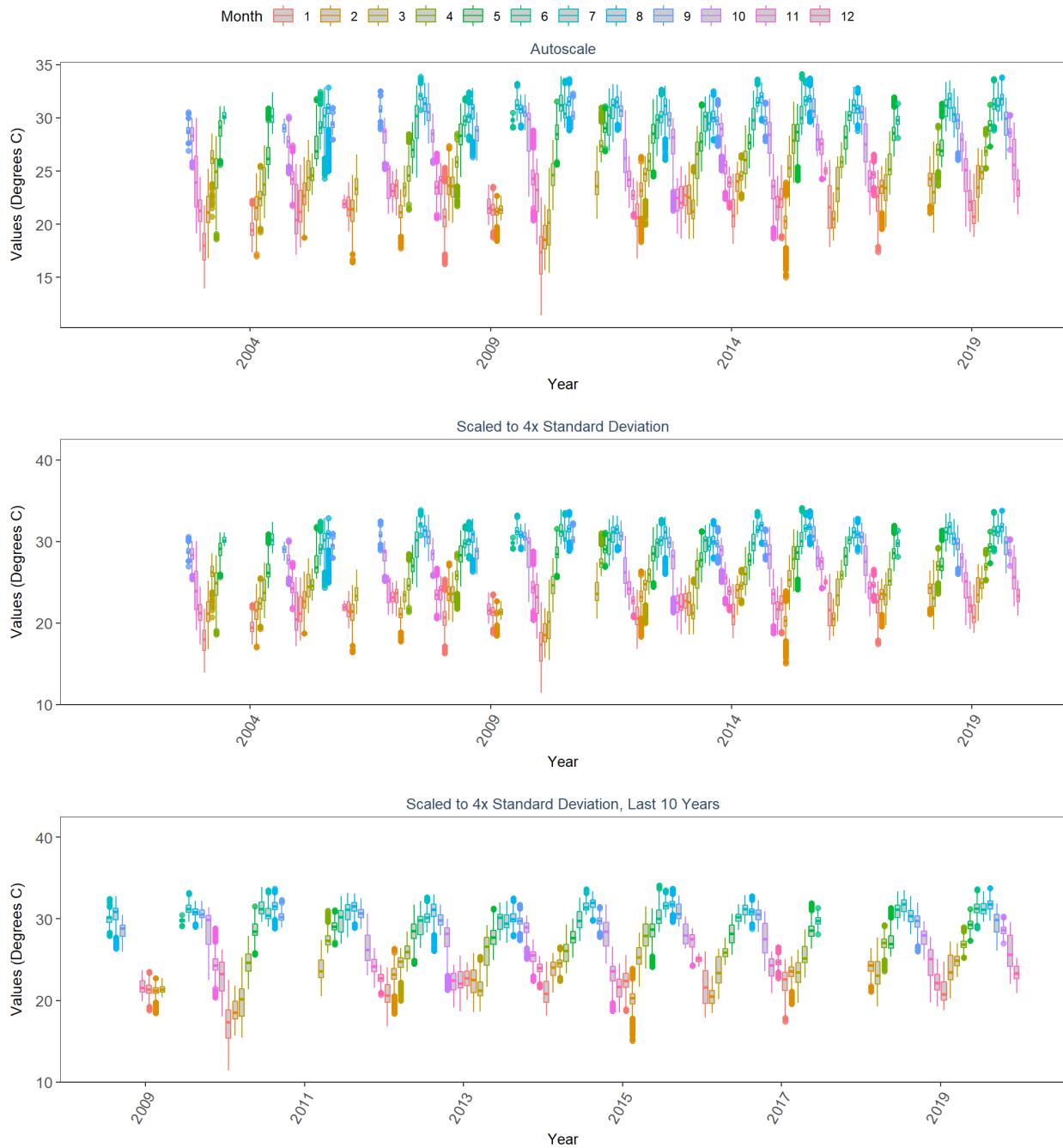
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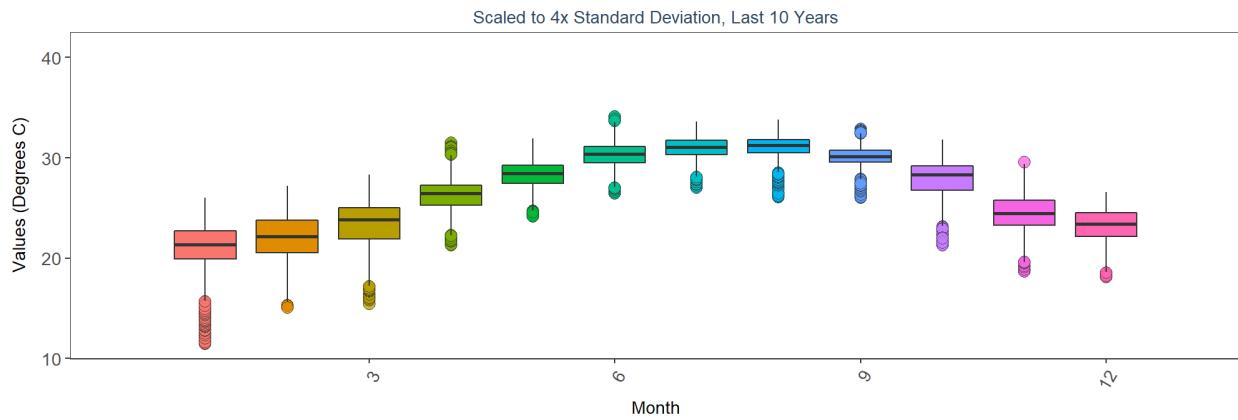
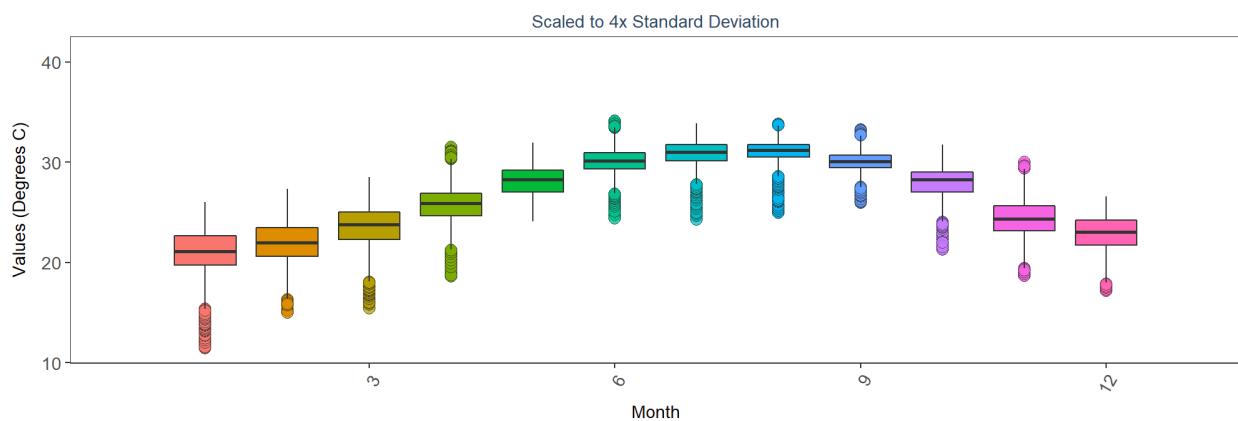
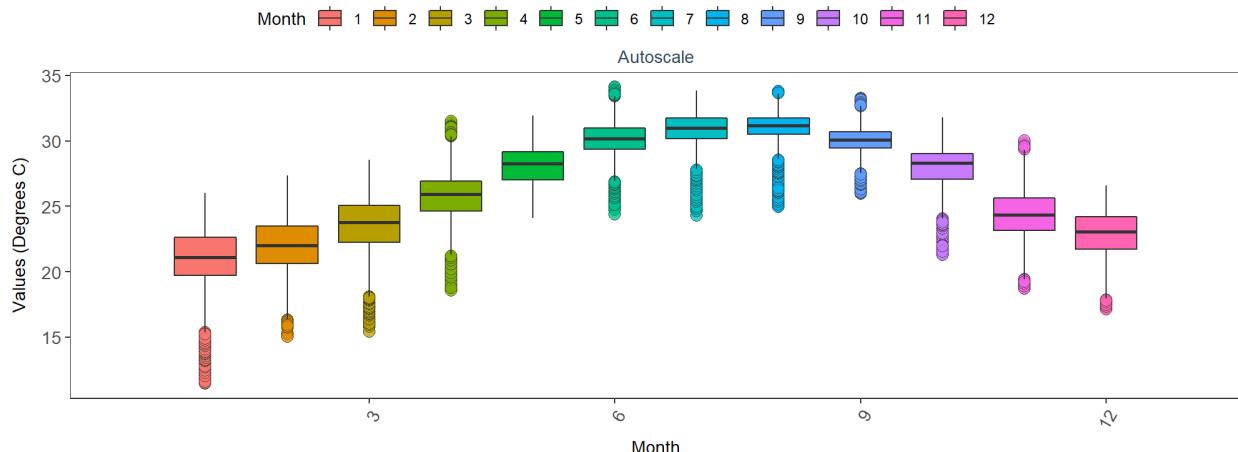
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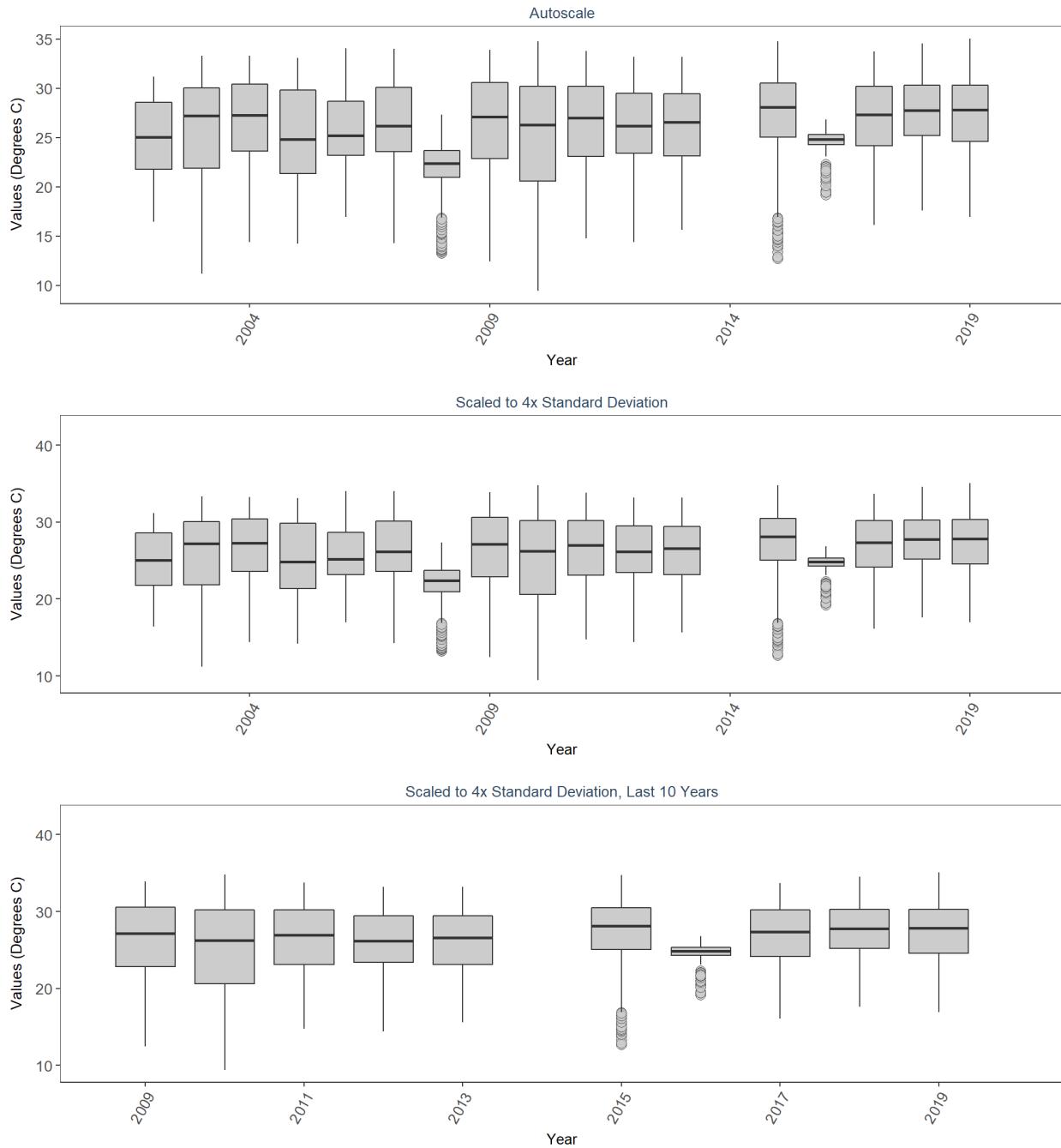
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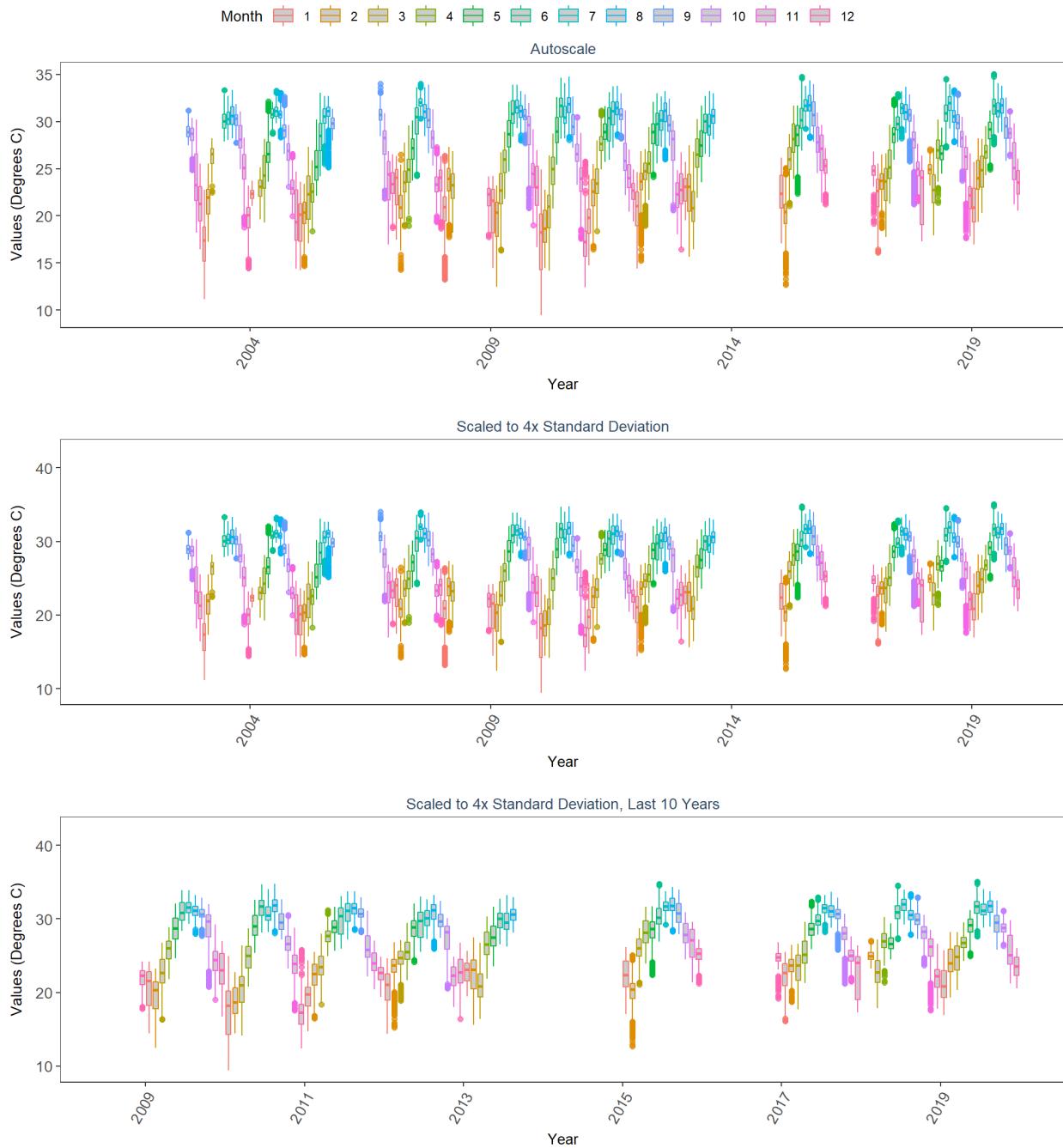
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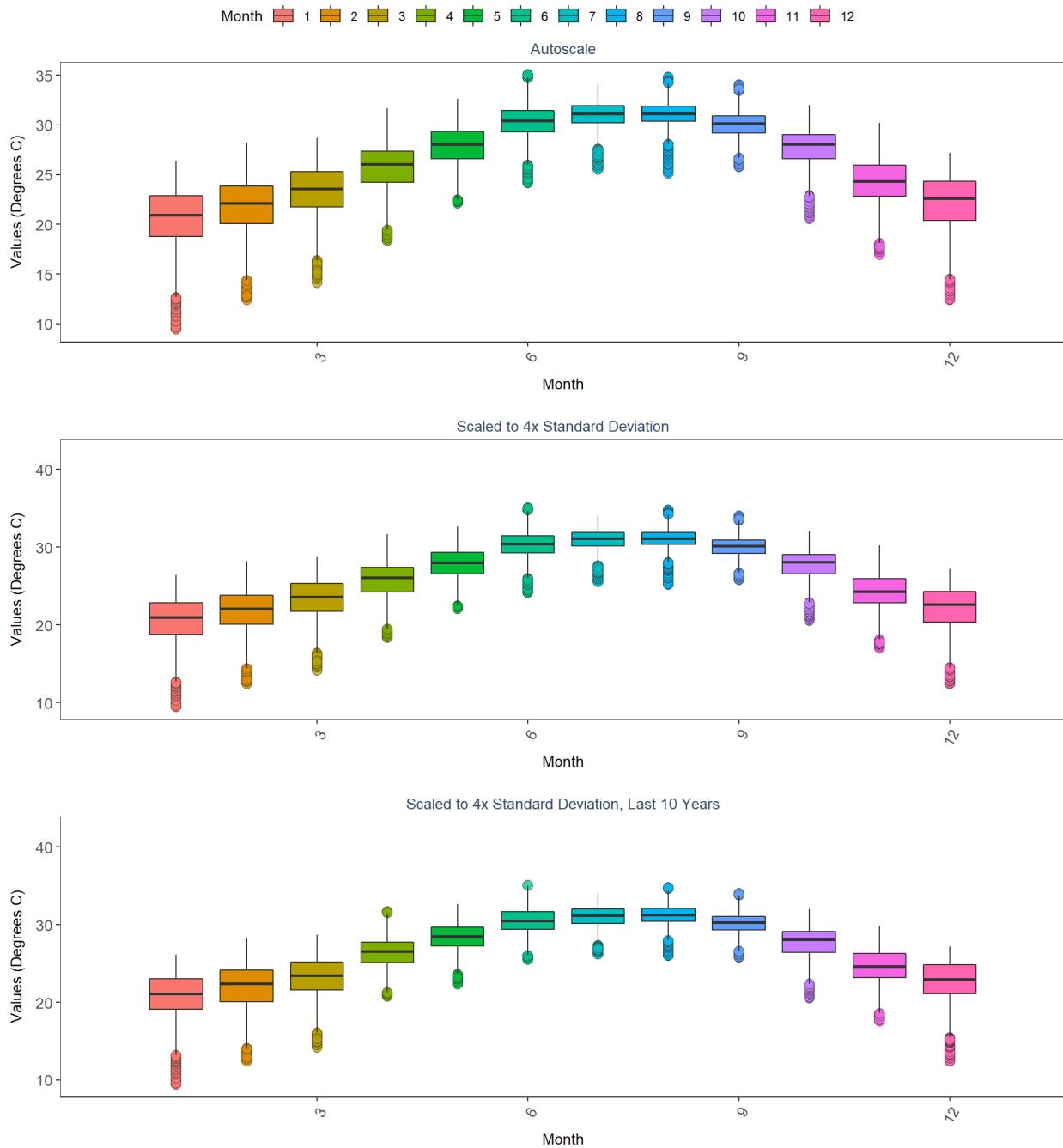
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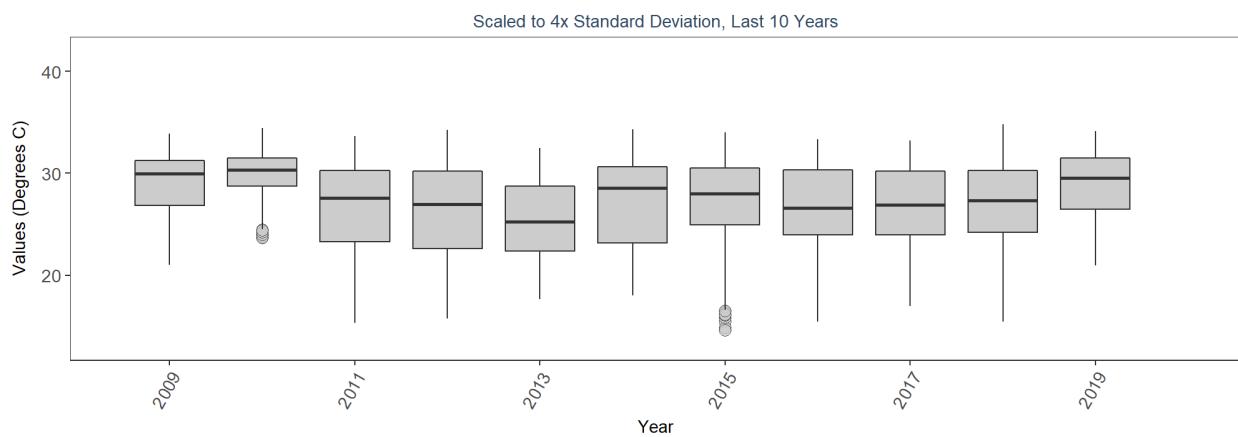
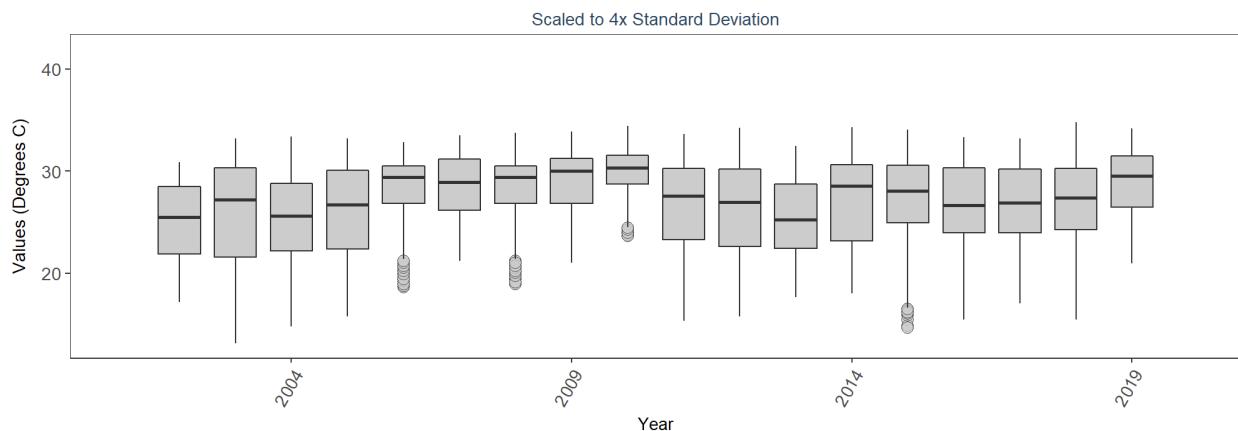
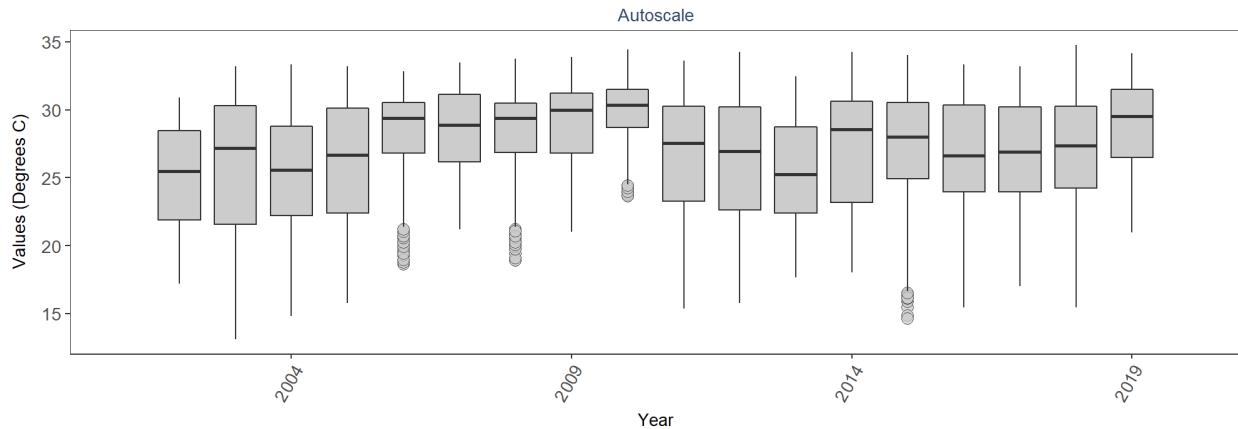
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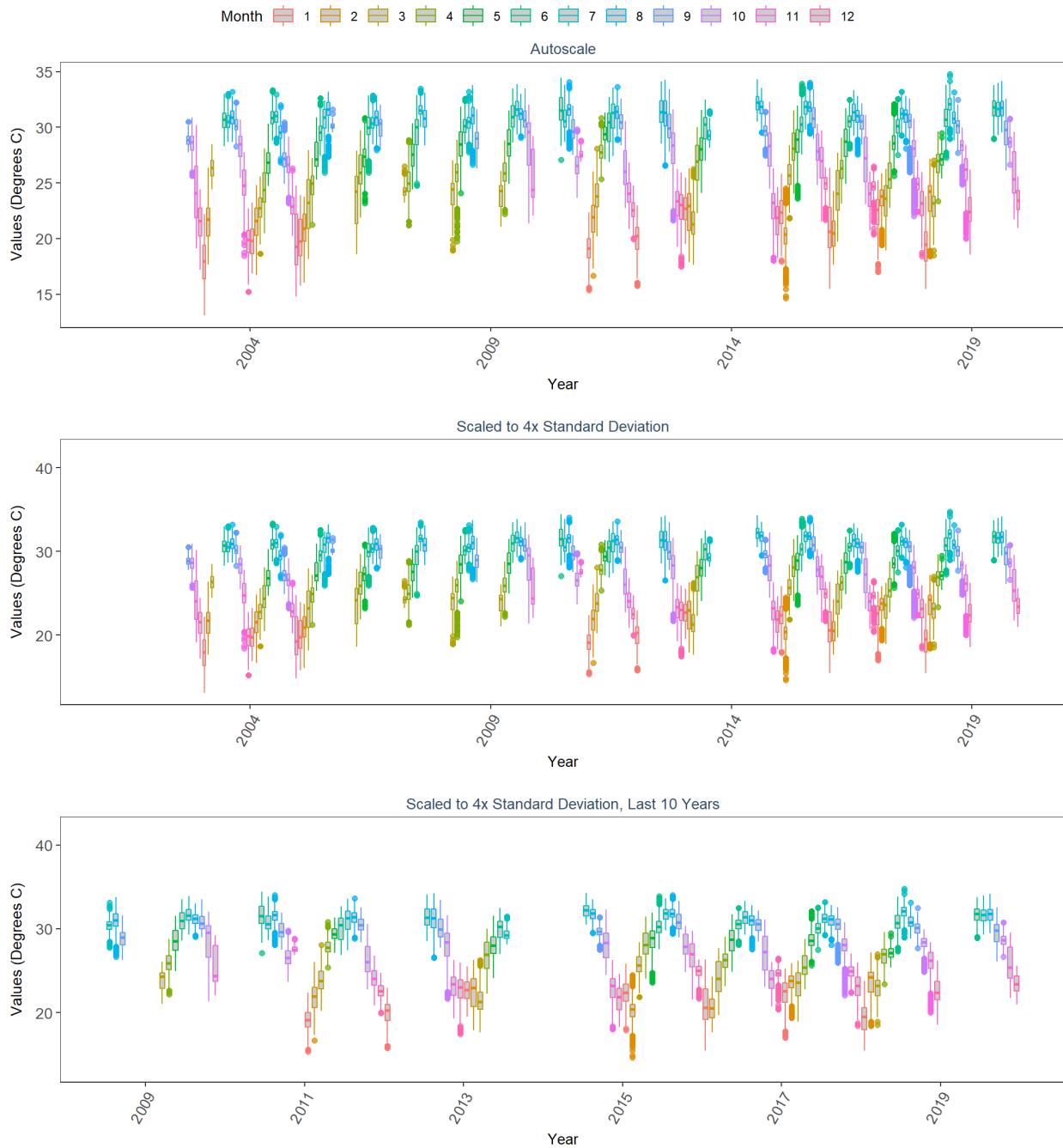
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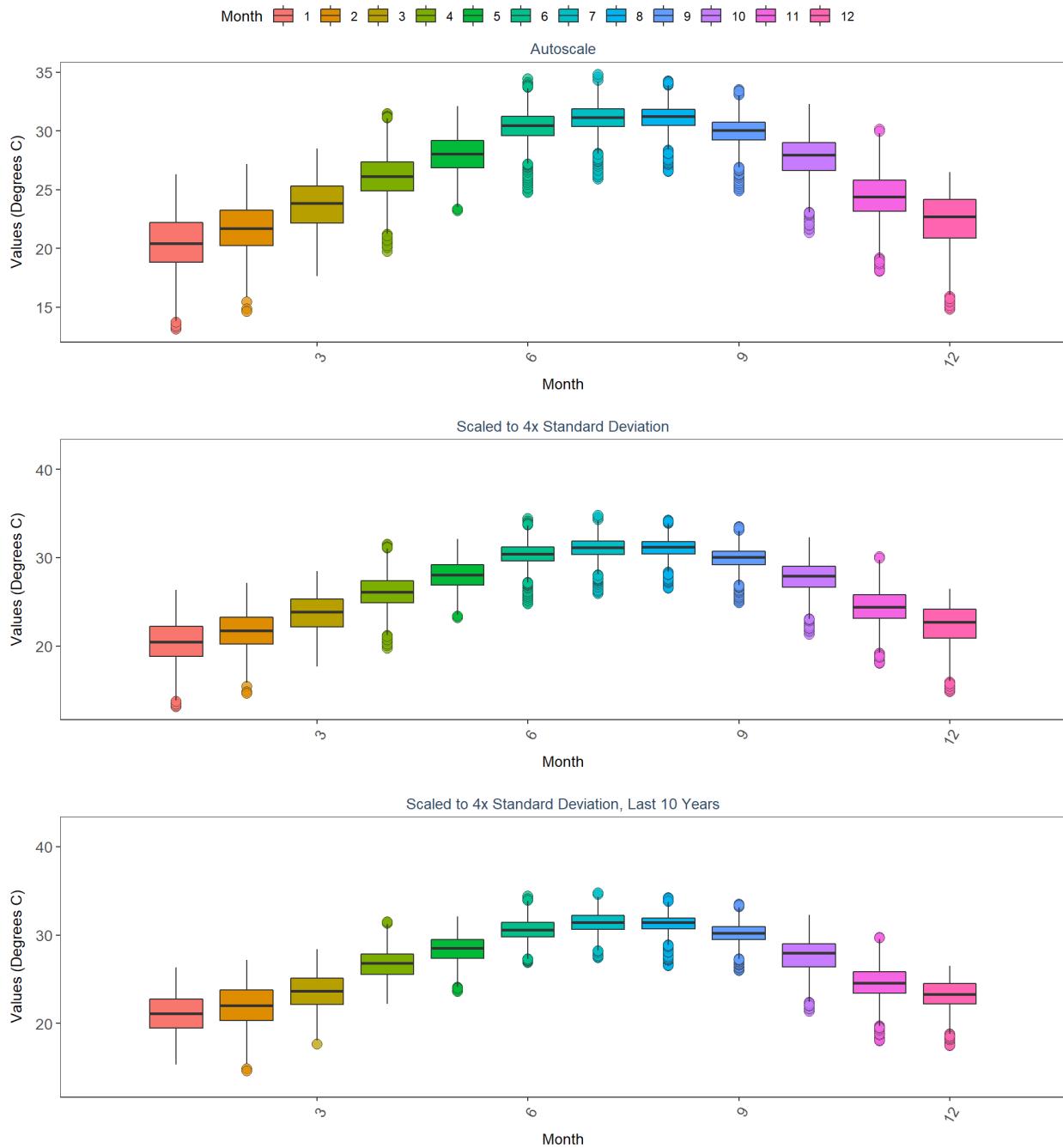
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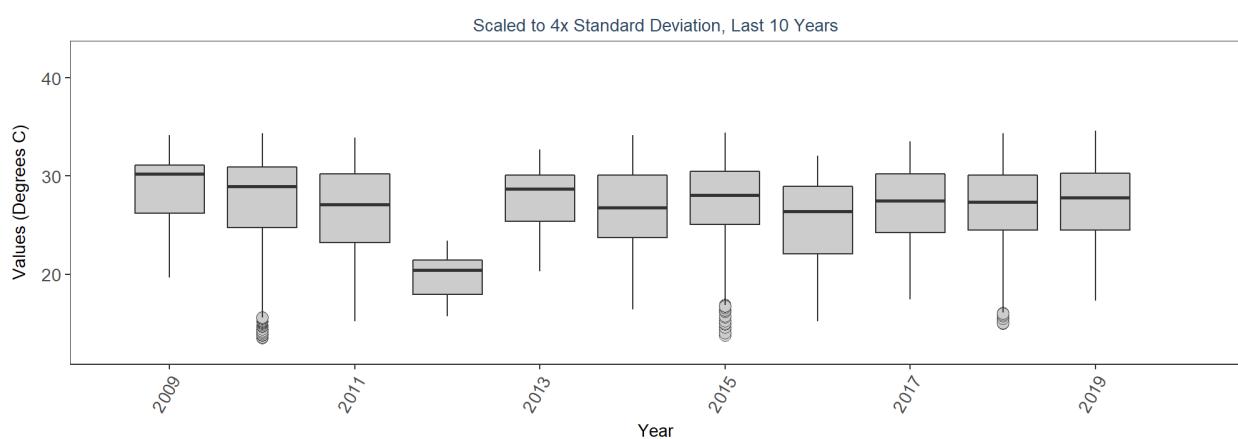
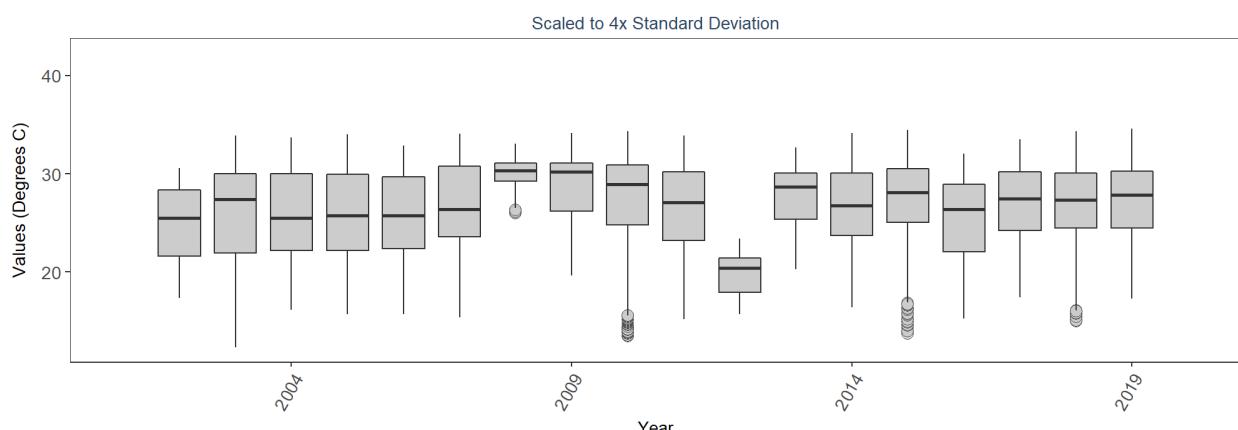
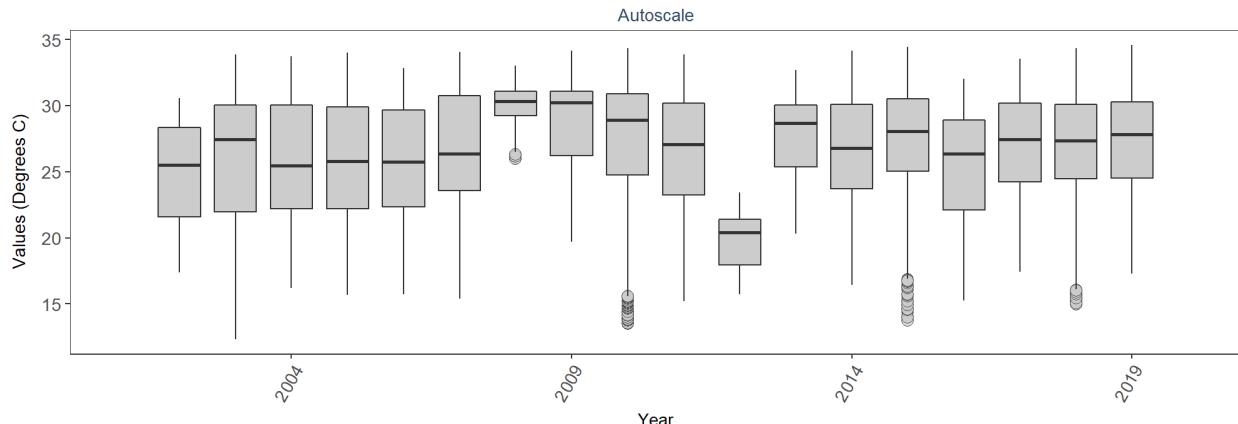
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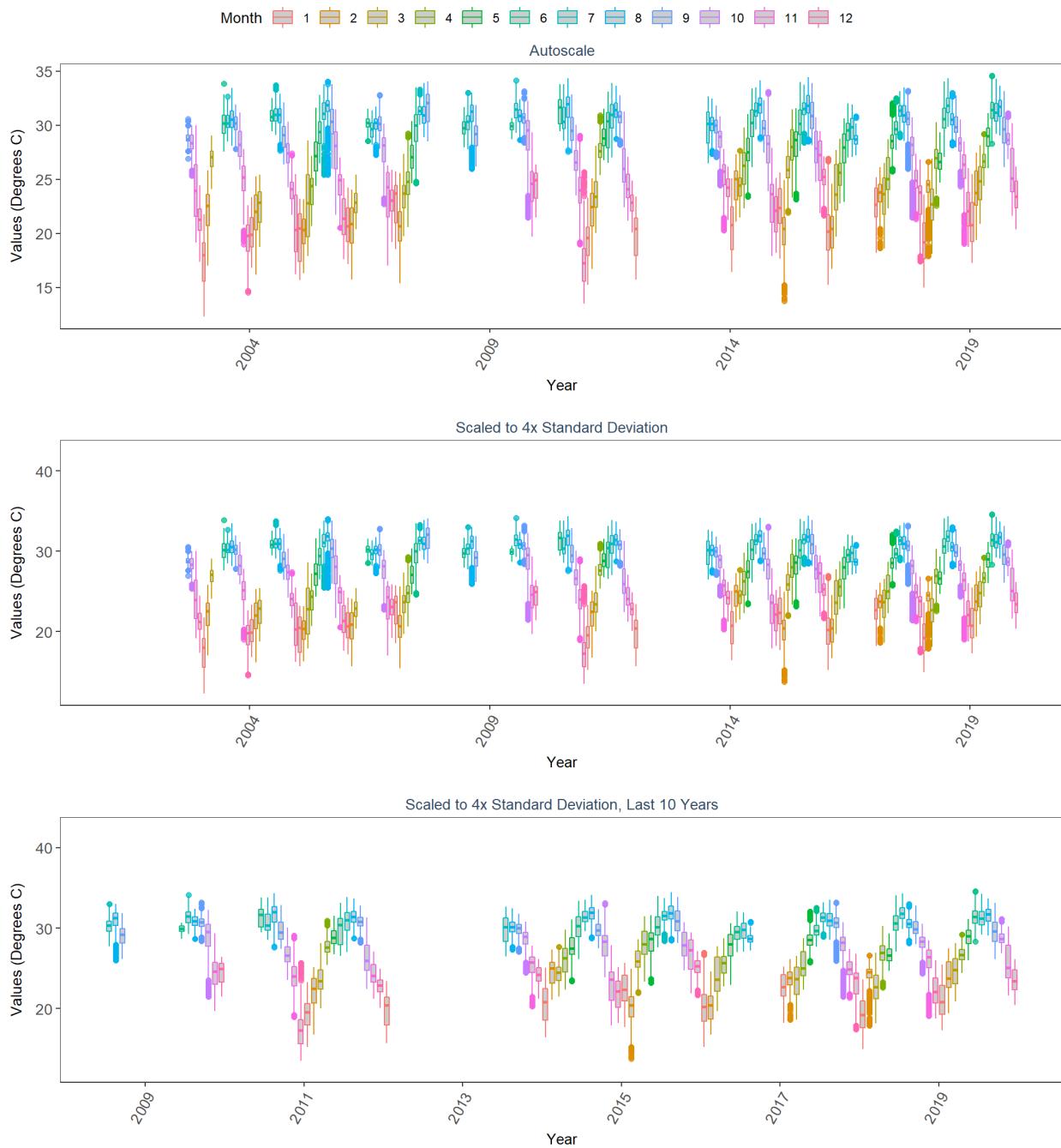
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 By Month



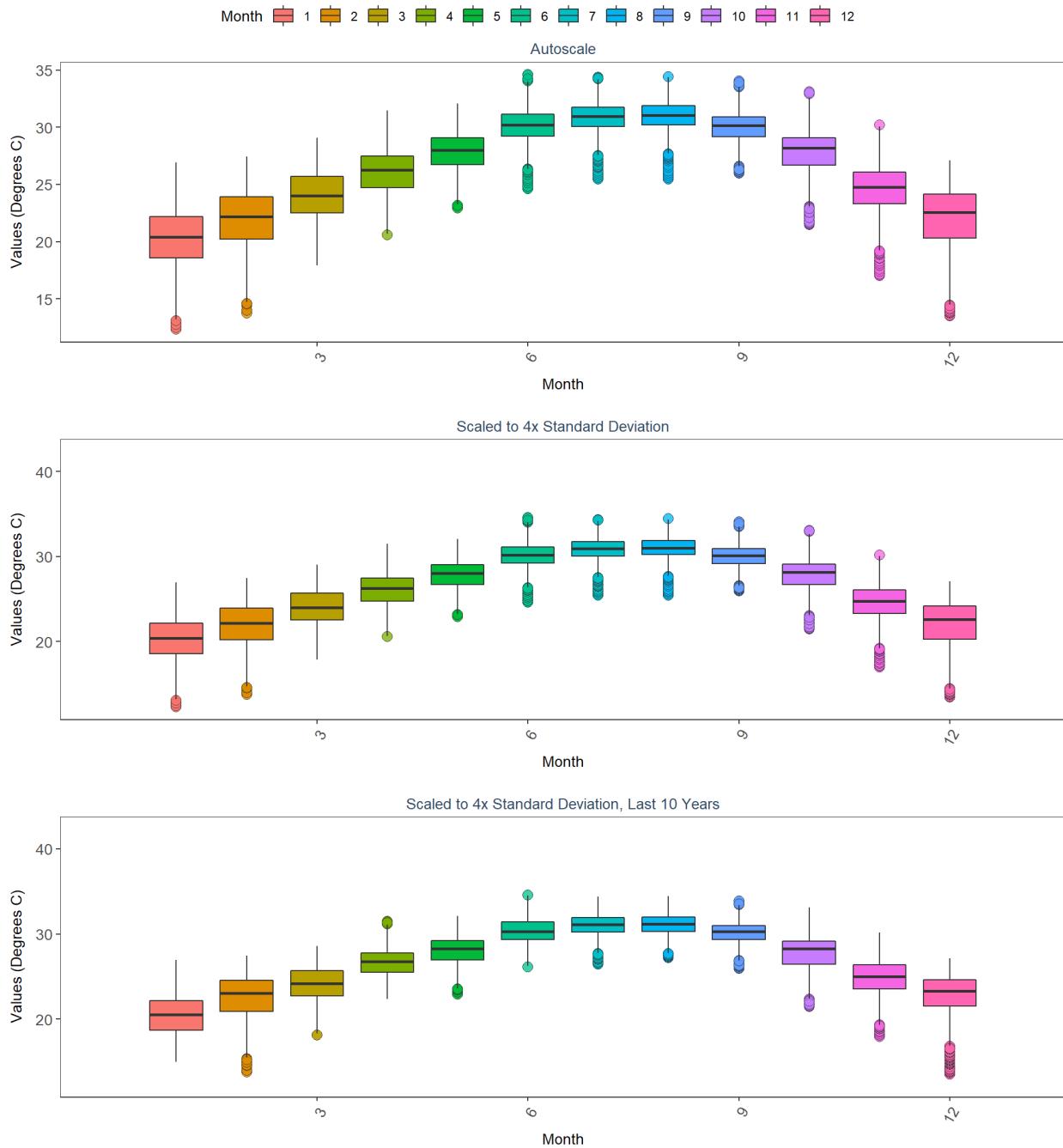
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 By Year



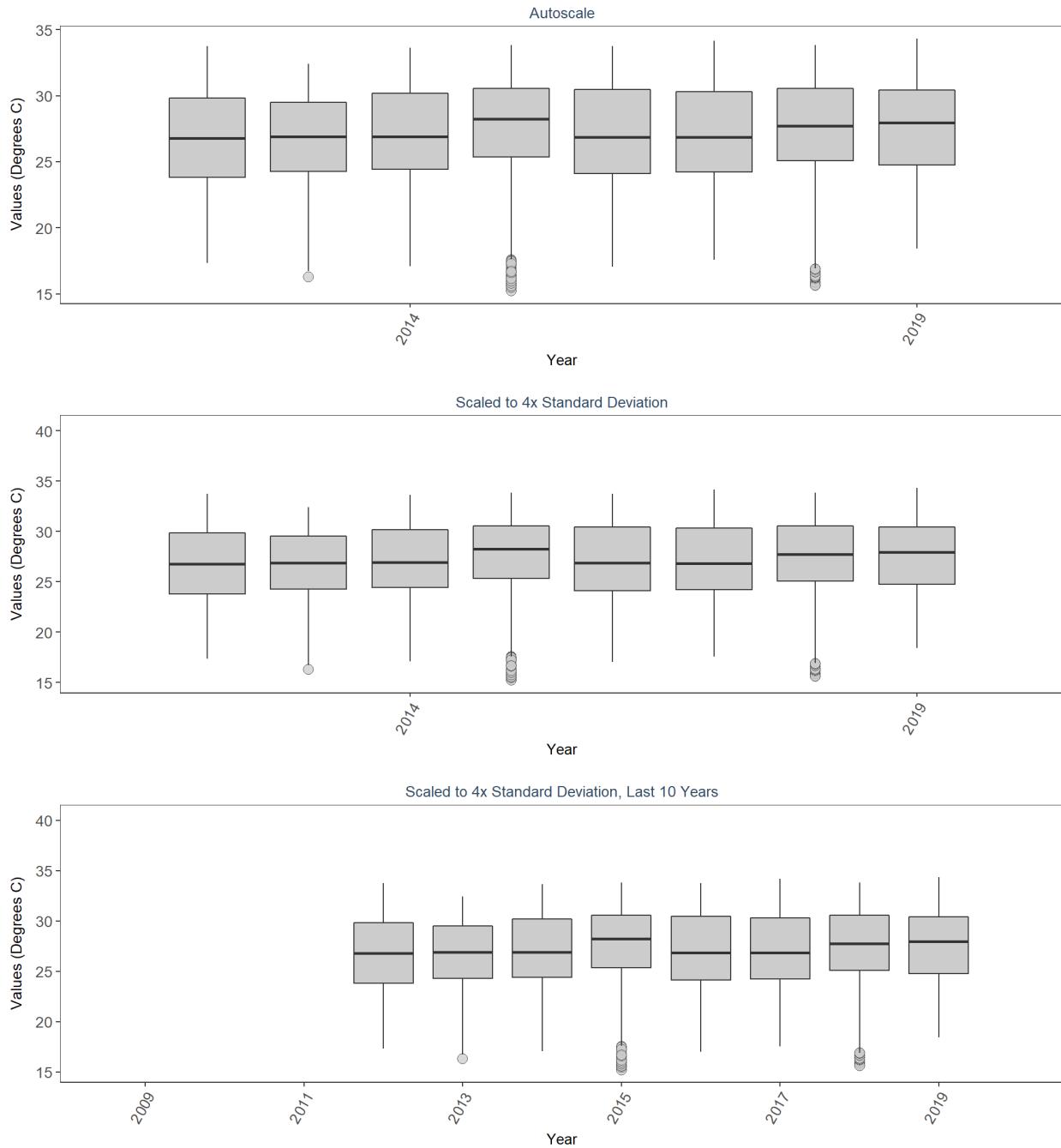
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 By Year & Month



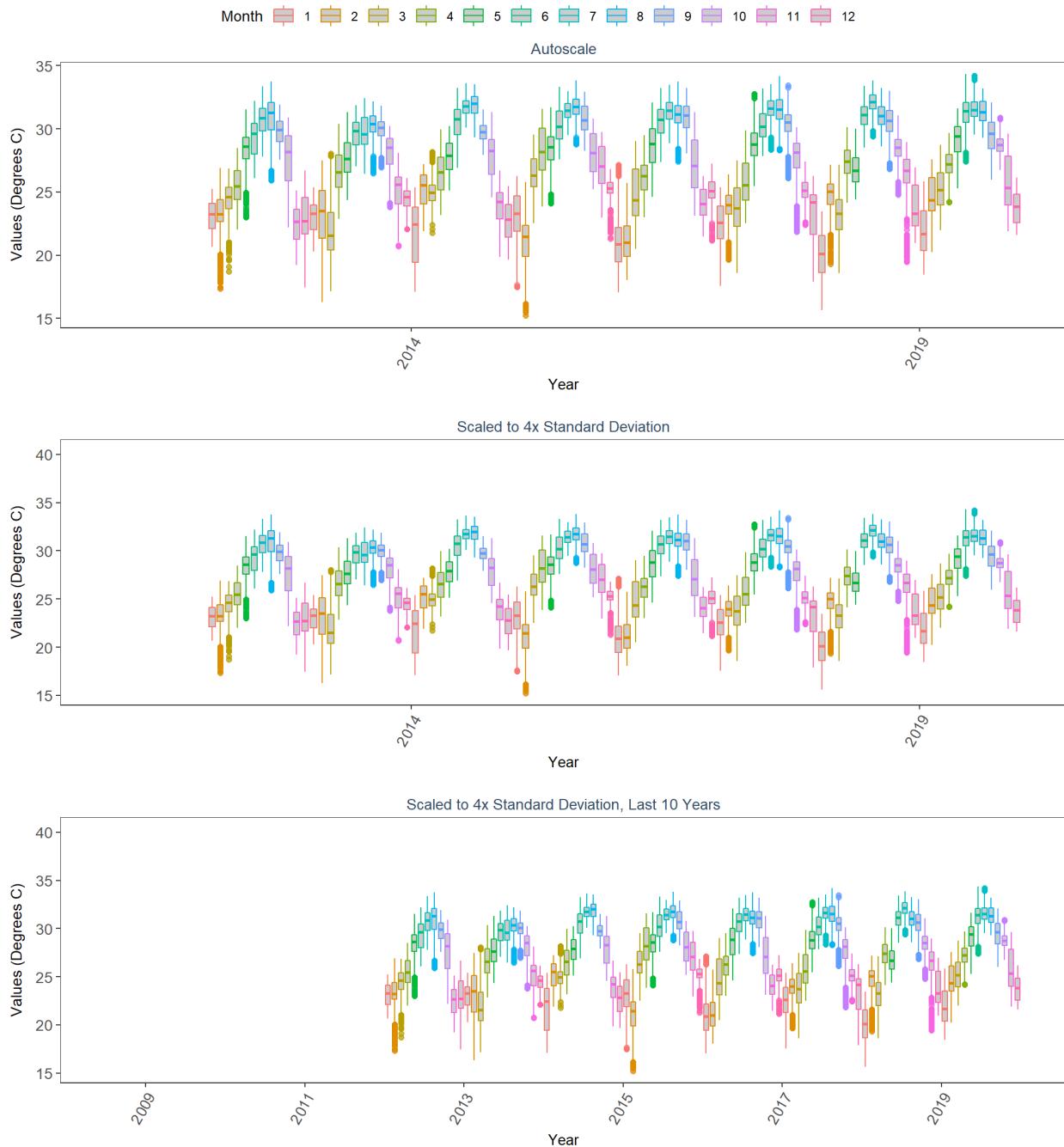
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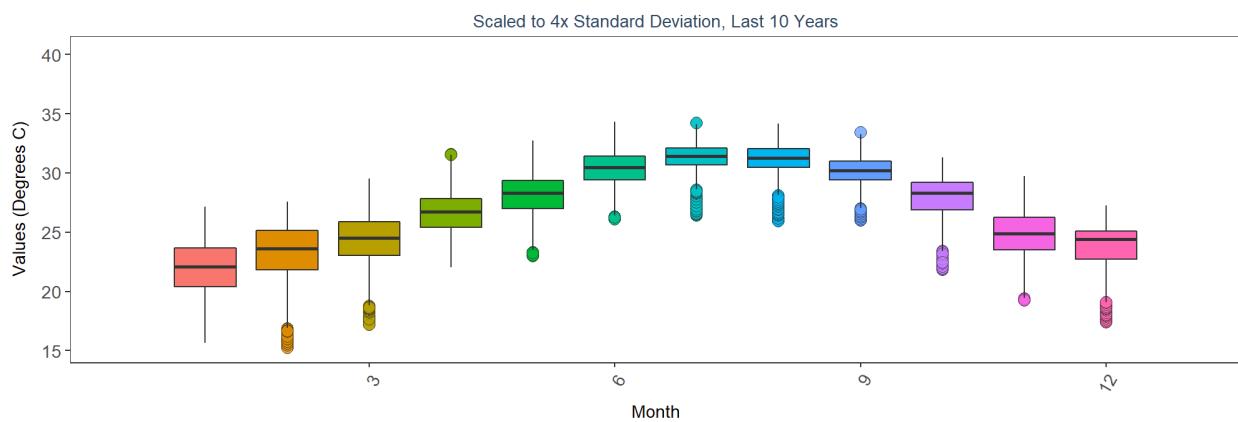
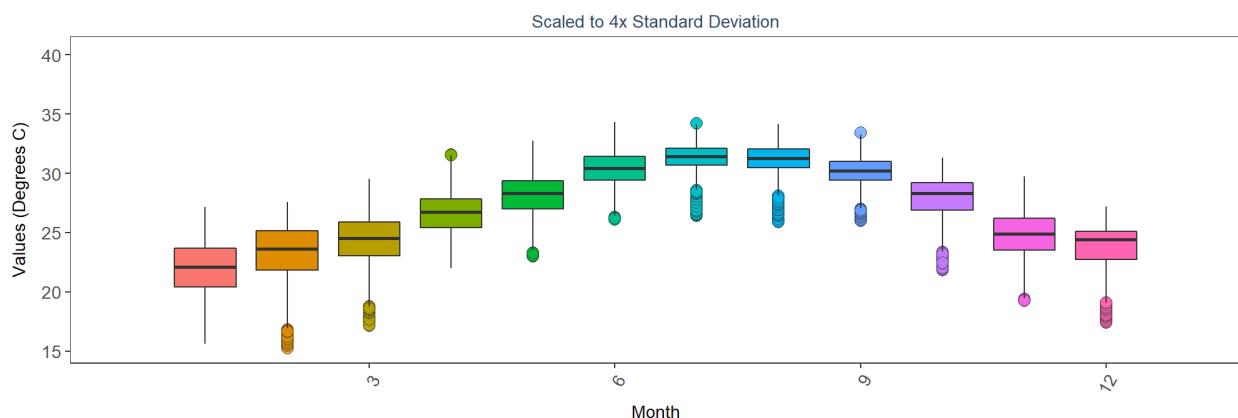
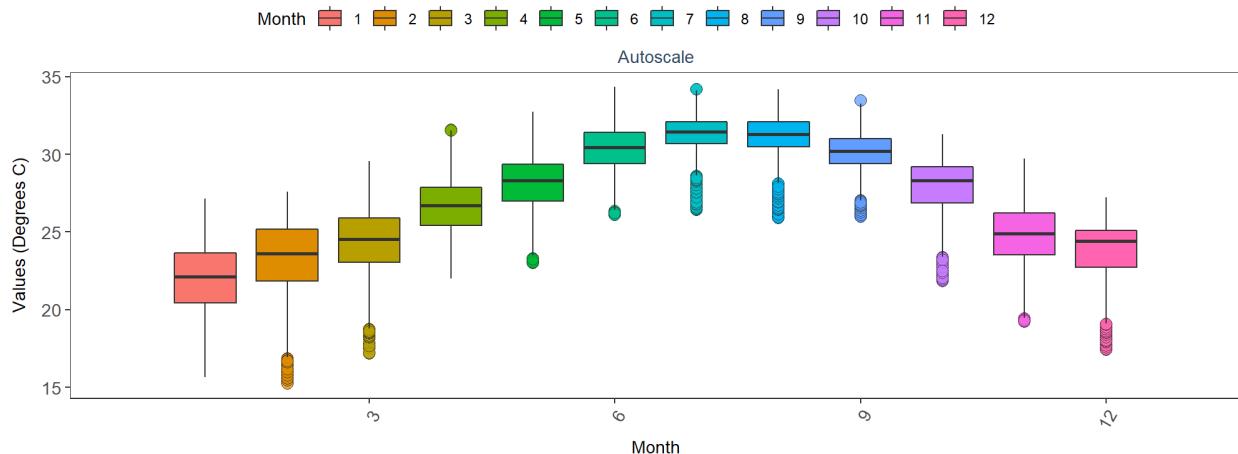
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 By Year



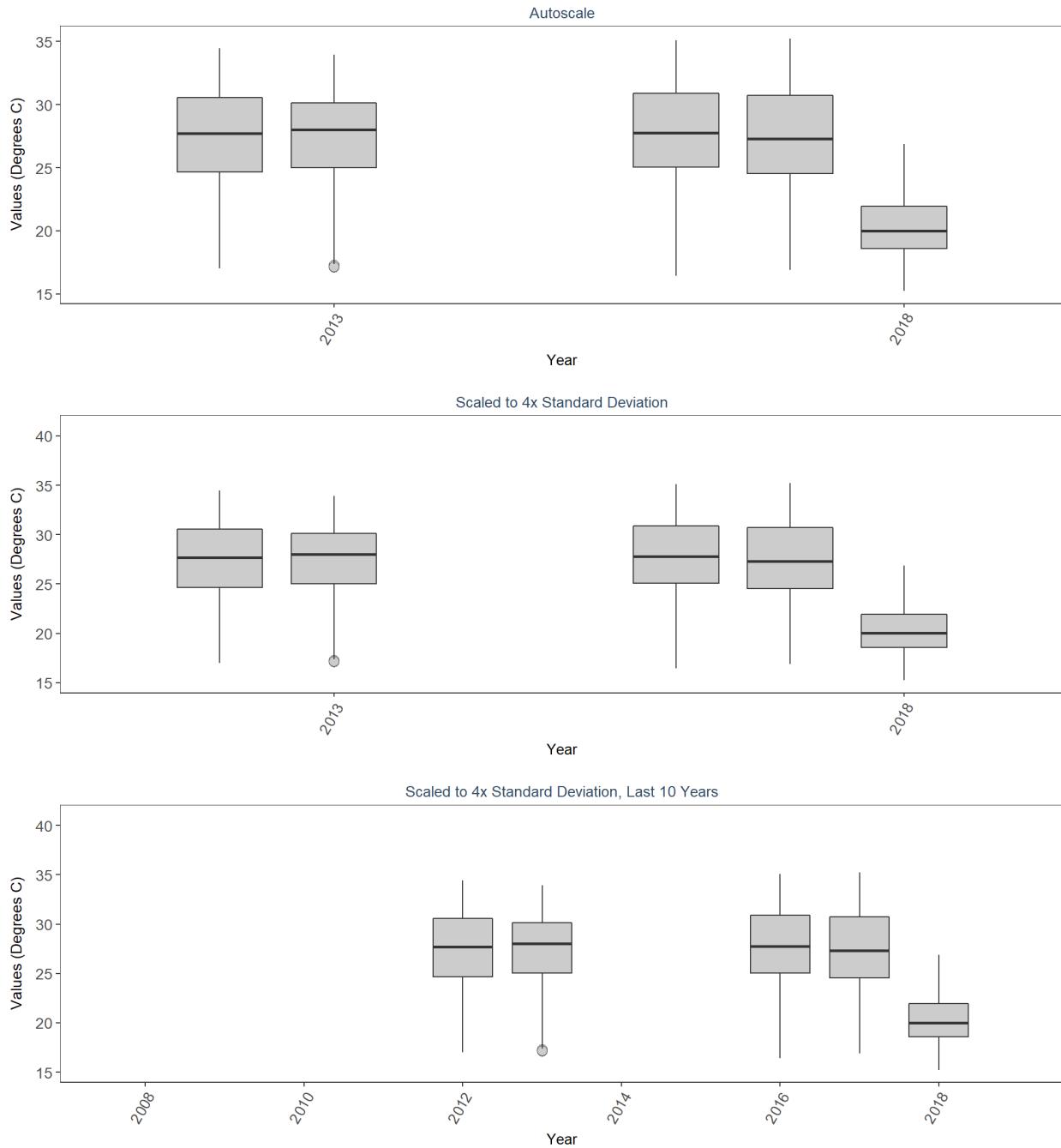
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 By Year & Month



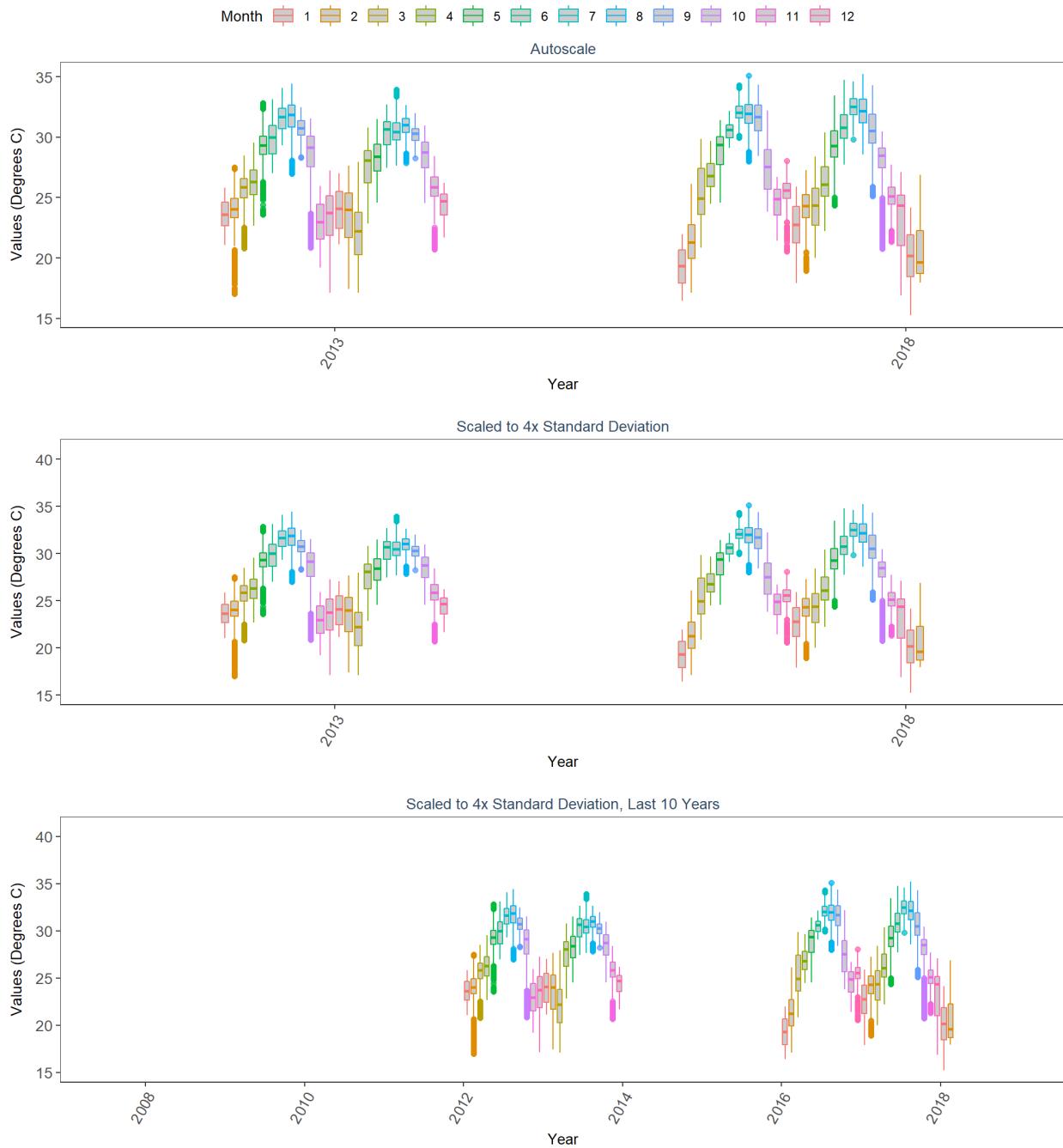
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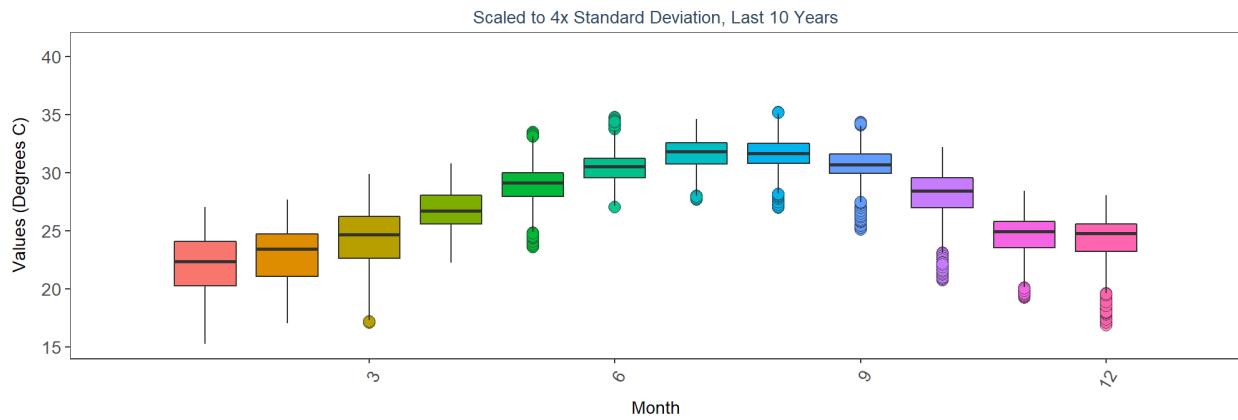
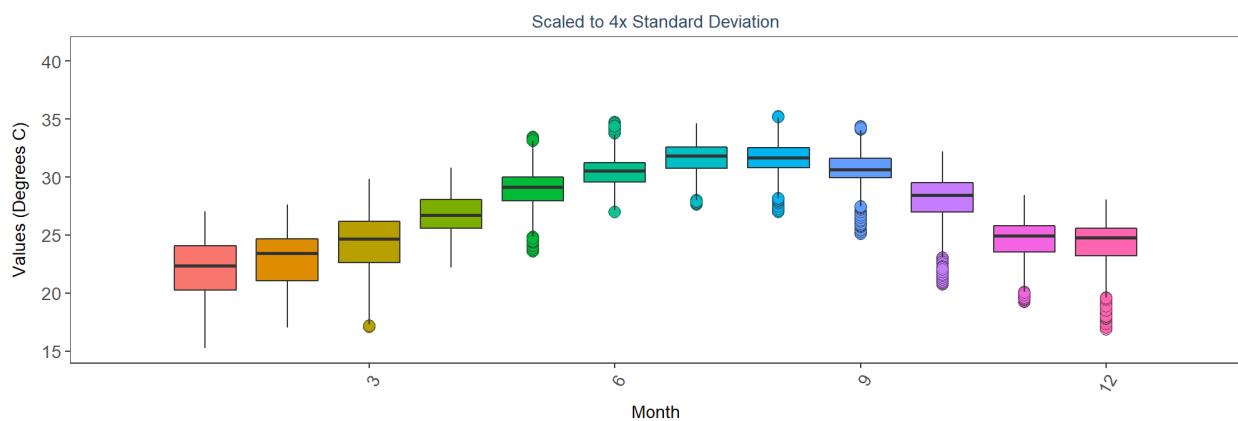
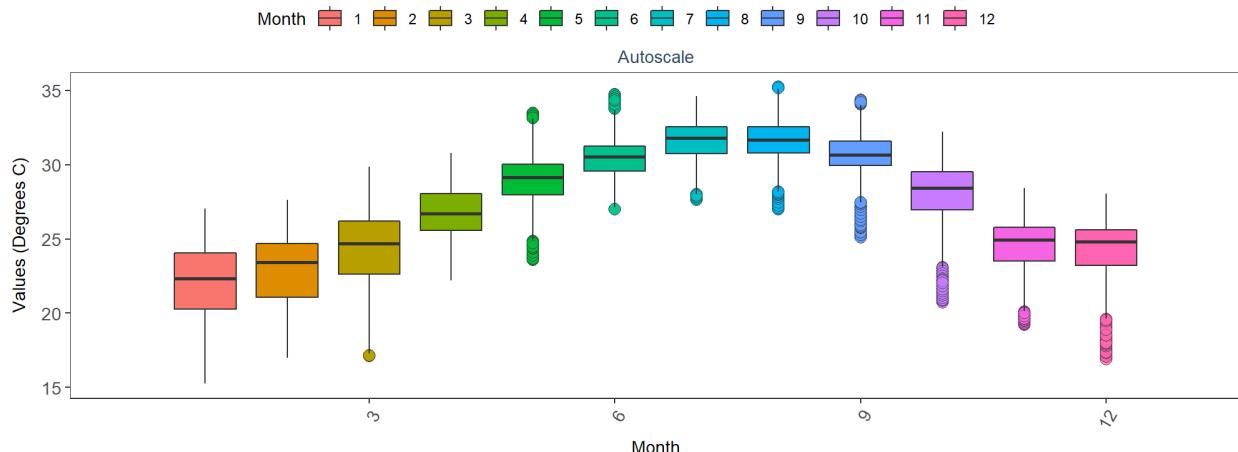
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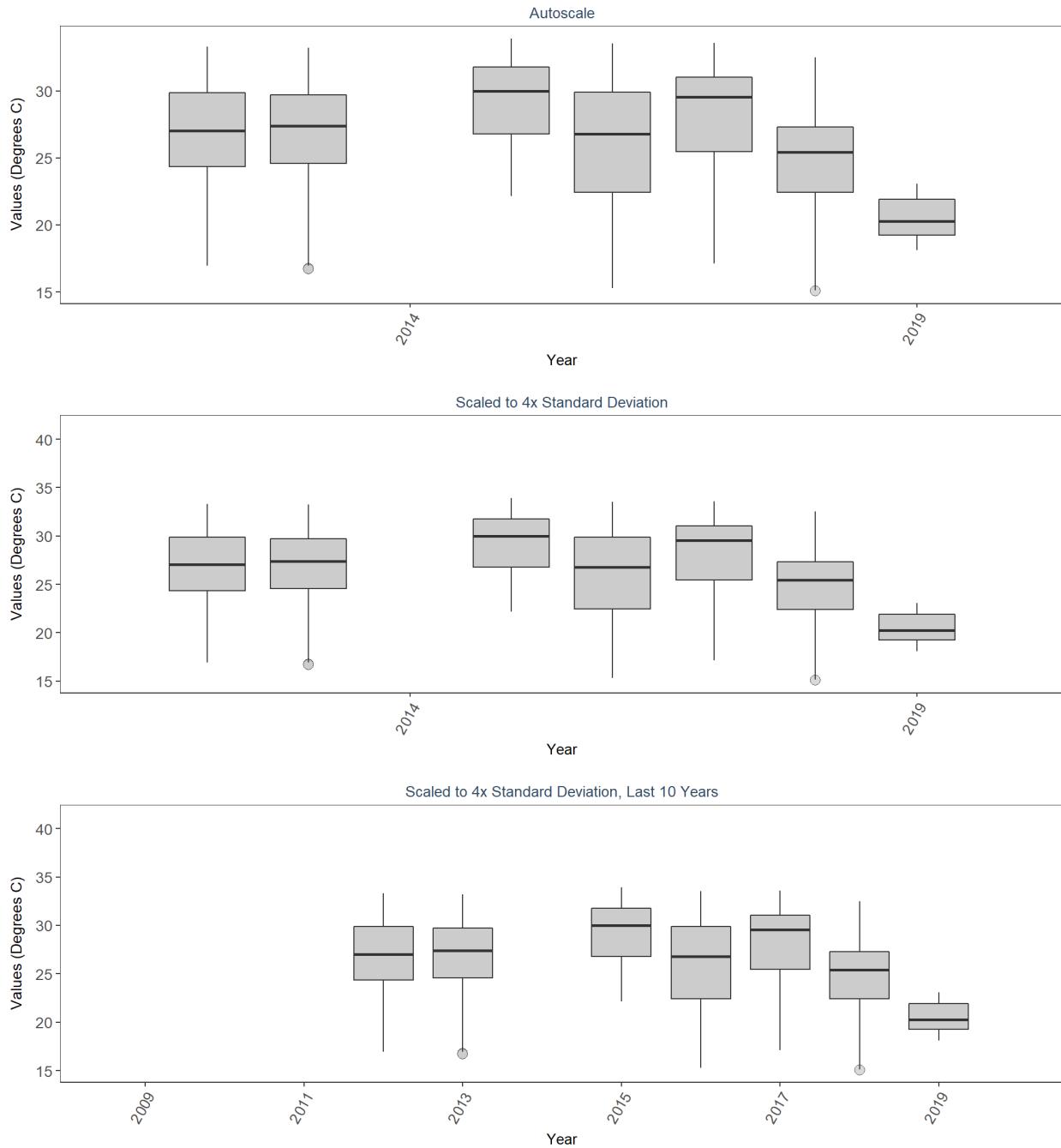
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 By Year & Month



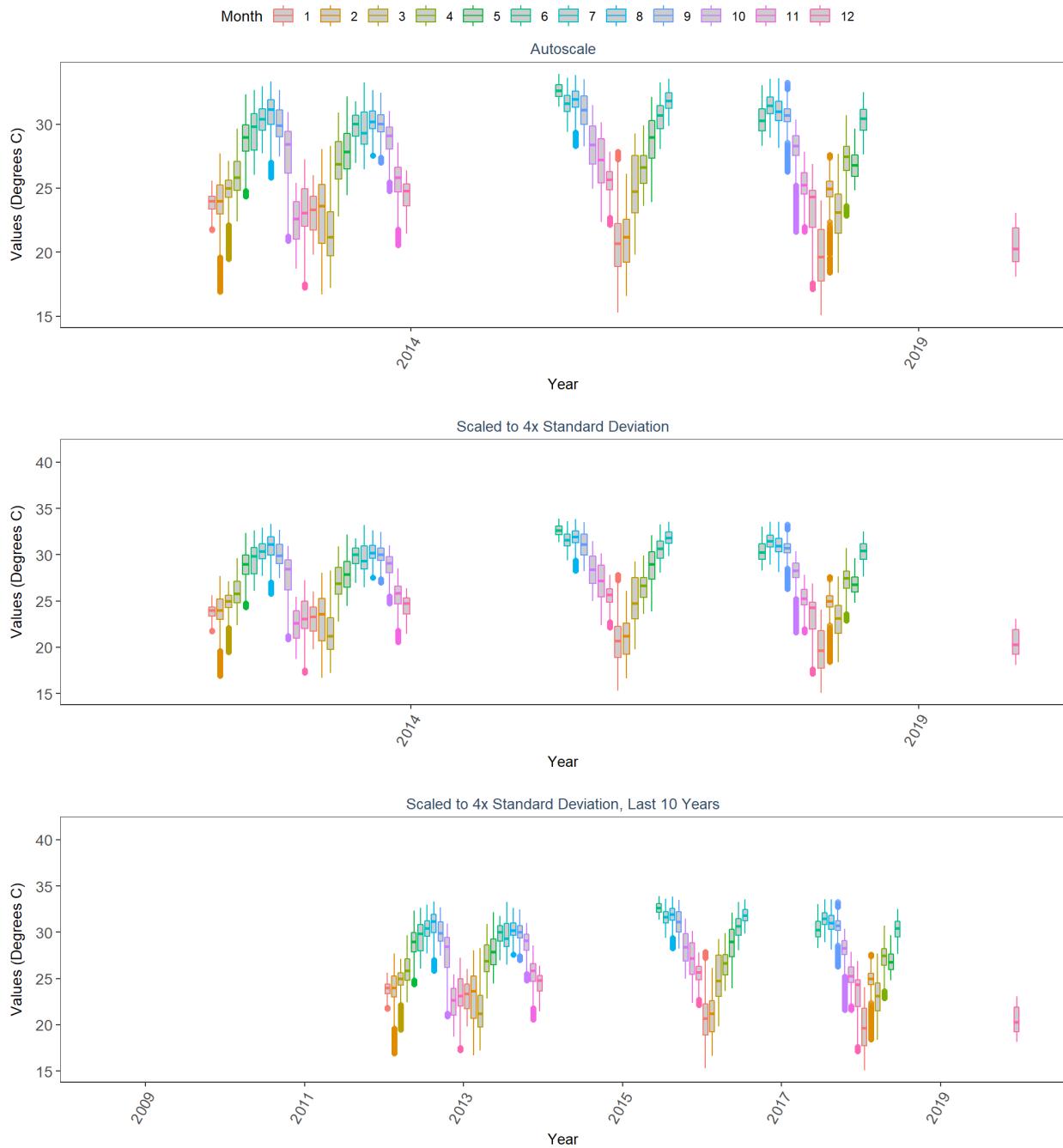
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 By Month



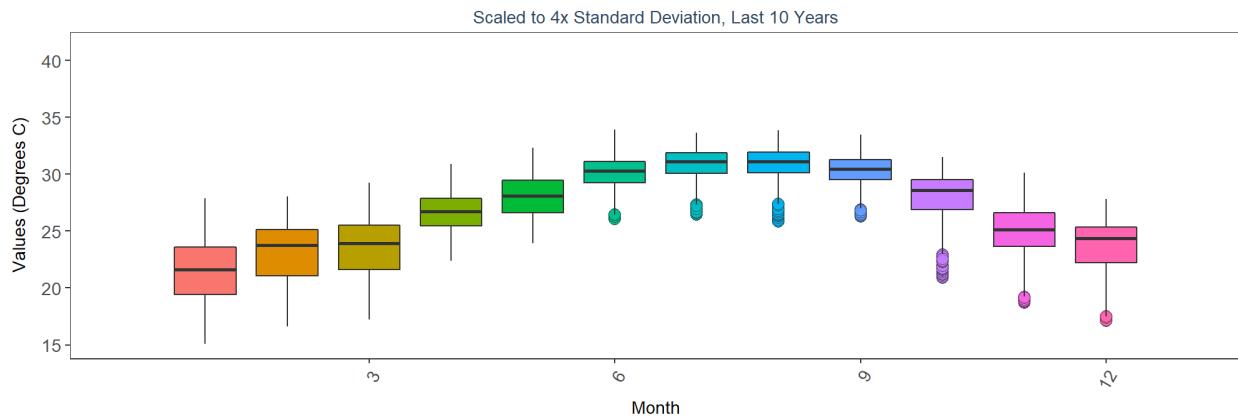
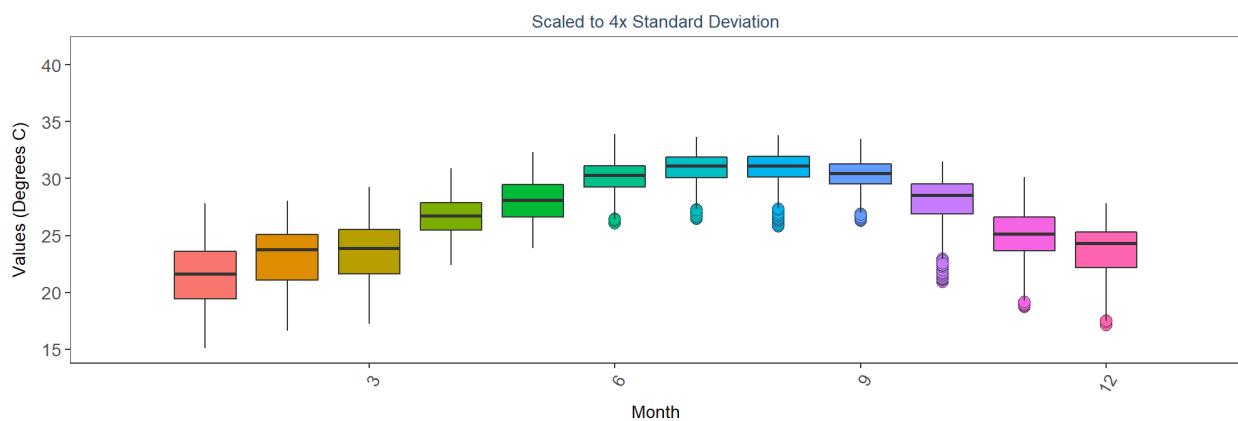
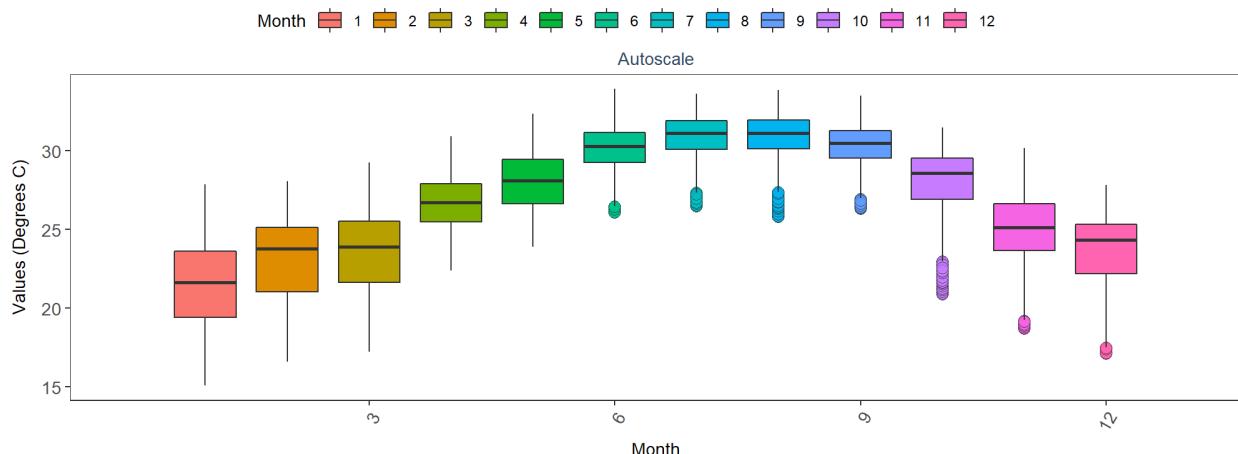
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 By Year



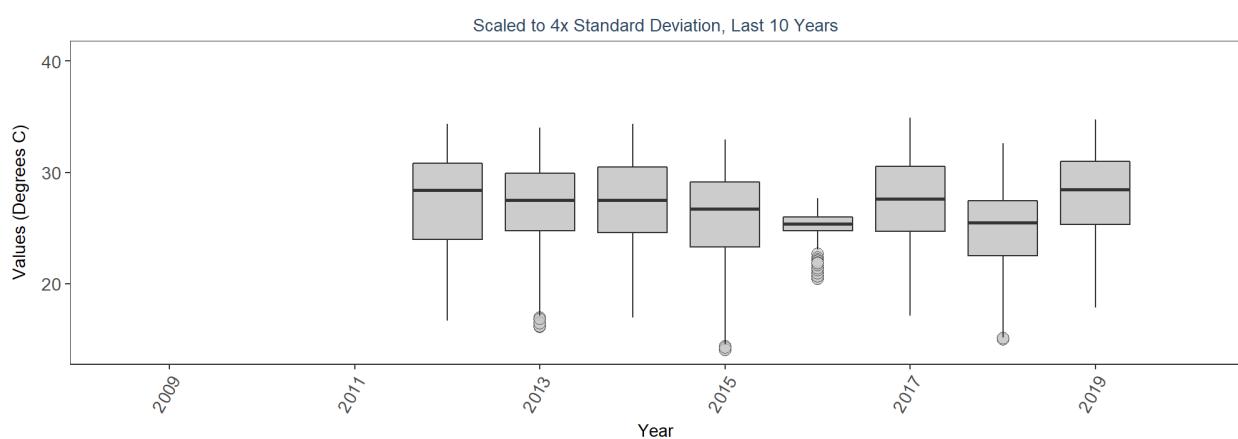
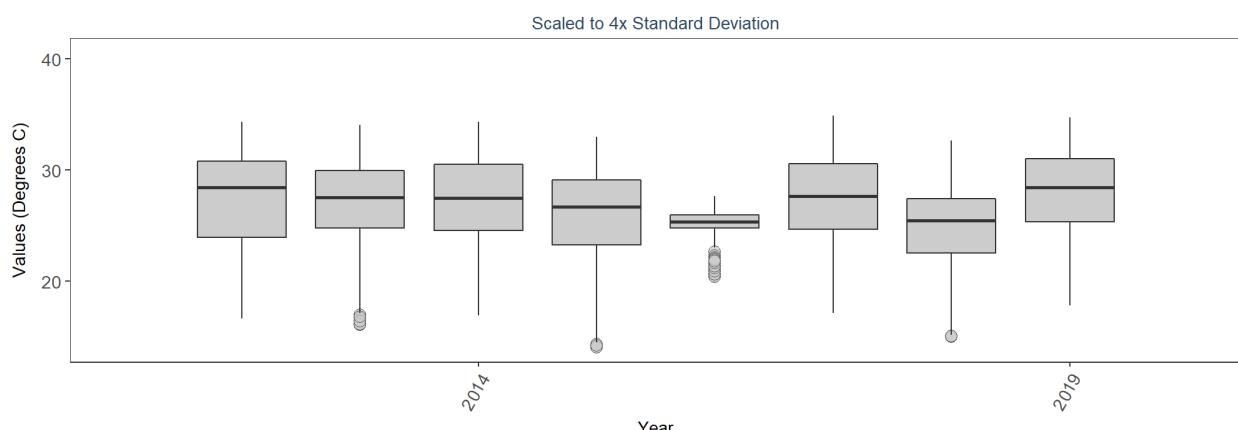
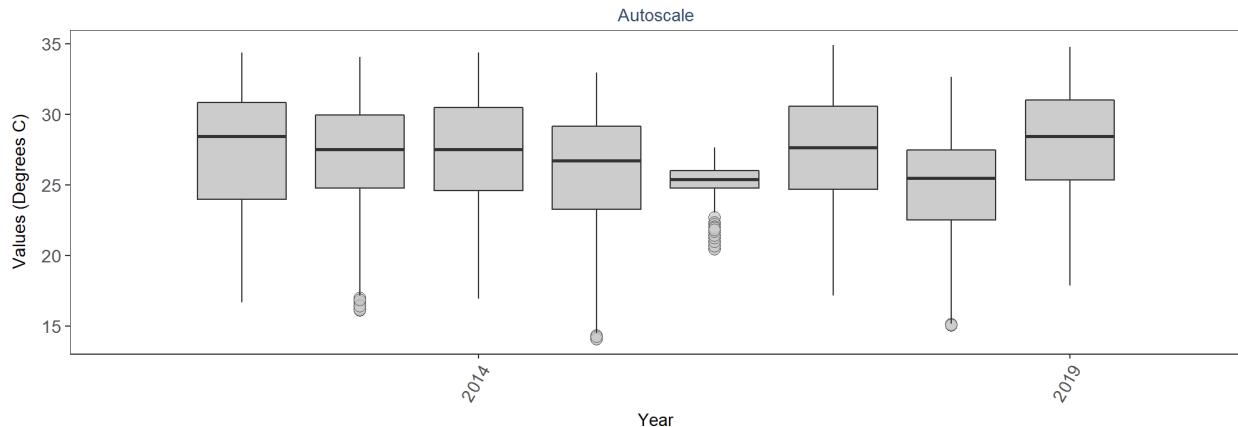
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 By Year & Month



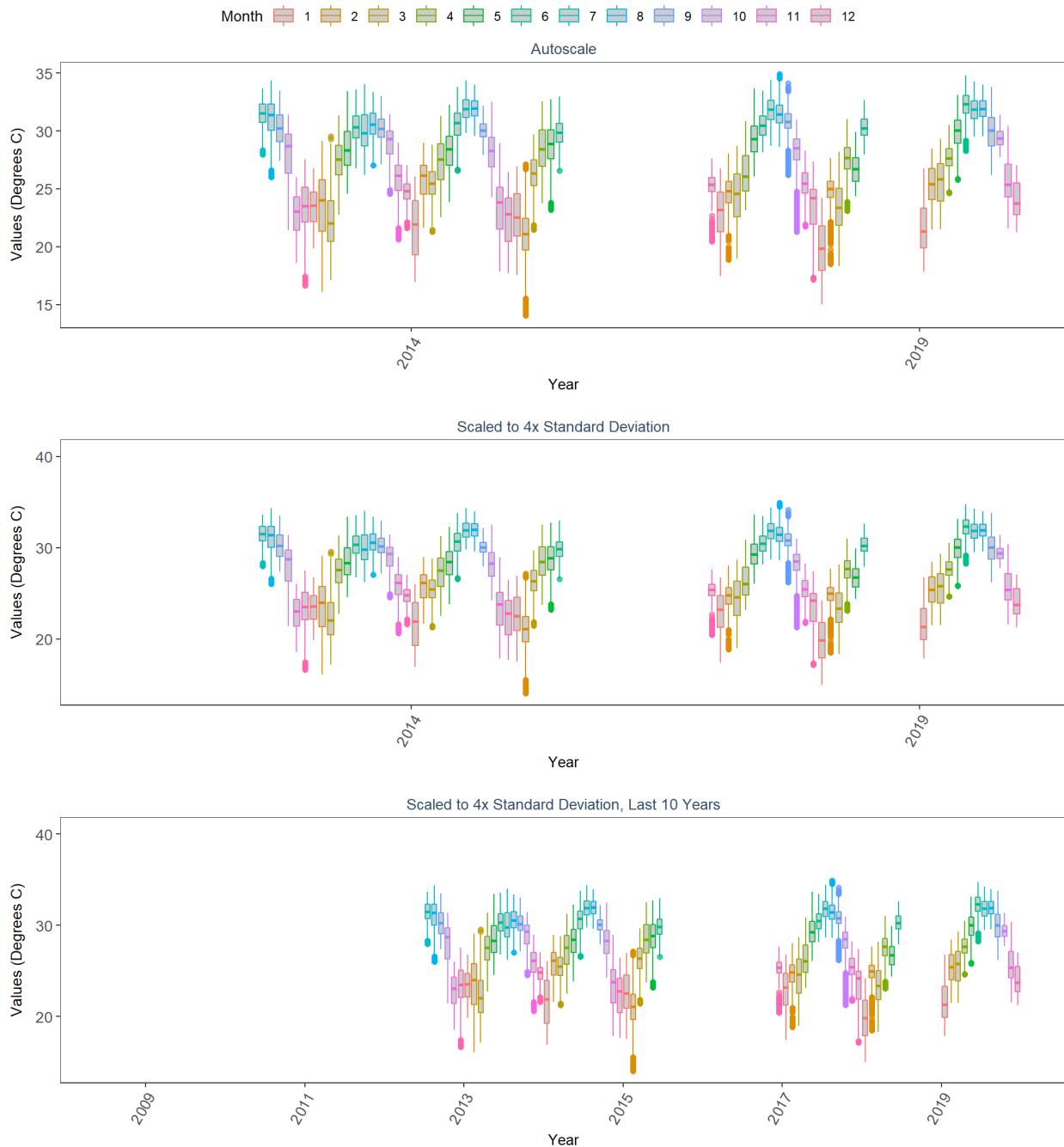
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 By Month



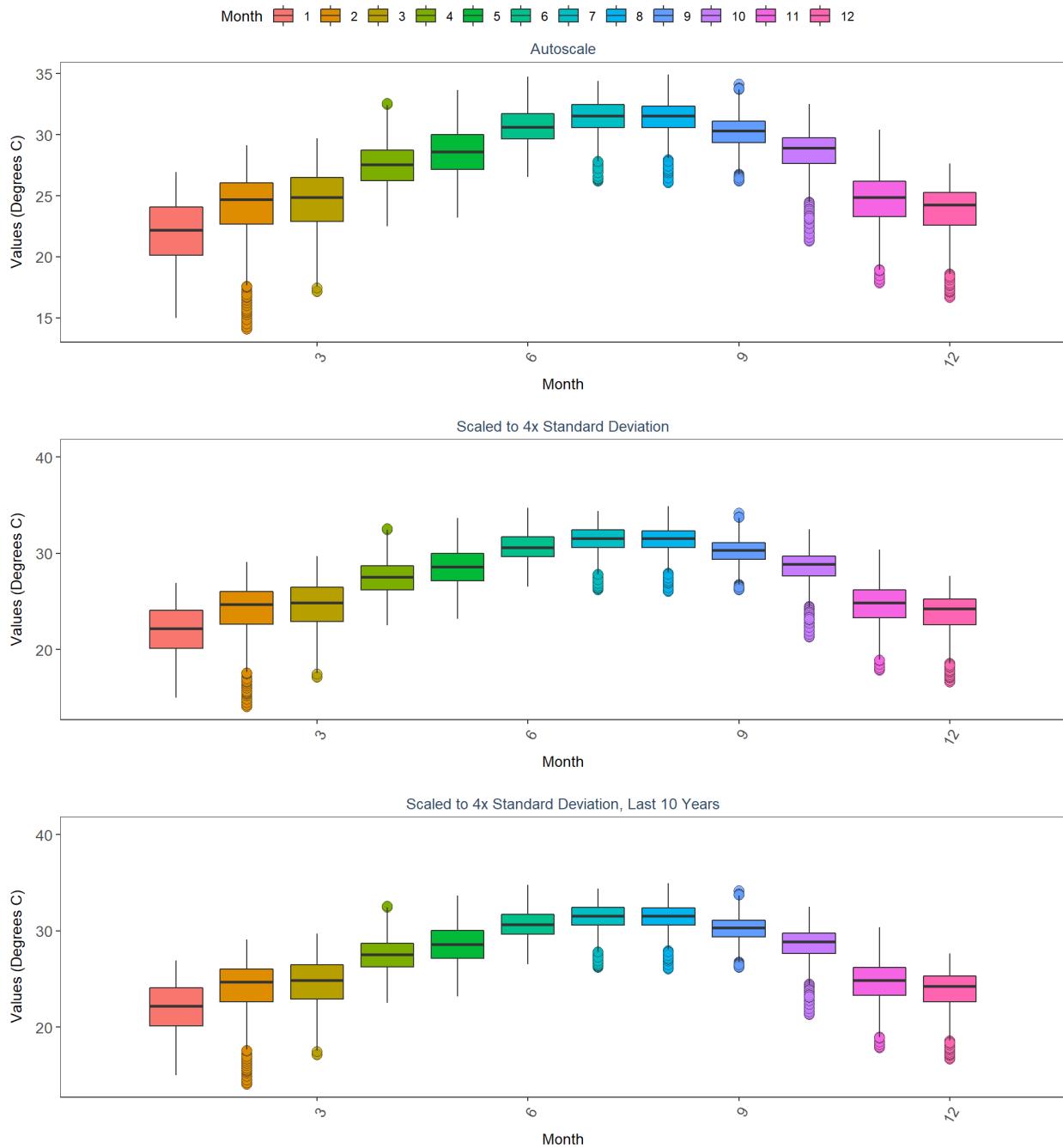
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 By Year



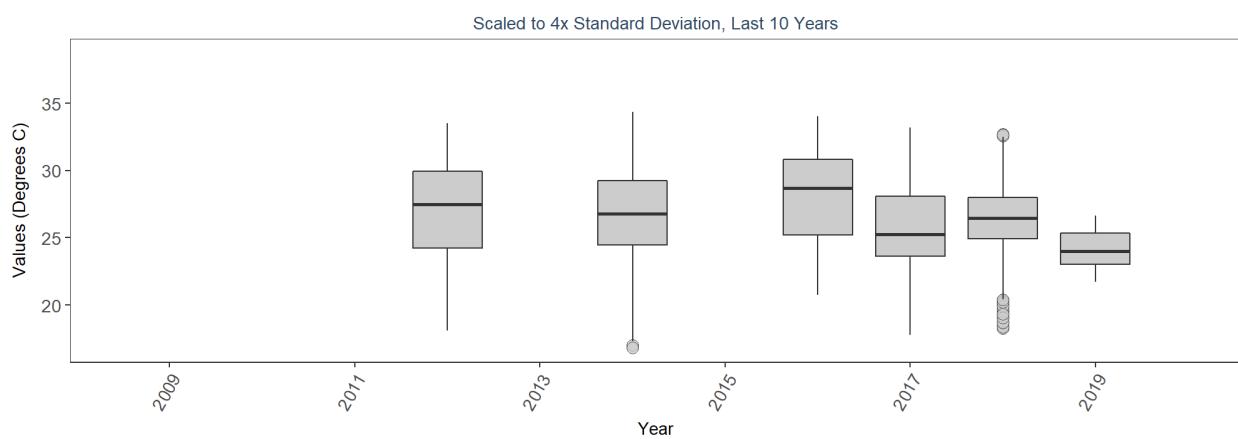
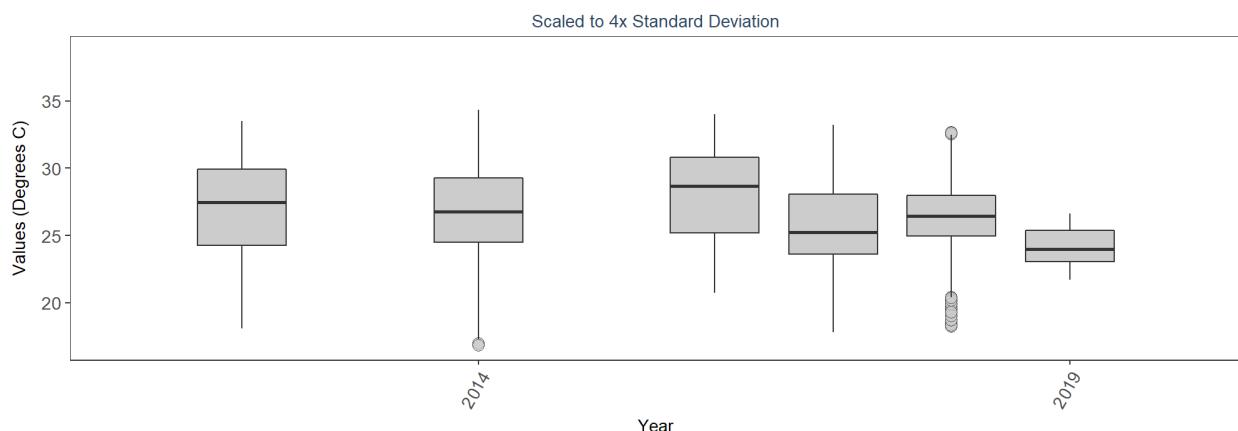
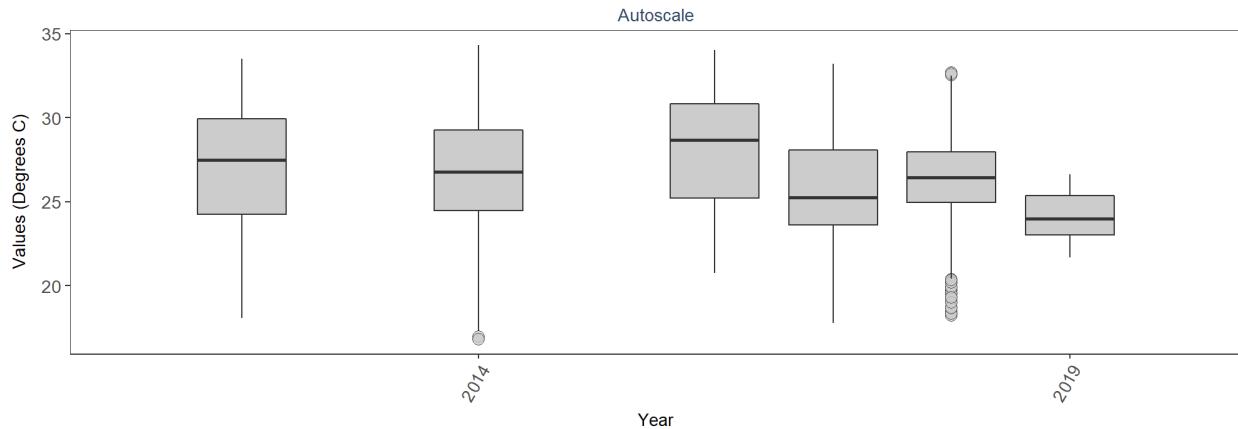
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 By Year & Month



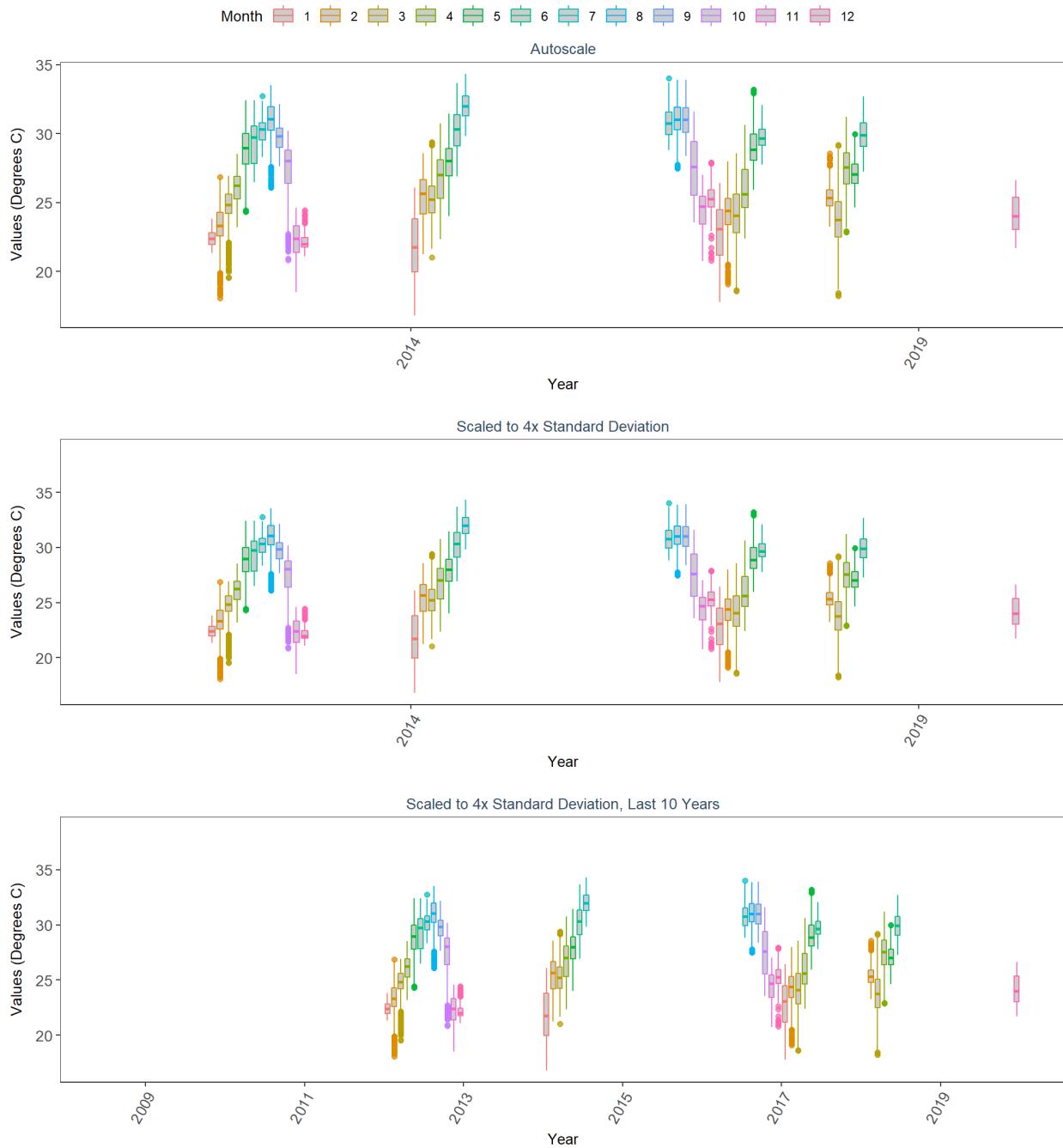
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 By Month



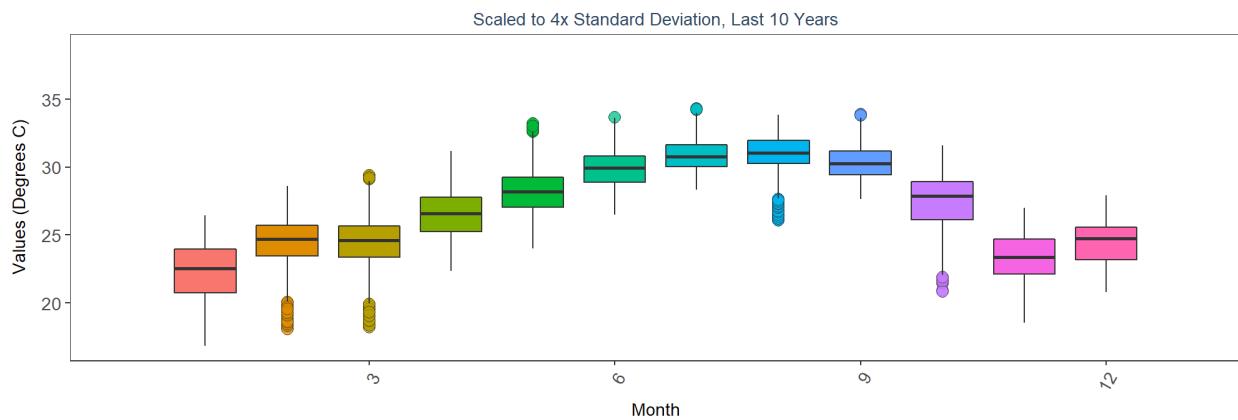
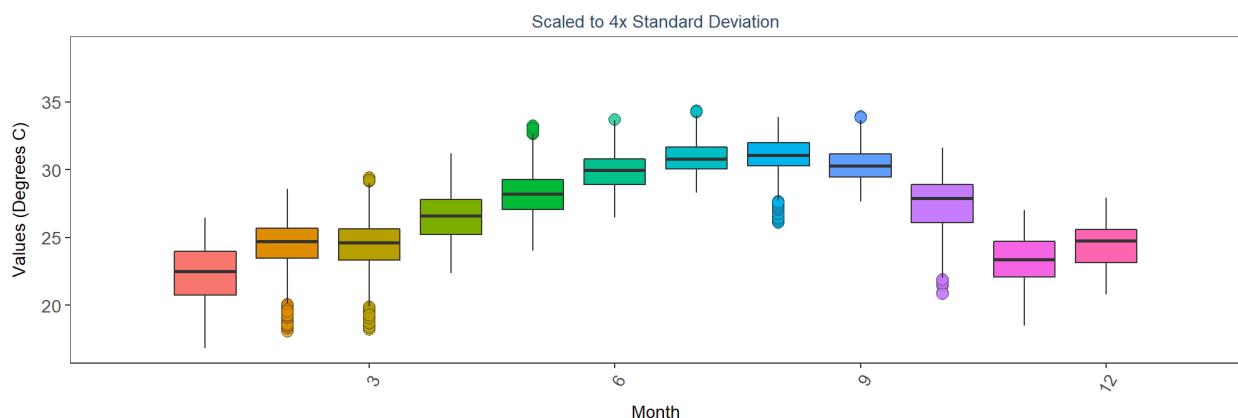
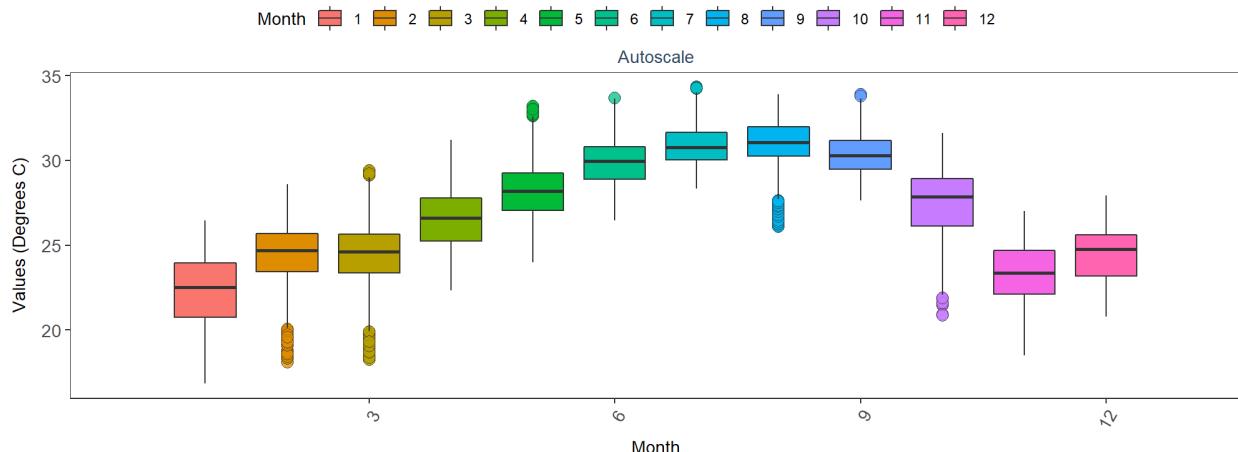
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 By Year



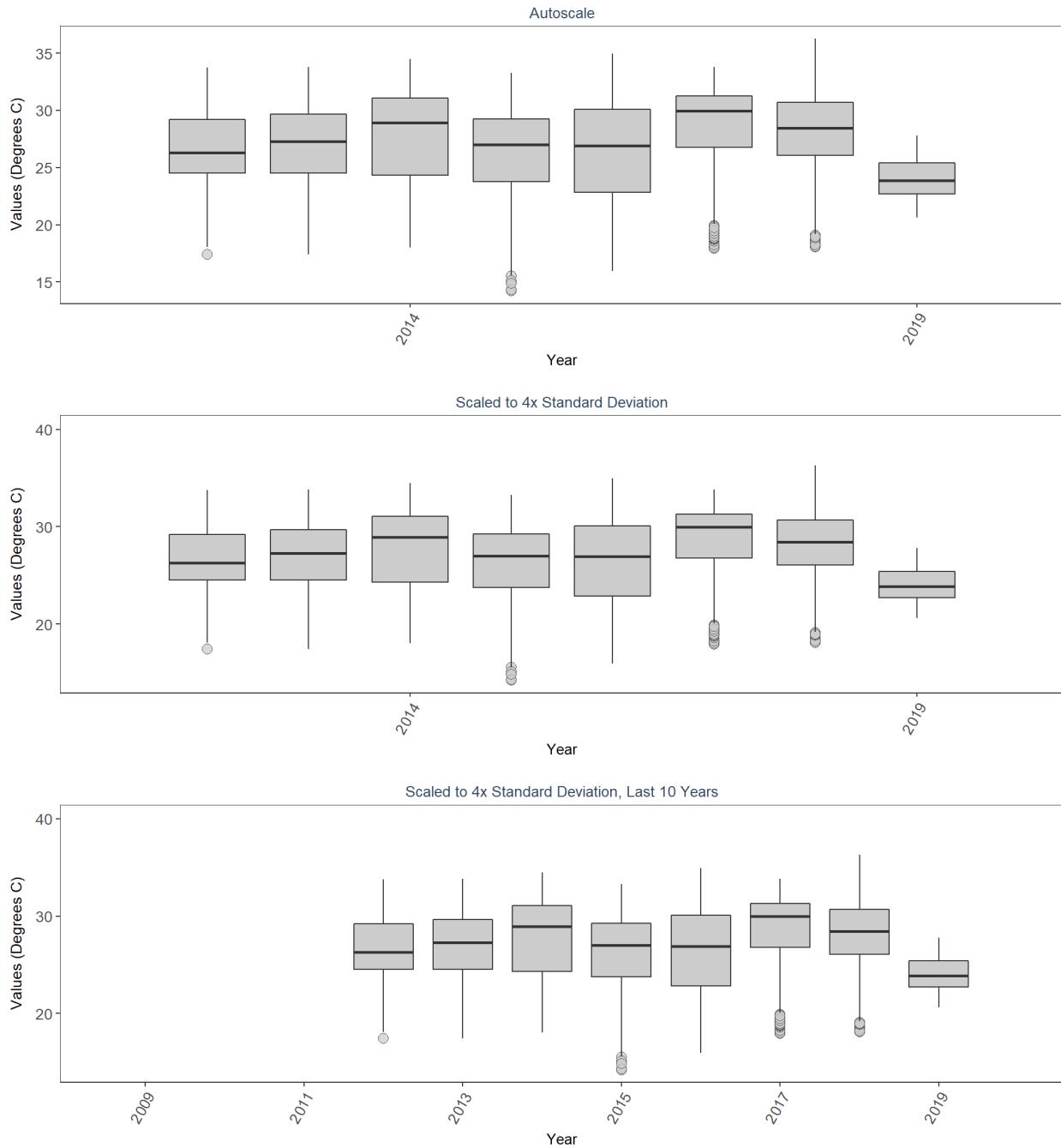
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 By Year & Month



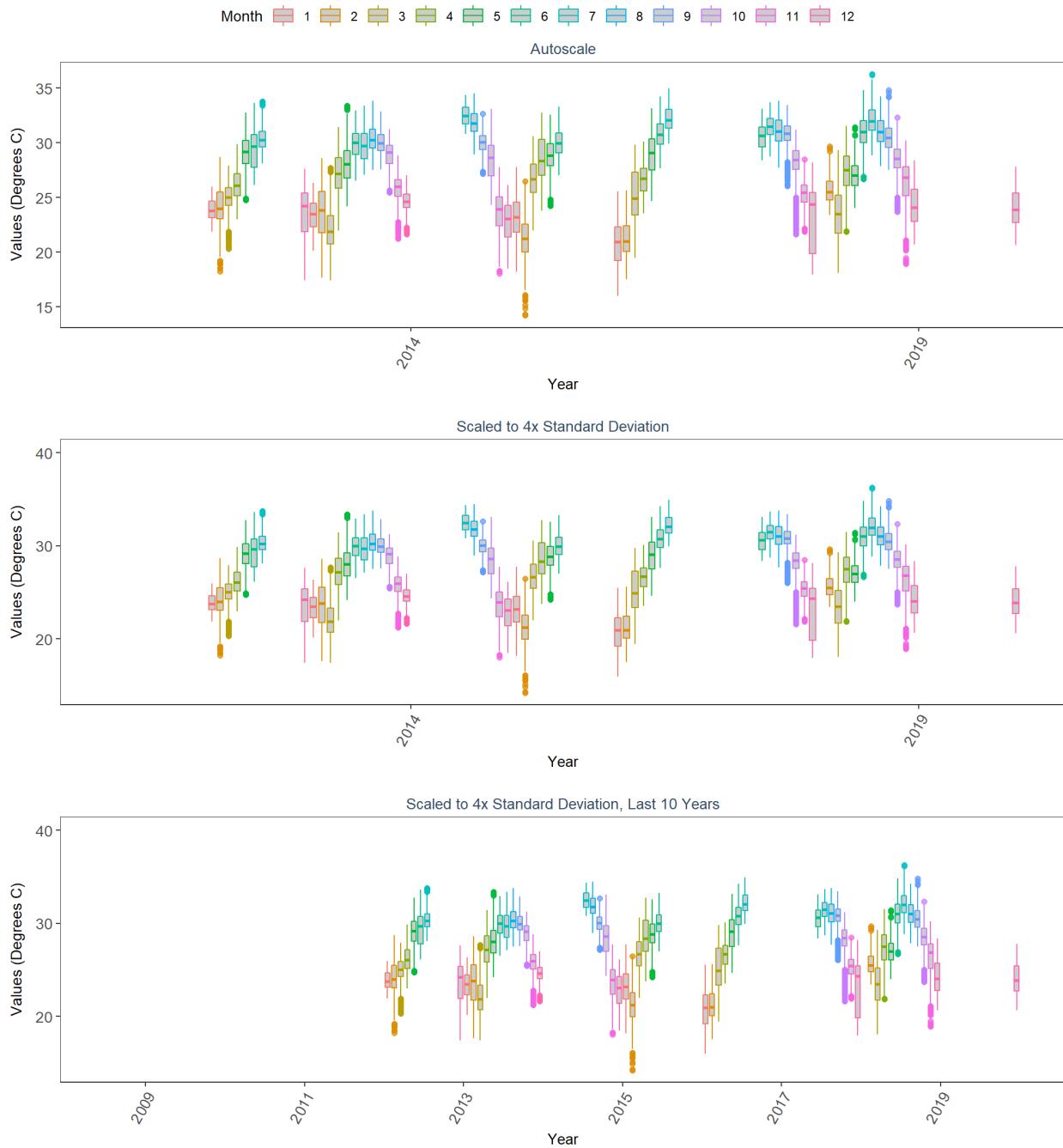
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 508  
 By Month



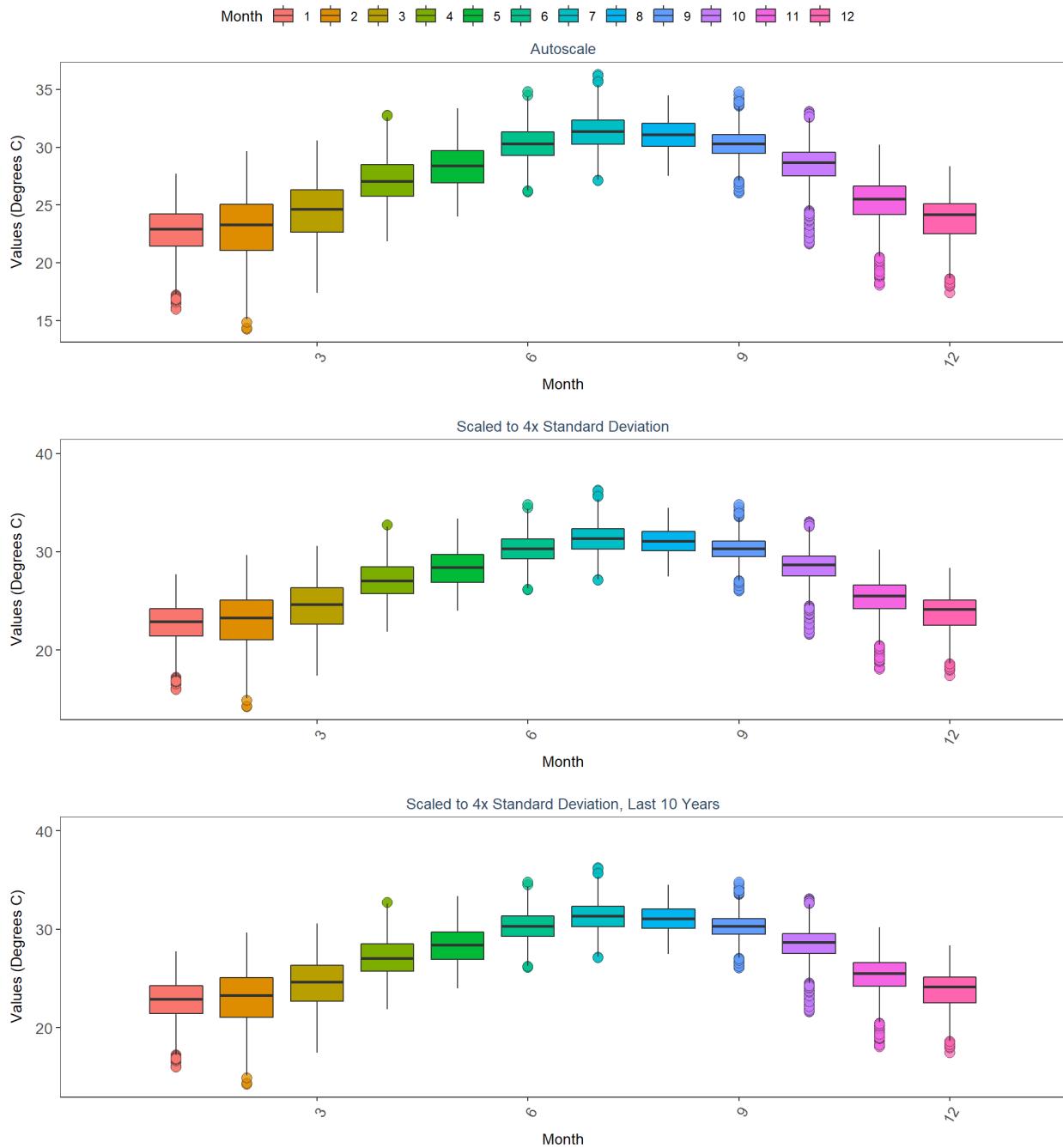
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509  
By Year



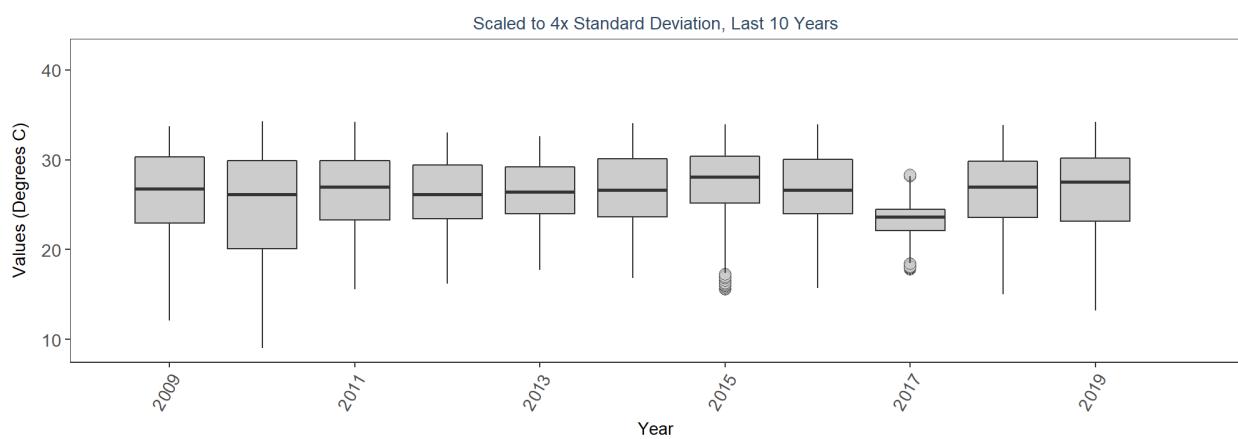
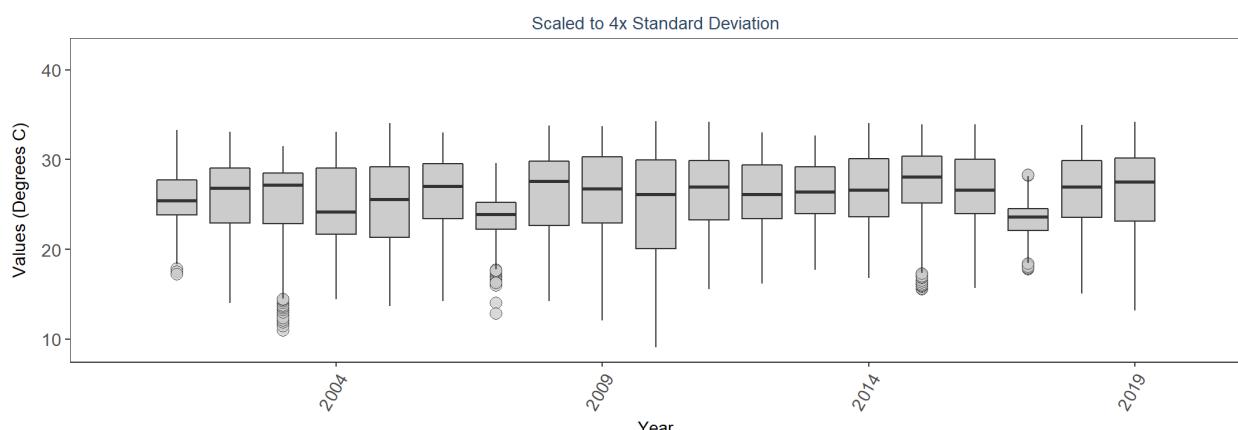
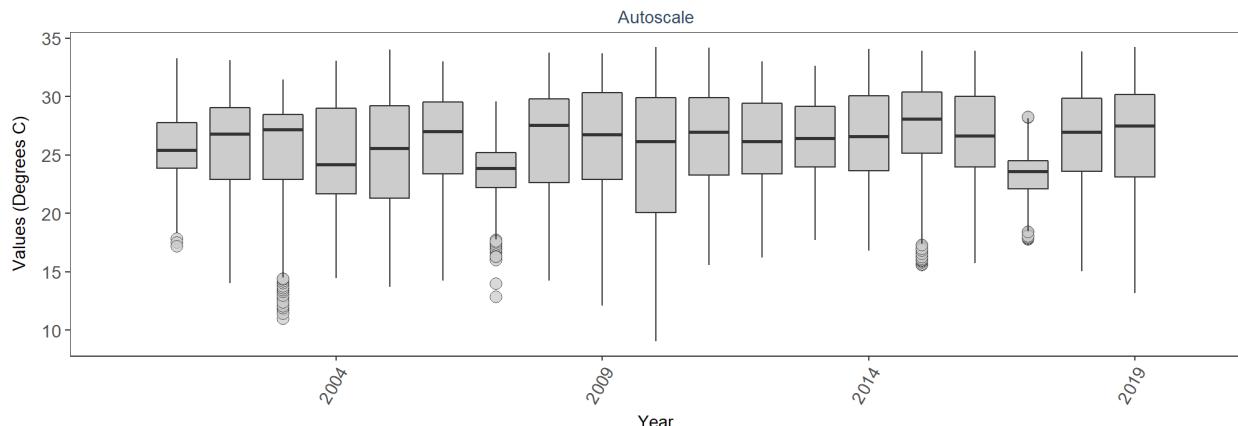
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 509  
 By Year & Month



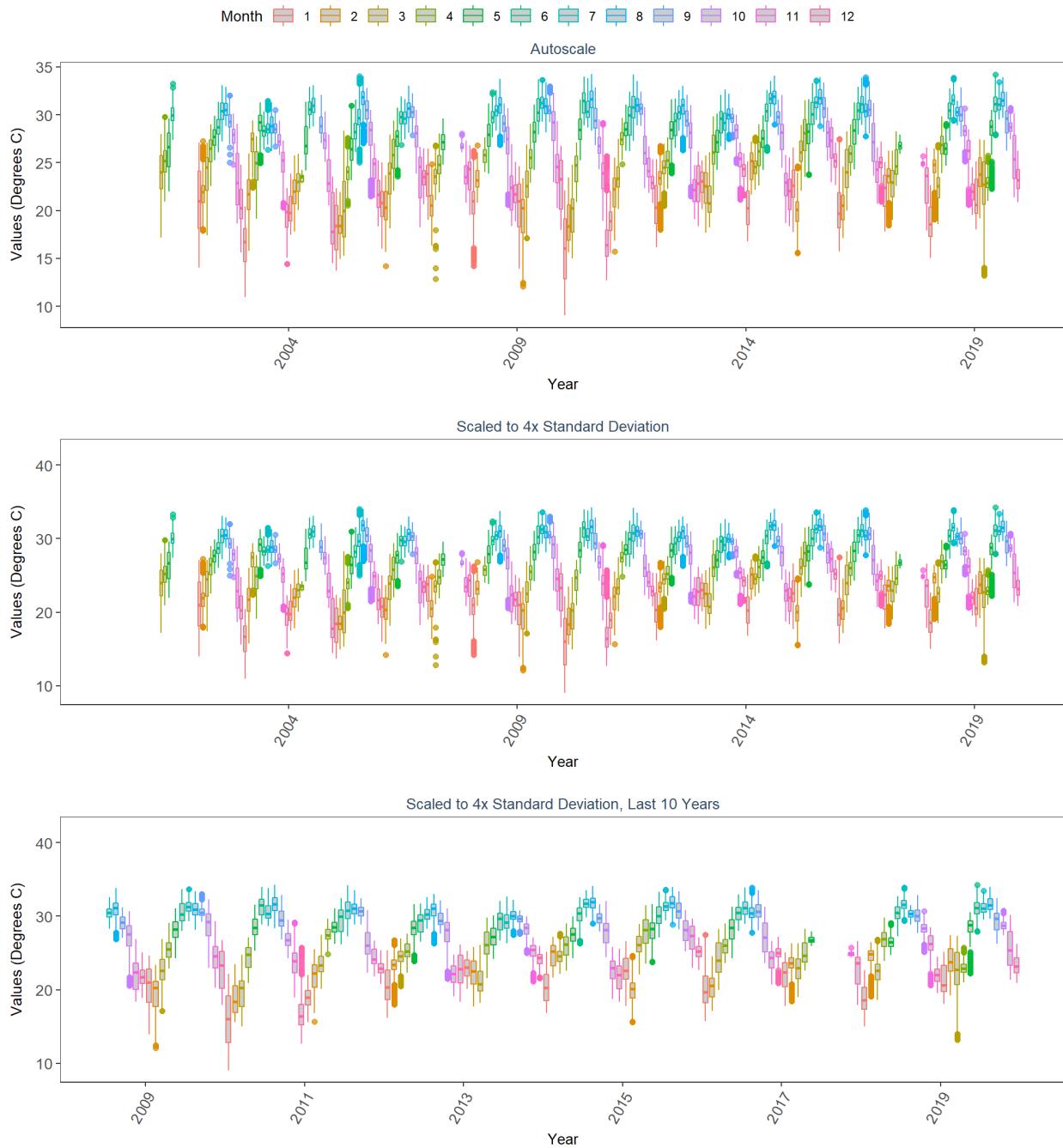
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 By Month



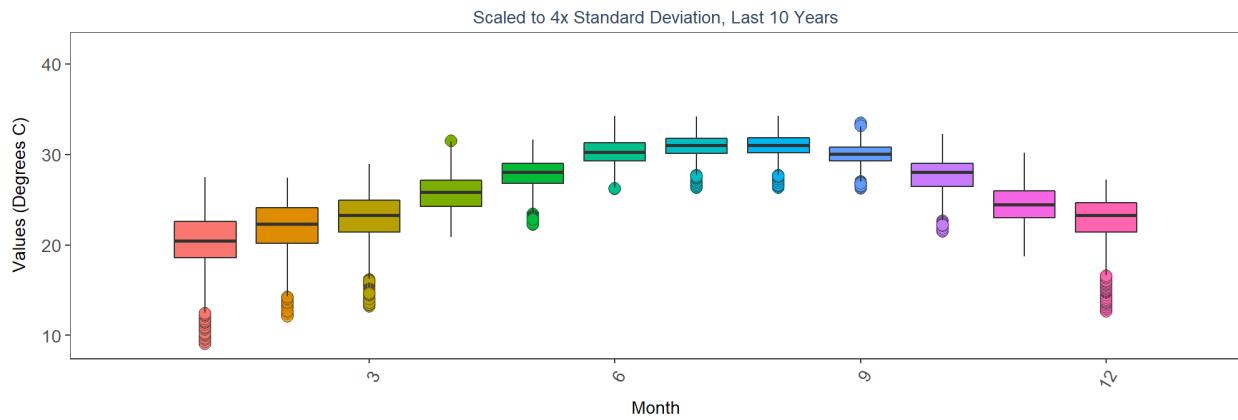
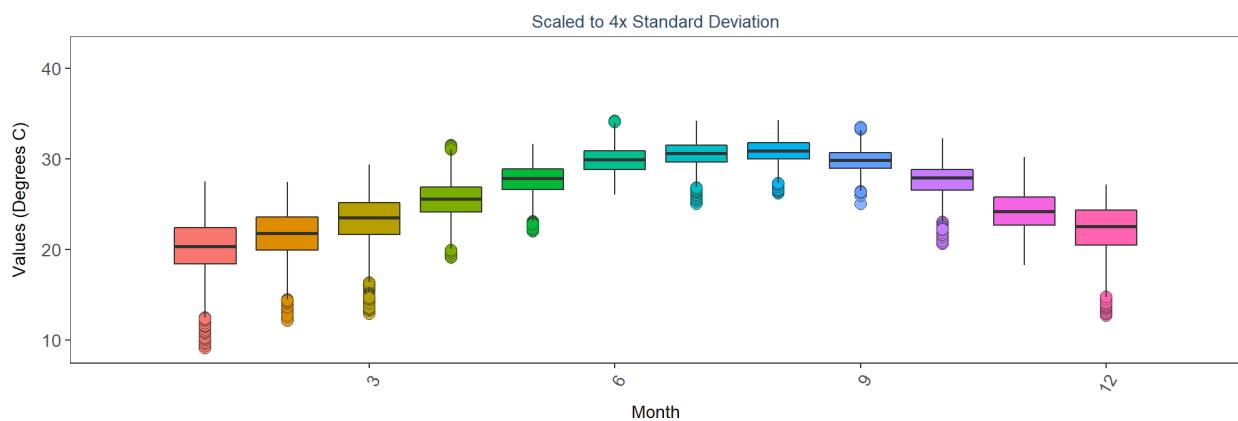
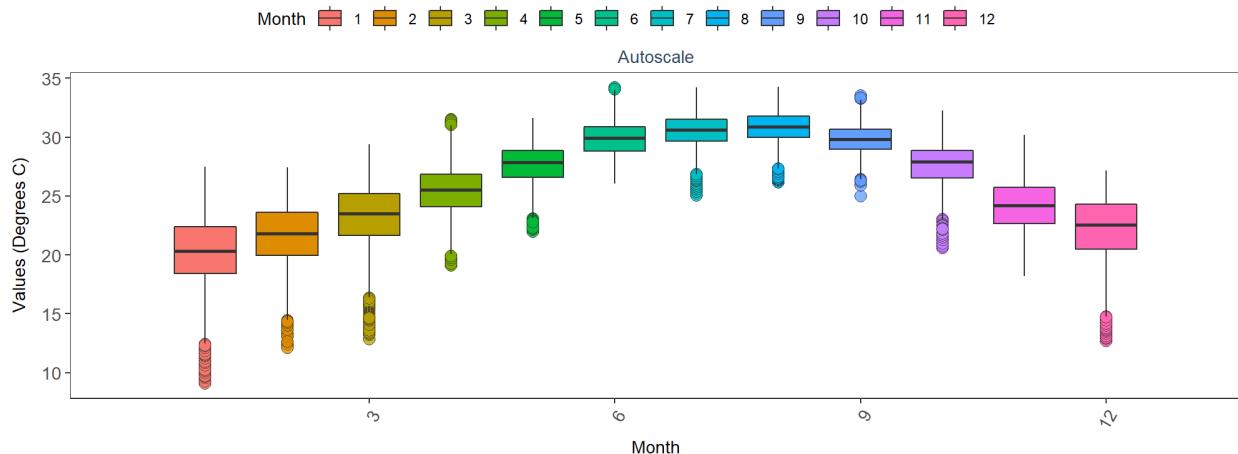
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 By Year



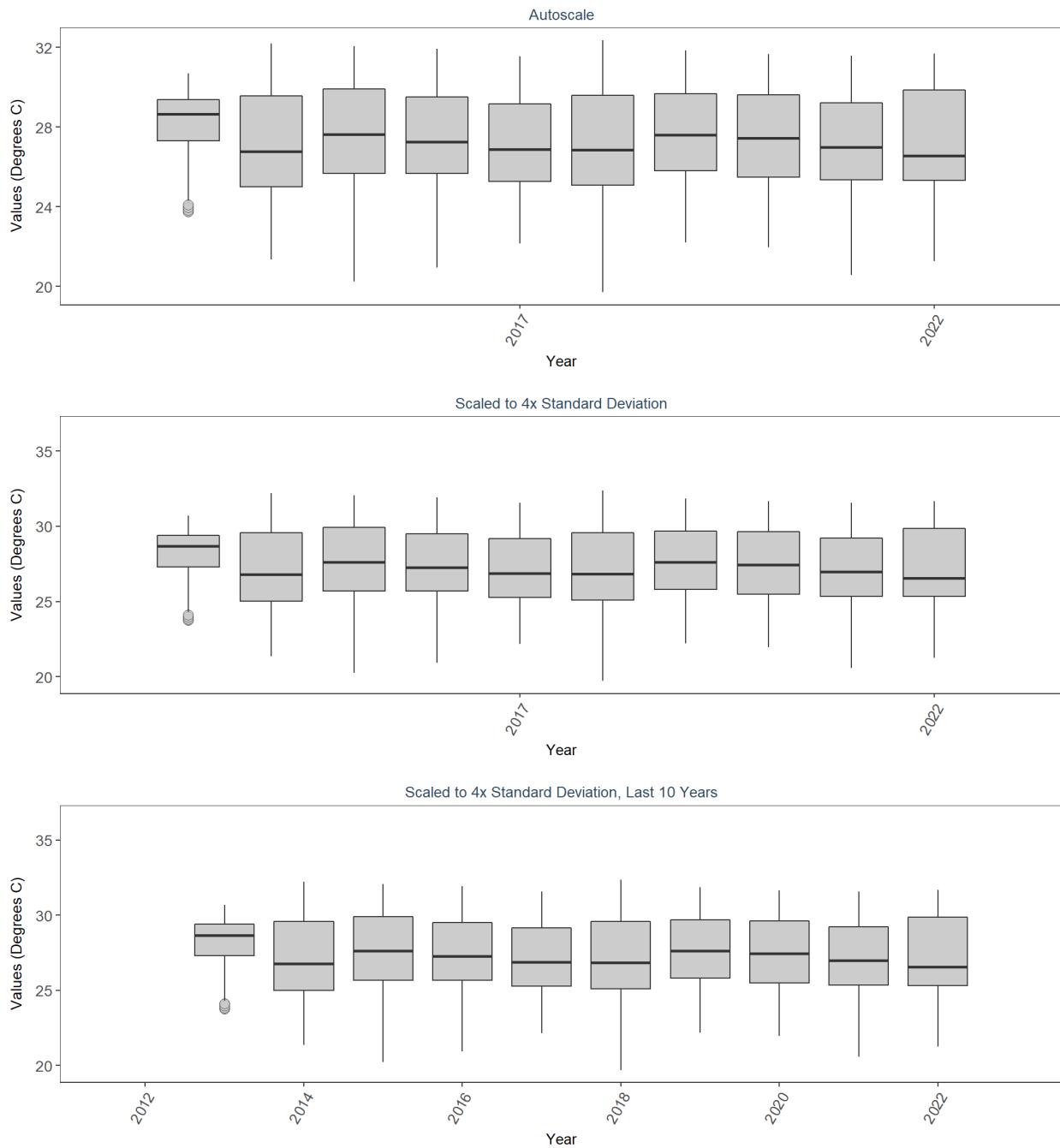
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 SB  
 By Year & Month



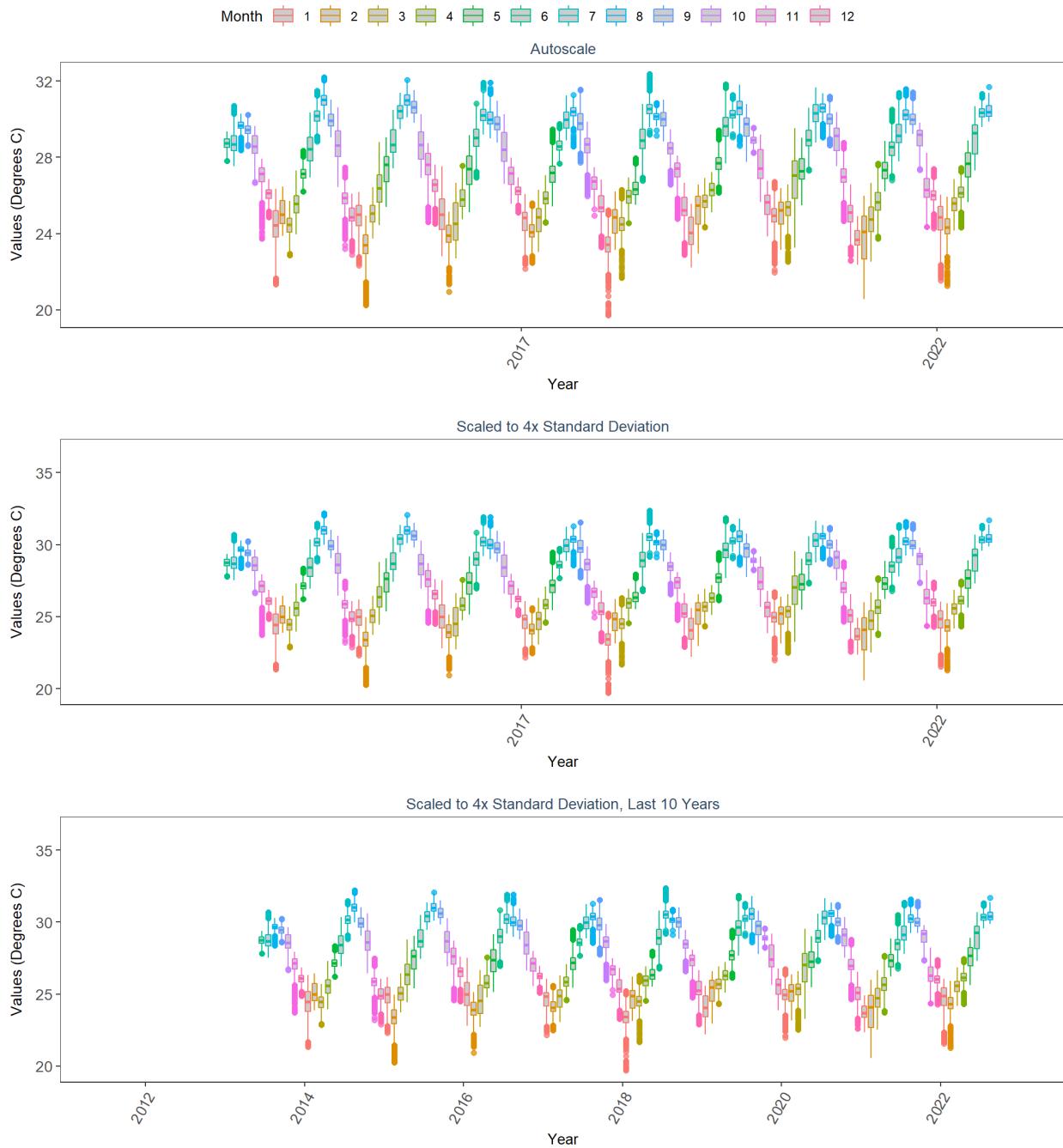
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 By Month



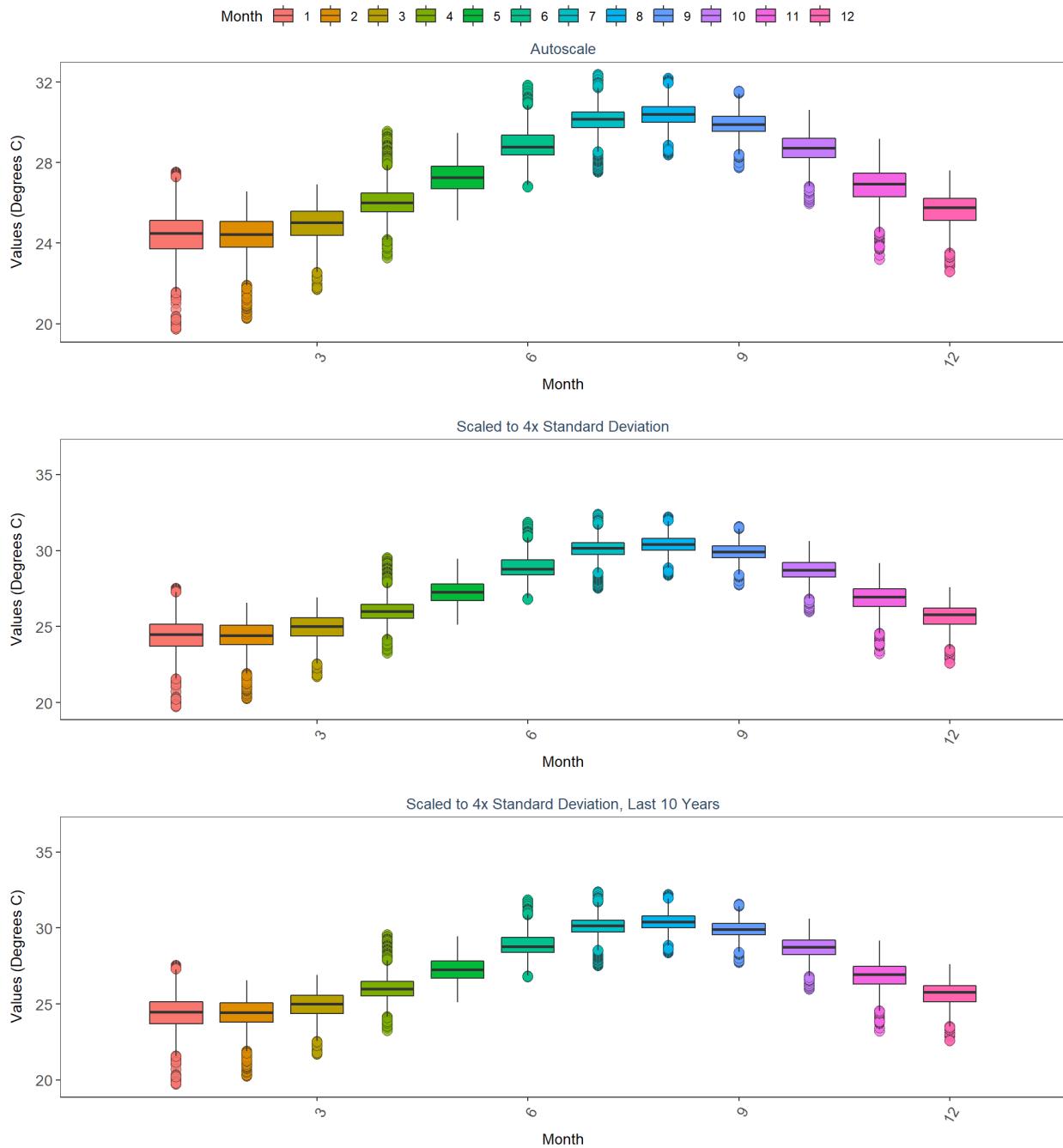
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Crocker  
By Year



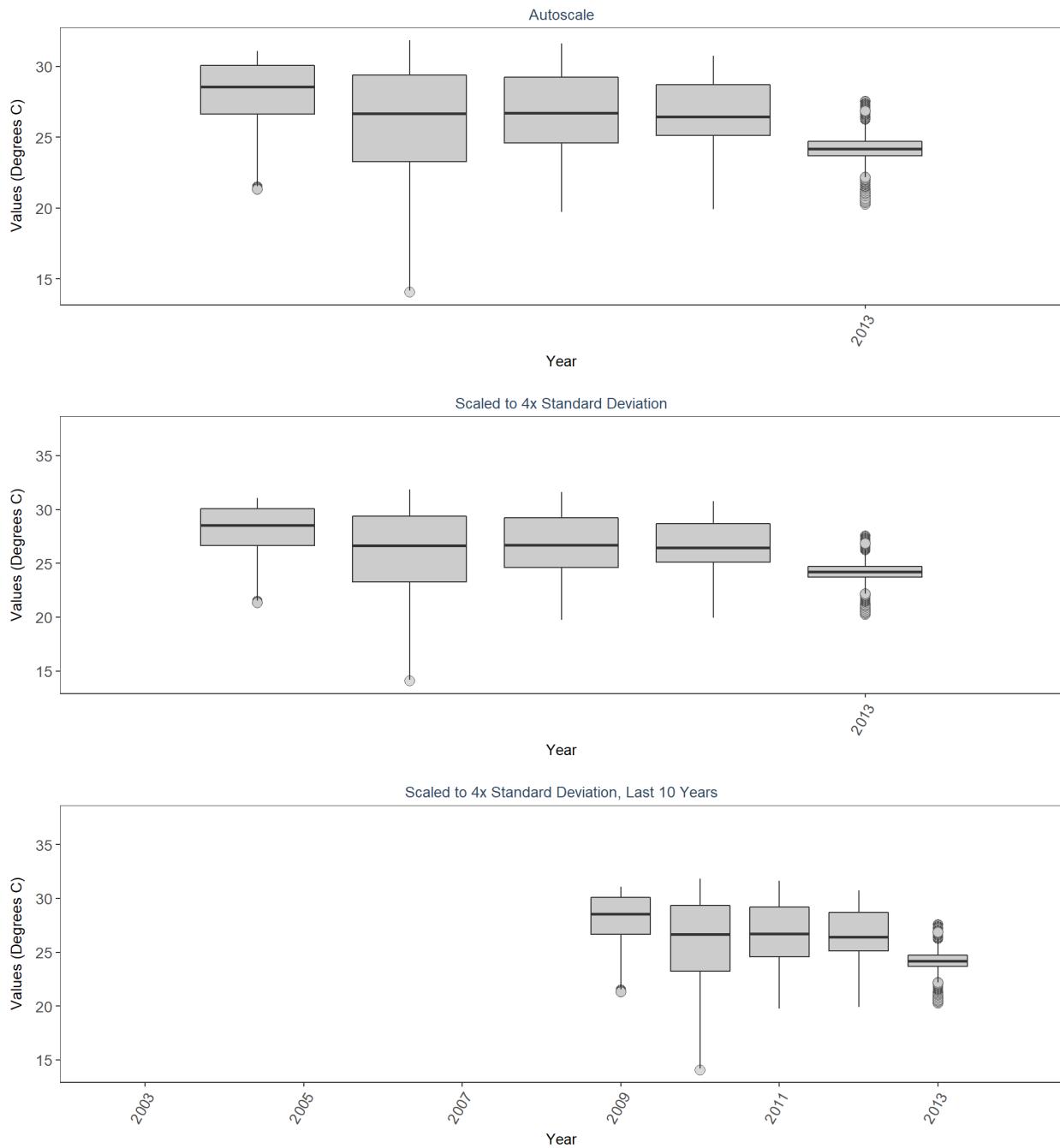
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 Crocker  
 By Year & Month



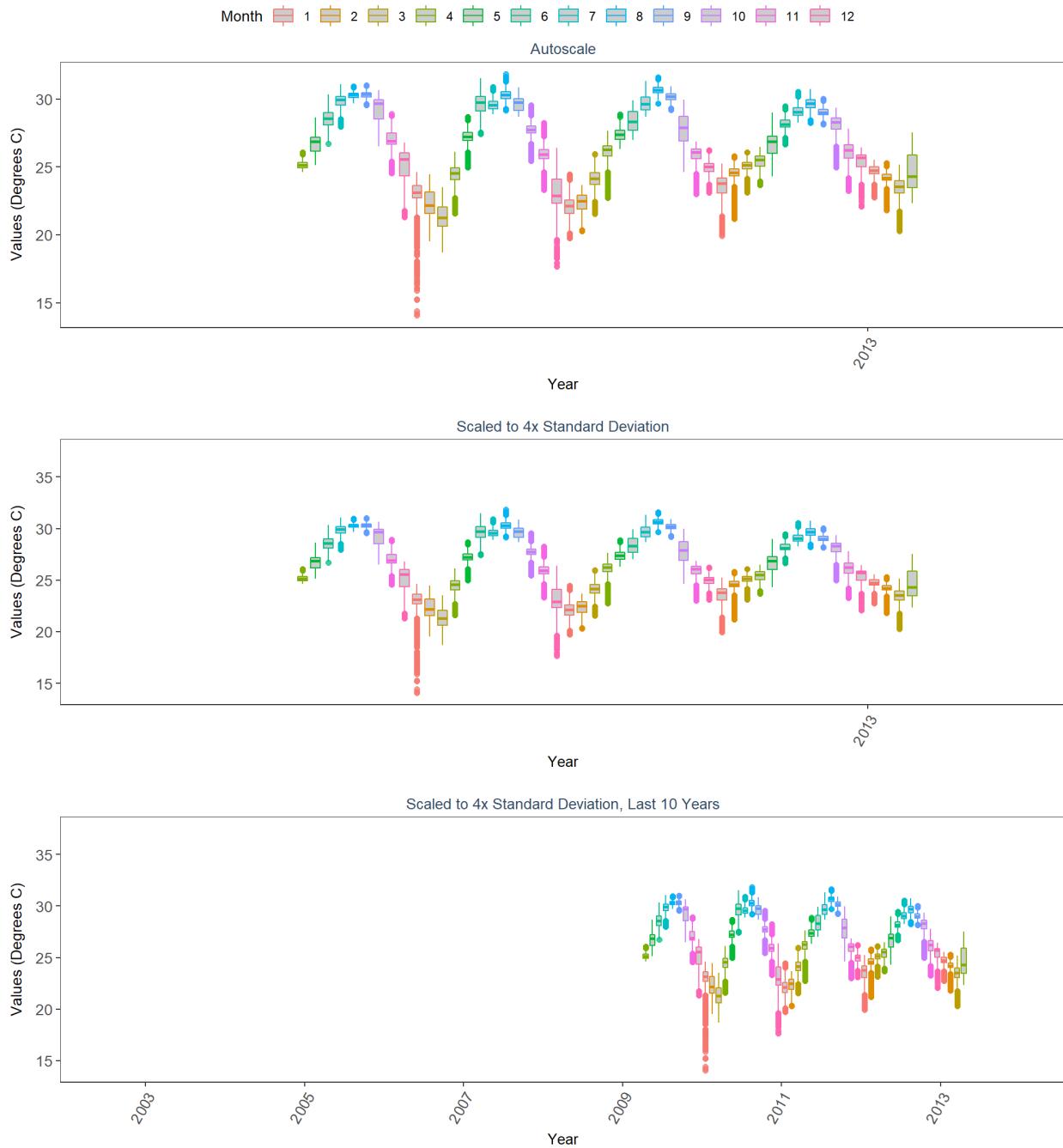
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 By Month



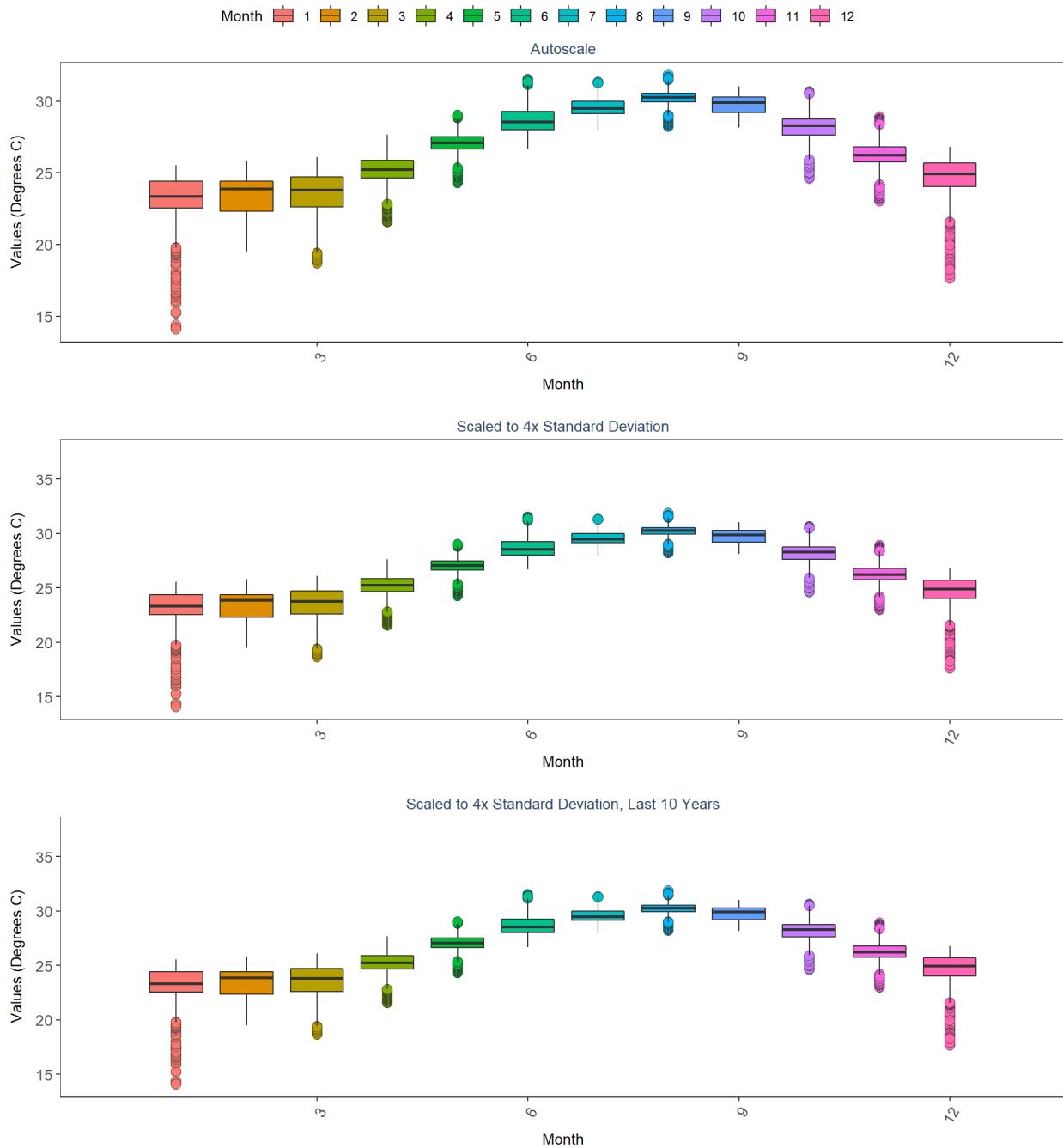
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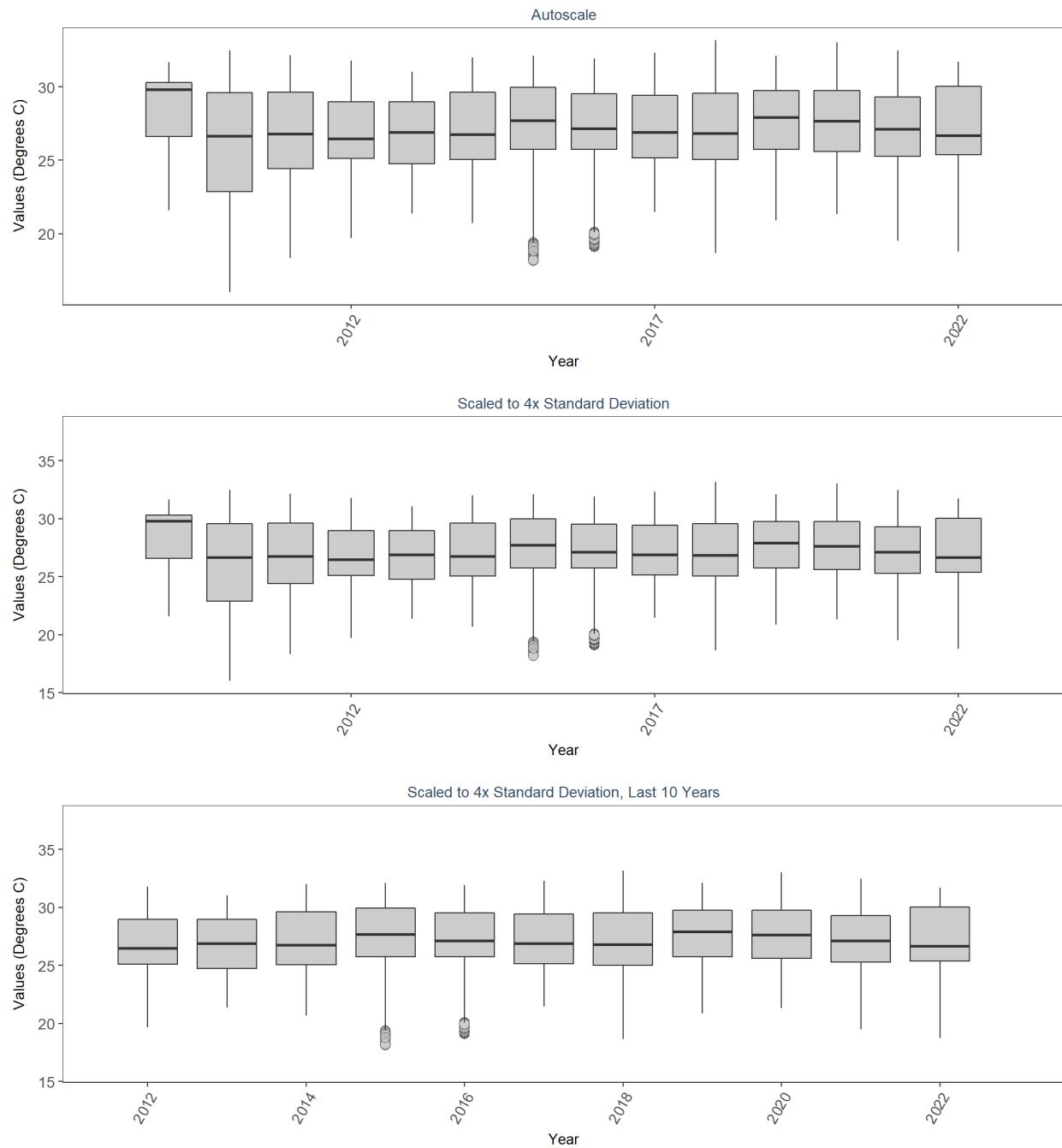
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 Molasses  
 By Year & Month



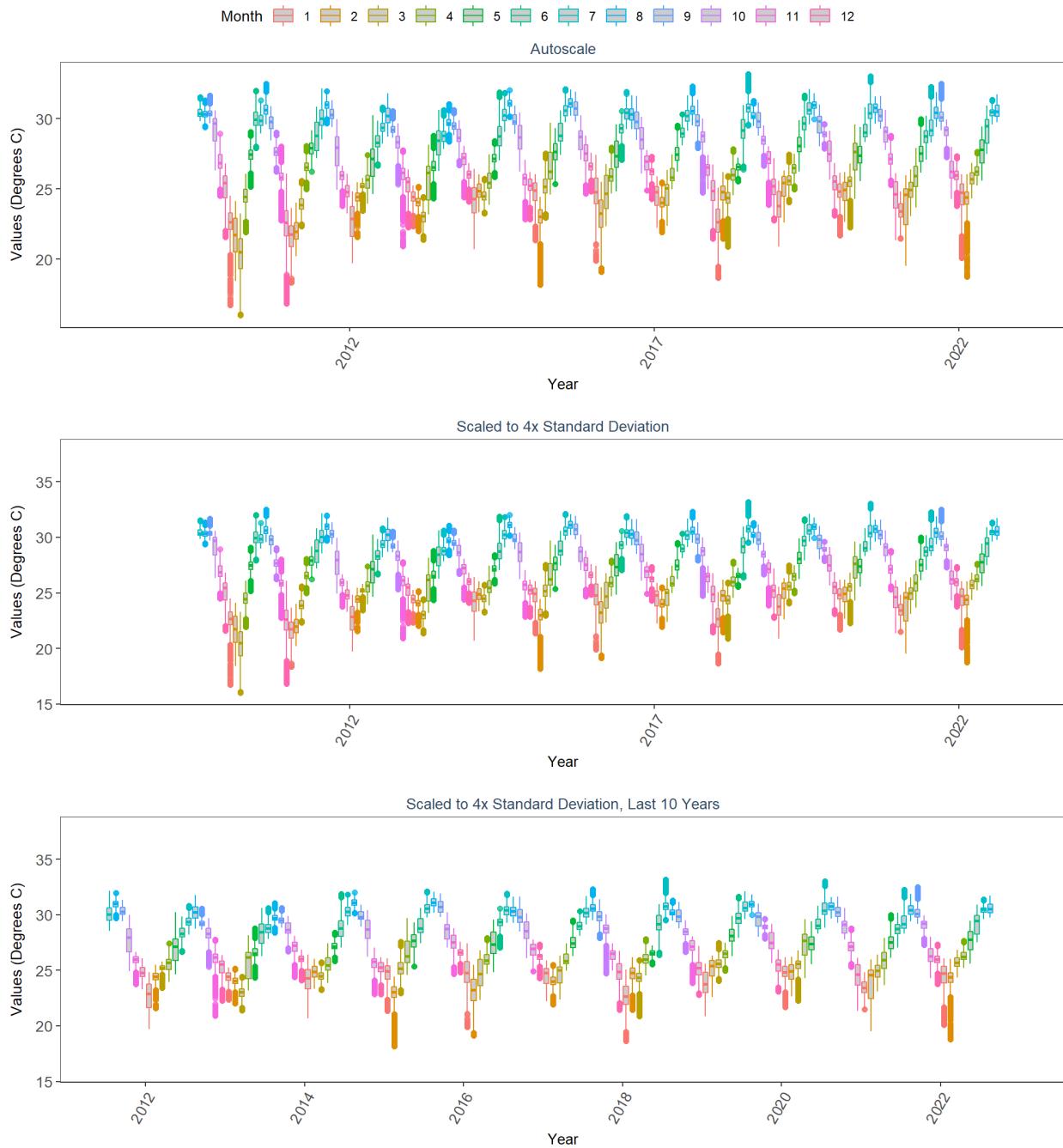
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 Molasses  
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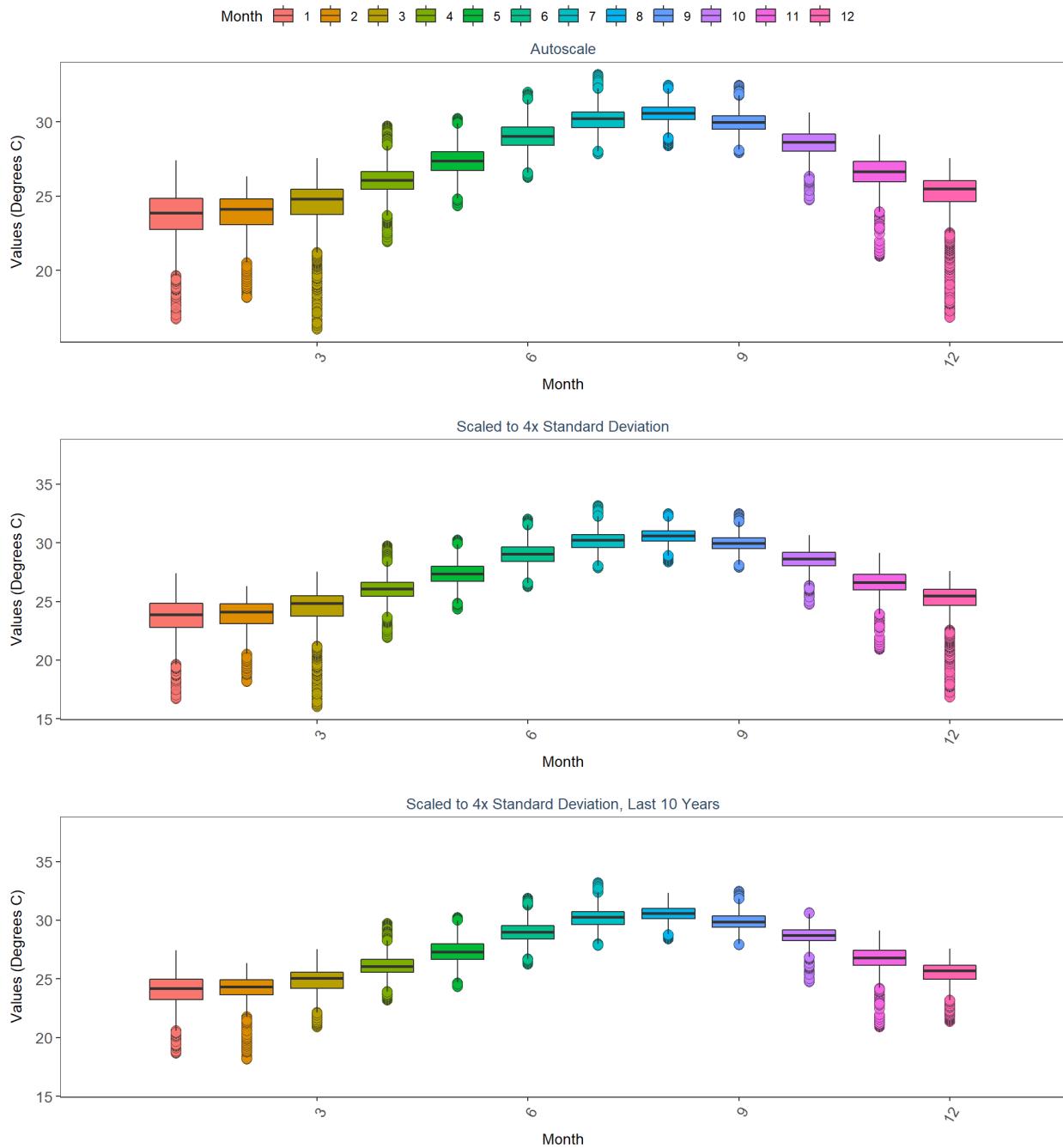
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Sombrero  
By Year



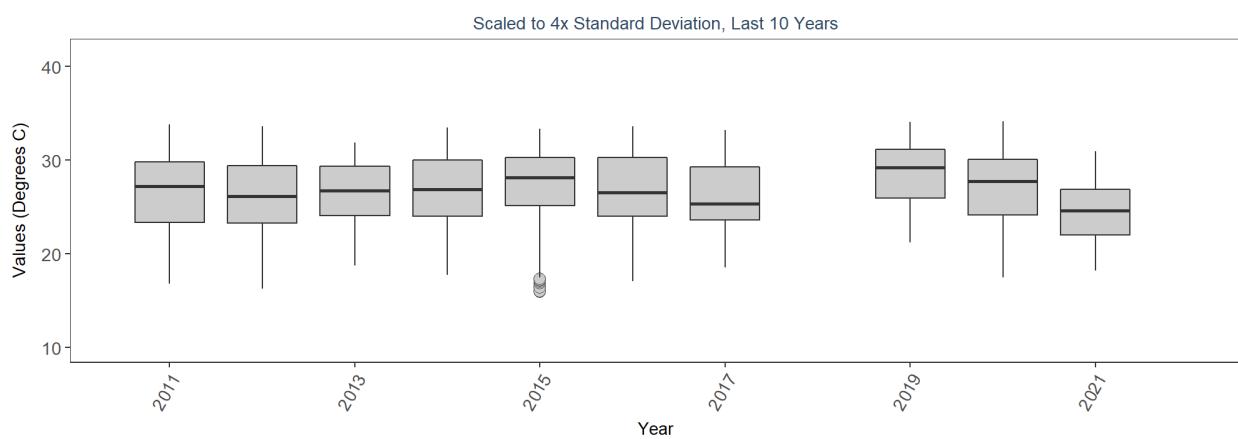
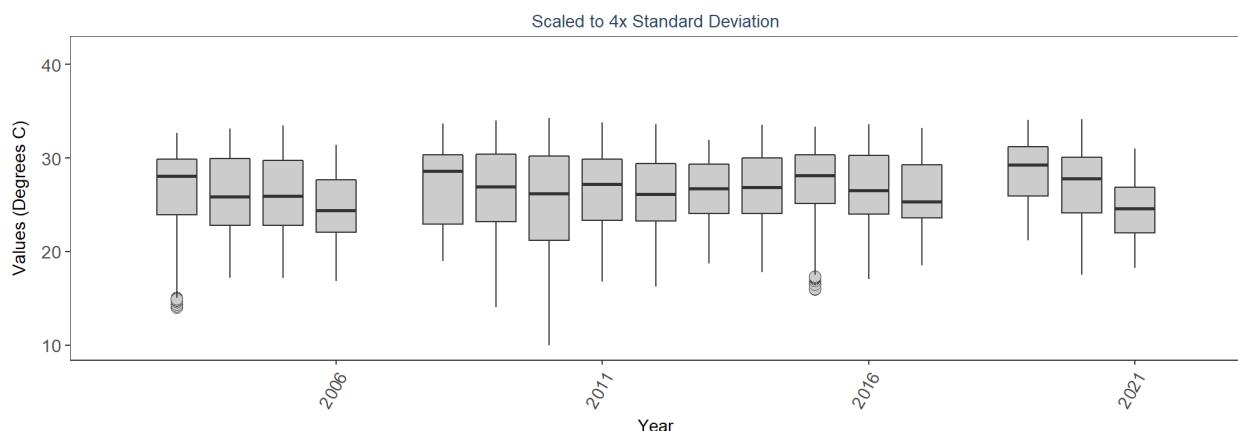
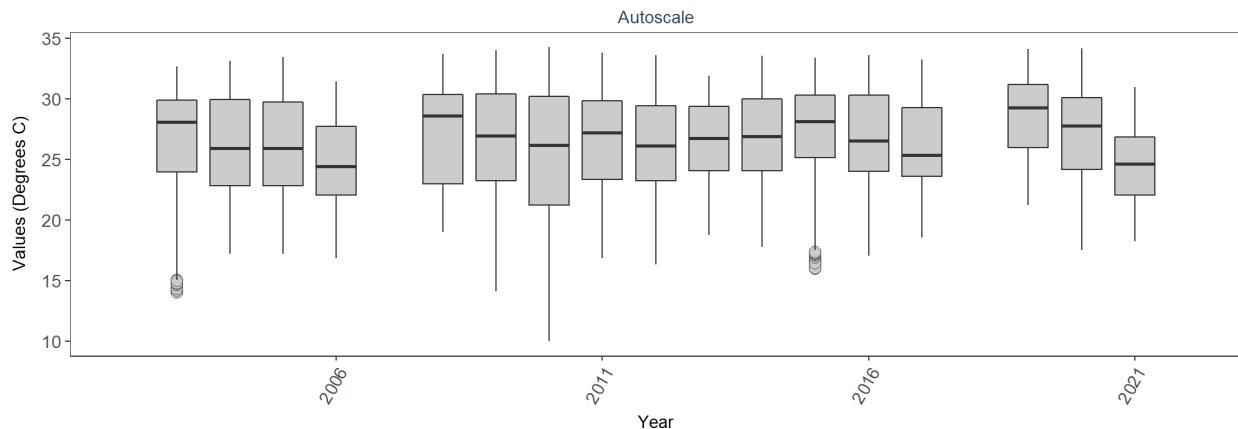
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 Sombrero  
 By Year & Month



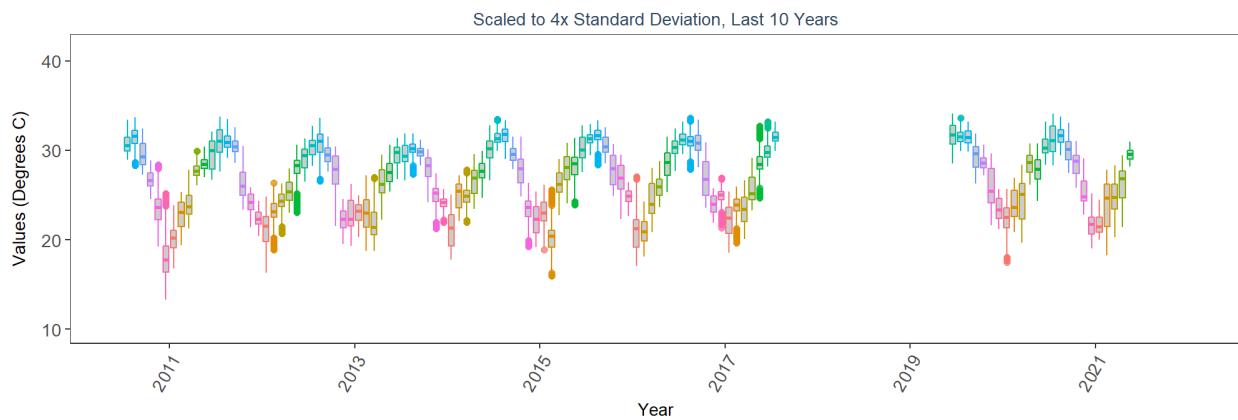
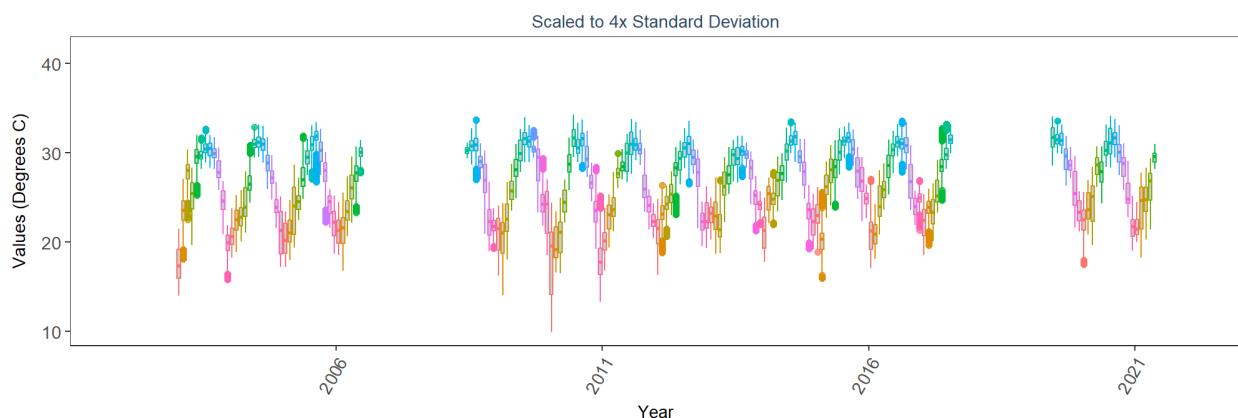
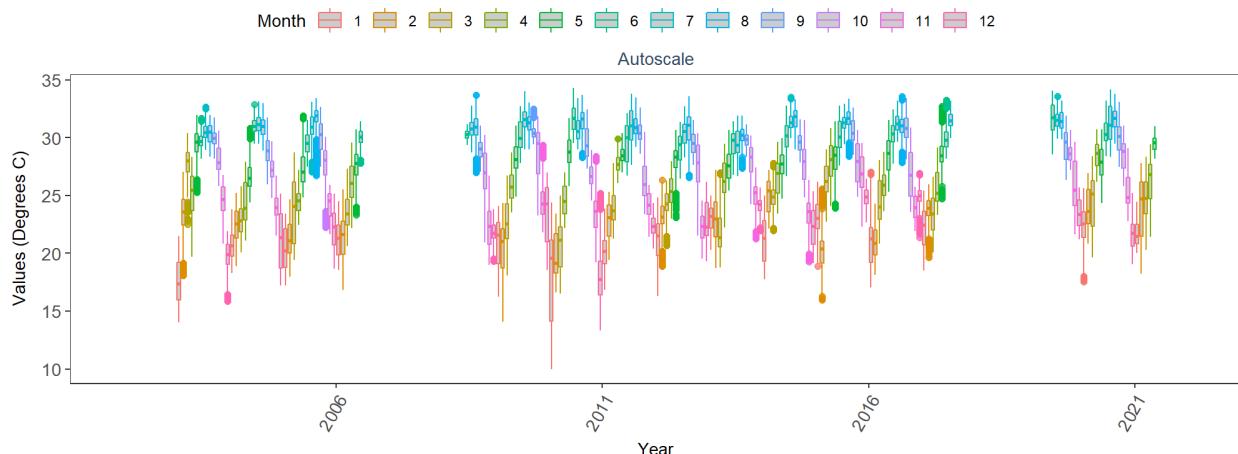
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 Sombrero  
 By Month



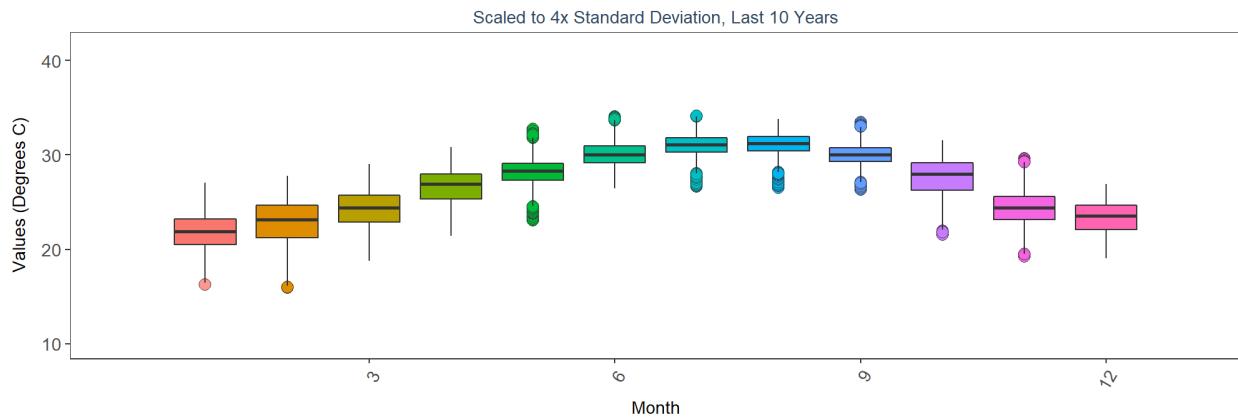
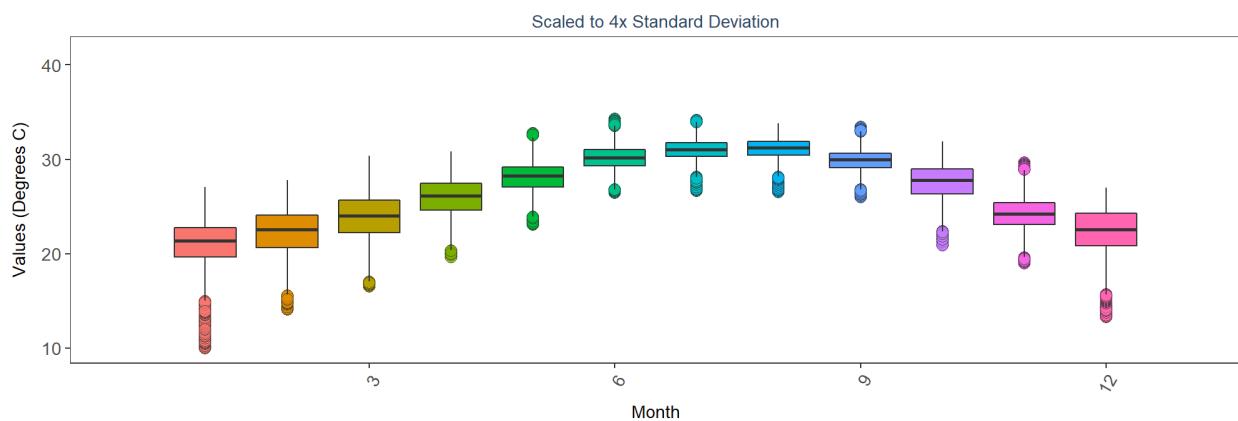
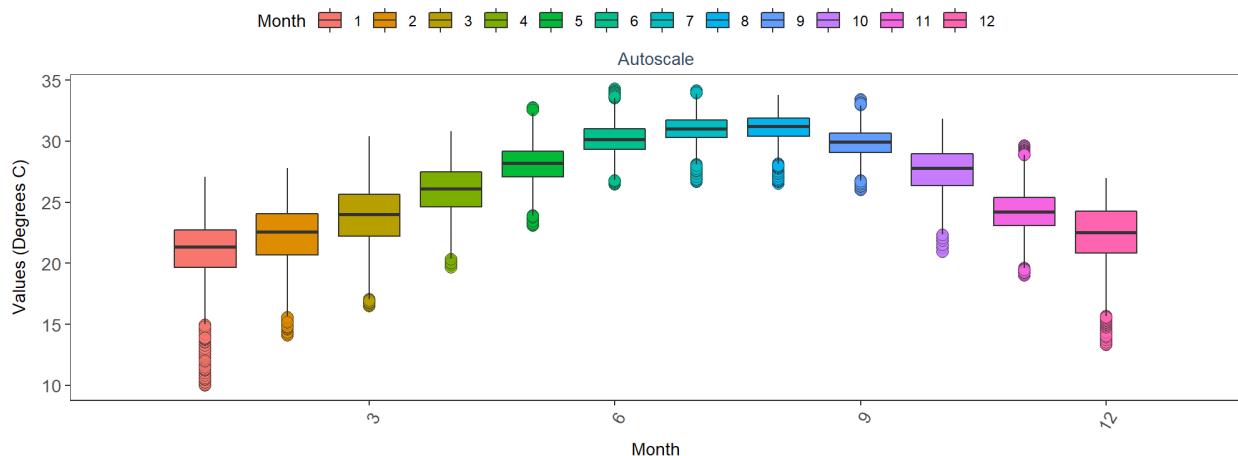
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Water Temperature on Coral Reefs in the Florida Keys  
11  
By Year



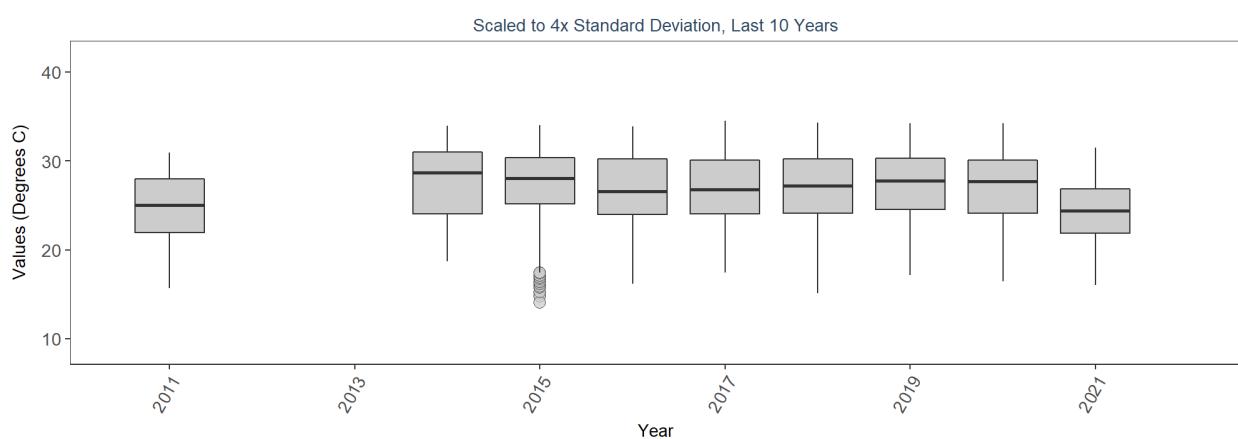
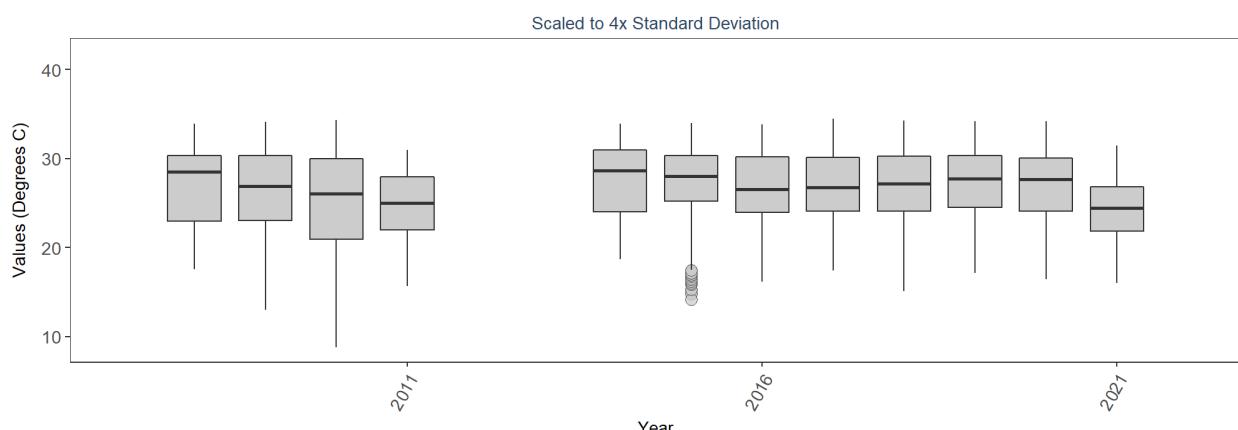
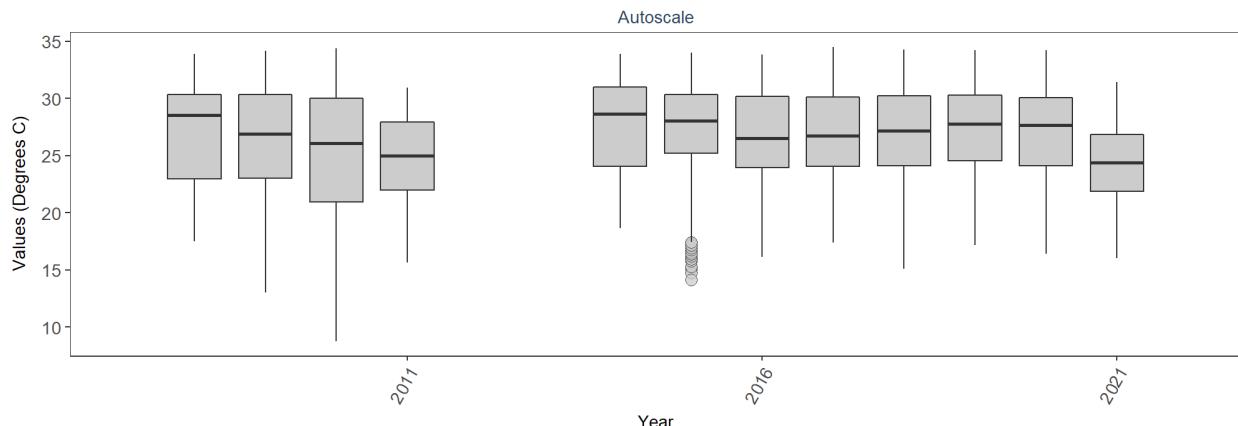
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 Water Temperature on Coral Reefs in the Florida Keys  
 11  
 By Year & Month



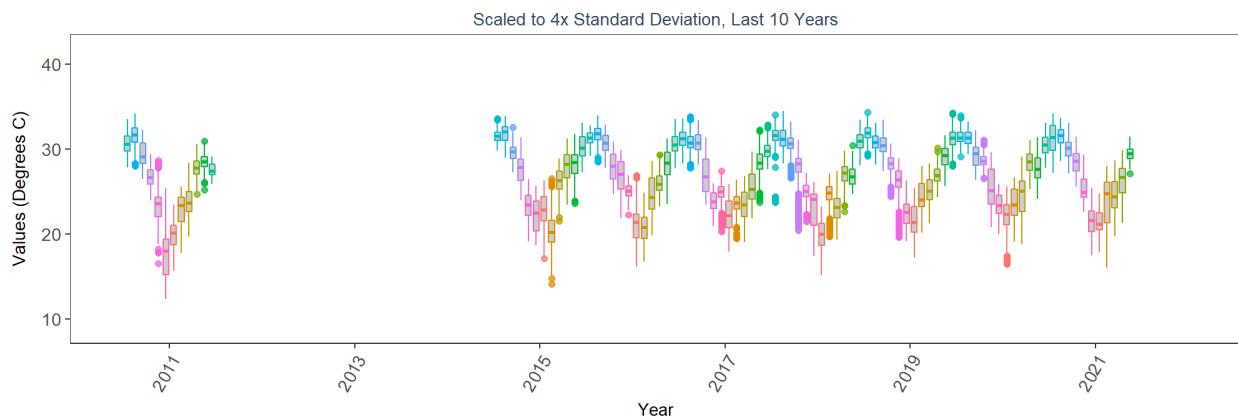
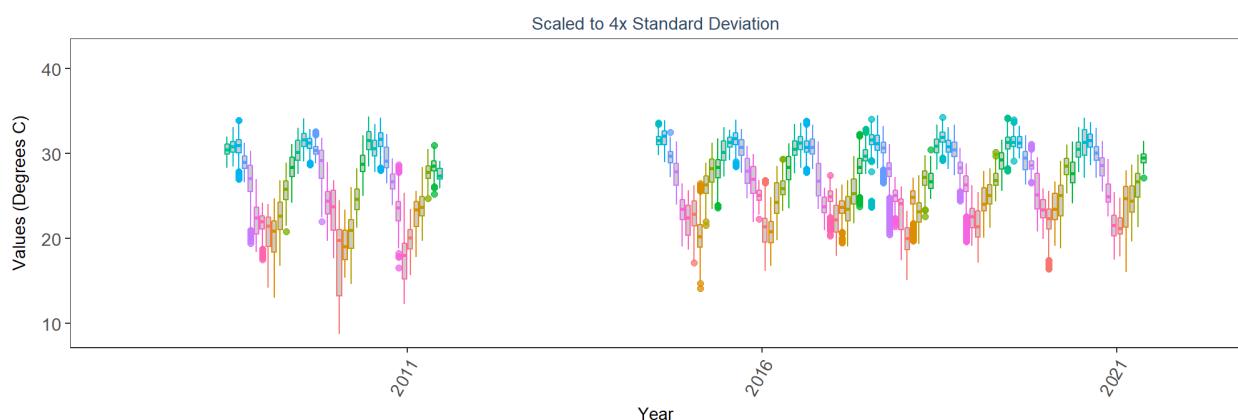
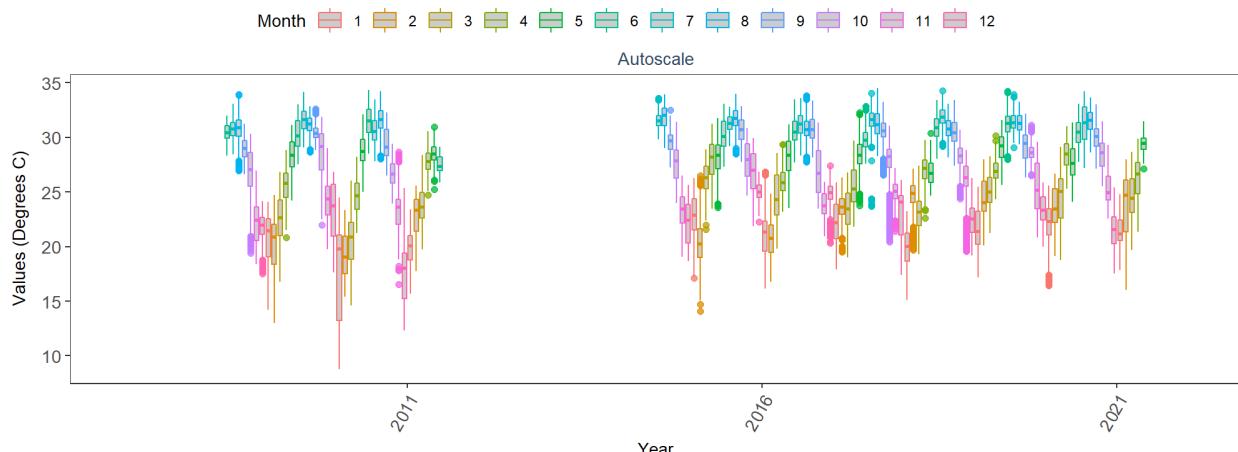
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



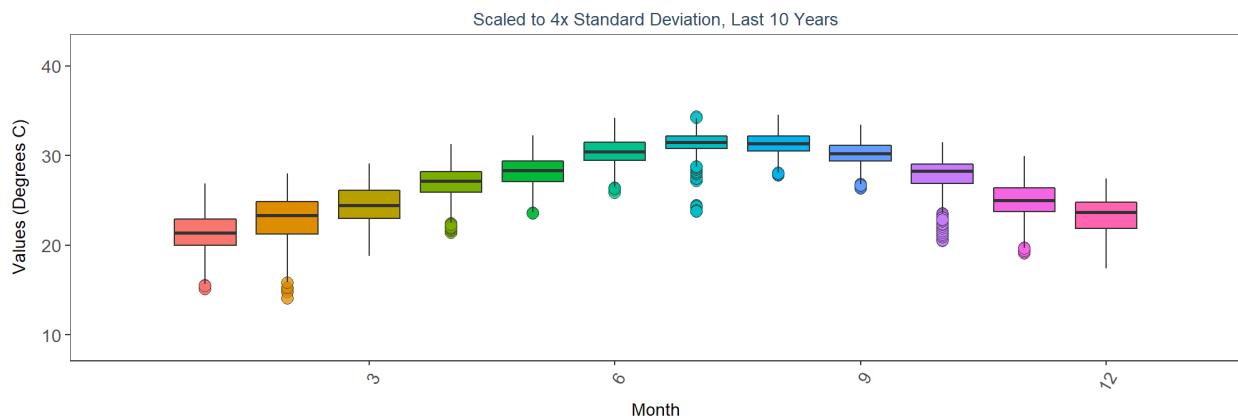
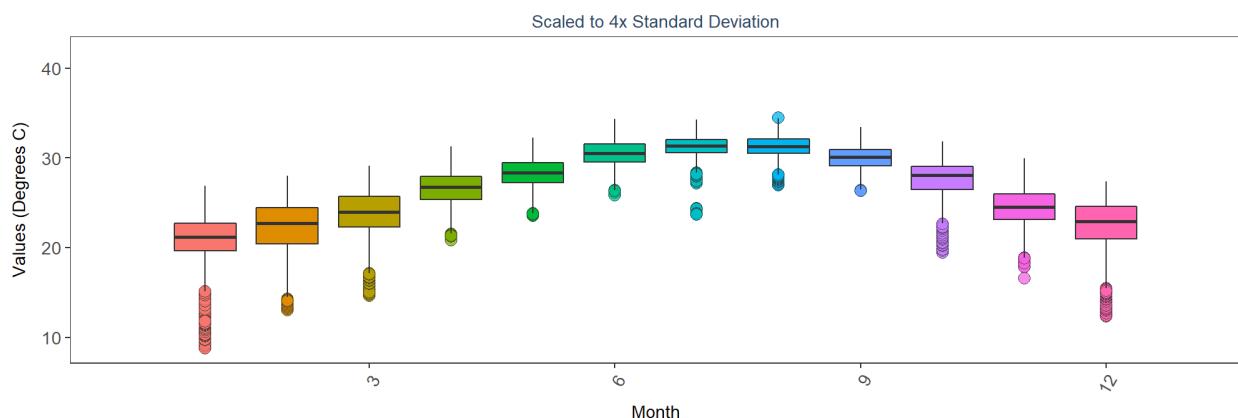
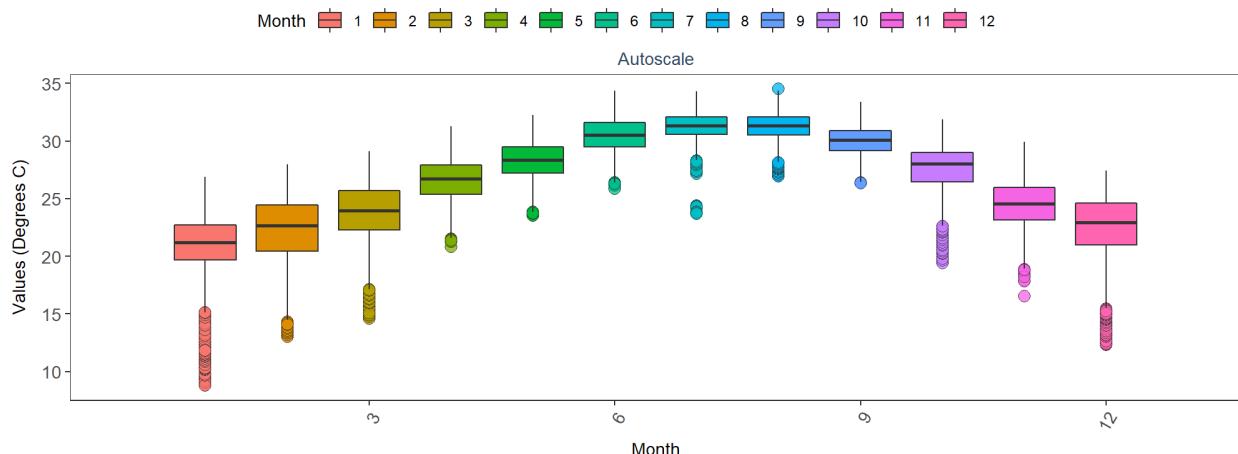
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 Water Temperature on Coral Reefs in the Florida Keys  
 12  
 By Year



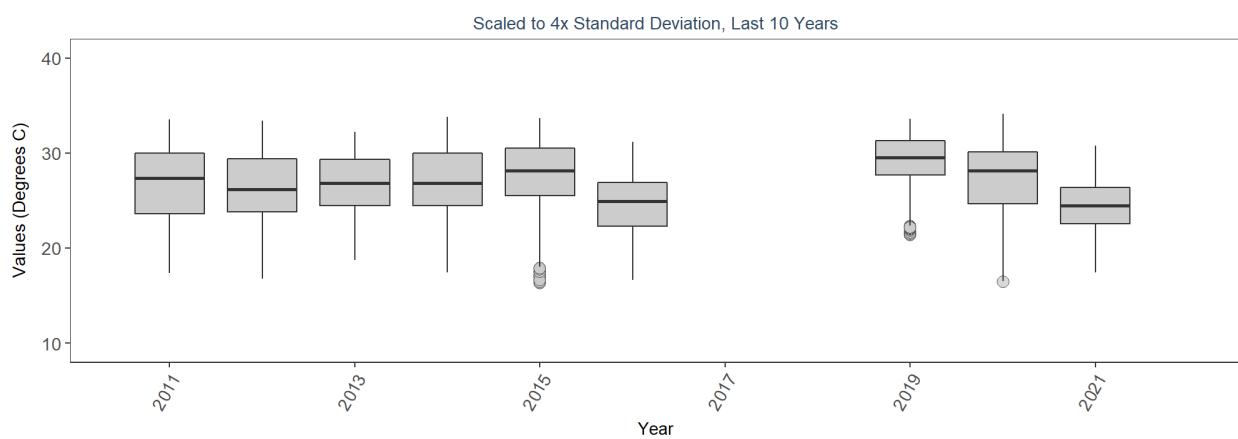
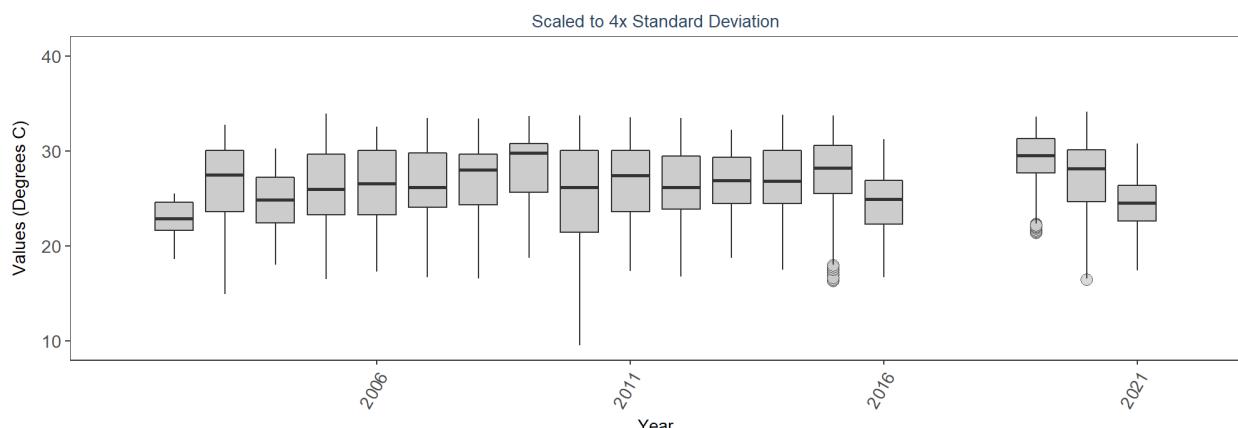
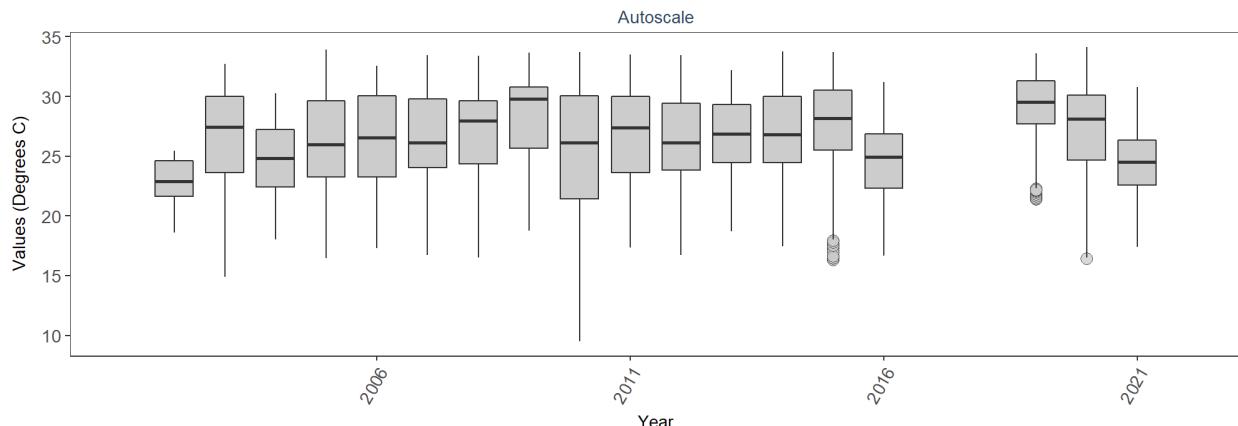
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 Water Temperature on Coral Reefs in the Florida Keys  
 12  
 By Year & Month



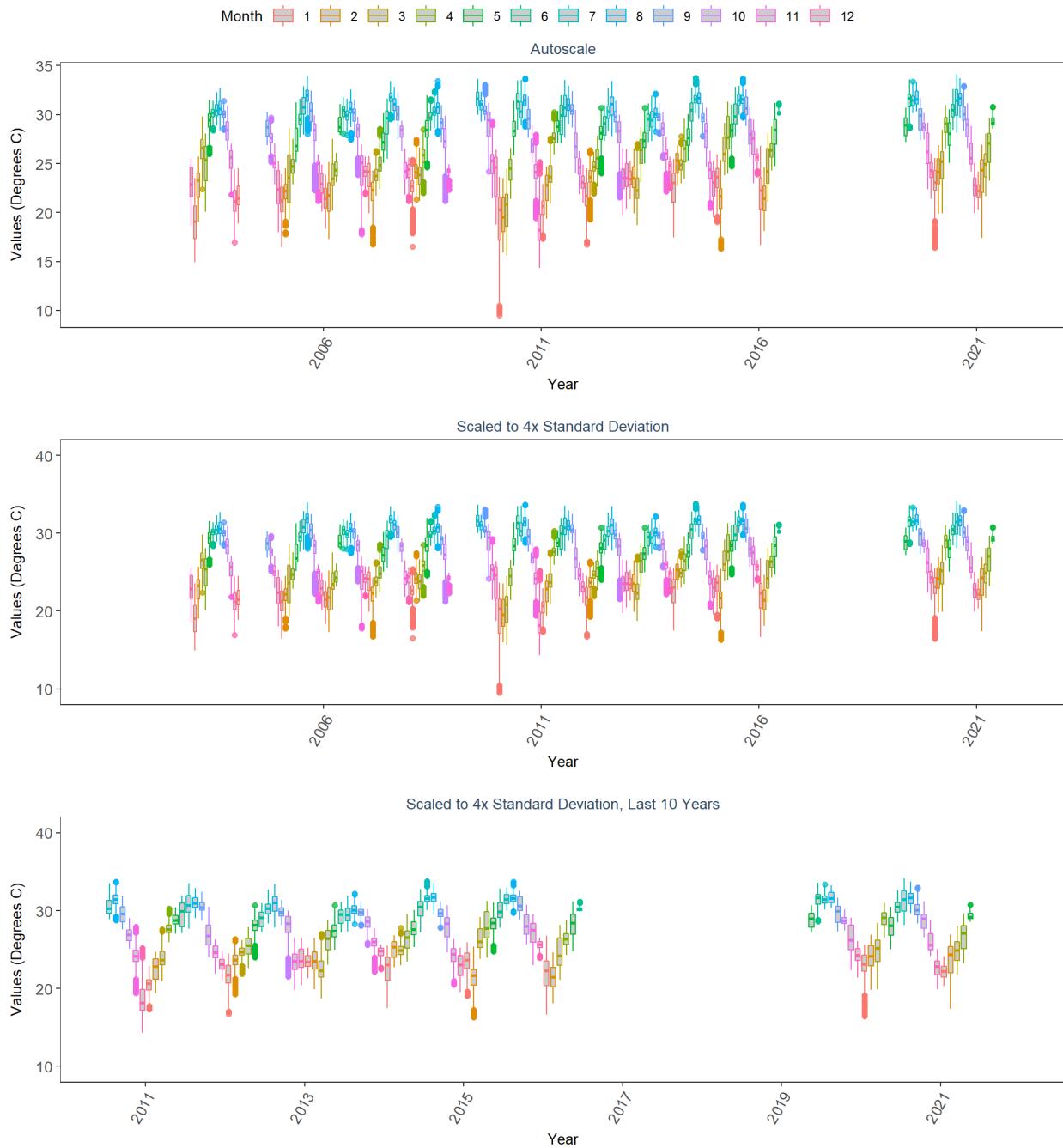
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 Water Temperature on Coral Reefs in the Florida Keys  
 12  
 By Month



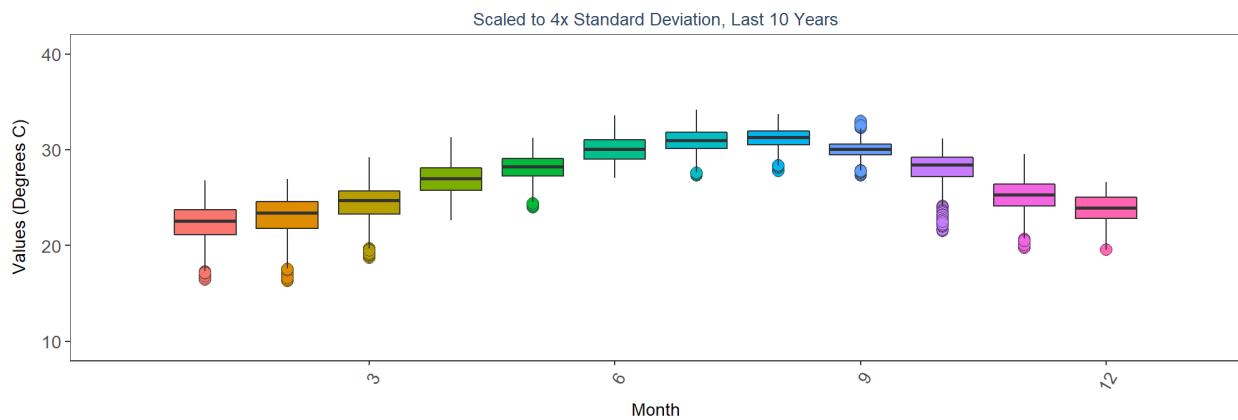
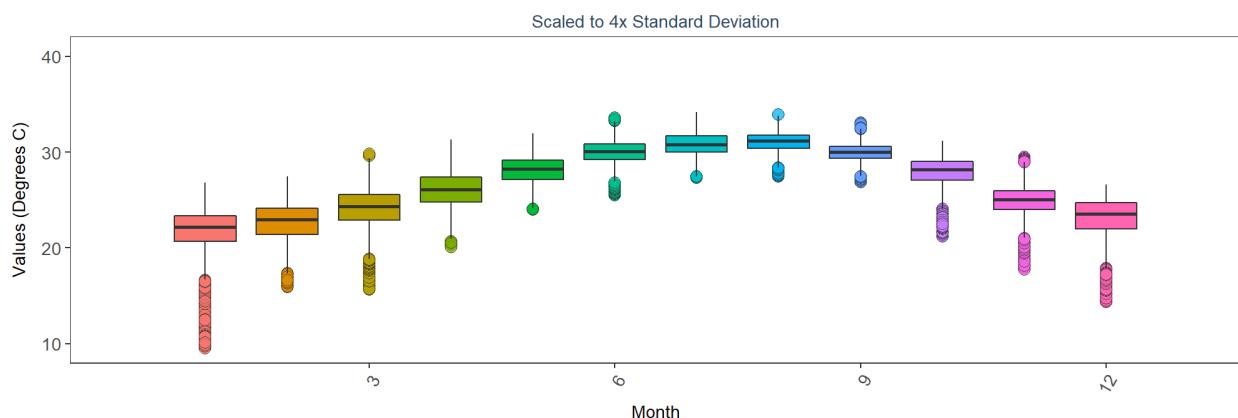
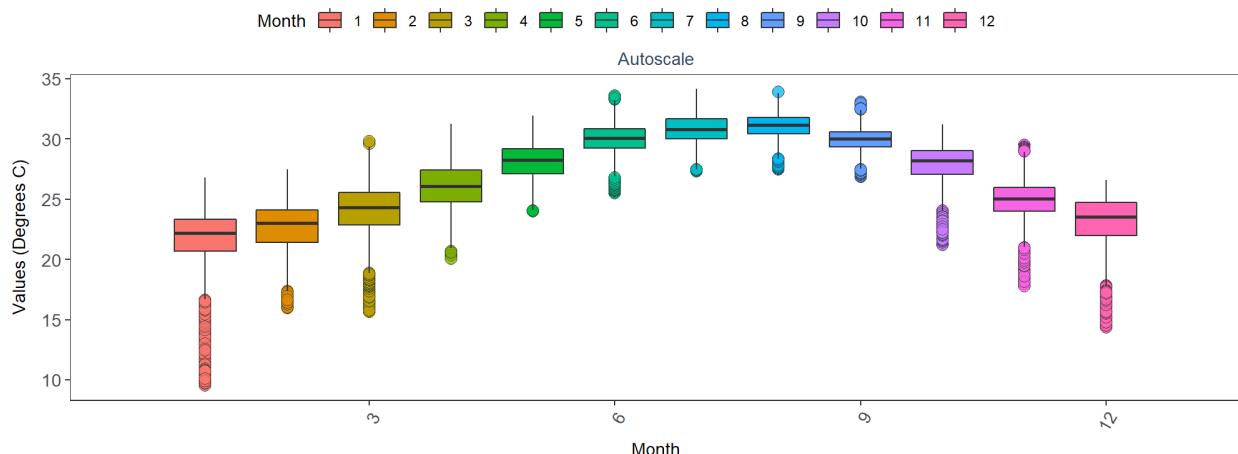
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 Water Temperature on Coral Reefs in the Florida Keys  
 14  
 By Year



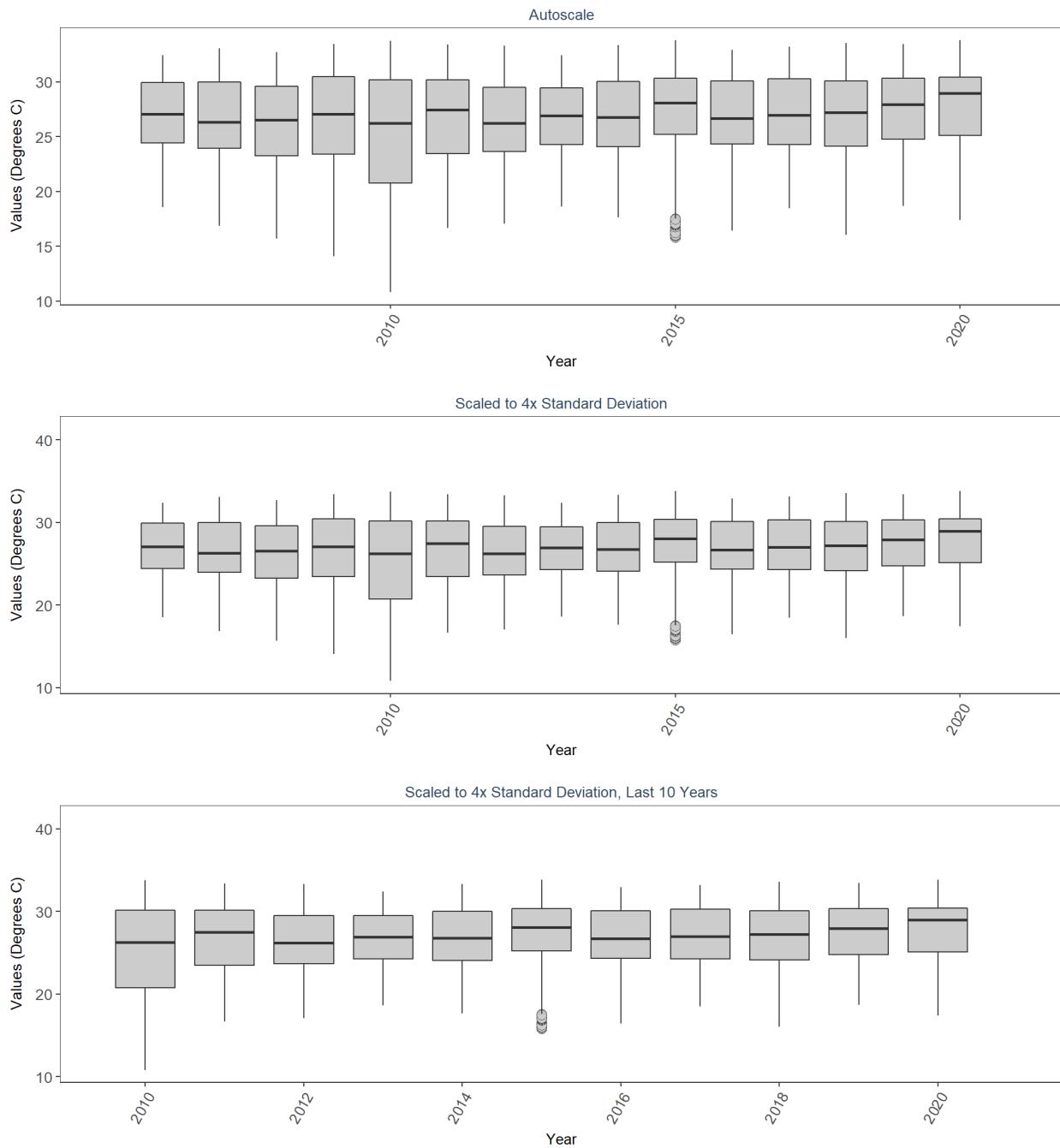
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



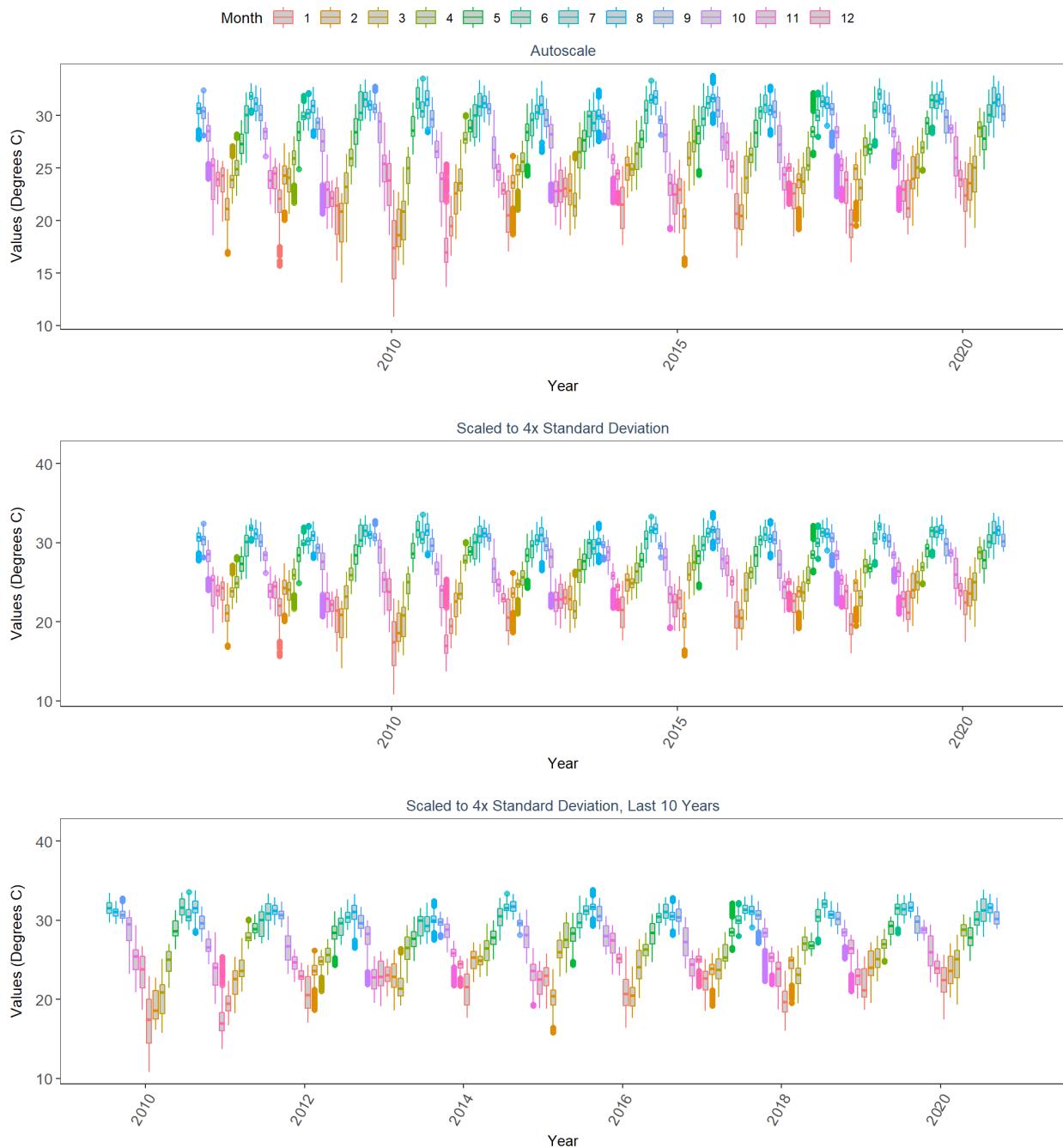
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



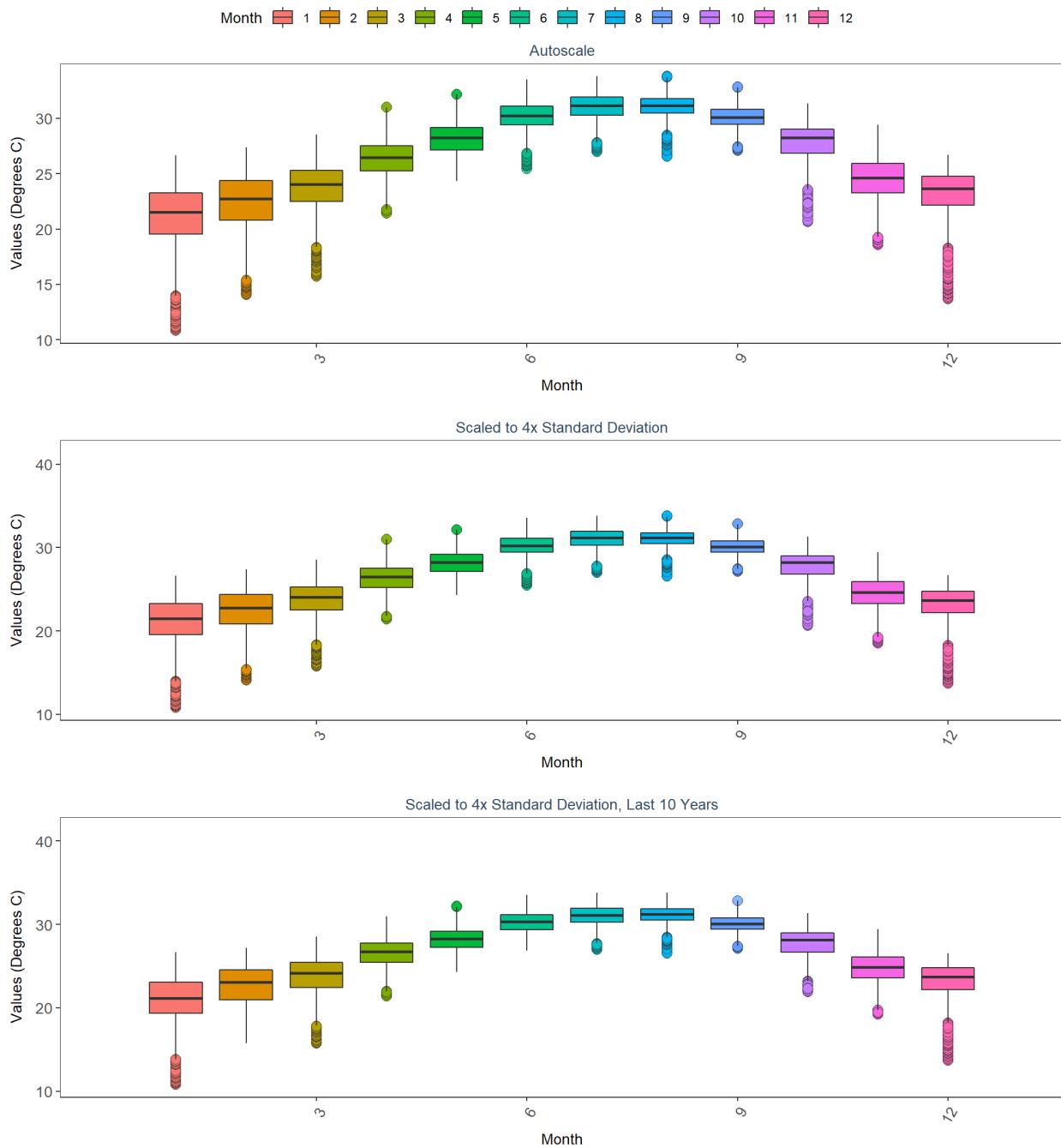
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Water Temperature on Coral Reefs in the Florida Keys  
15  
By Year



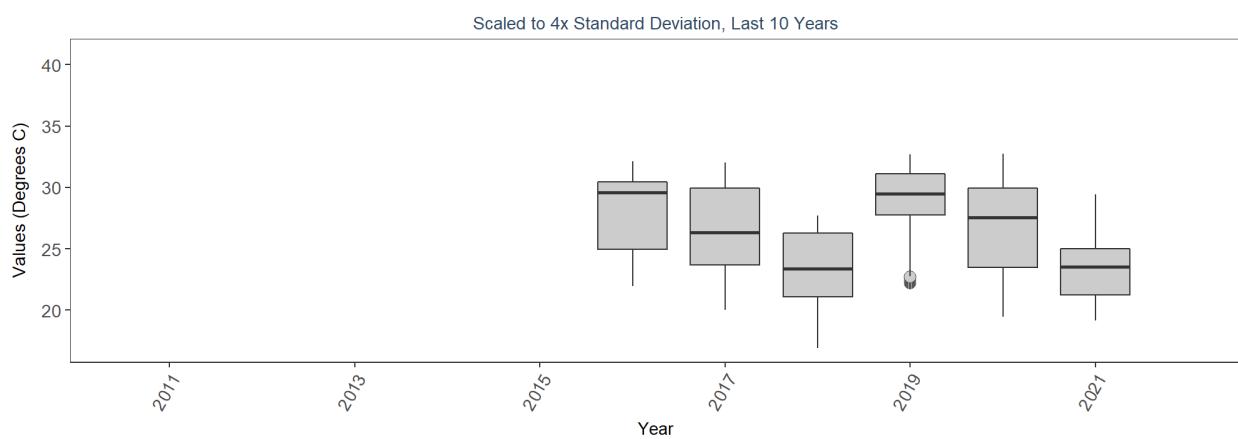
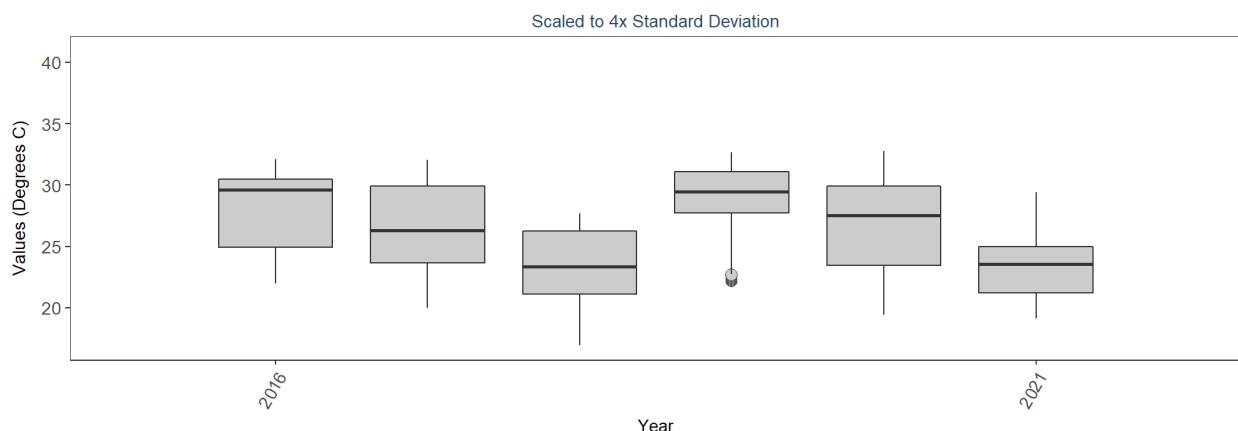
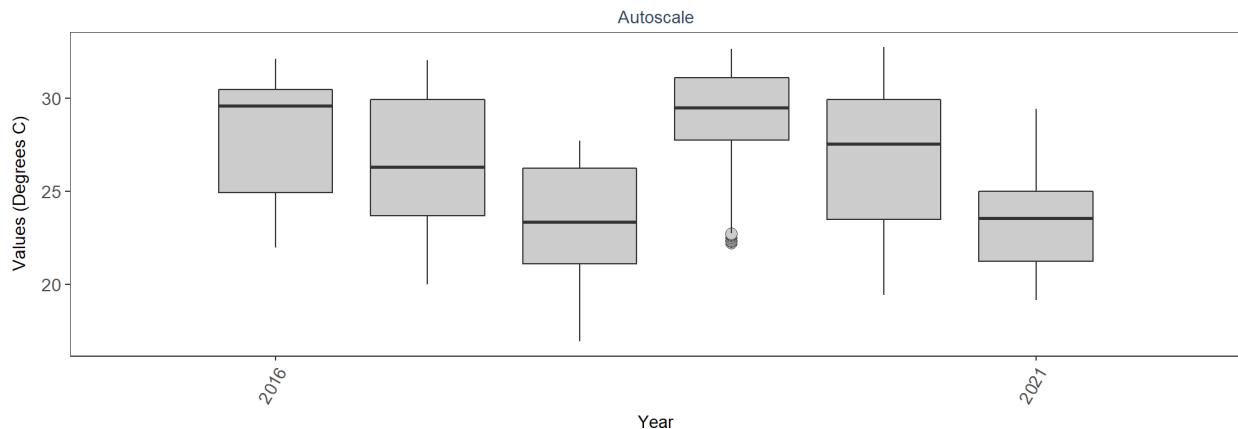
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 Water Temperature on Coral Reefs in the Florida Keys  
 15  
 By Year & Month



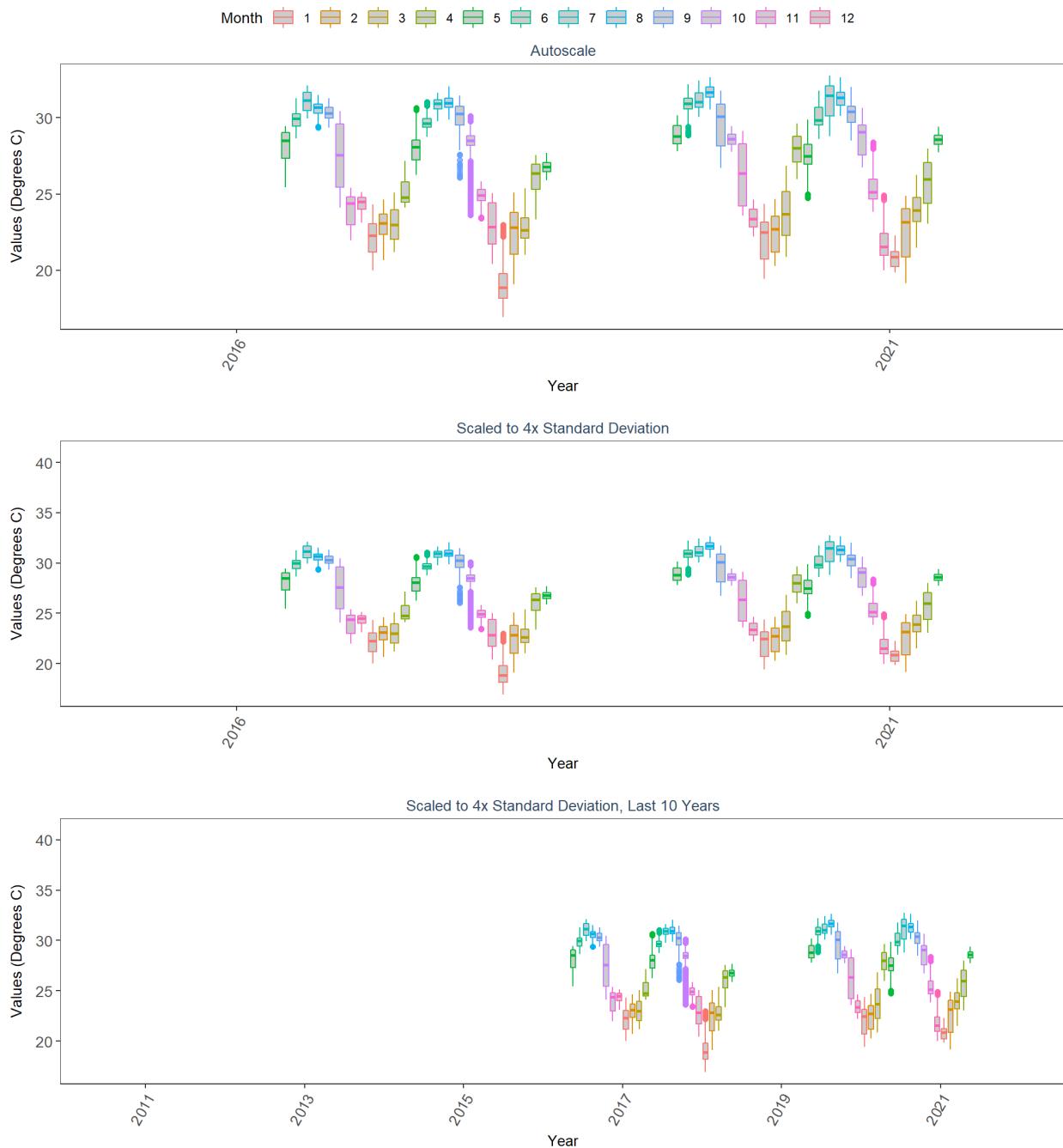
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 By Month



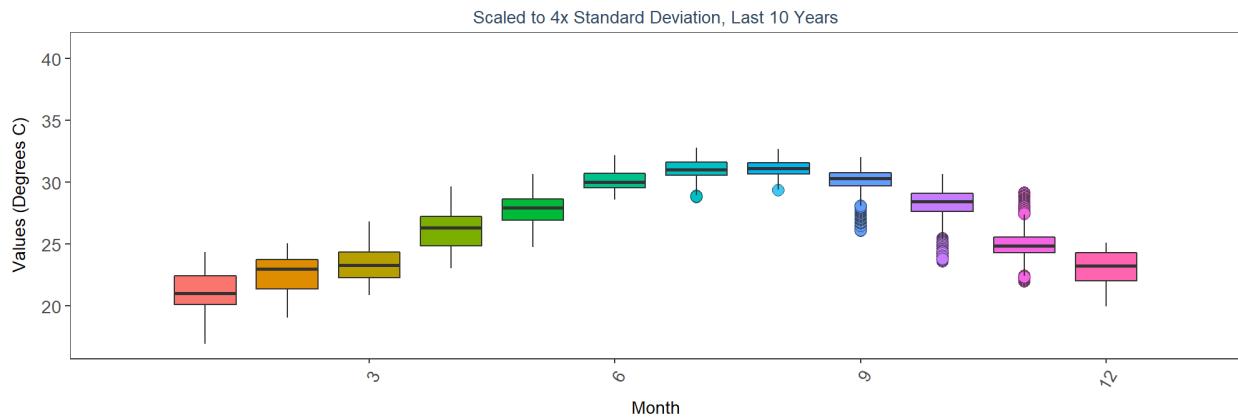
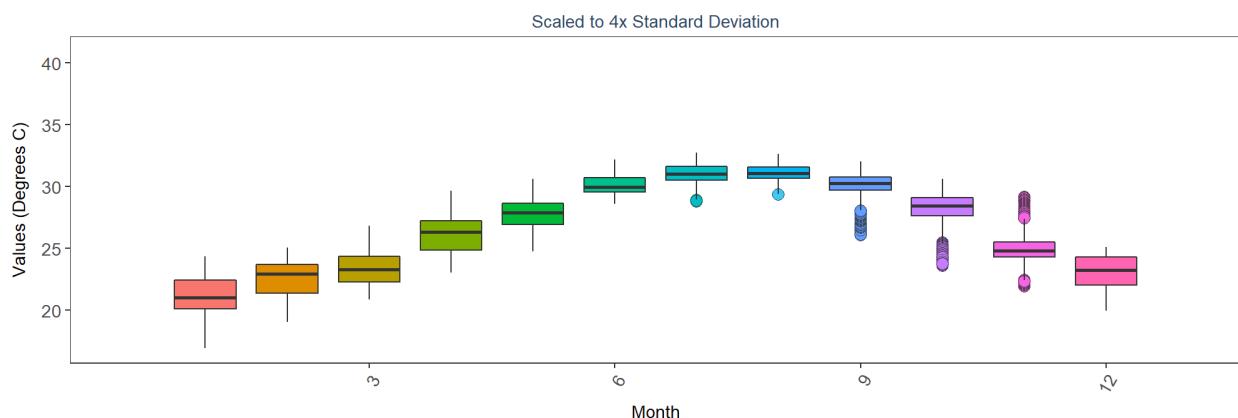
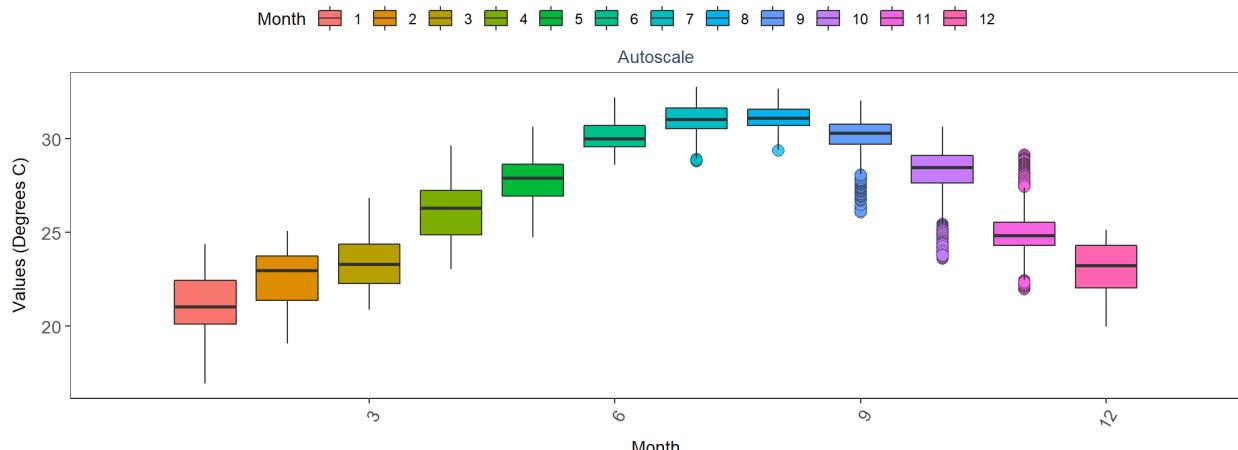
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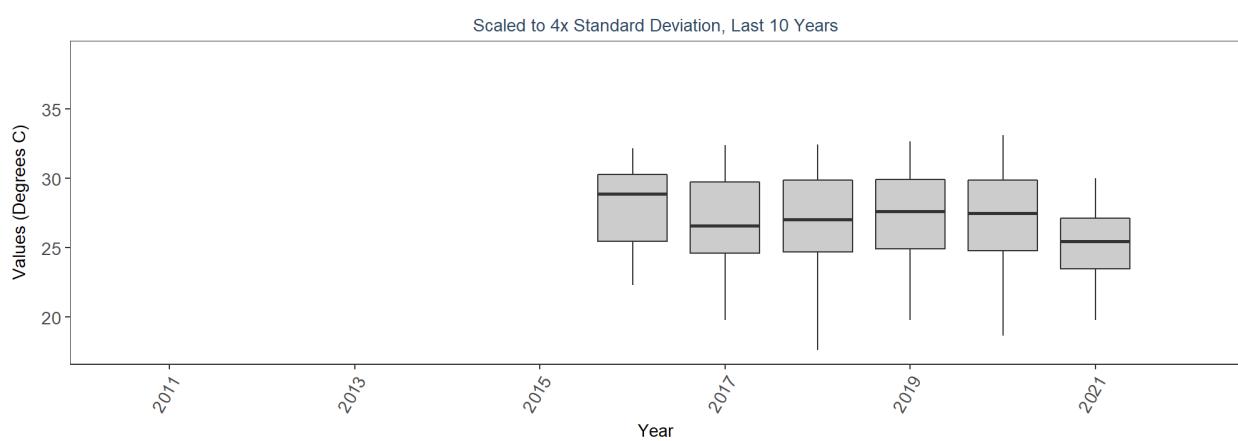
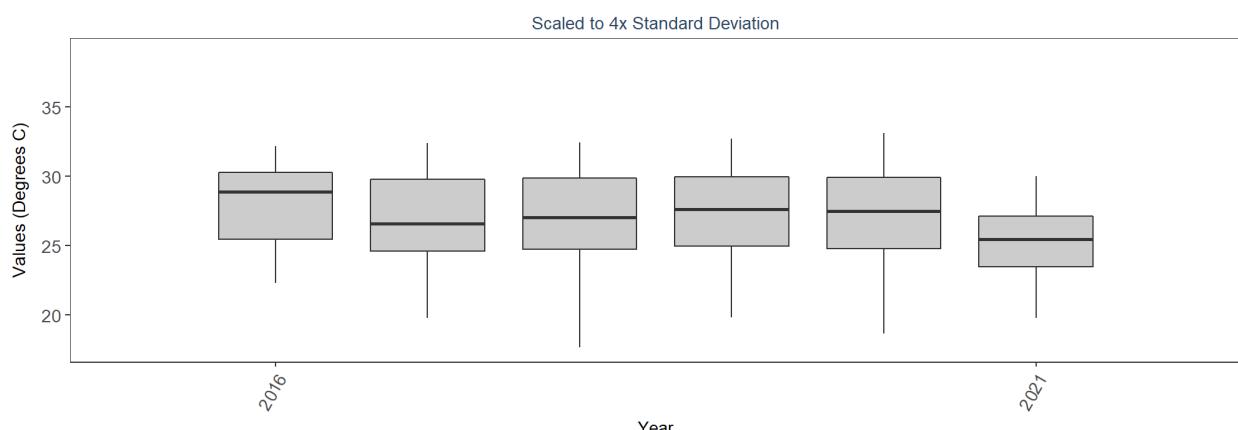
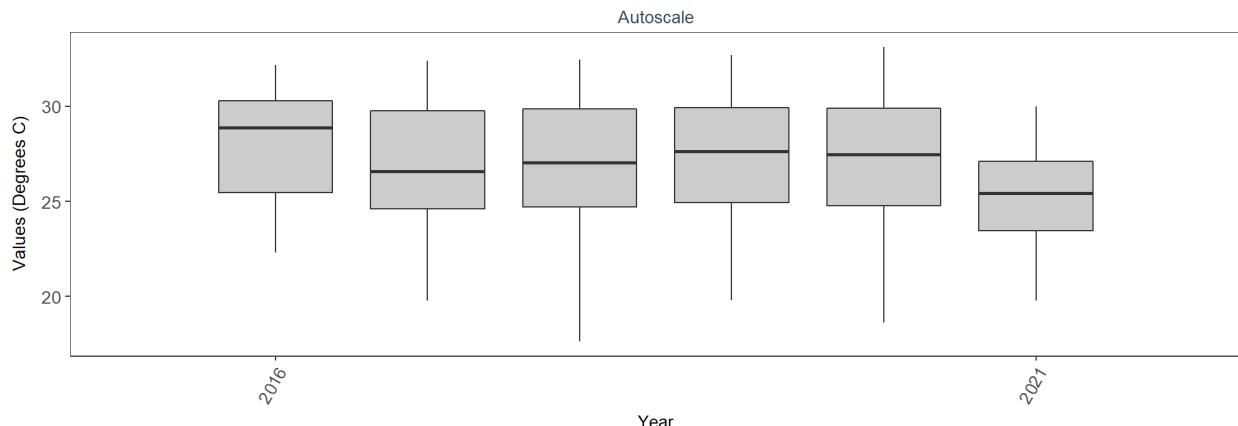
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**Water Temperature on Coral Reefs in the Florida Keys**  
**18**  
**By Year & Month**



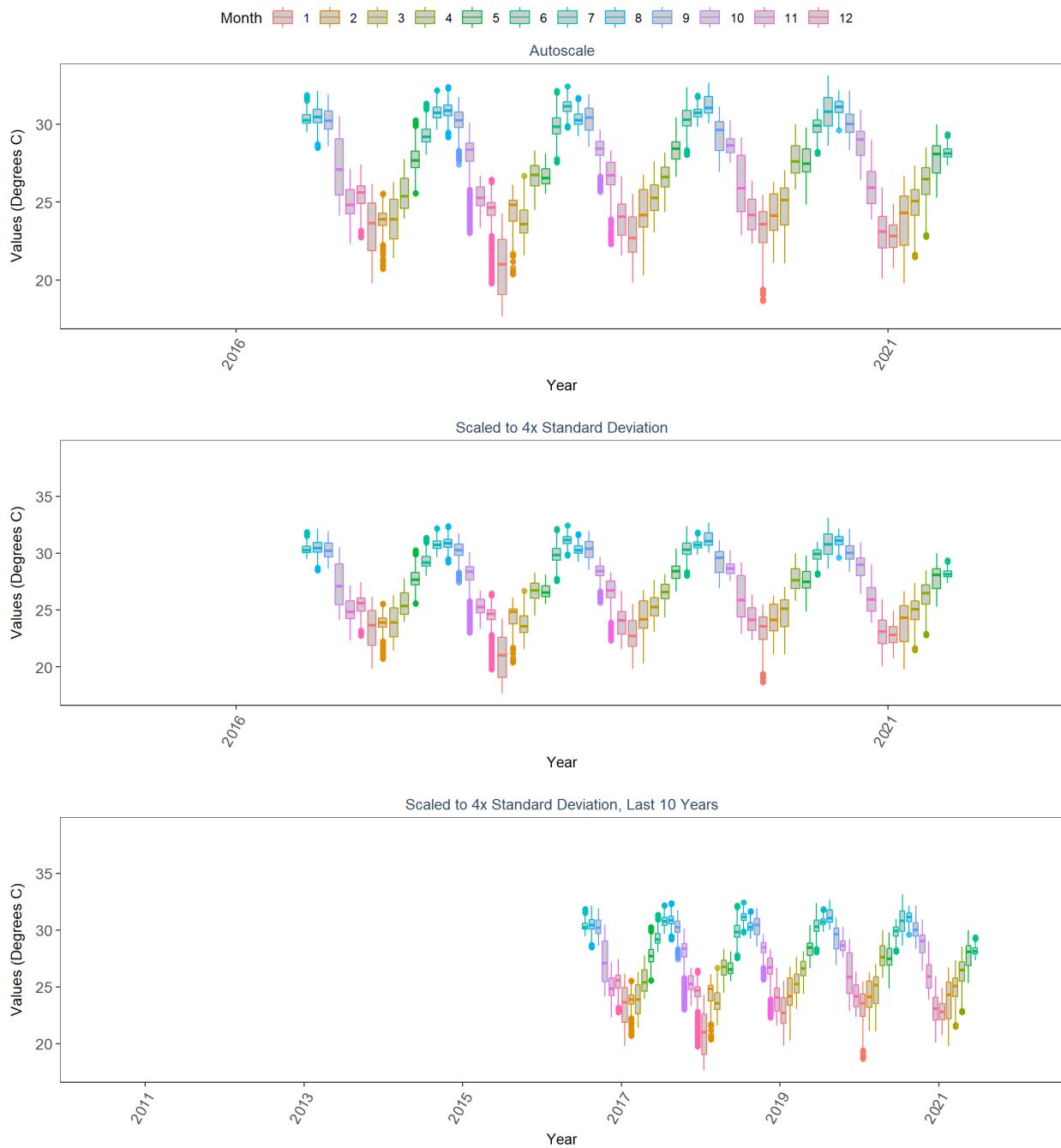
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 By Month



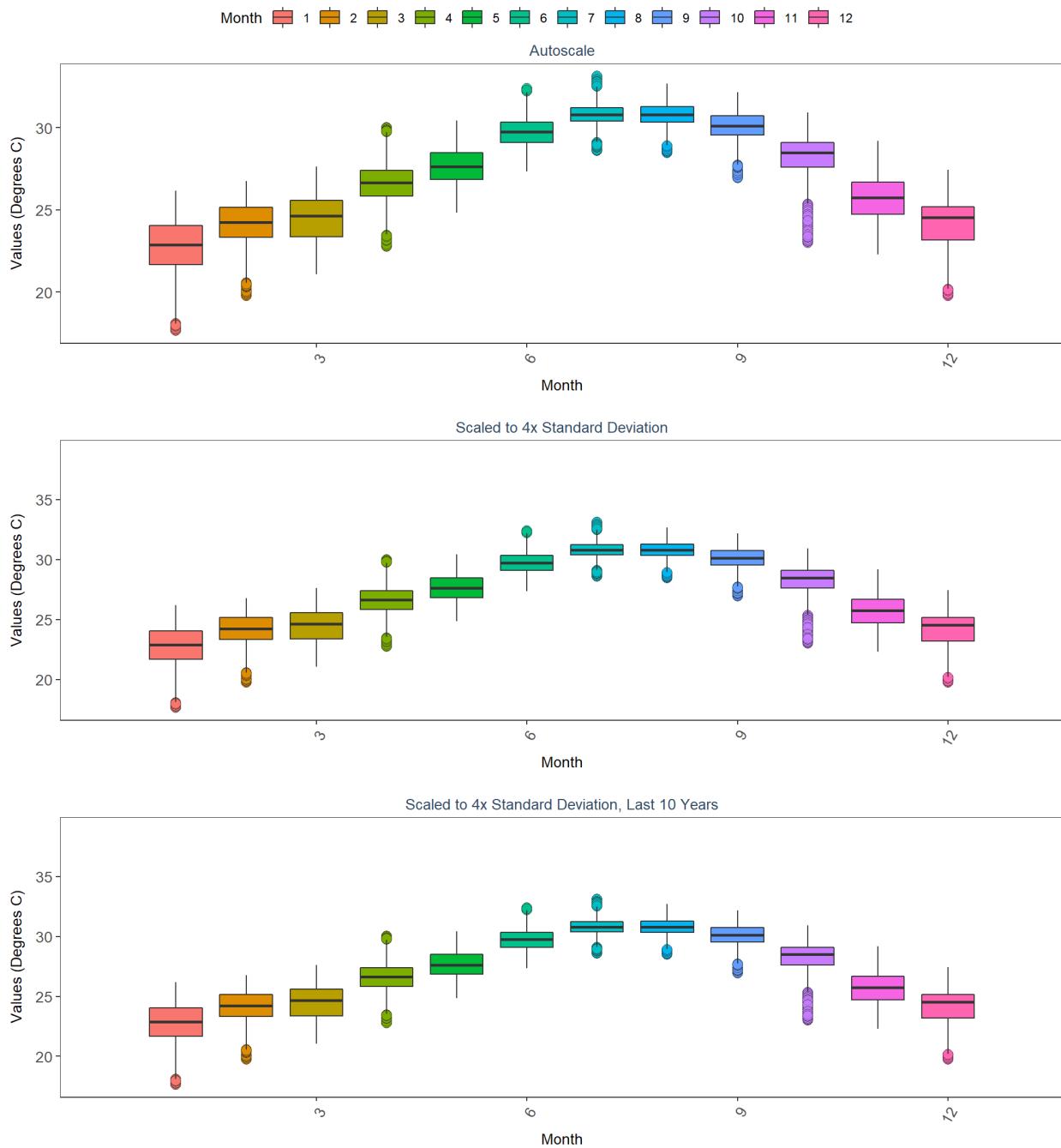
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By Year



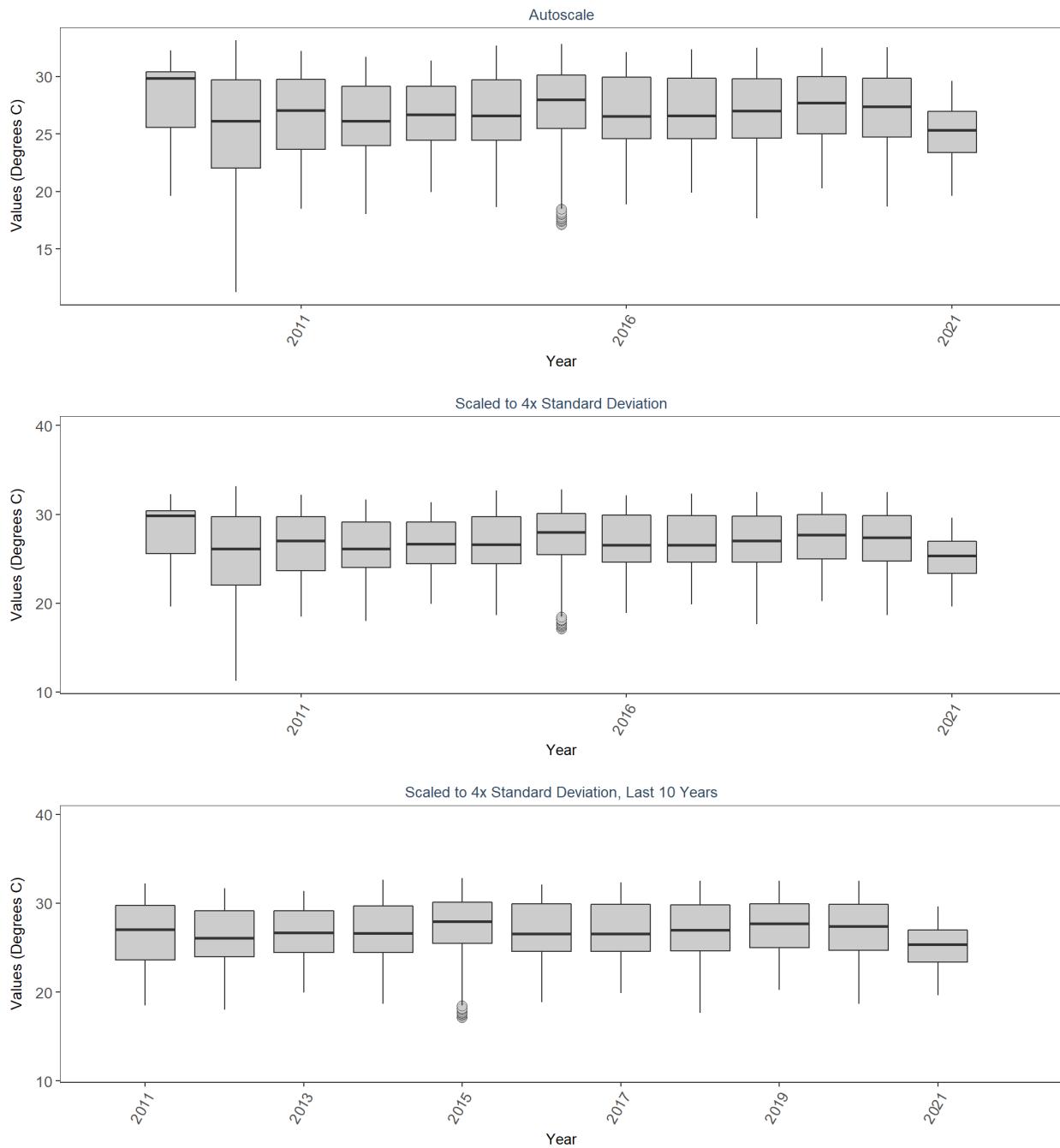
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 By Year & Month



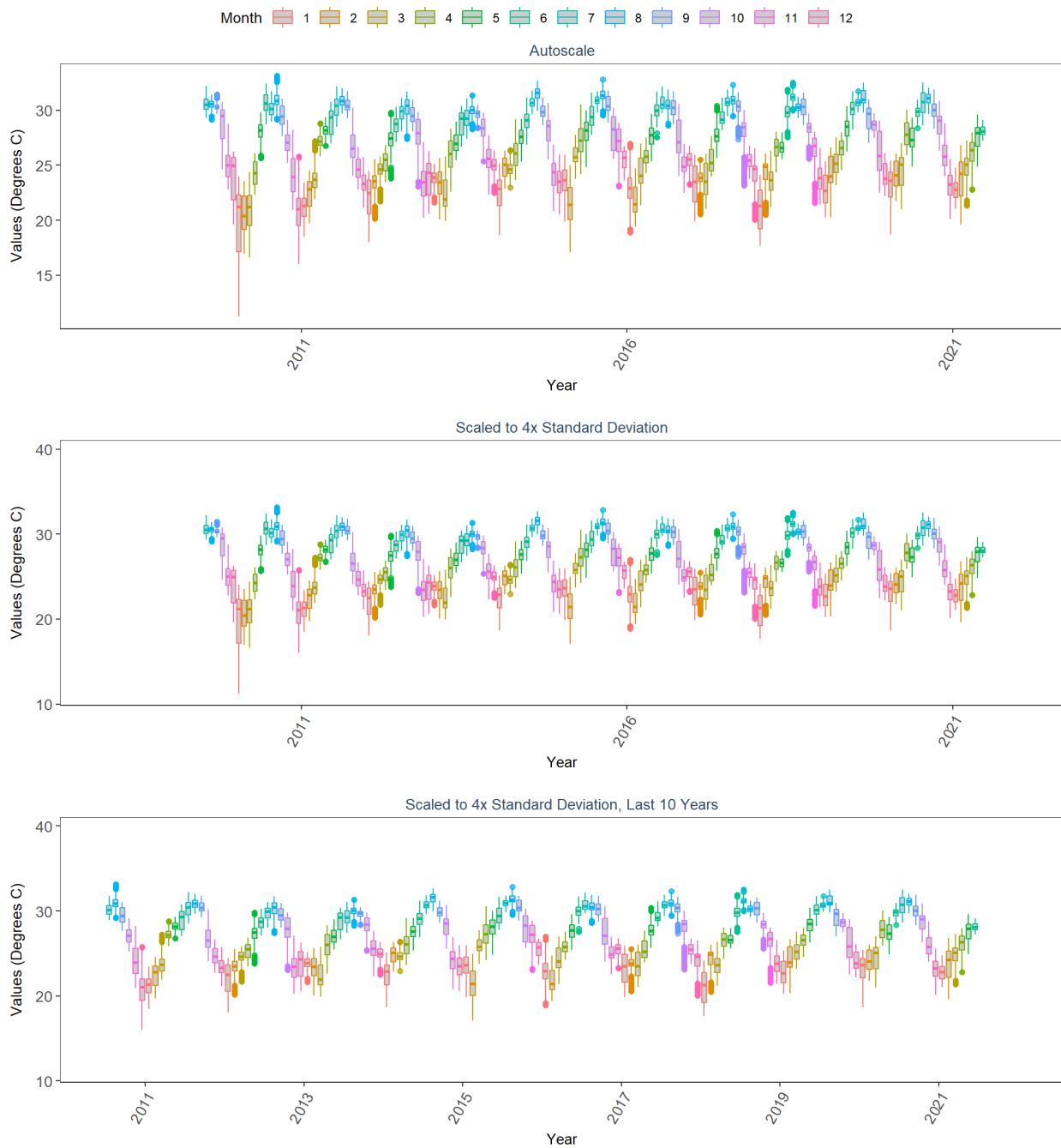
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 By Month



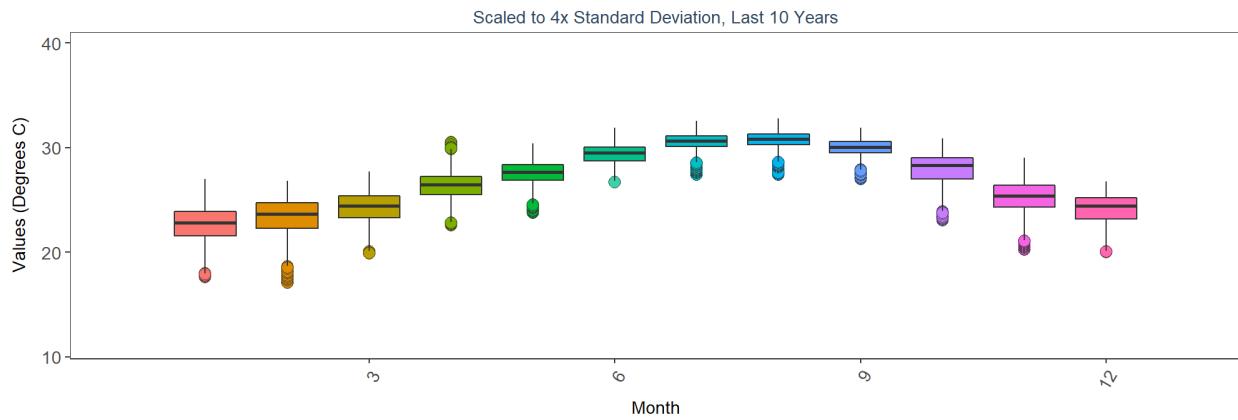
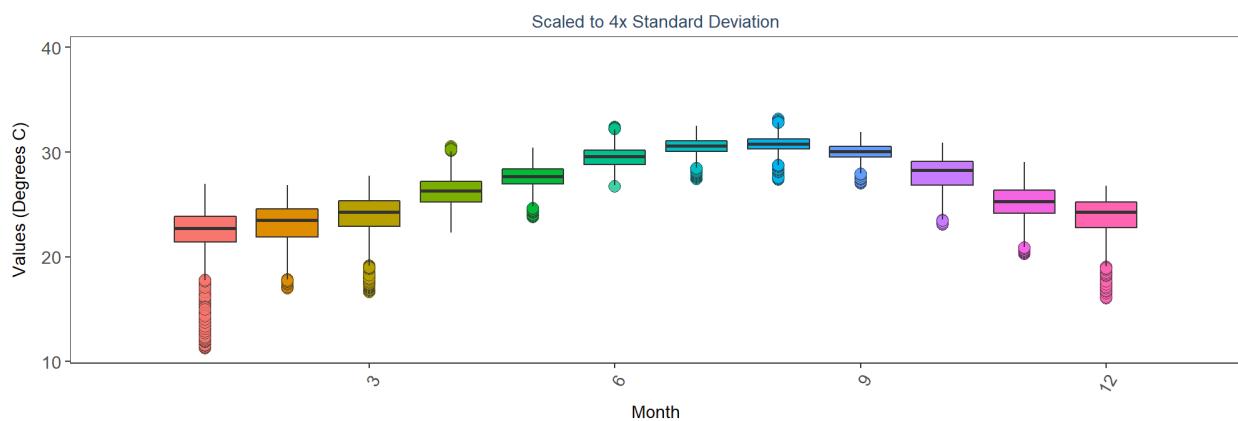
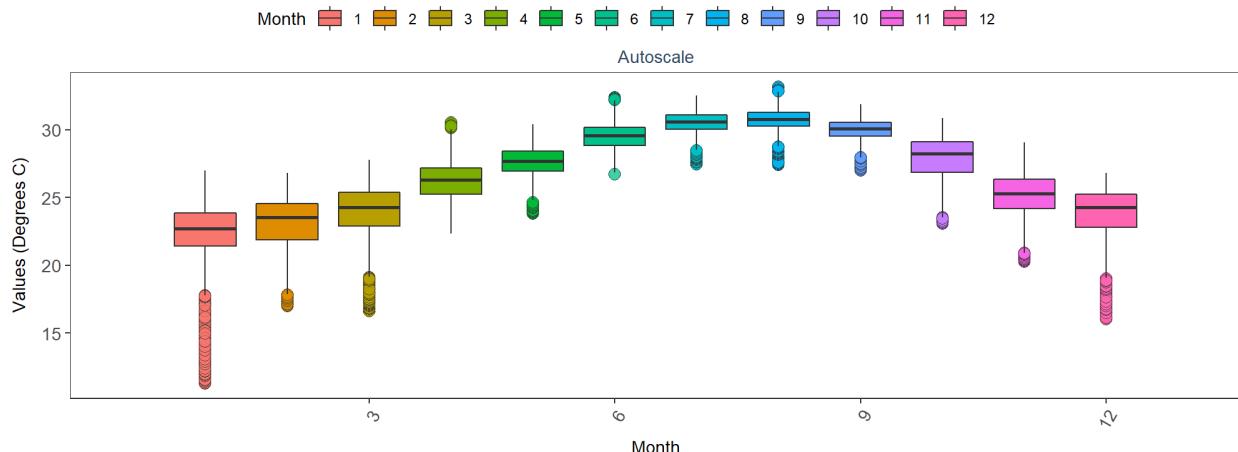
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By Year



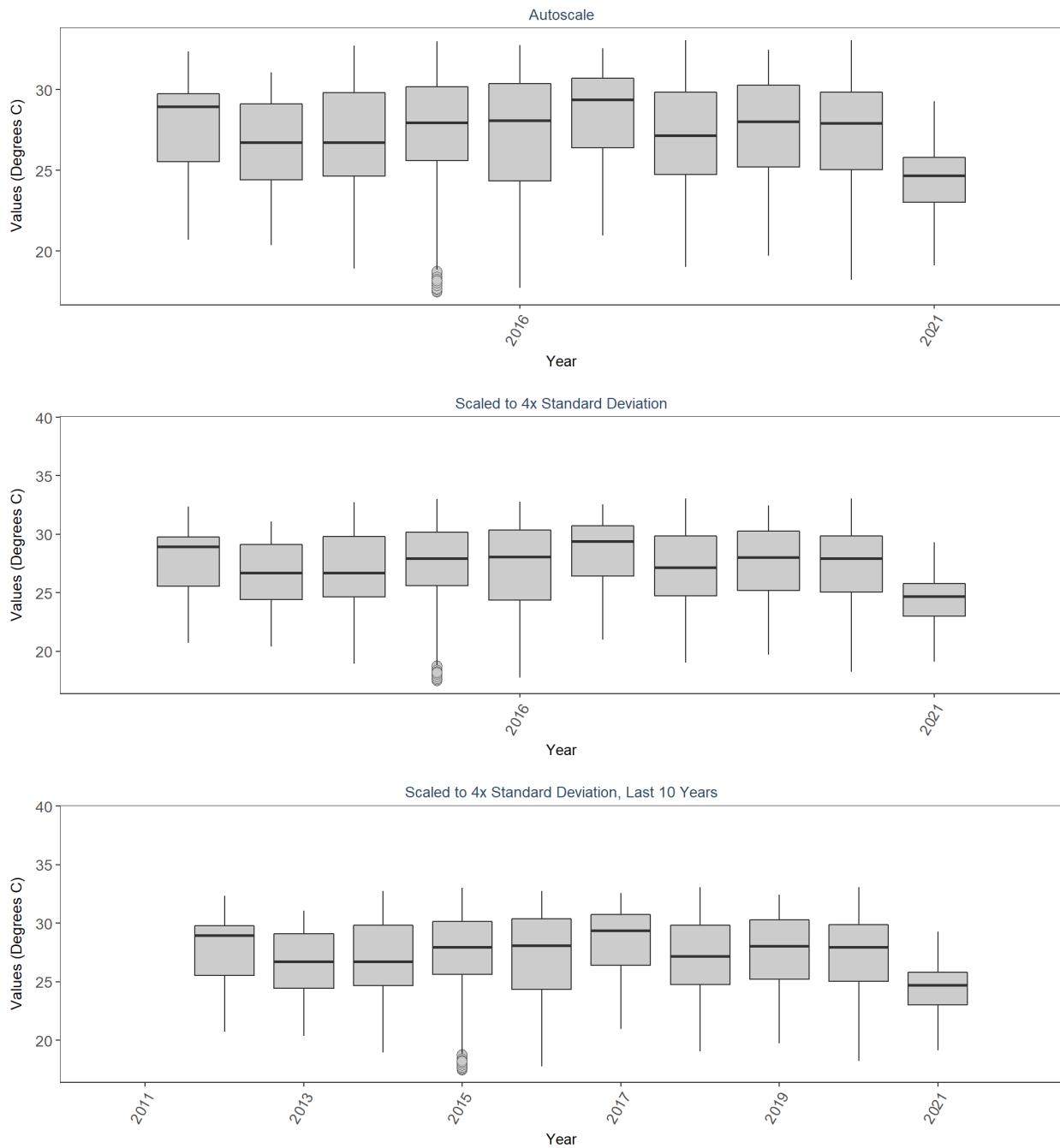
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 By Year & Month



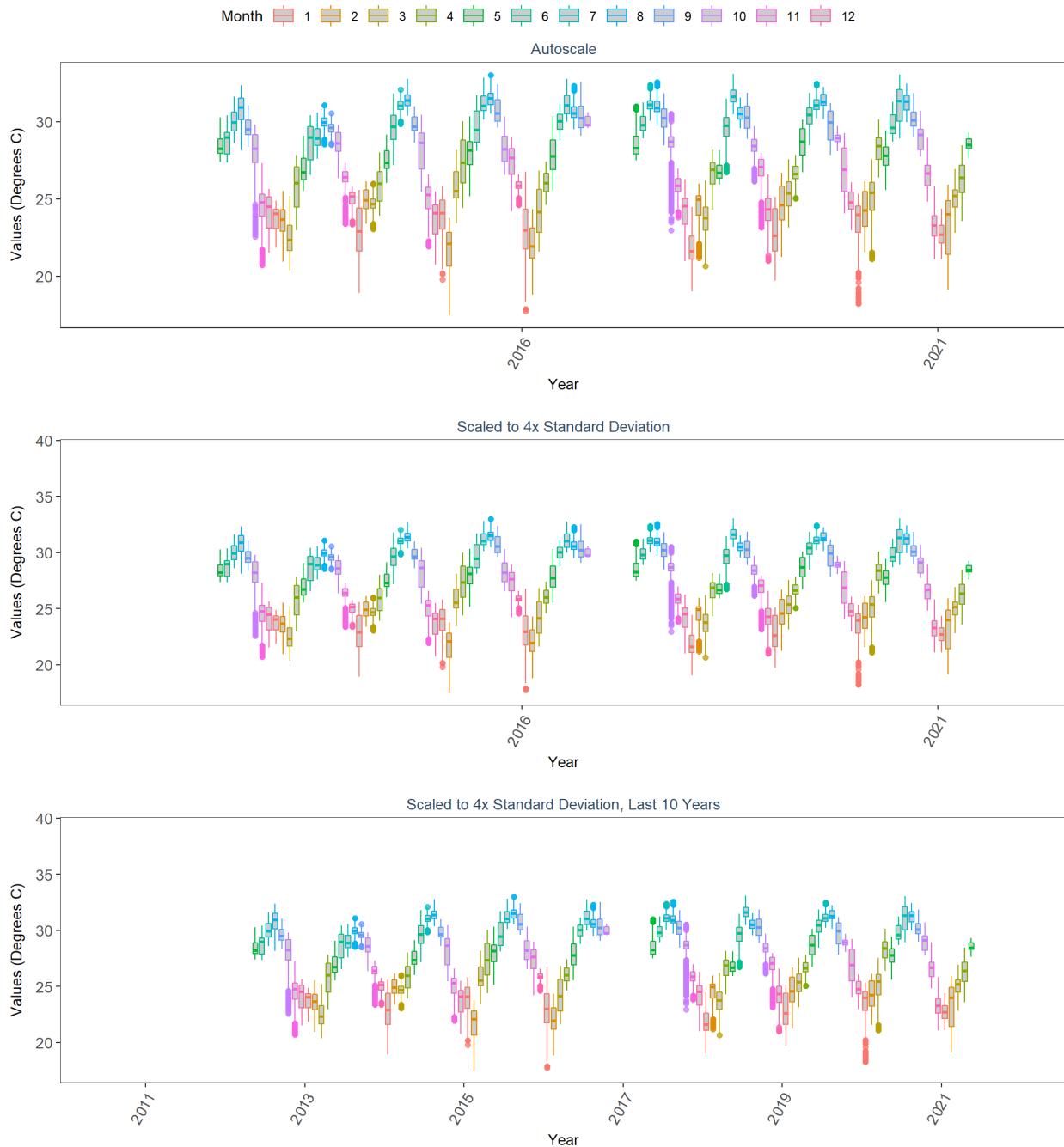
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 By Month



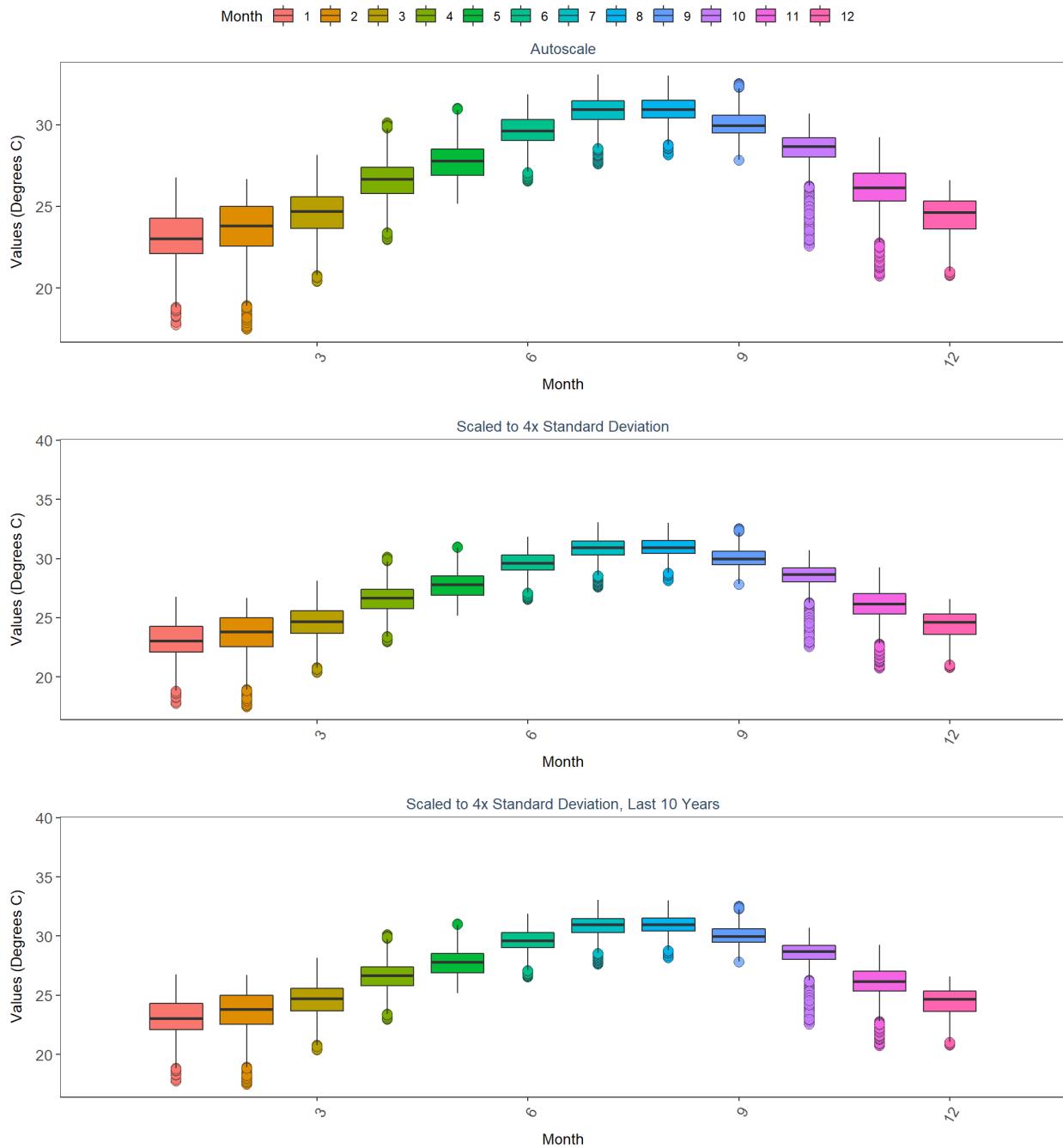
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23  
By Year



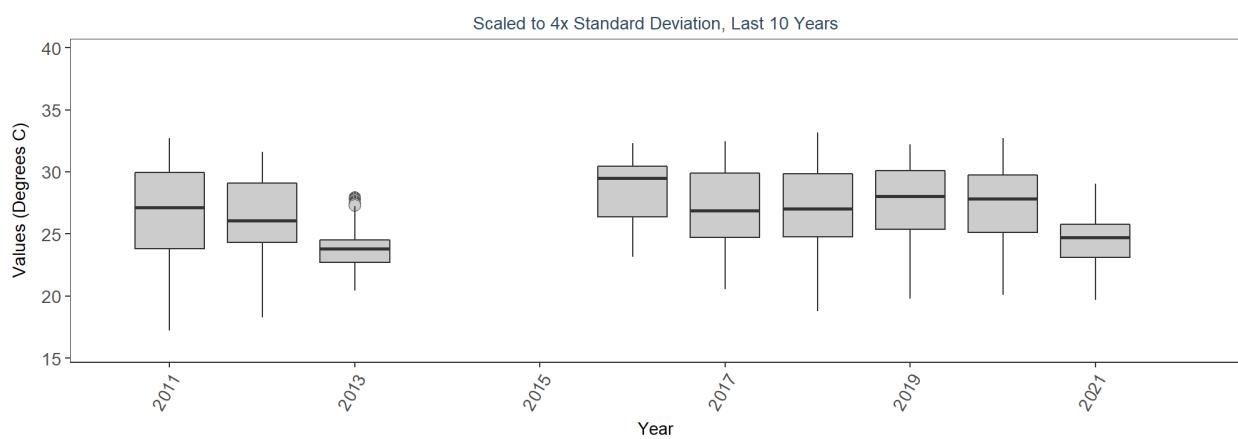
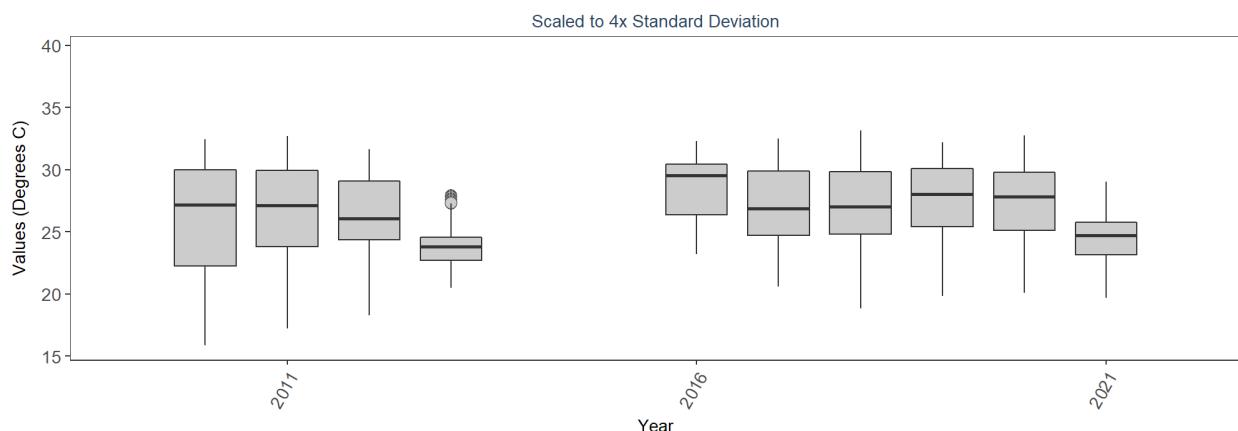
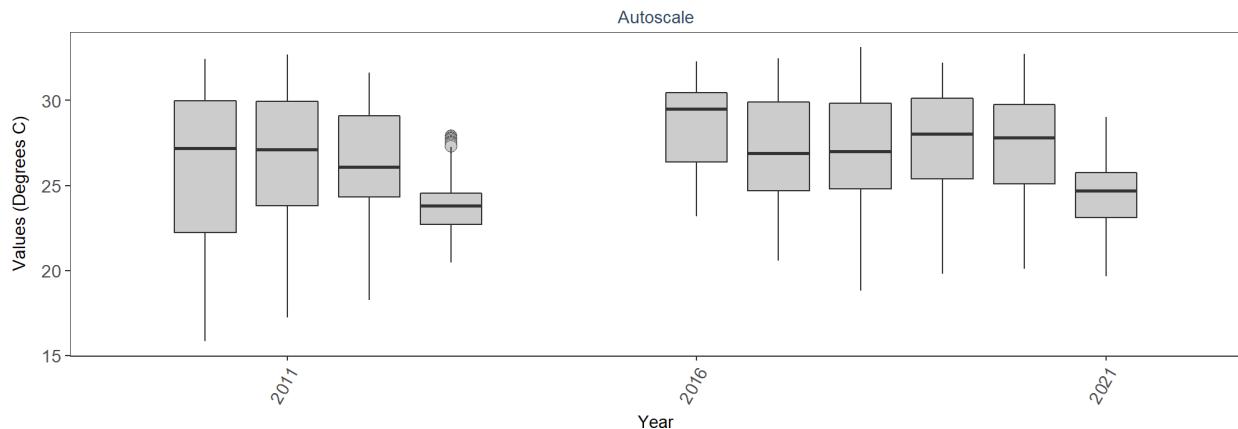
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



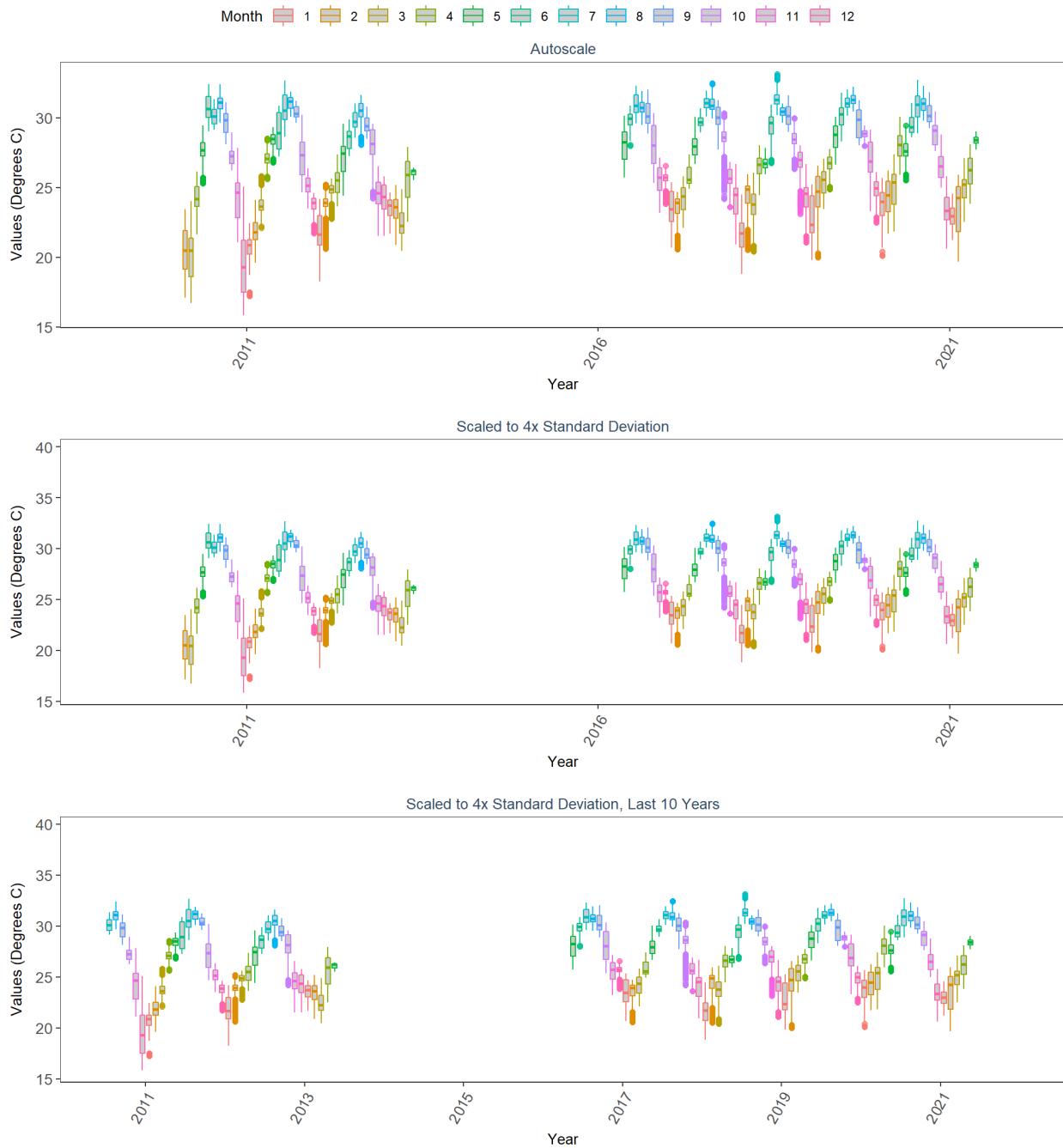
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 By Month



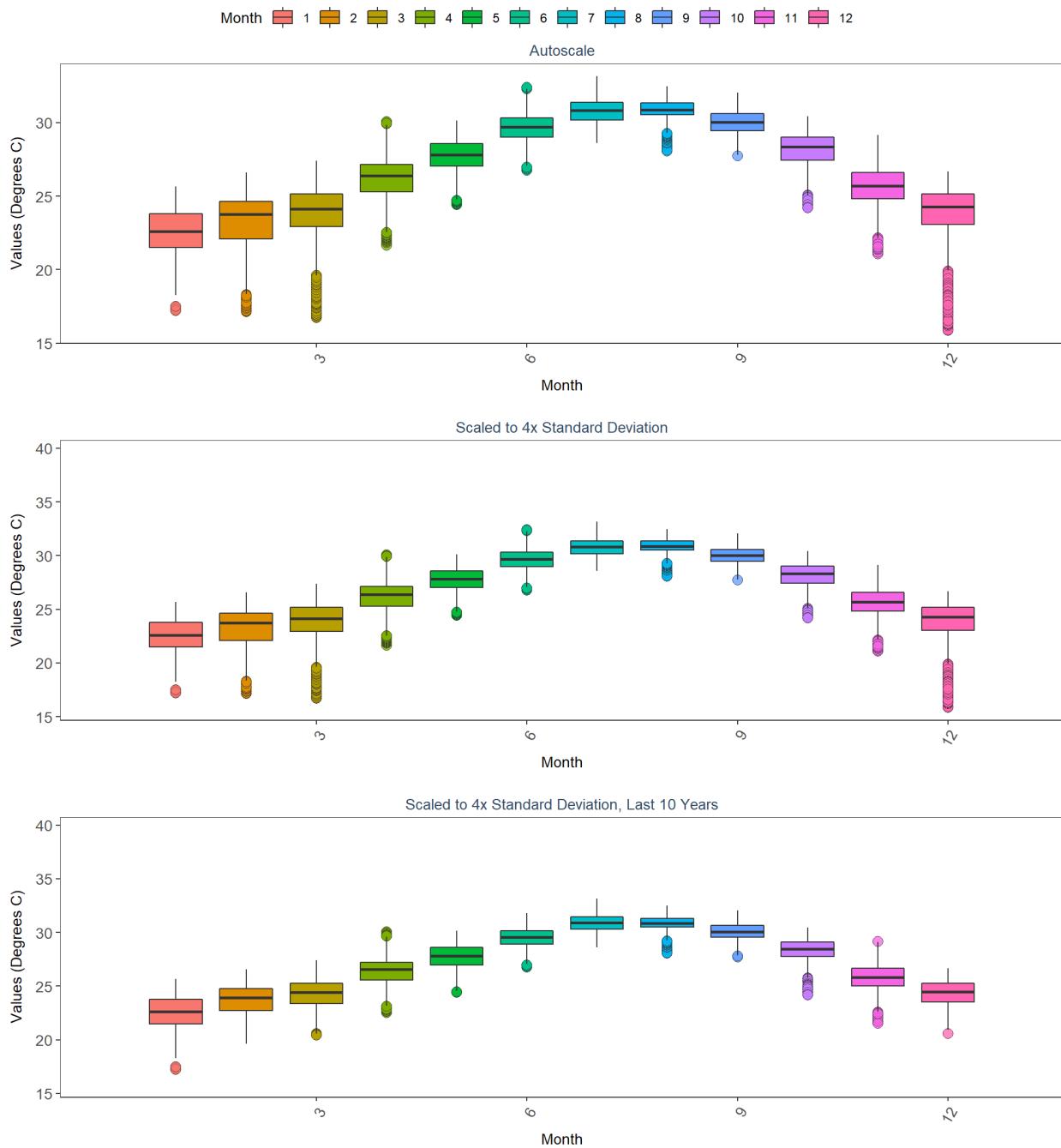
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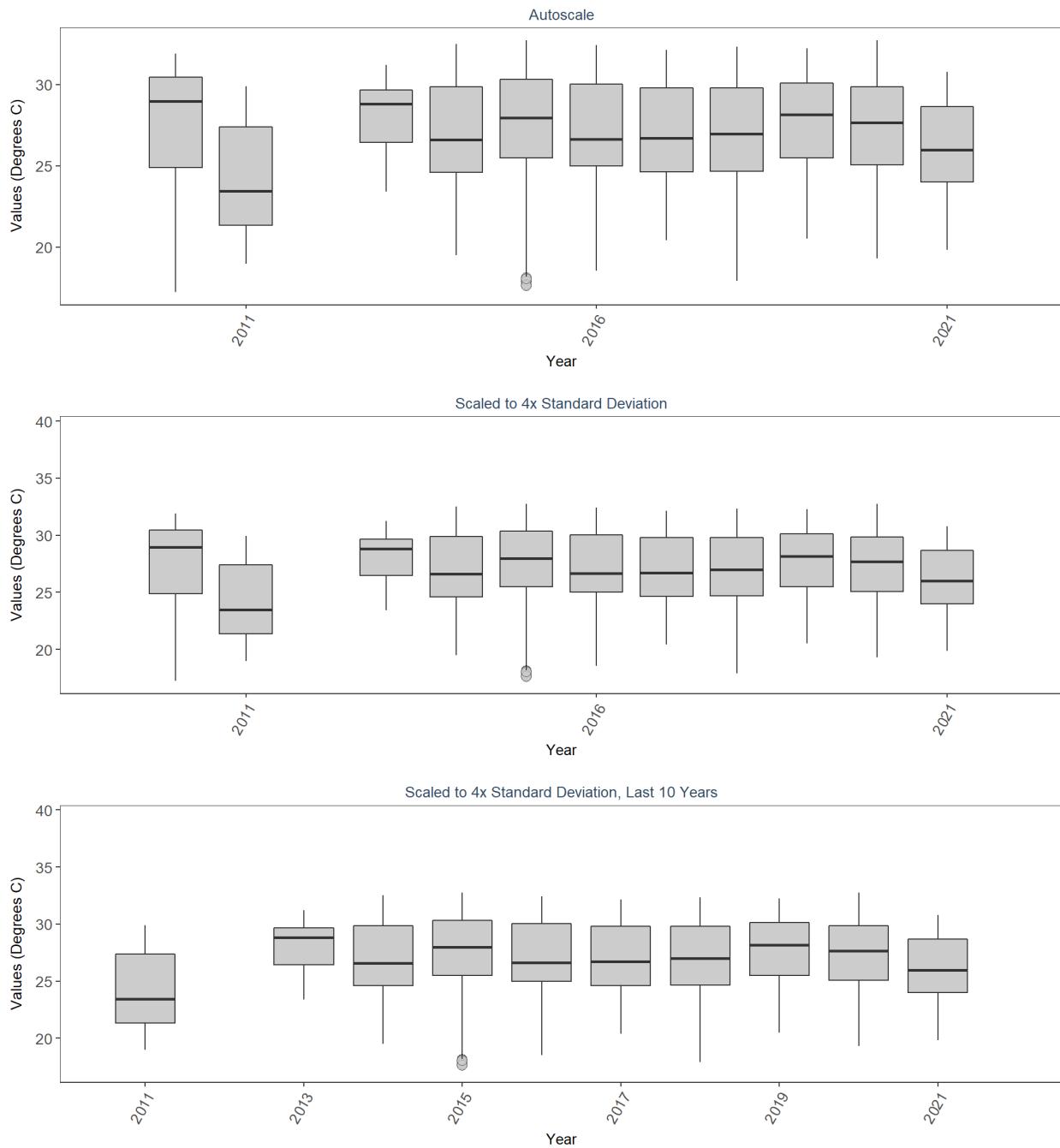
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 By Year & Month



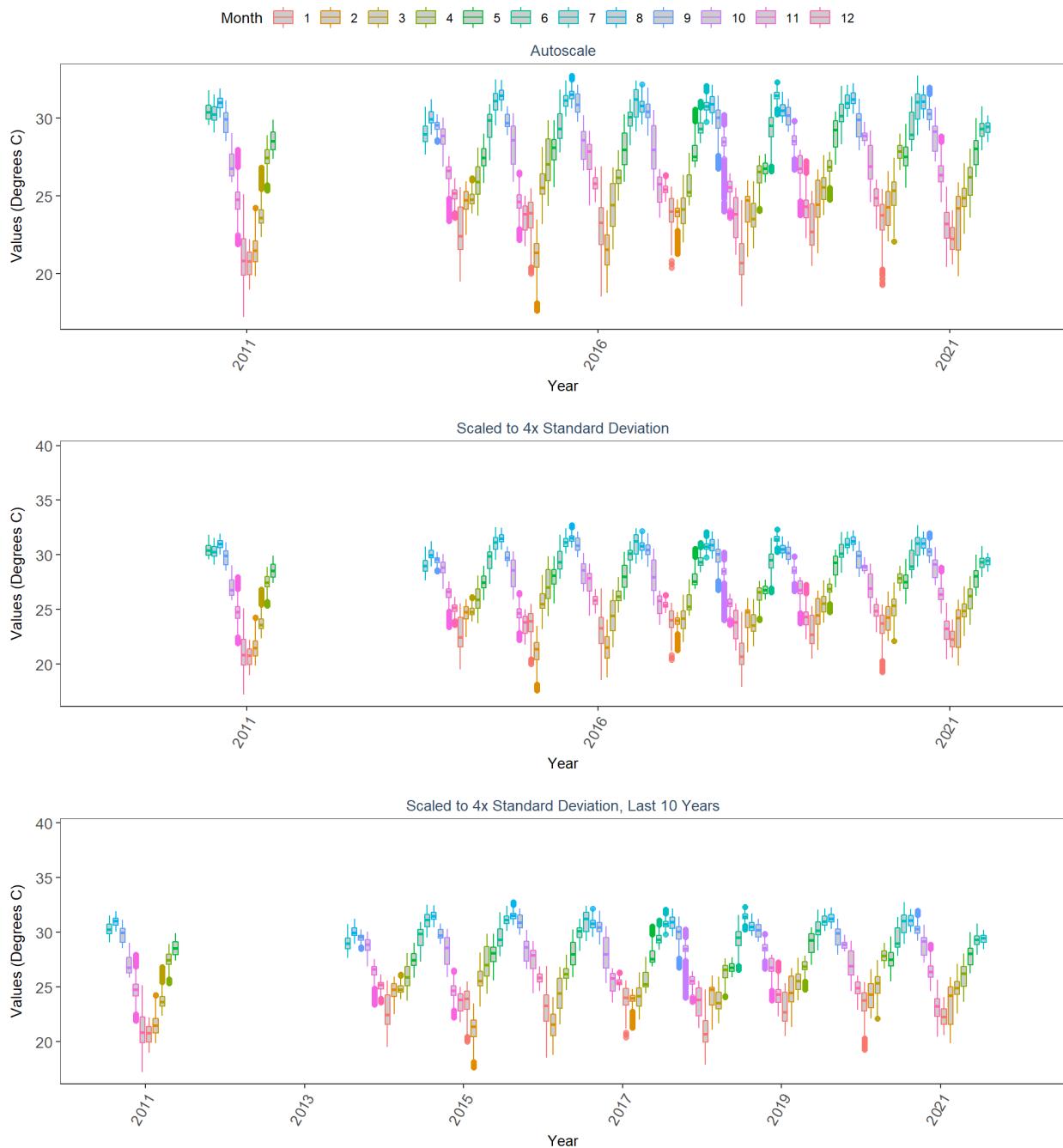
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 By Month



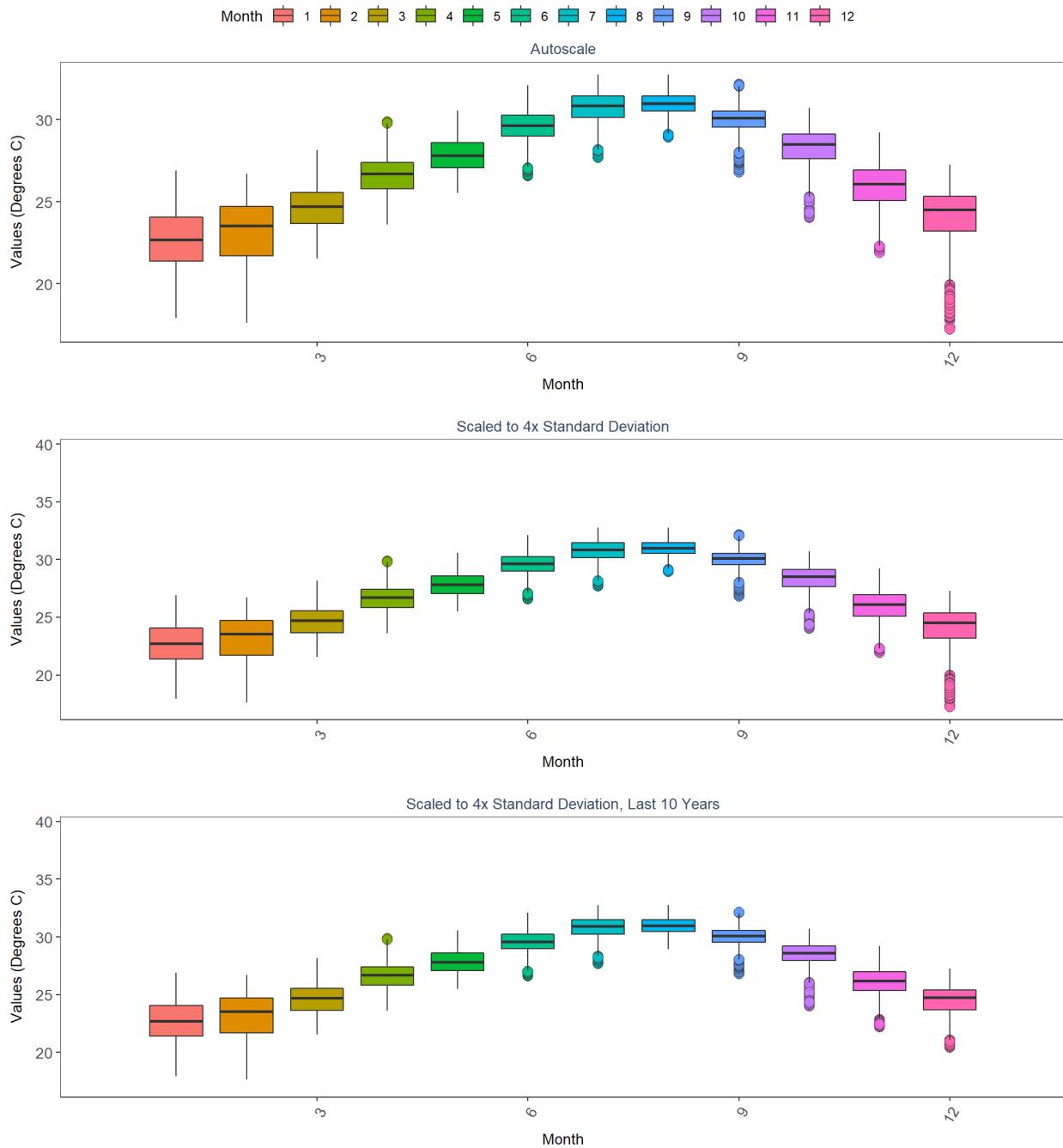
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 By Year



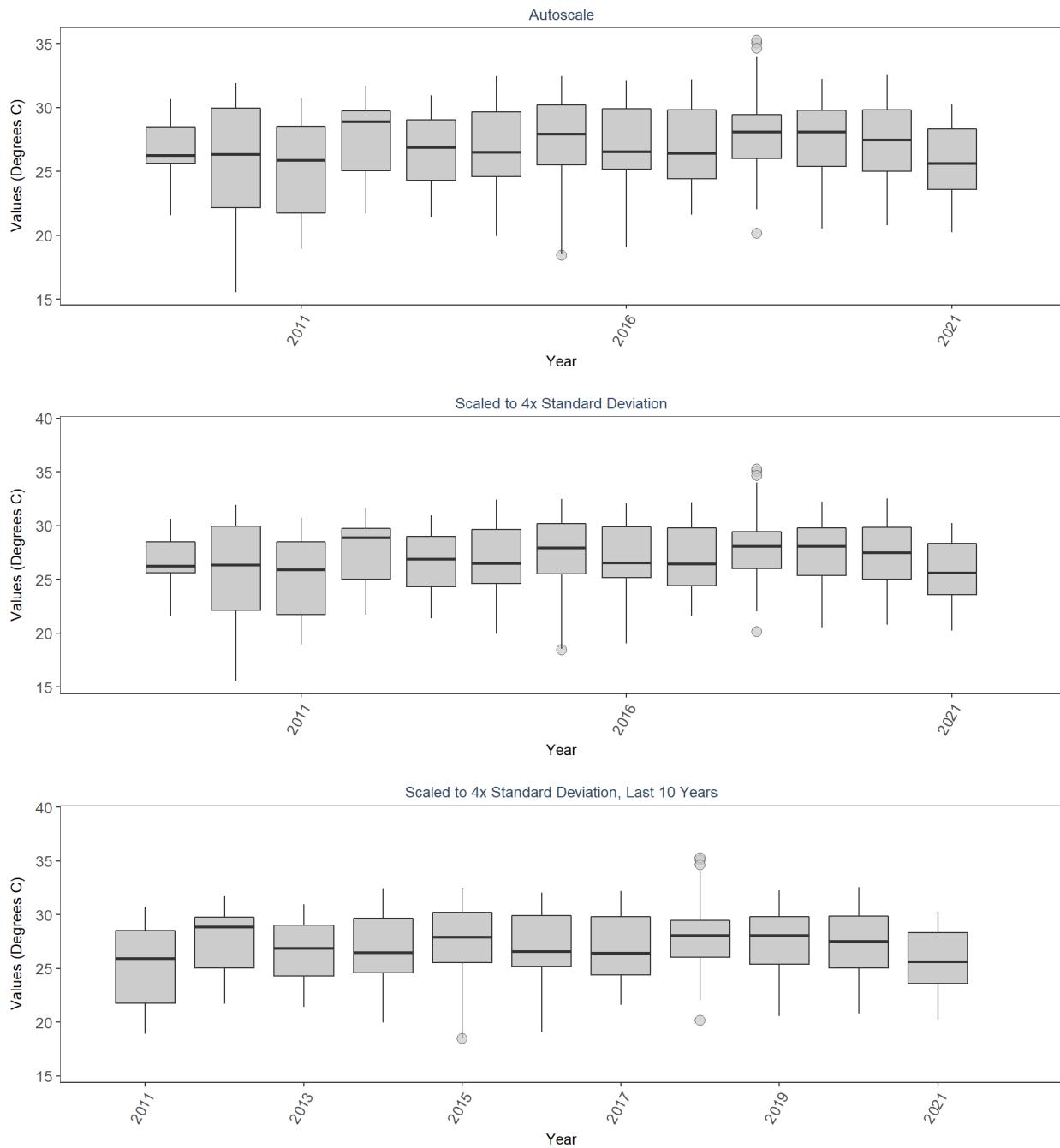
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 By Year & Month



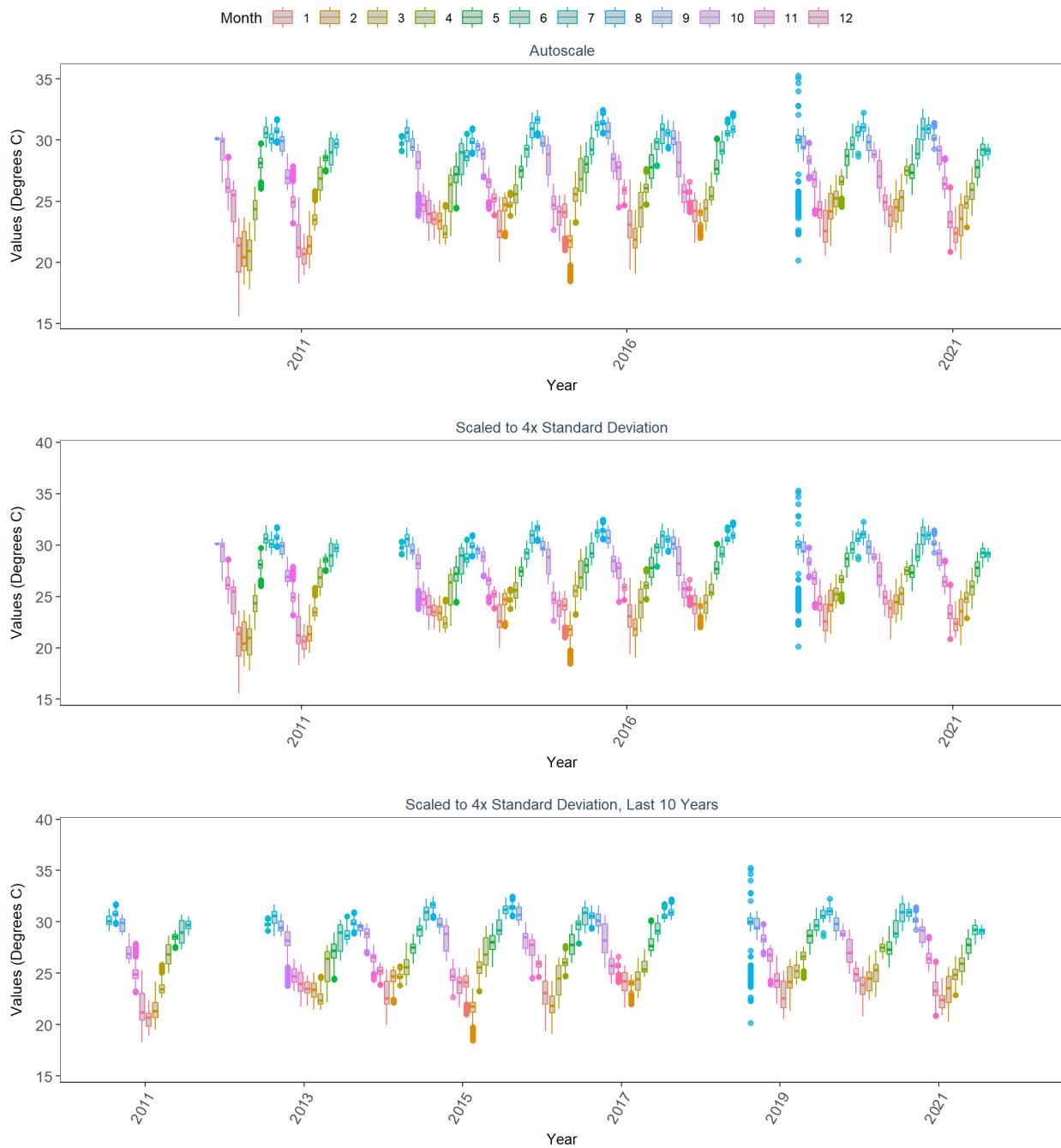
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 By Month



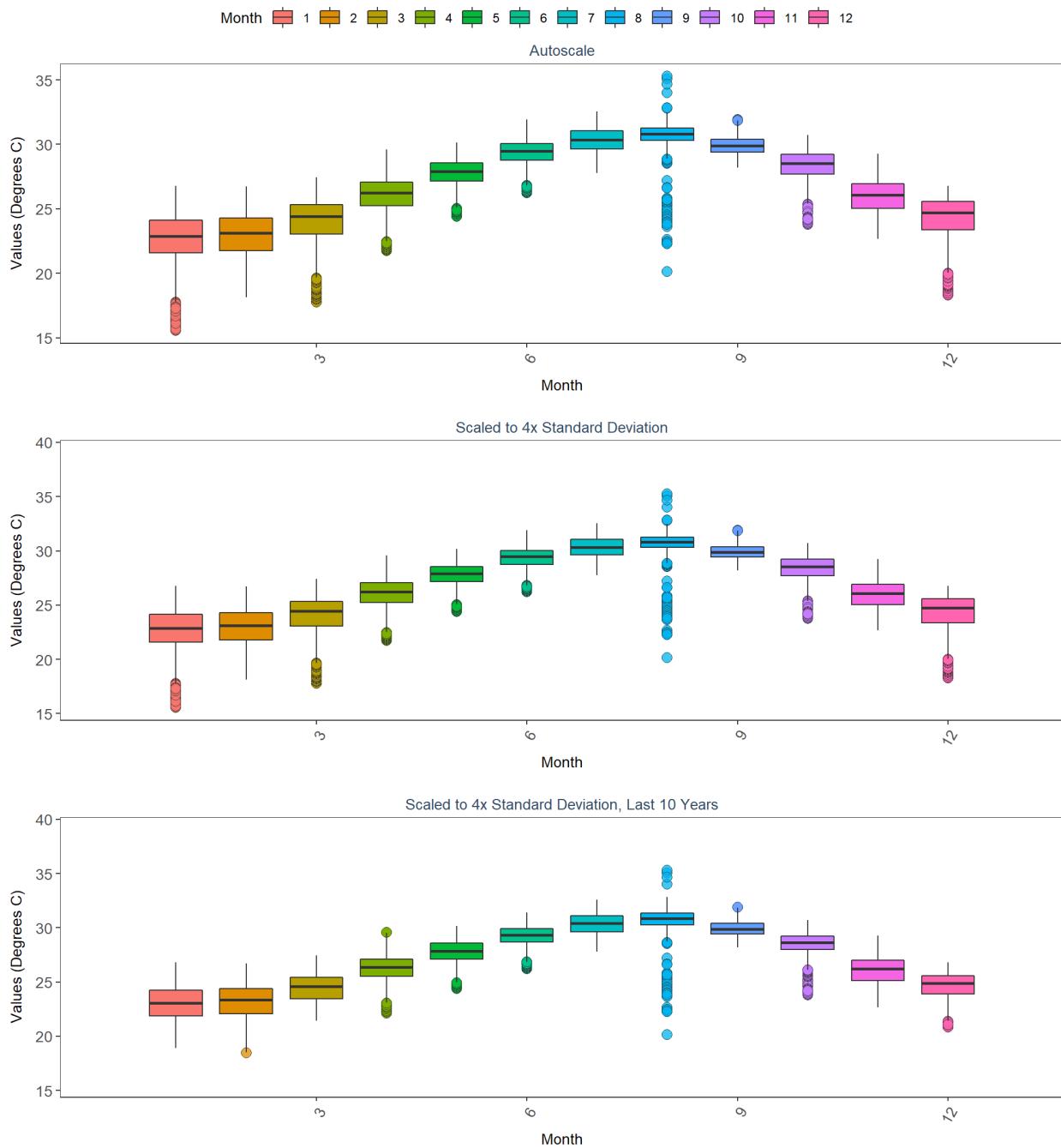
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 By Year



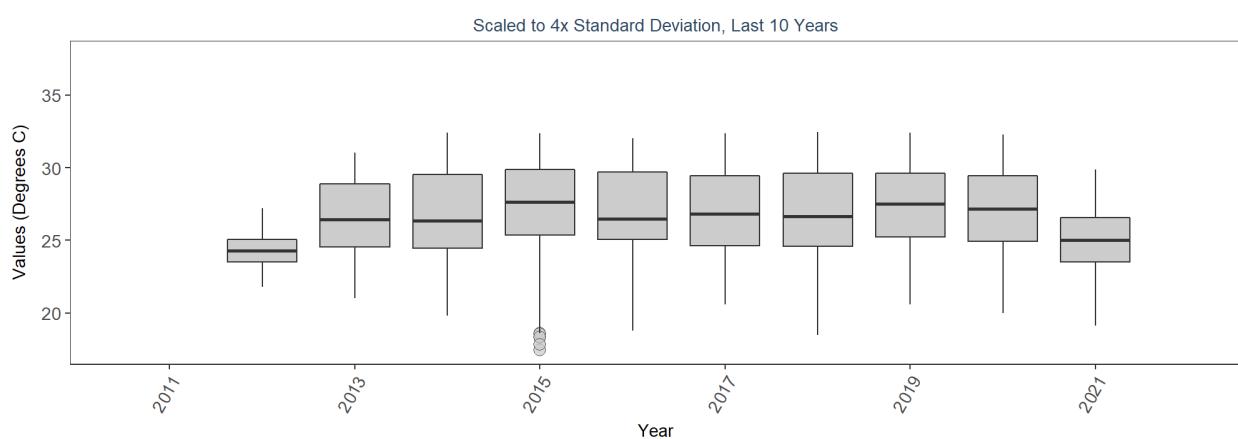
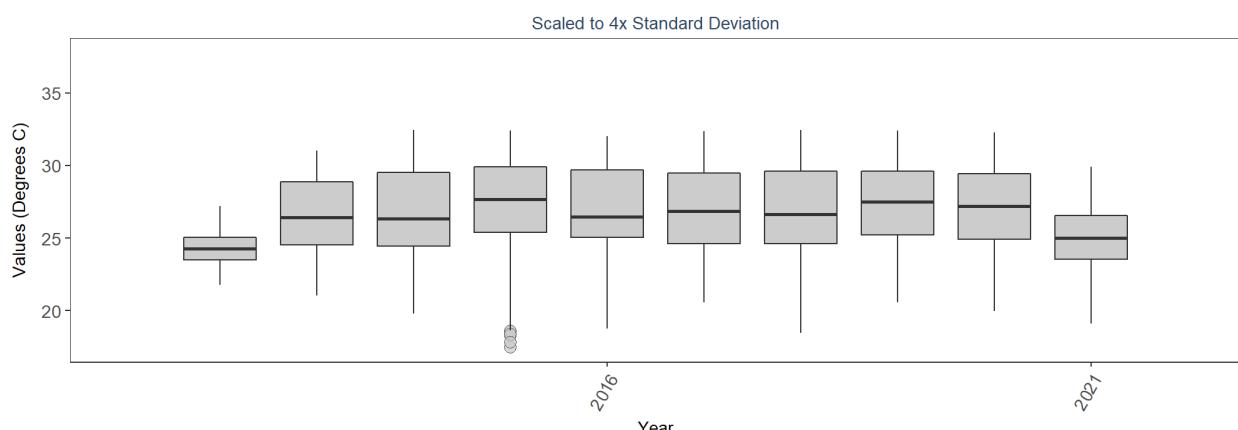
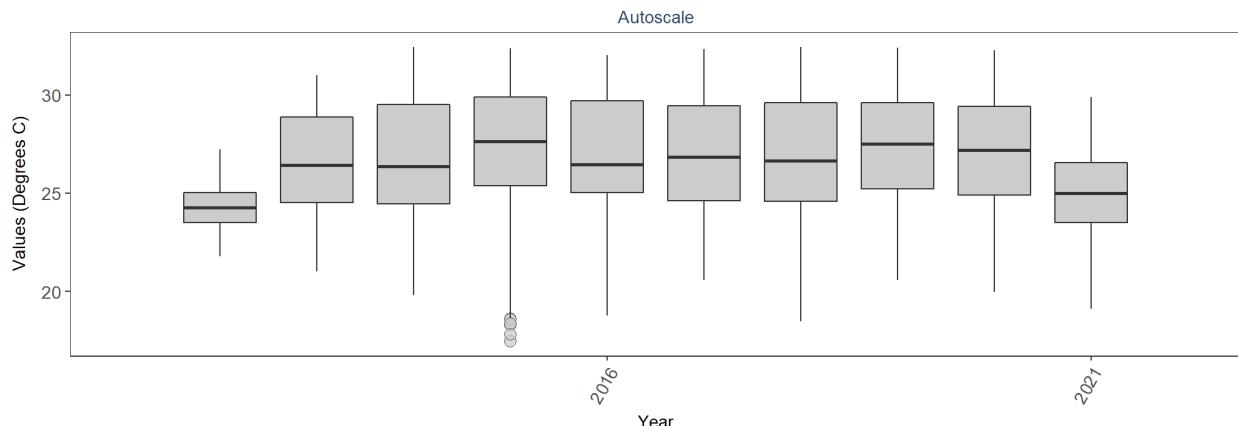
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



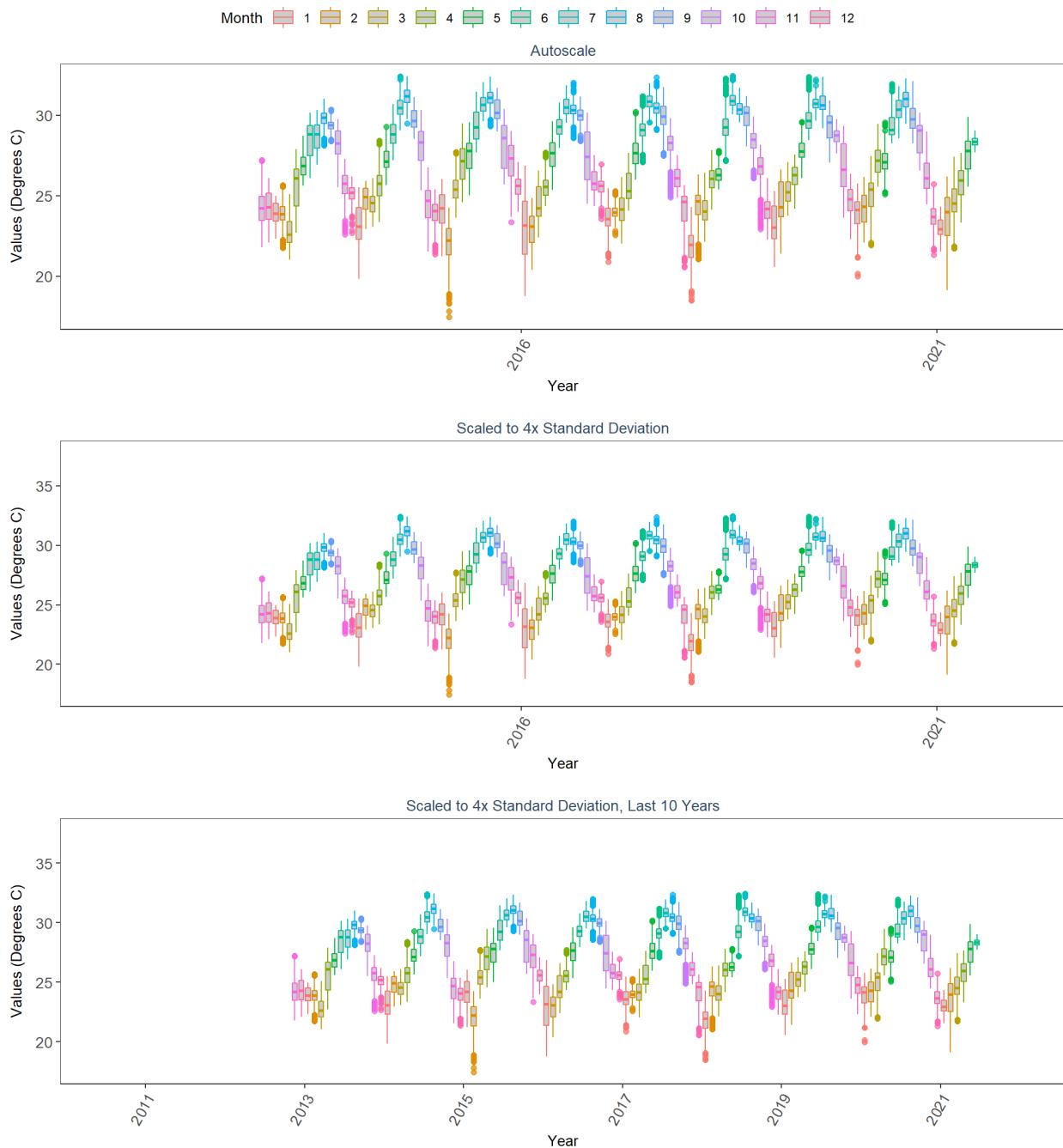
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 By Month



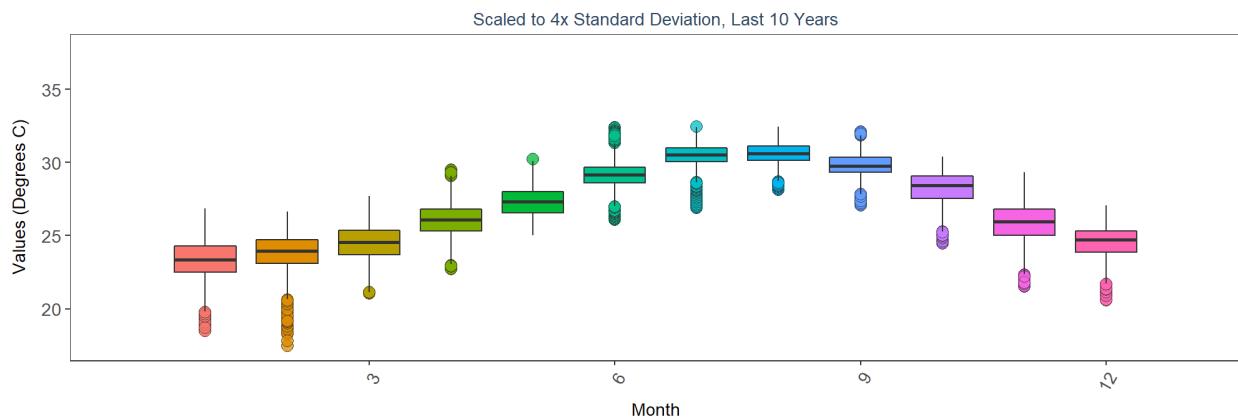
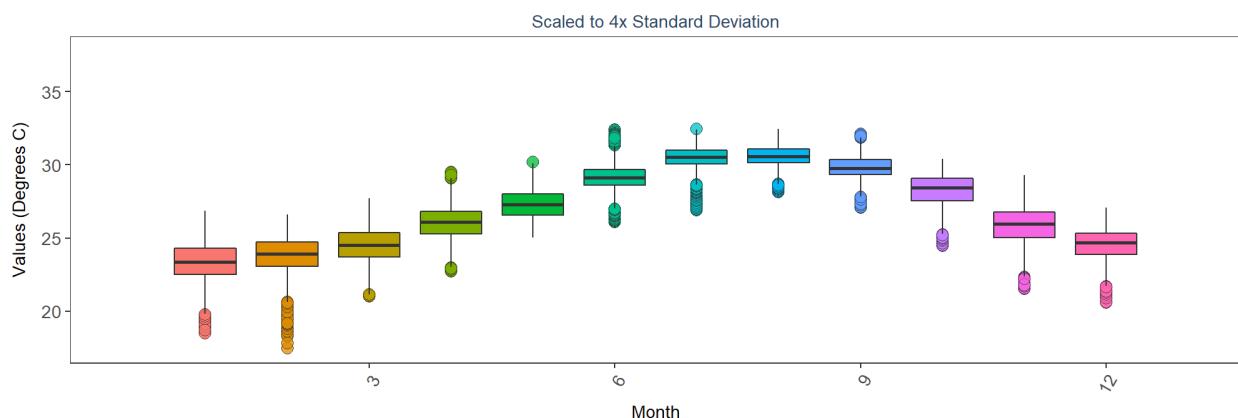
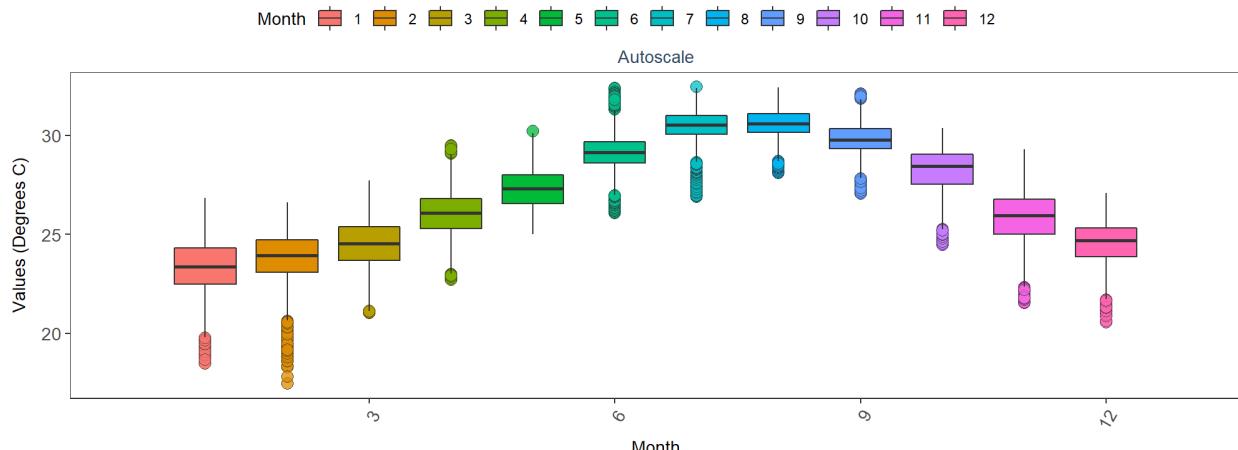
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30  
By Year



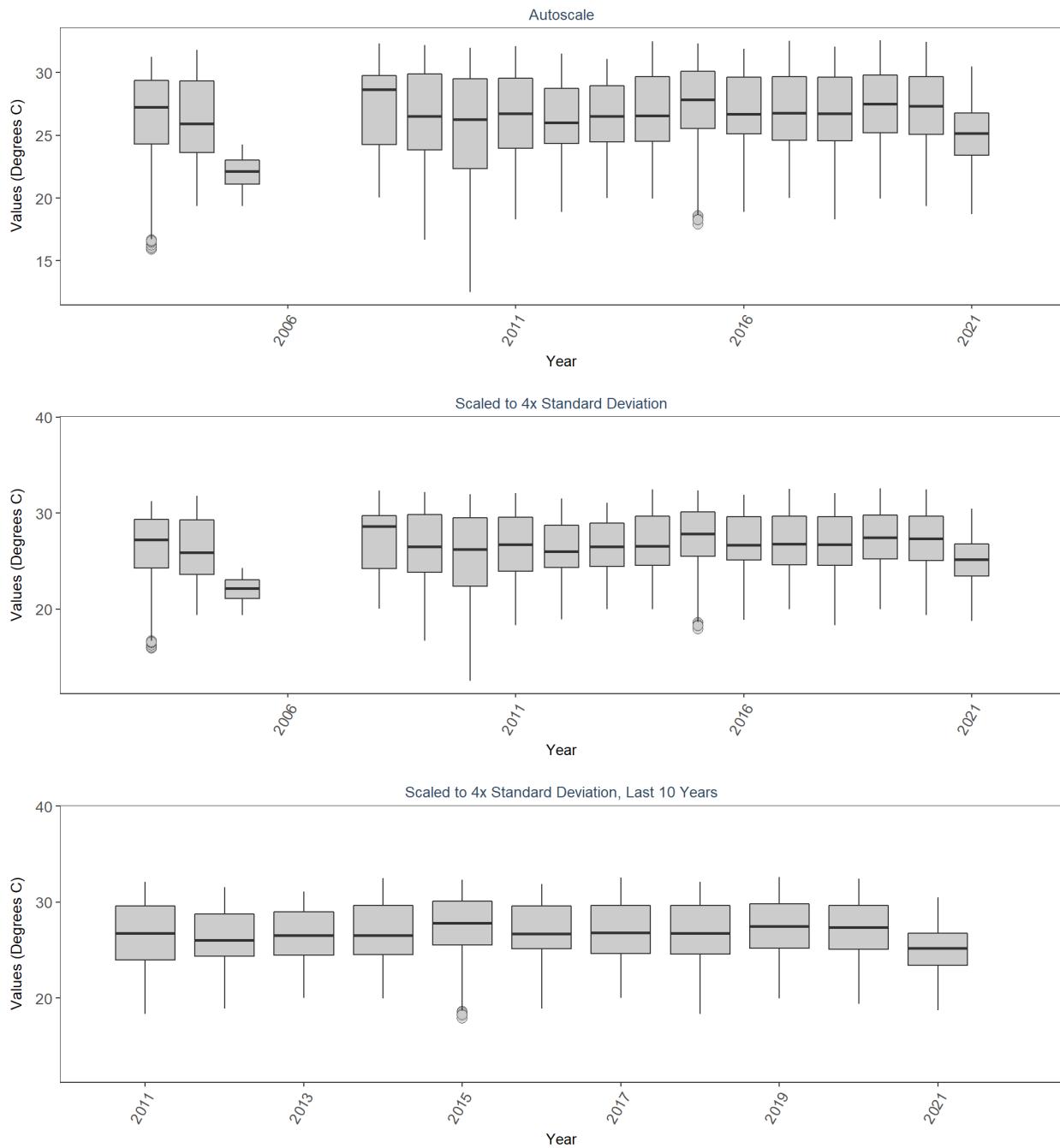
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**Water Temperature on Coral Reefs in the Florida Keys**  
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**By Year & Month**



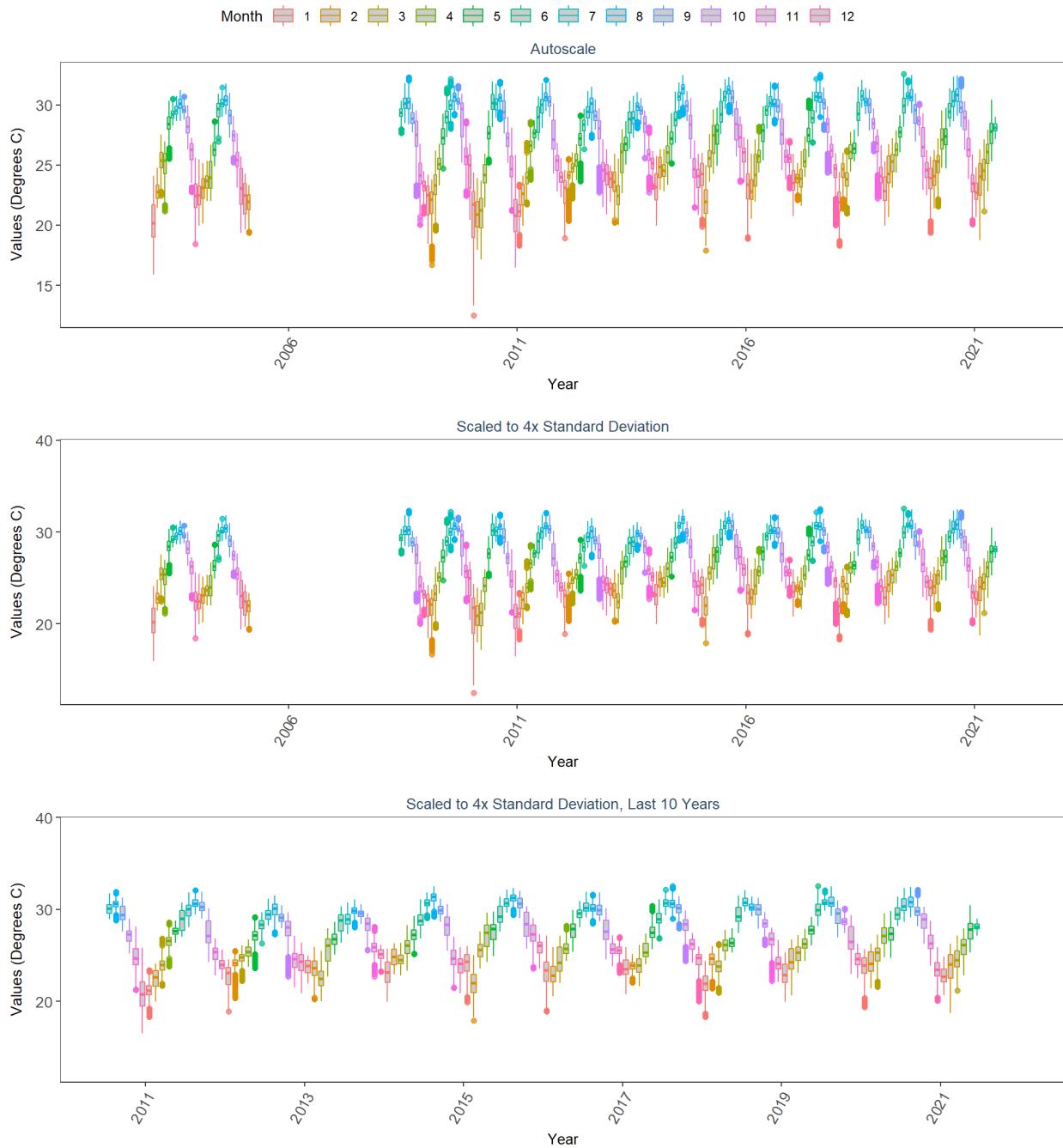
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 By Month



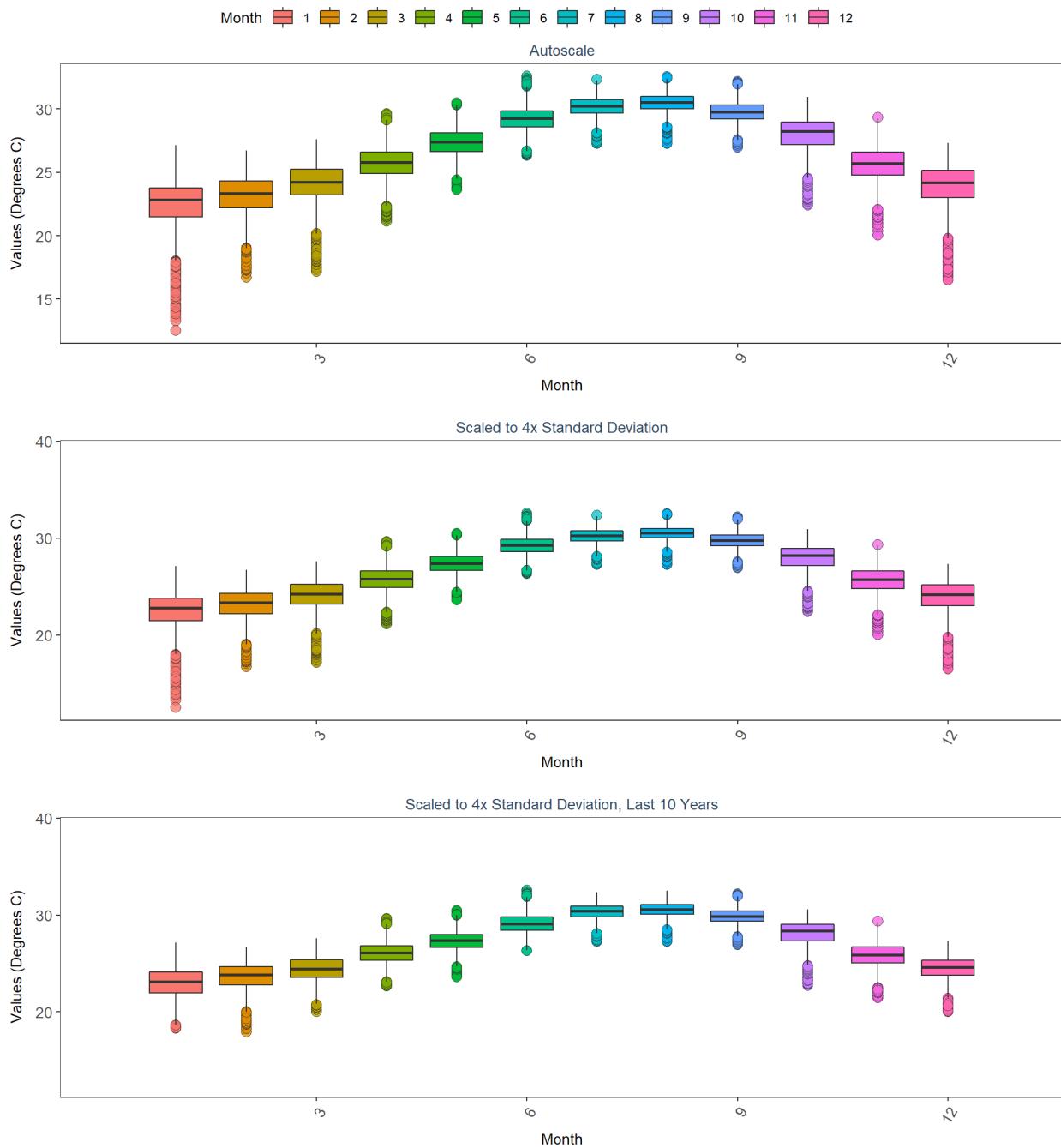
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Water Temperature on Coral Reefs in the Florida Keys  
32  
By Year



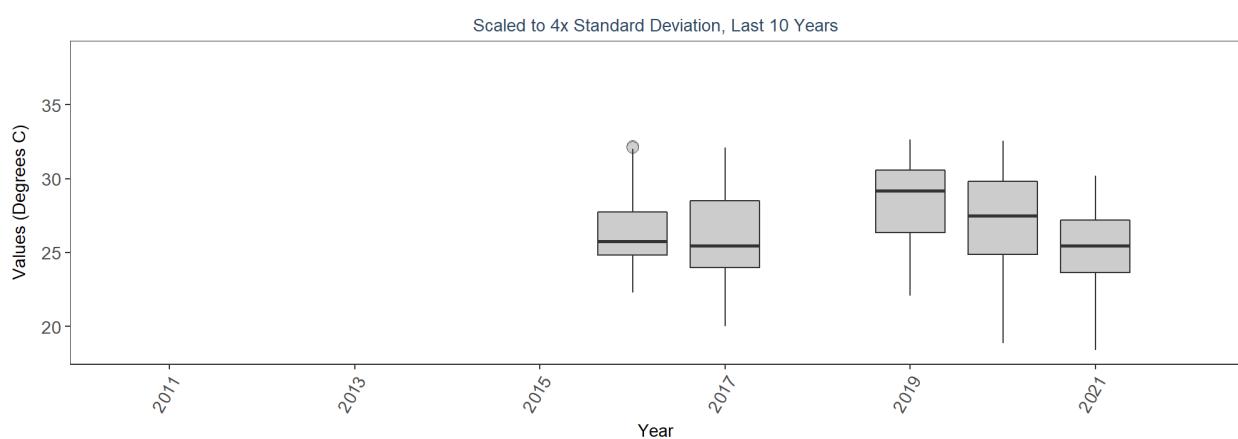
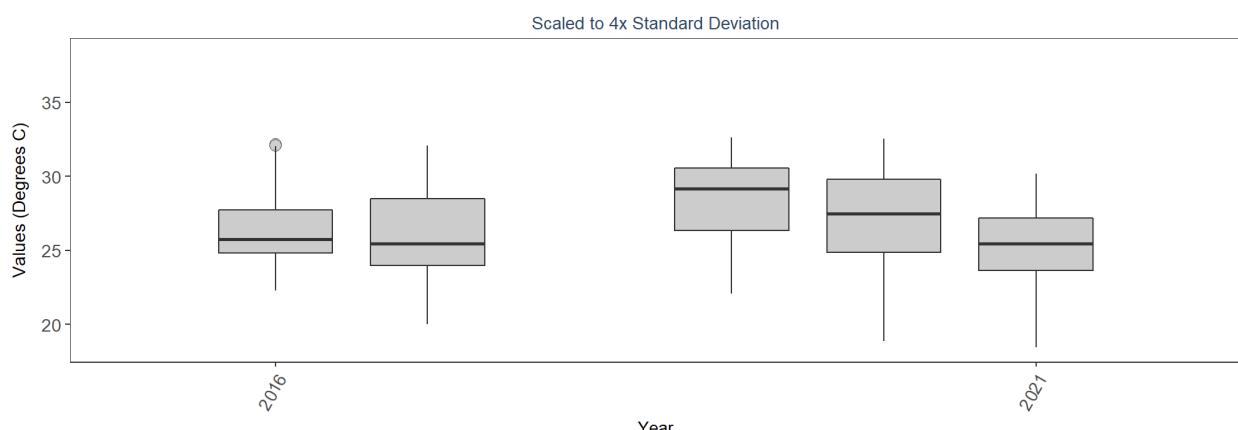
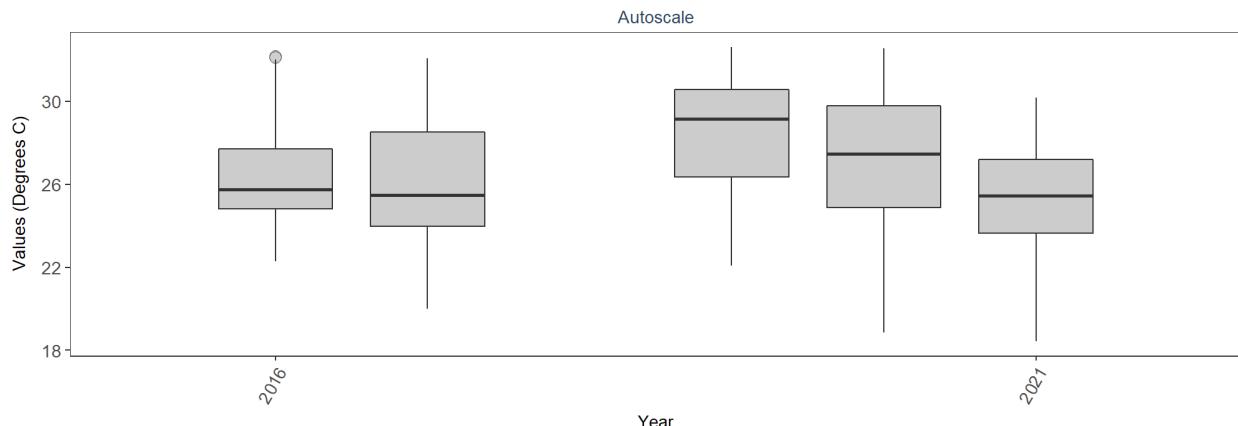
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**Water Temperature on Coral Reefs in the Florida Keys**  
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**By Year & Month**



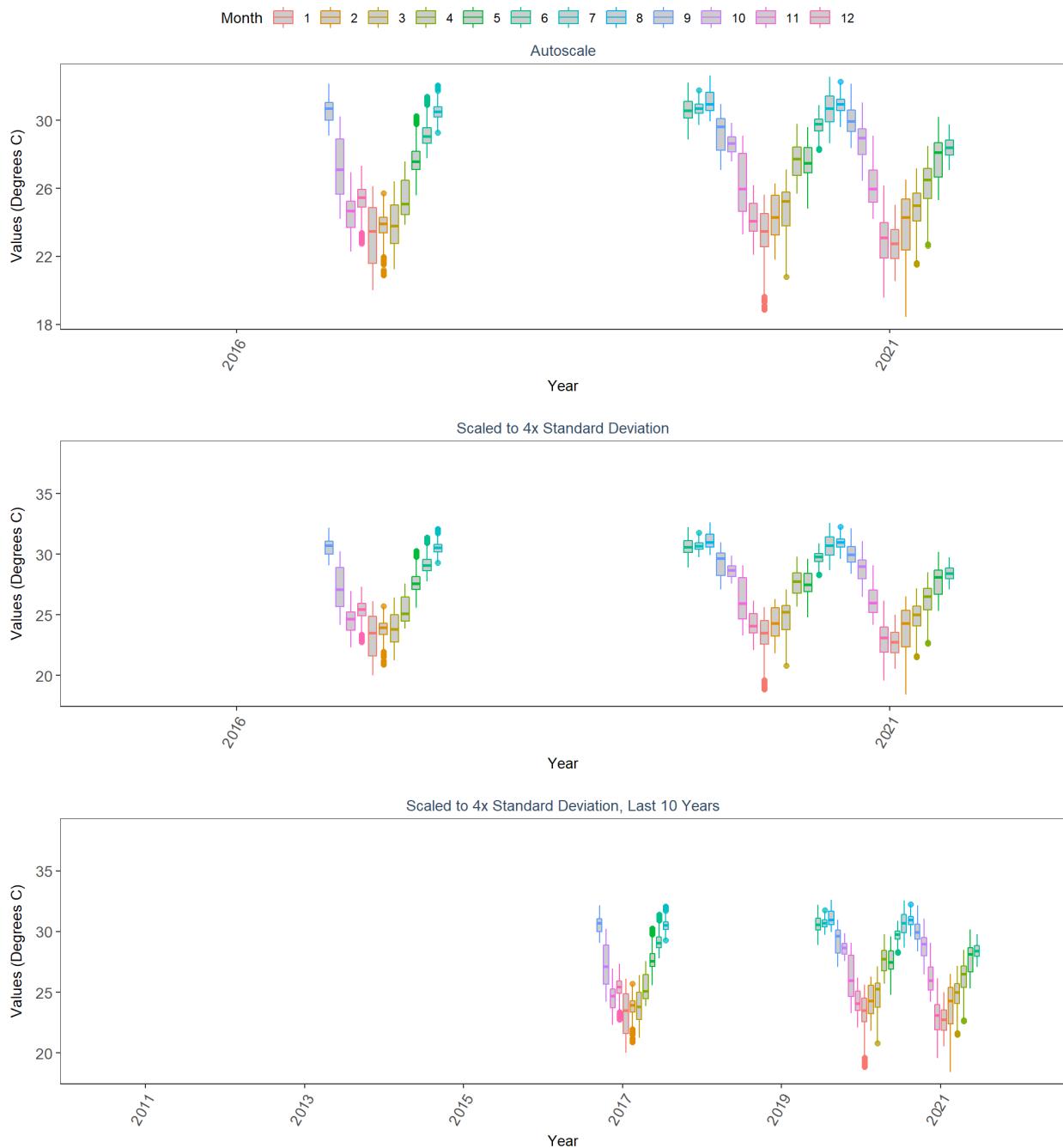
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 By Month



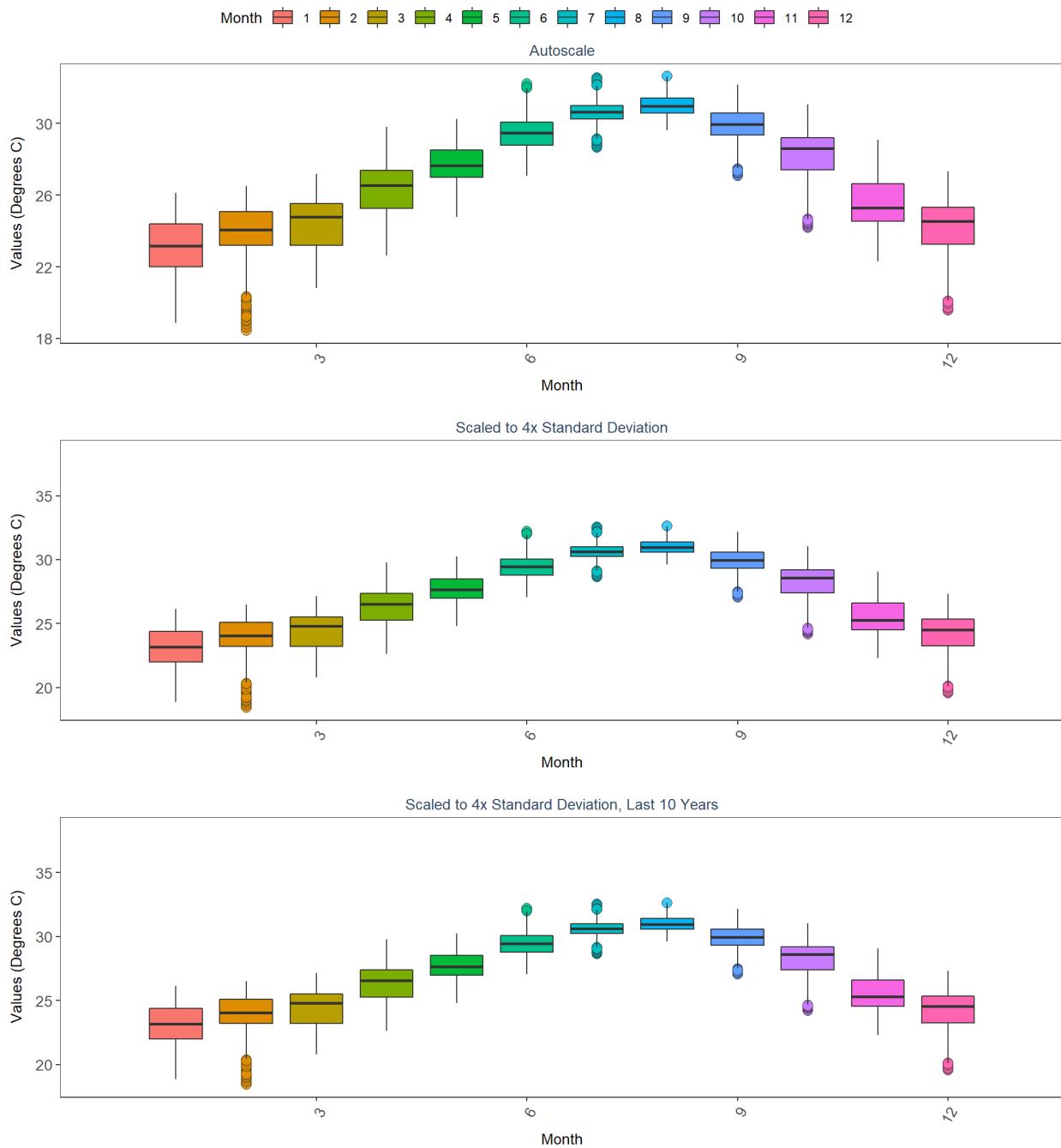
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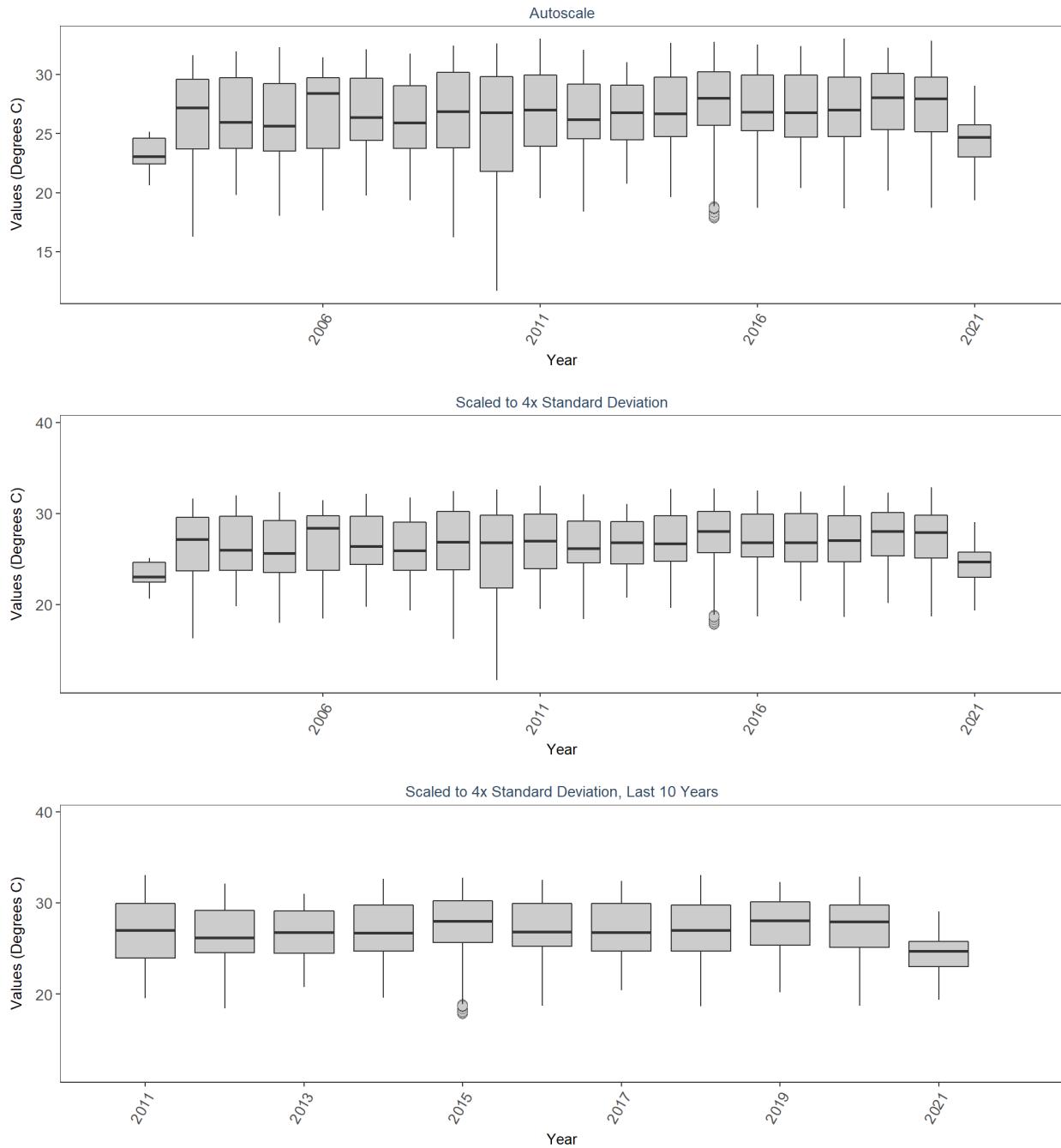
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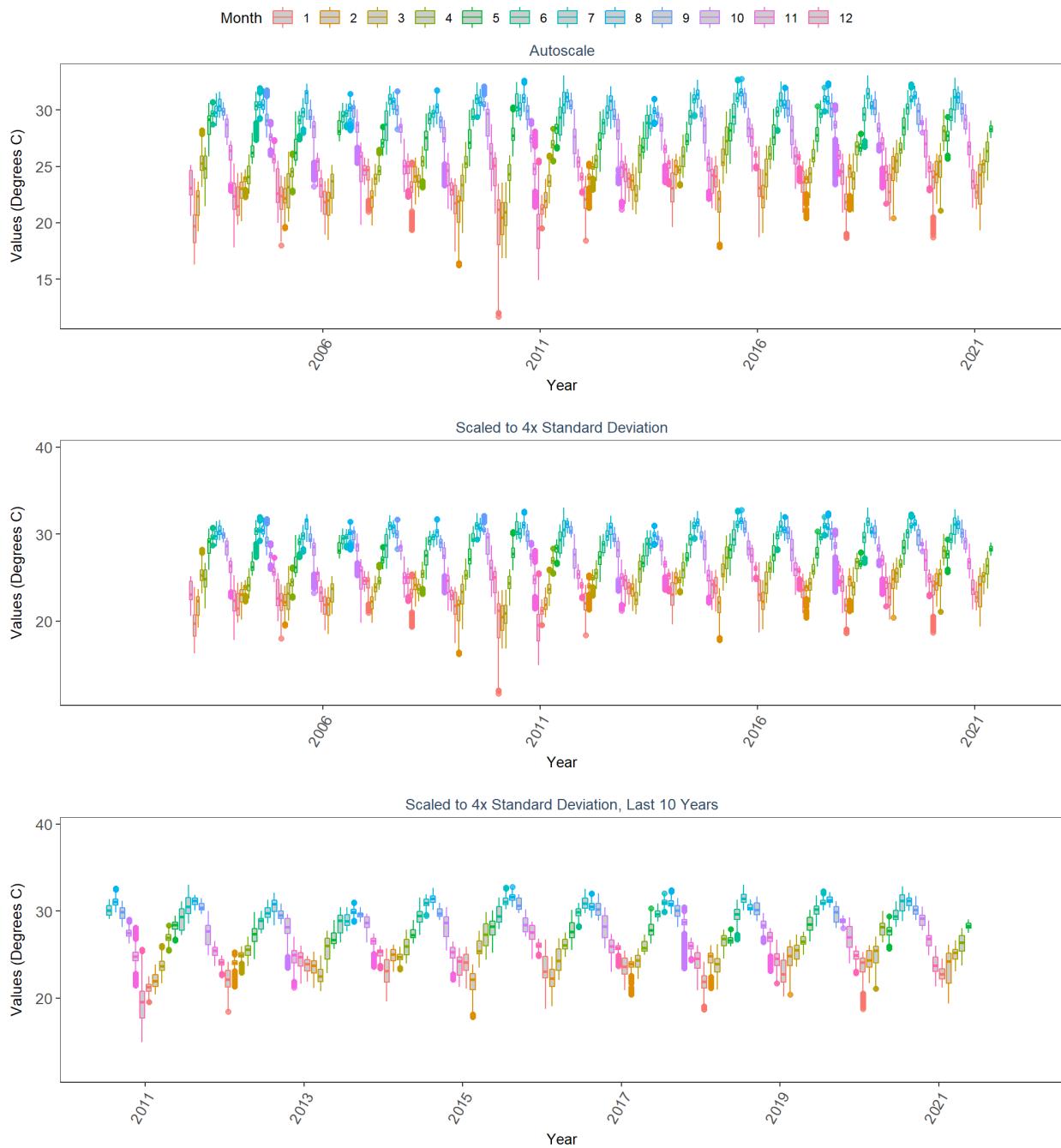
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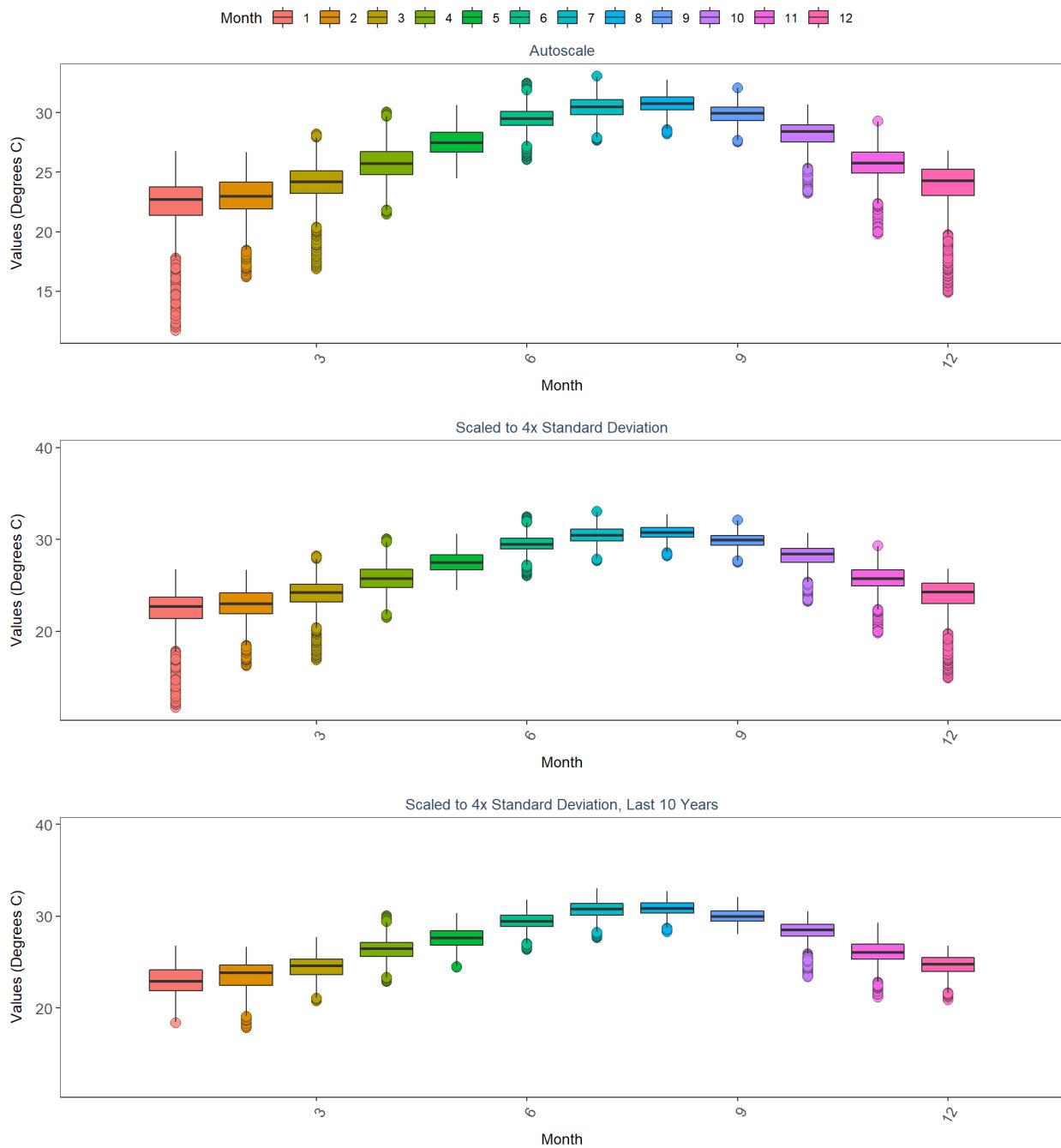
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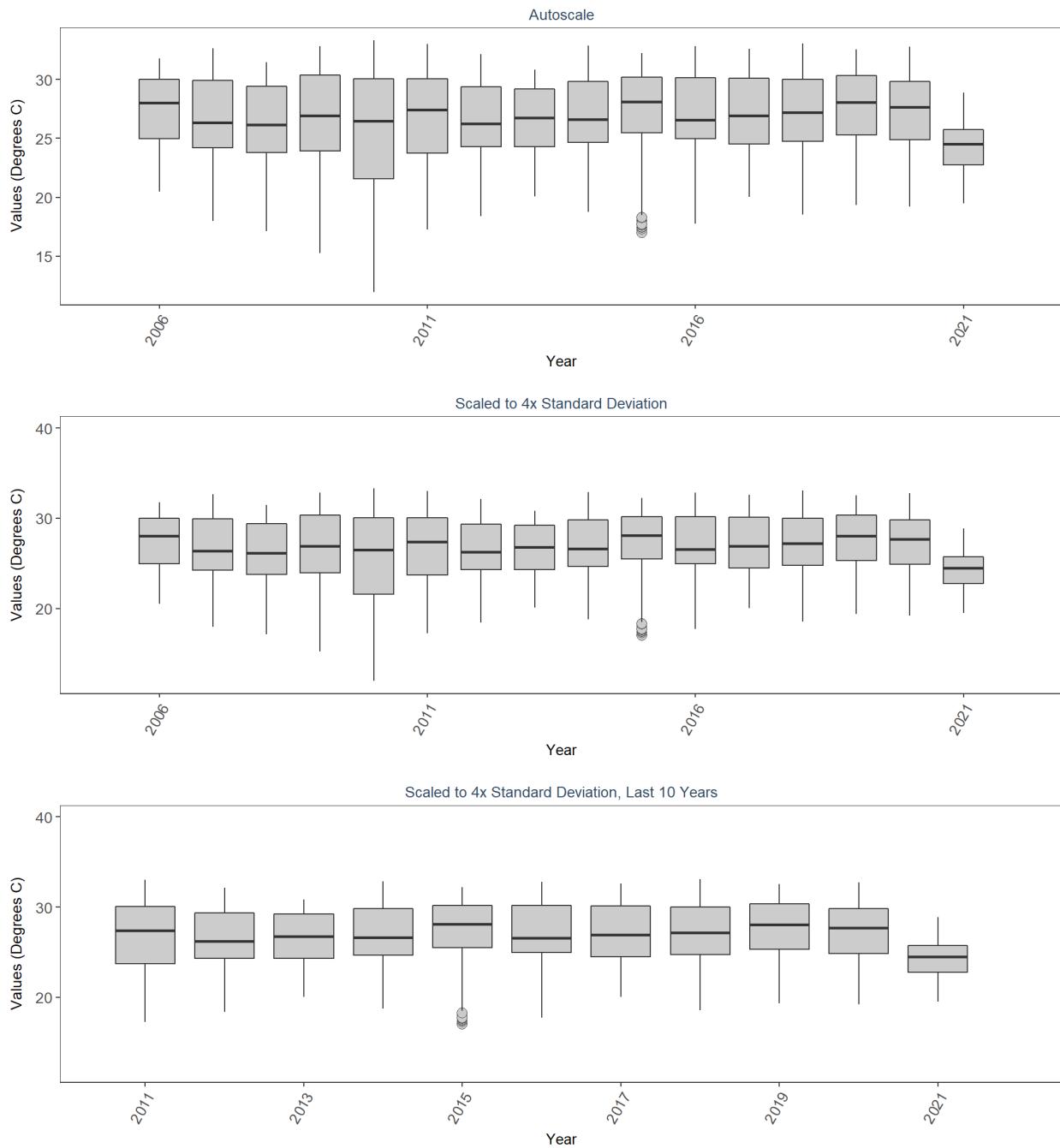
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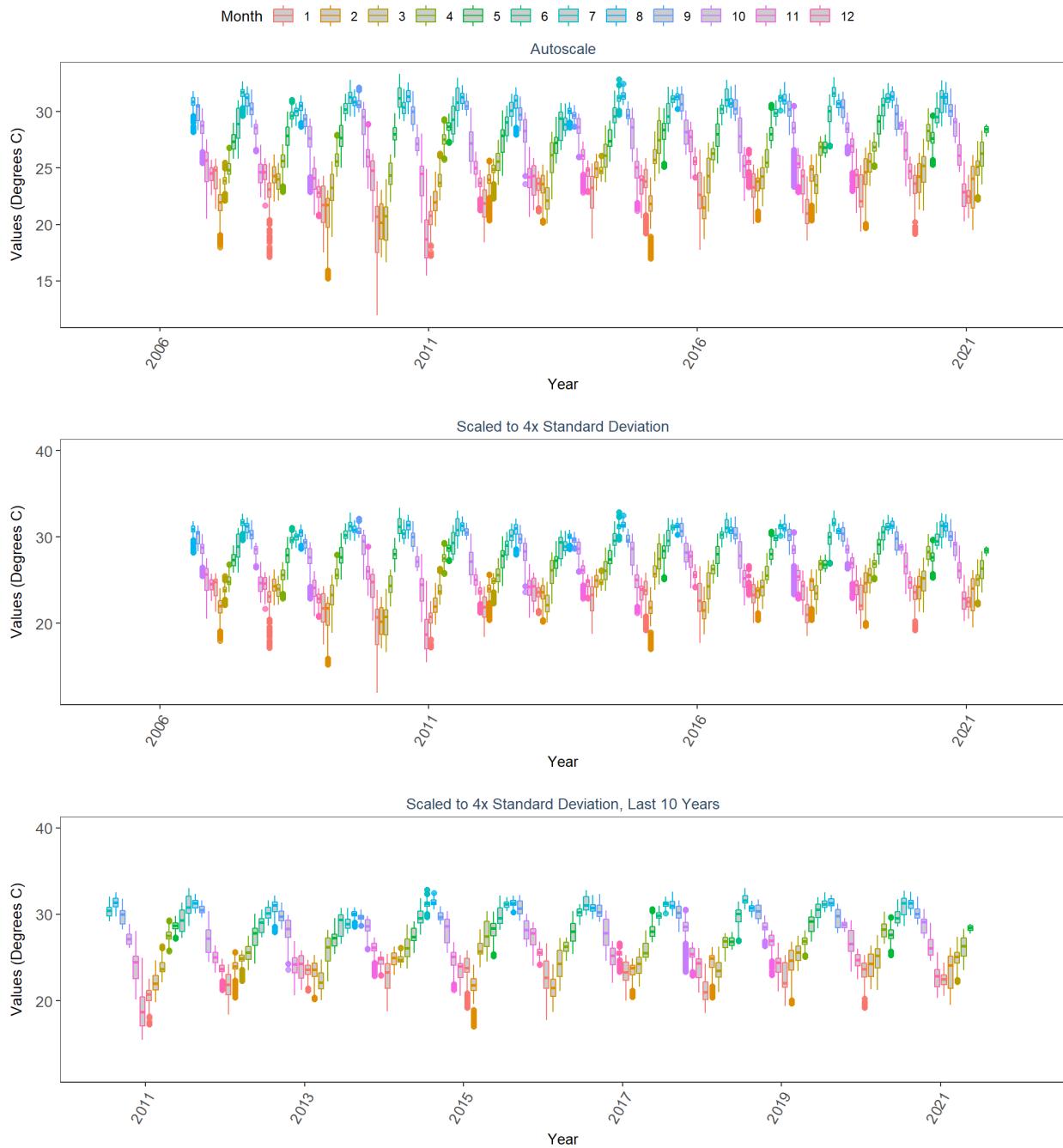
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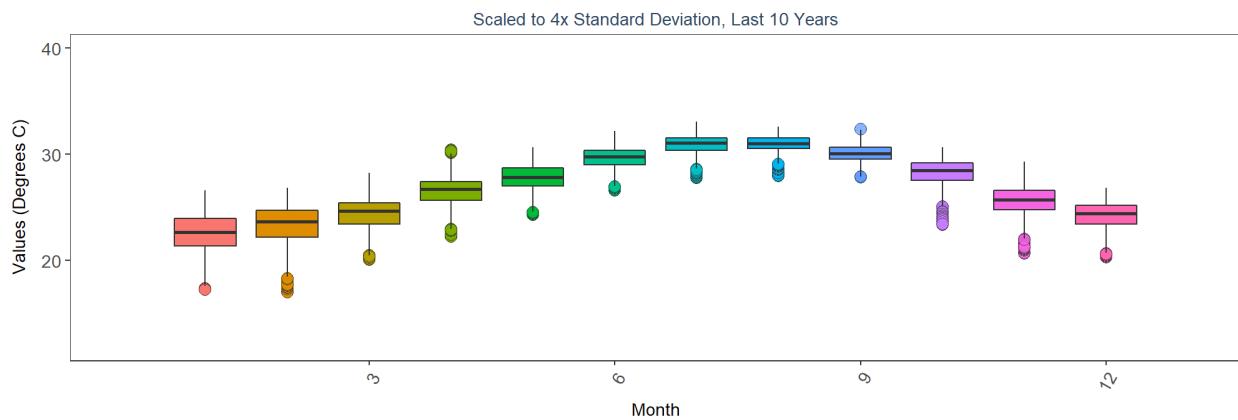
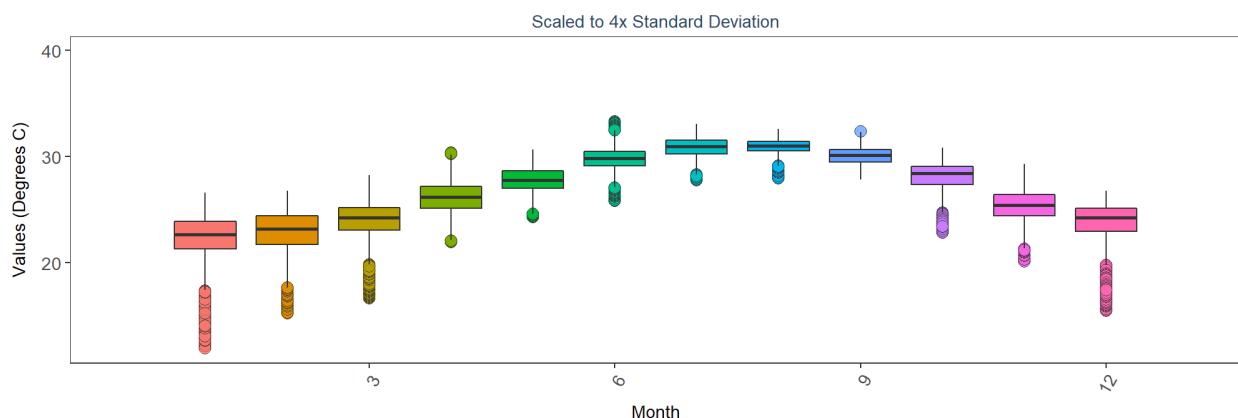
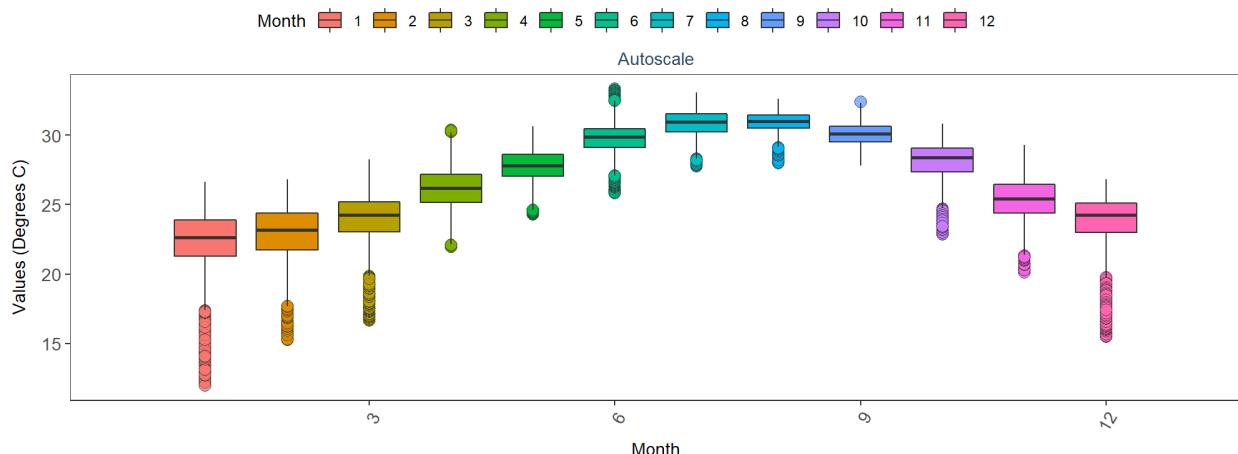
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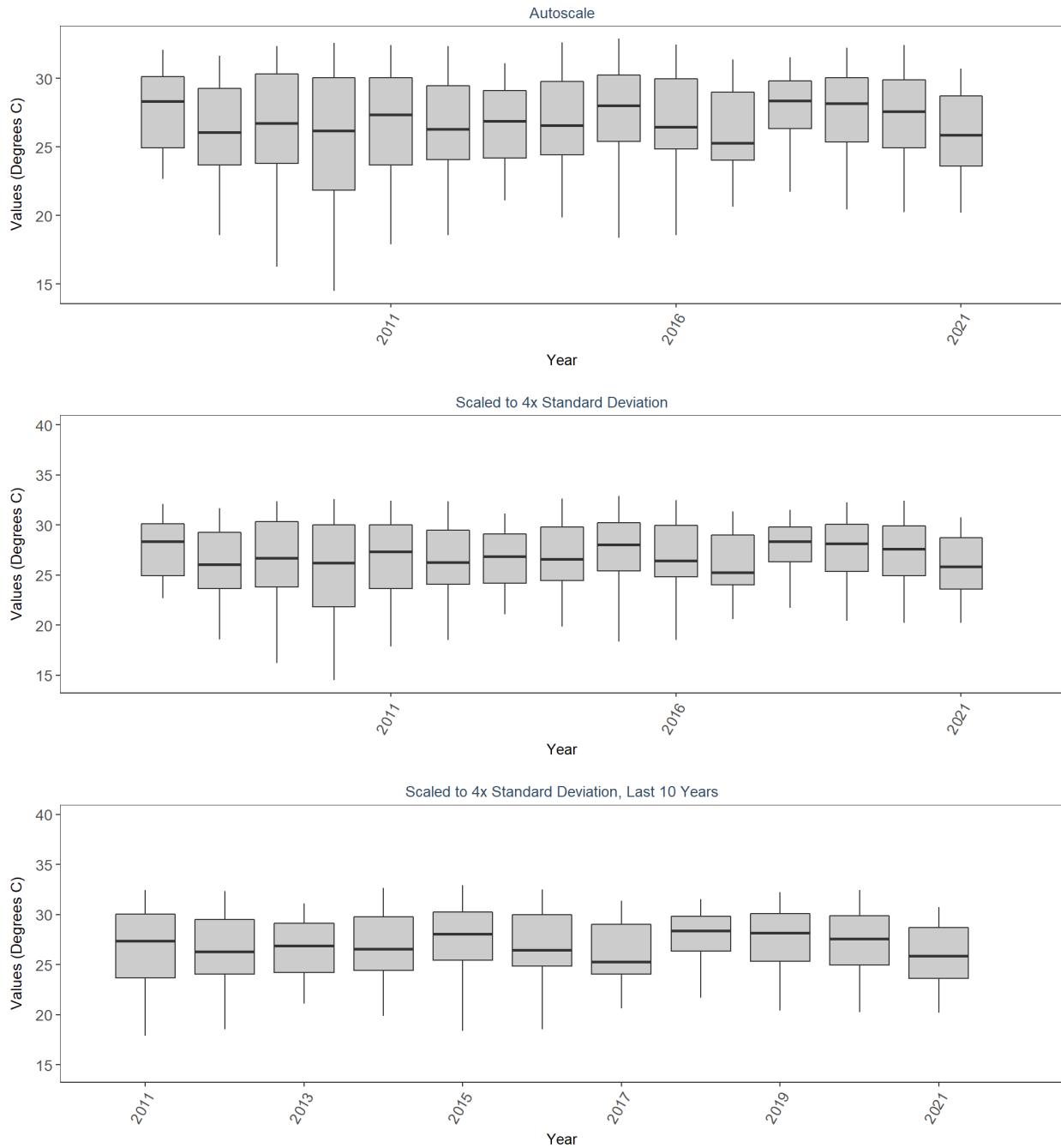
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**By Year & Month**



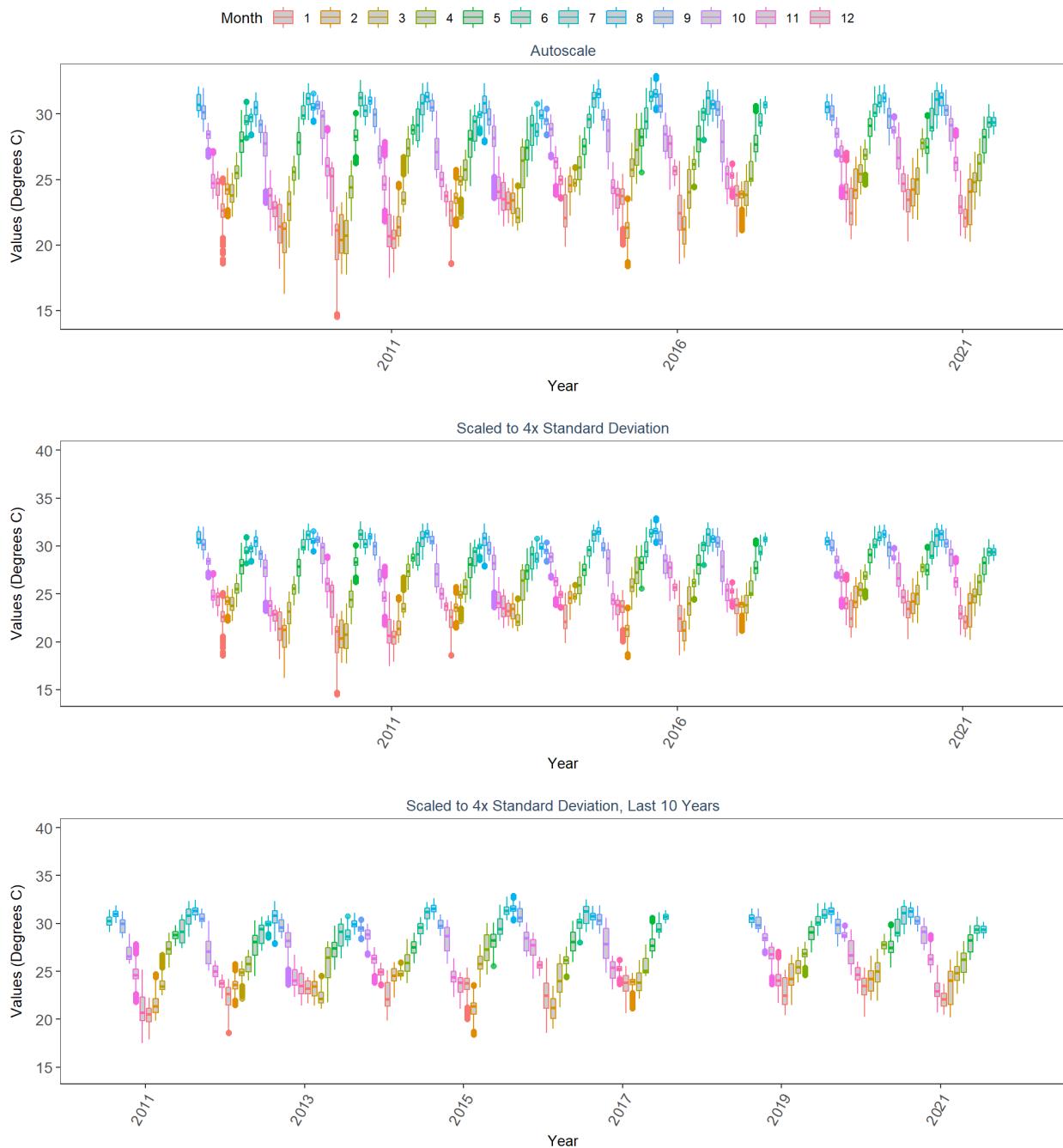
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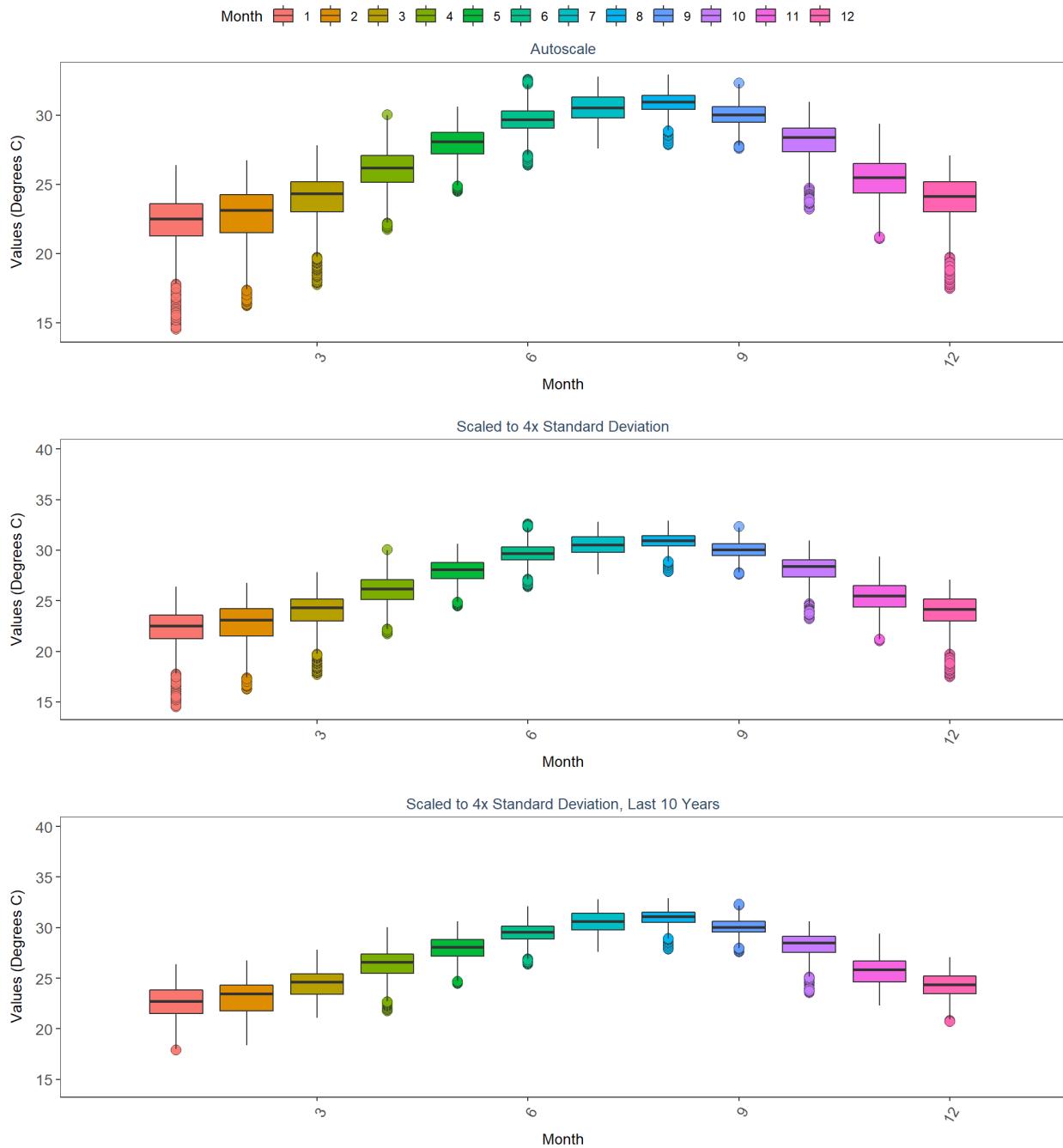
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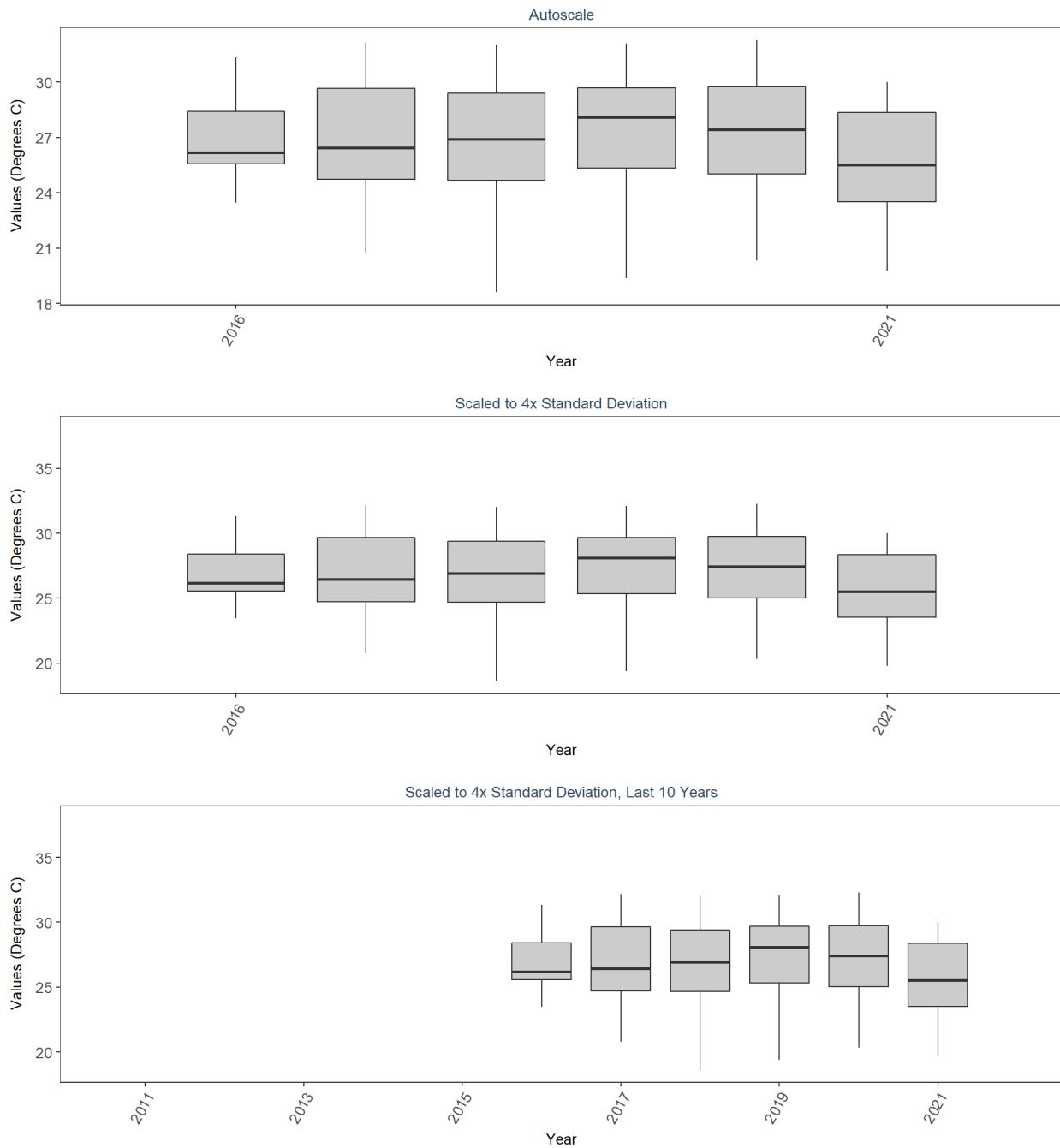
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**Water Temperature on Coral Reefs in the Florida Keys**  
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**By Year & Month**



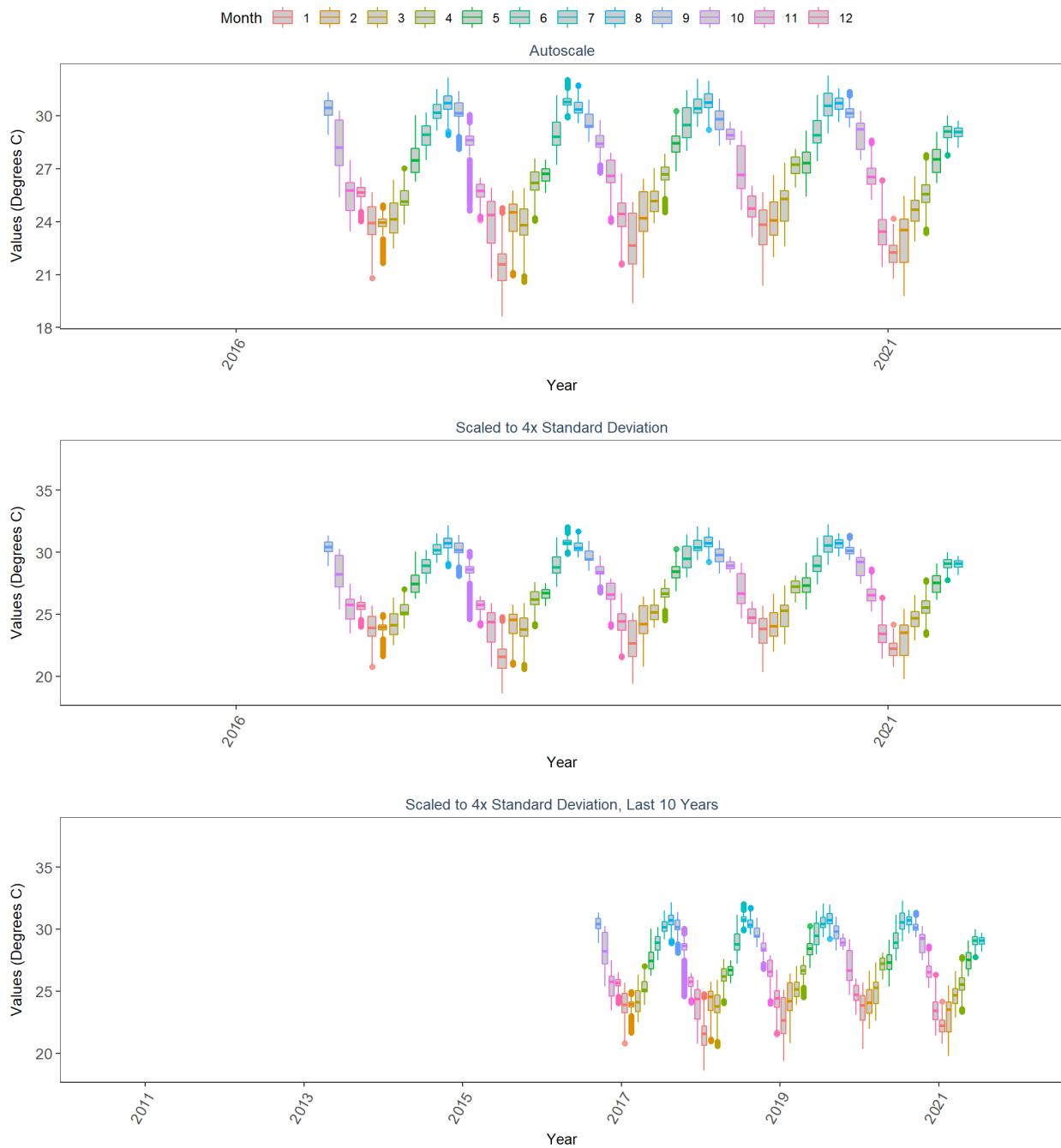
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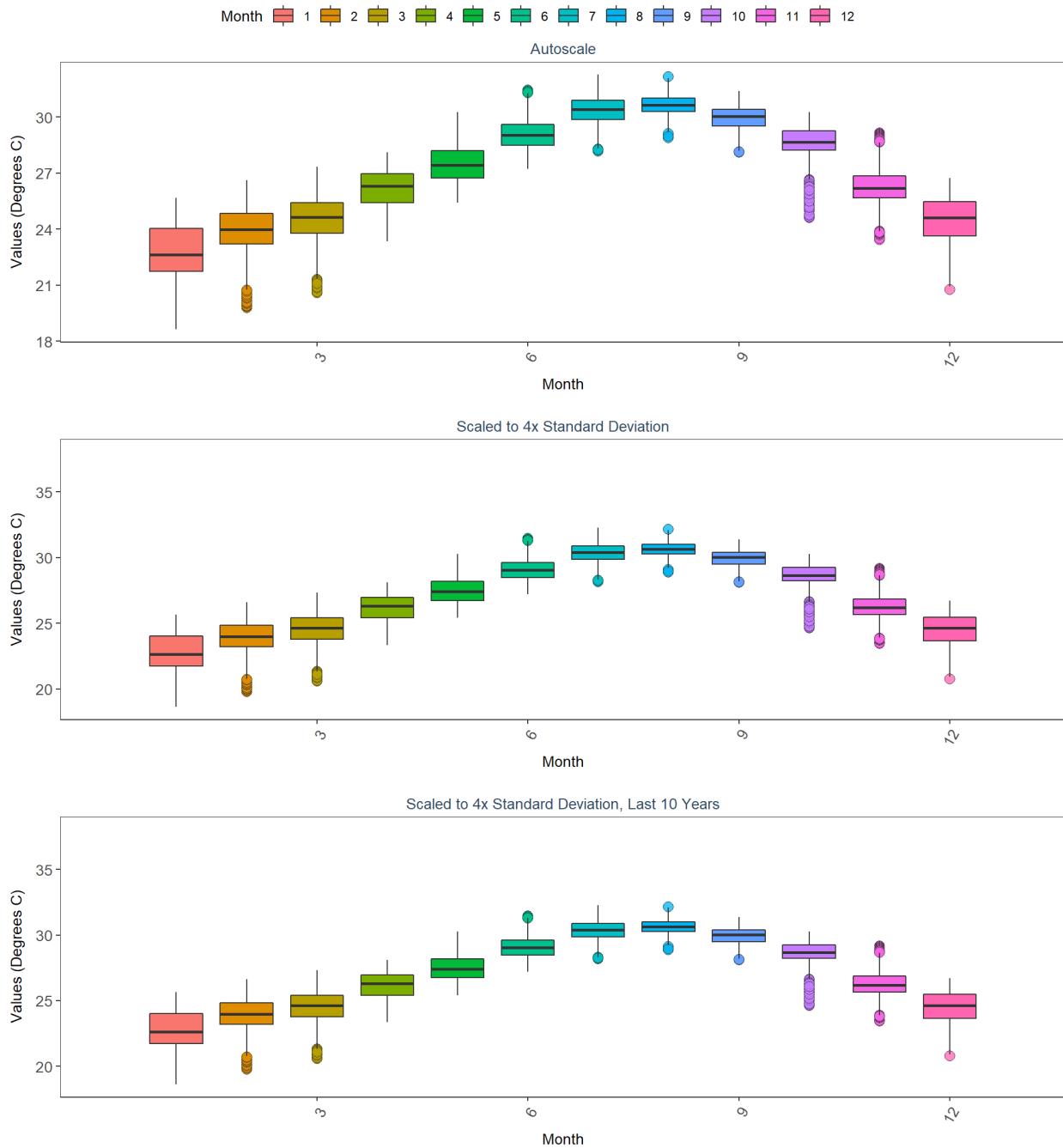
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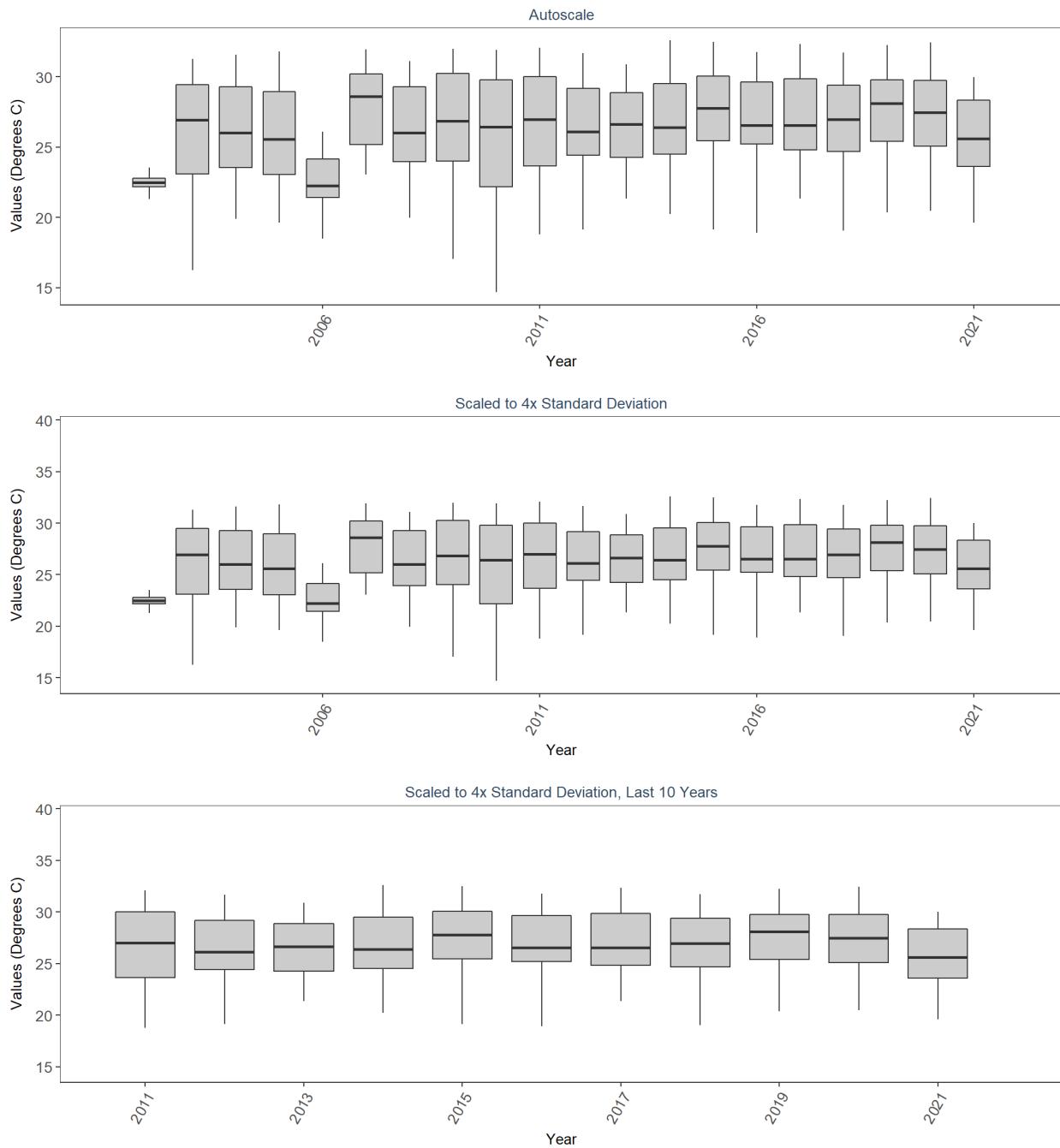
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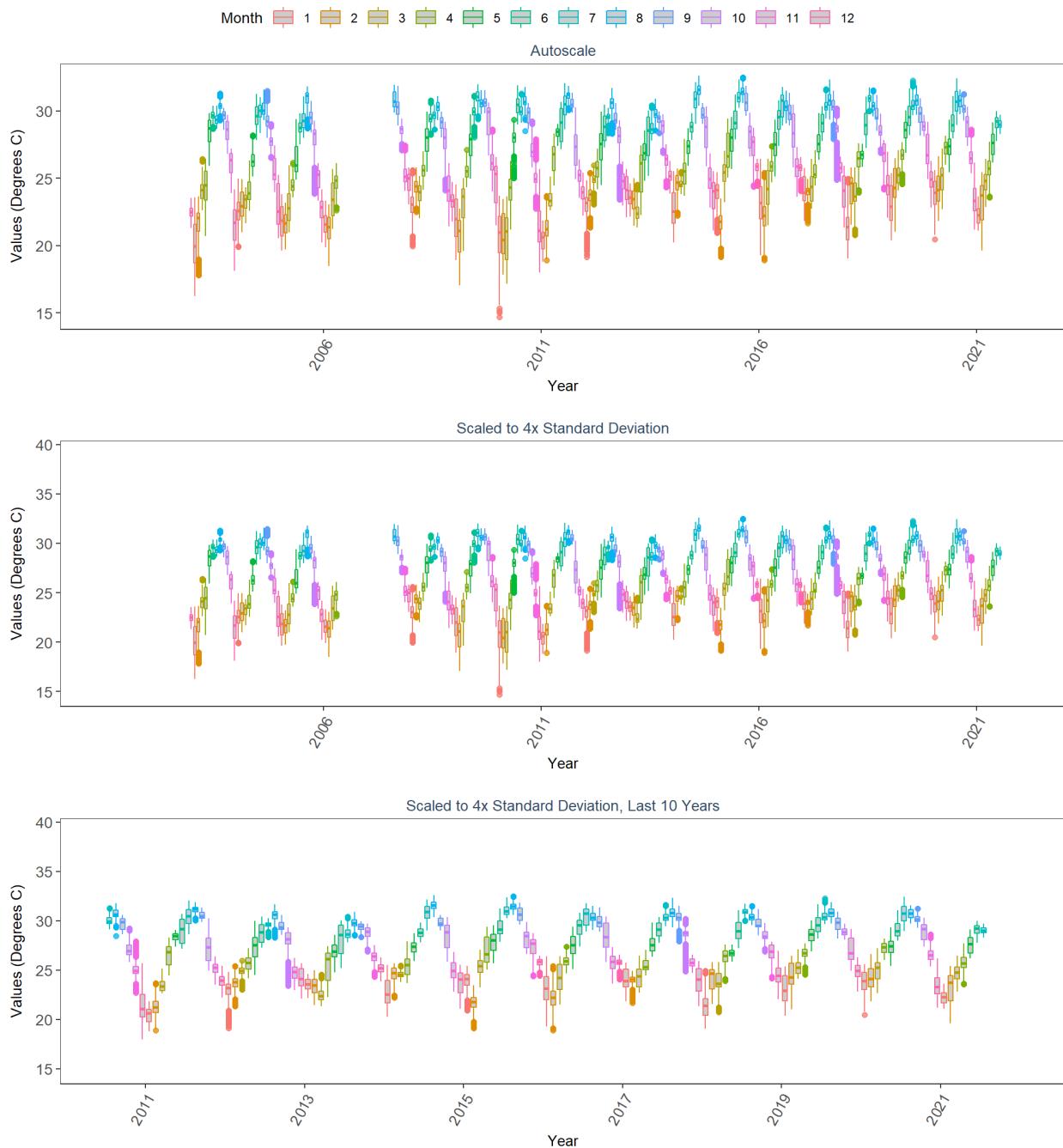
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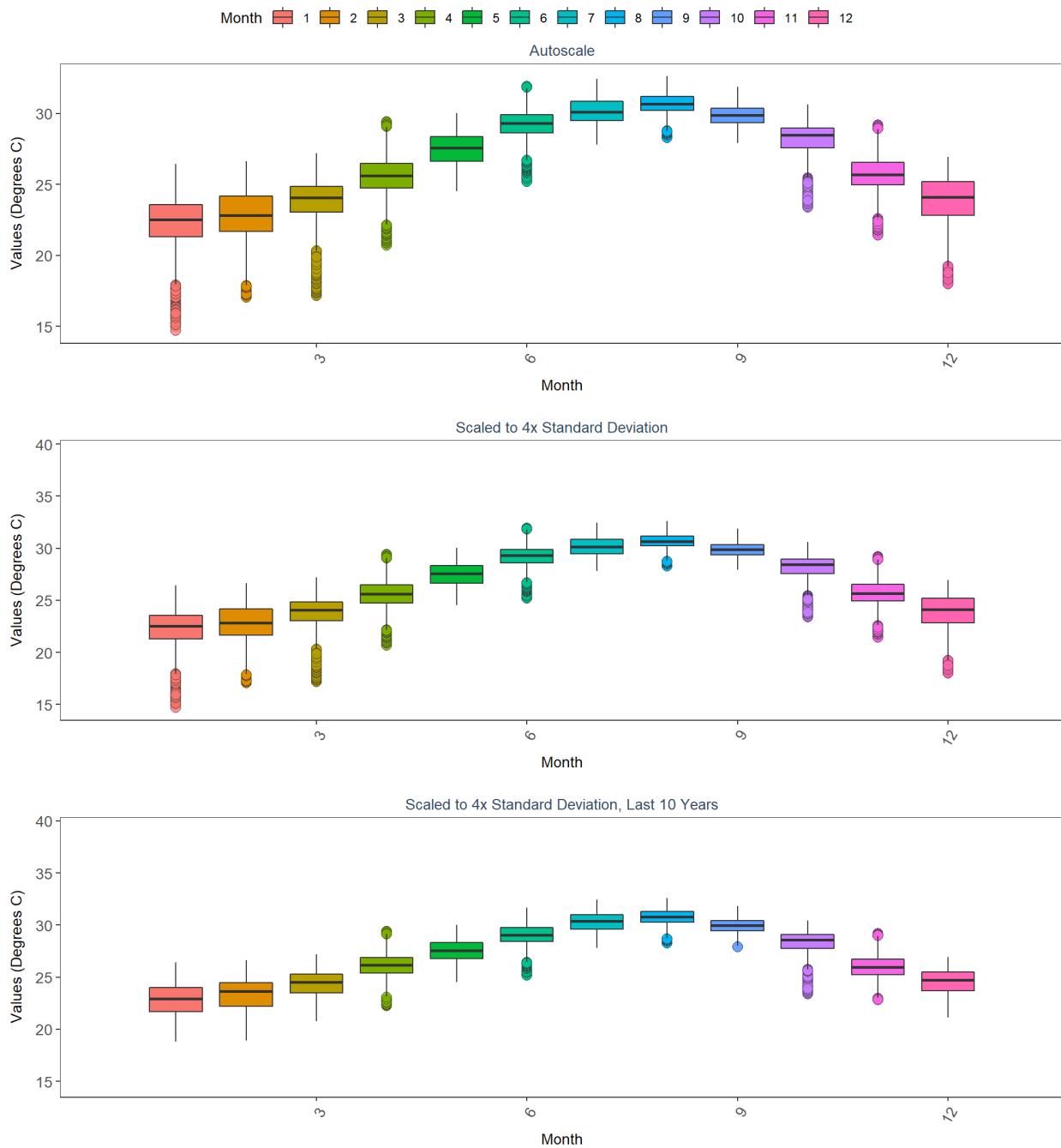
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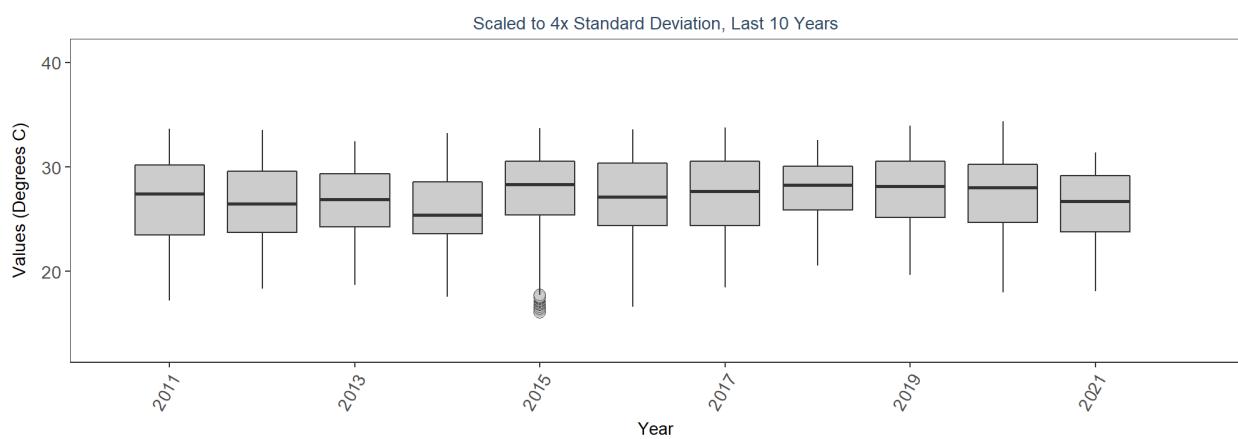
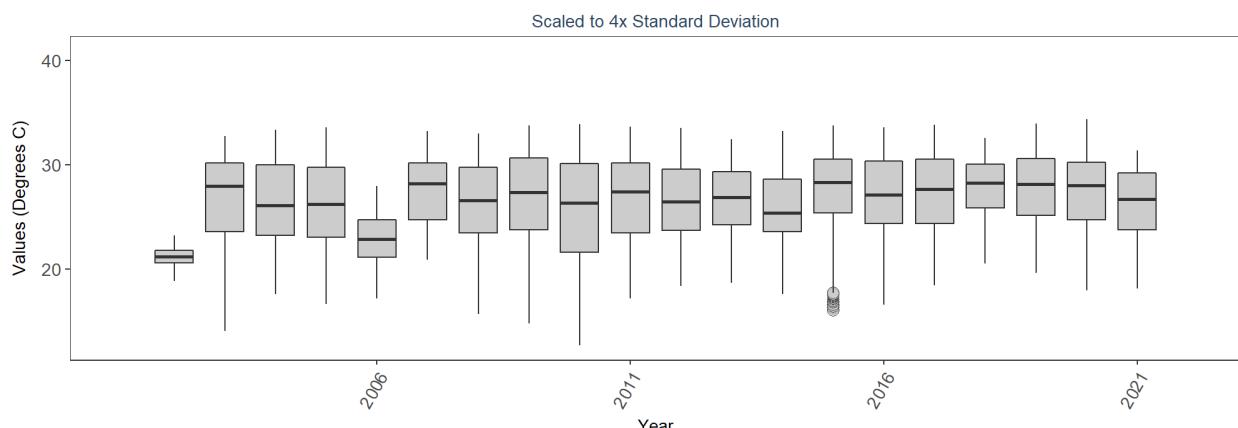
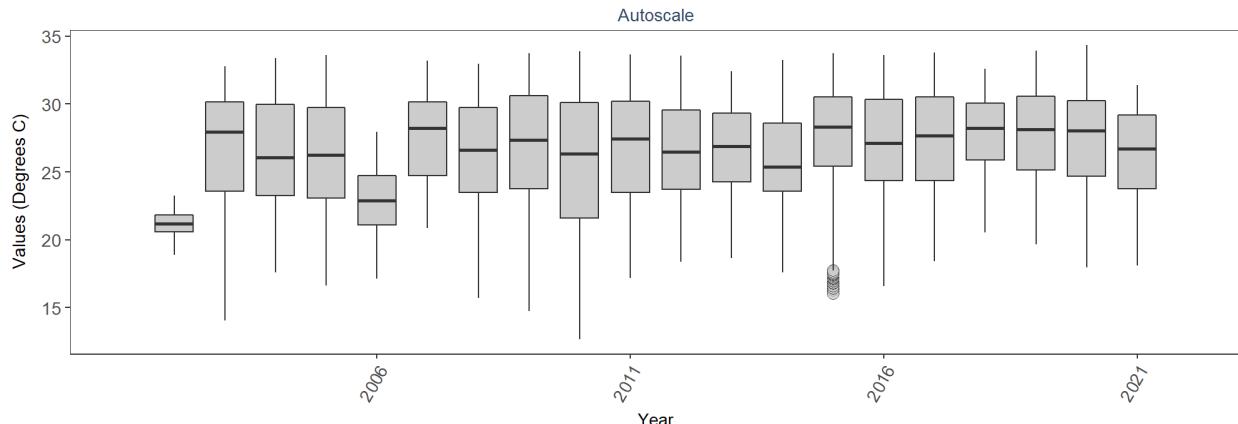
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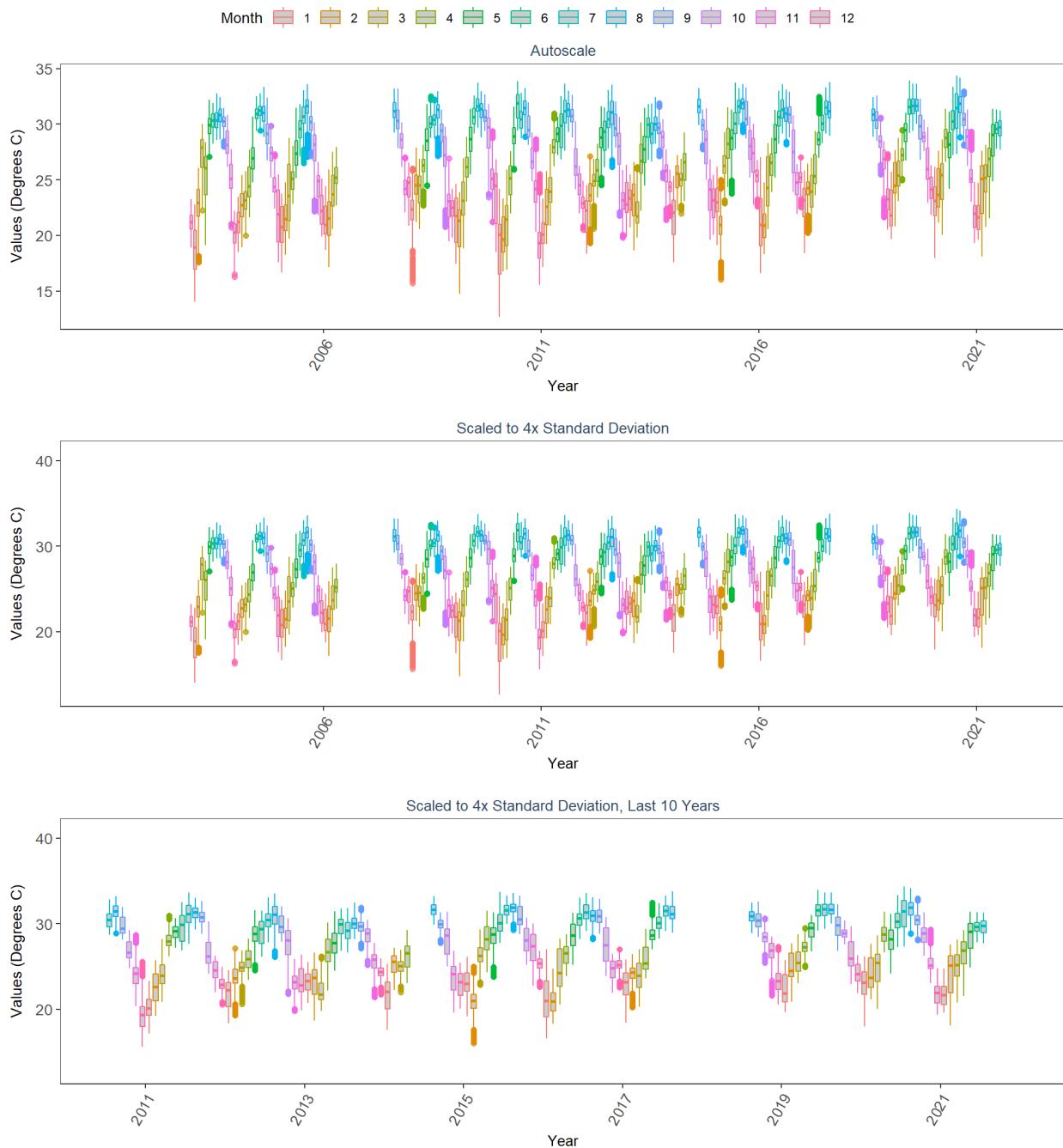
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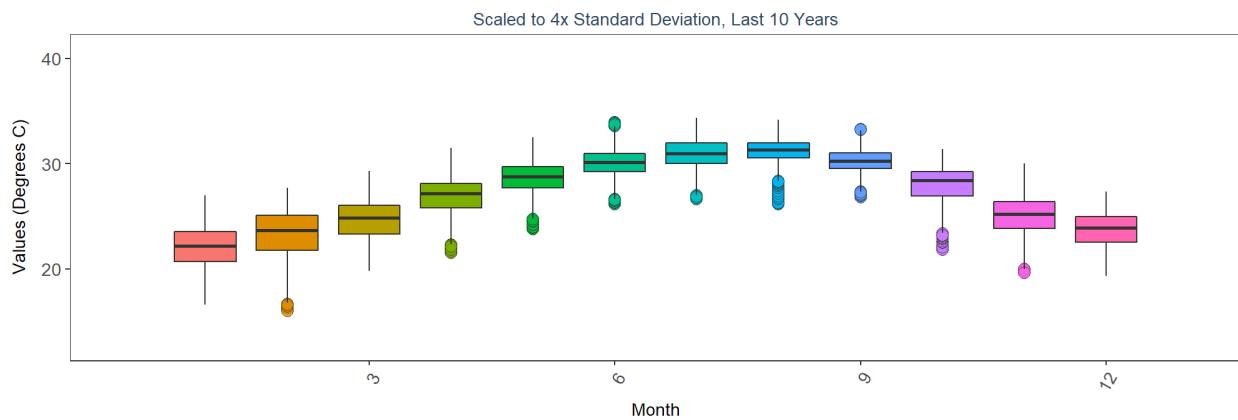
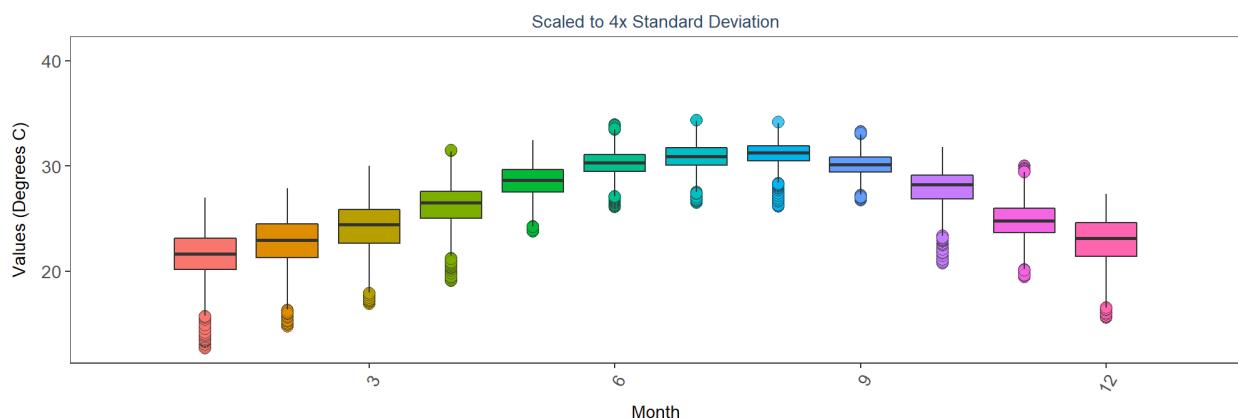
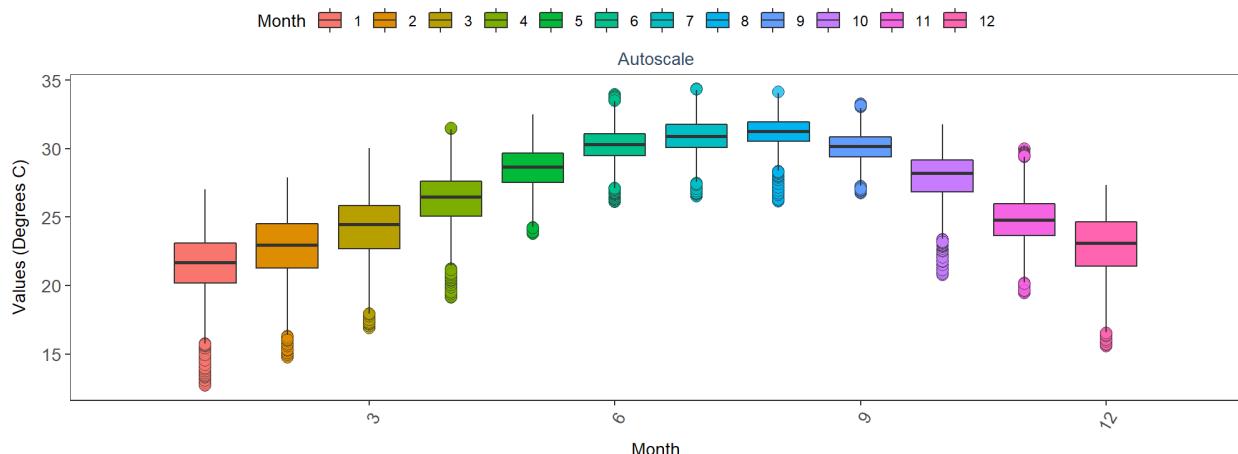
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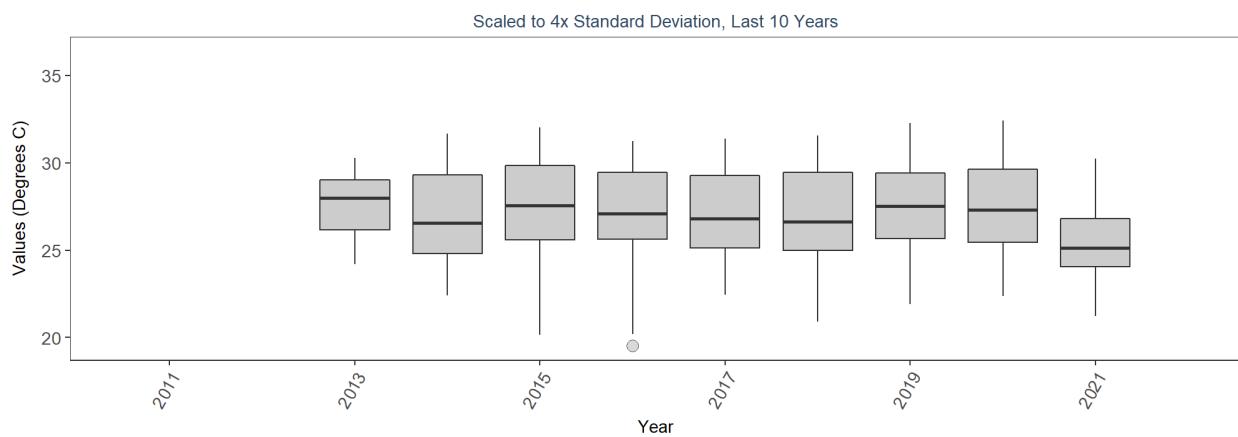
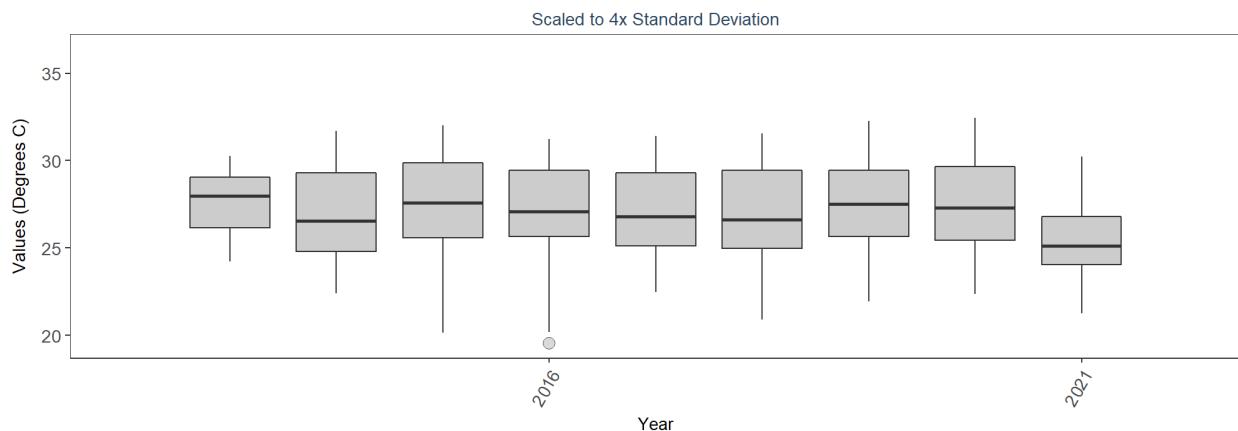
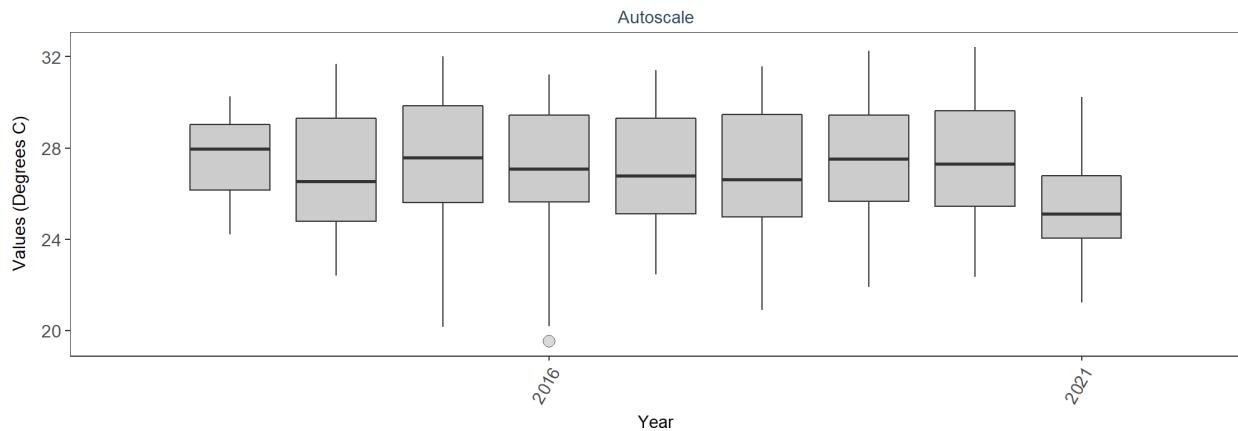
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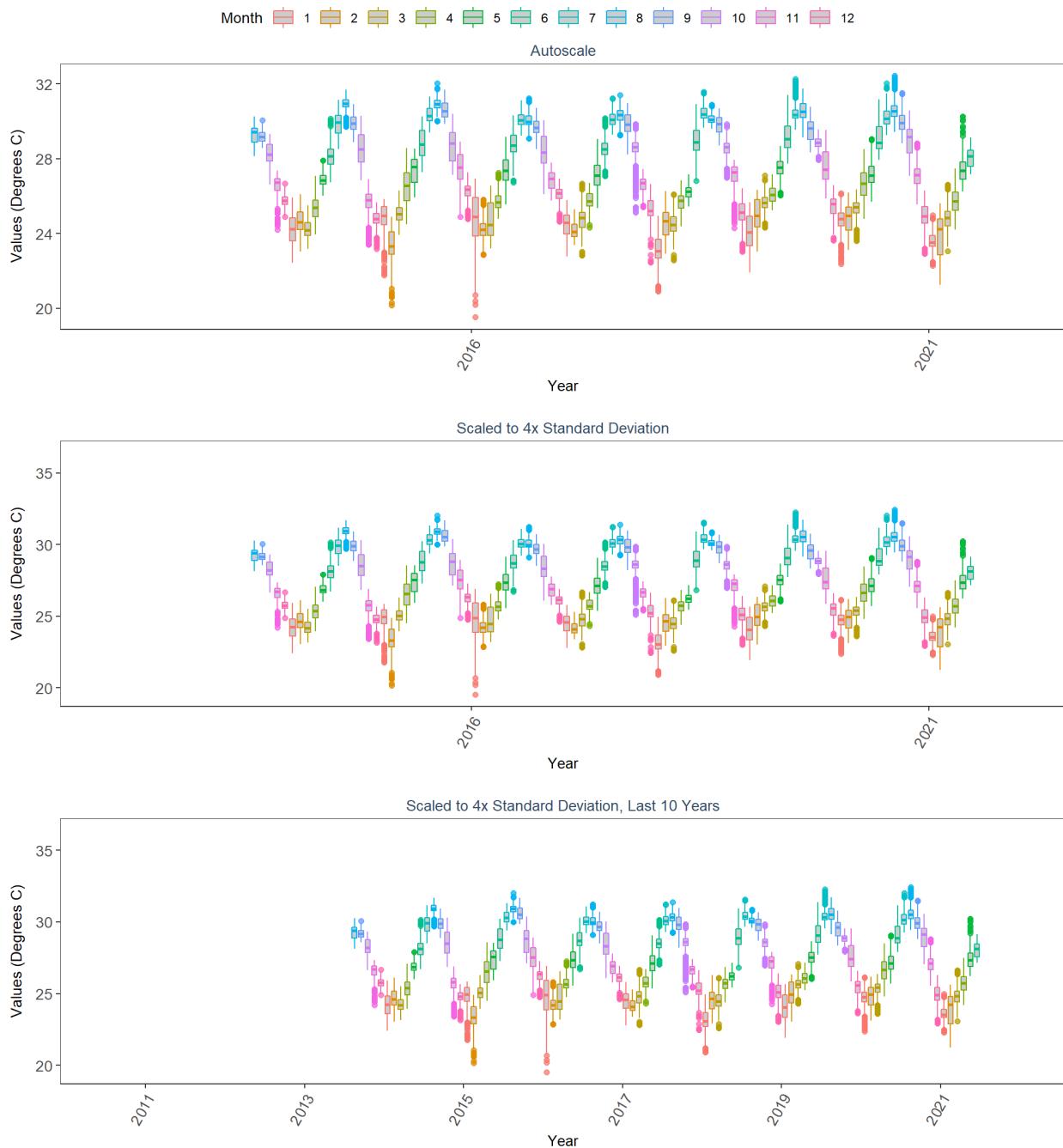
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 By Month



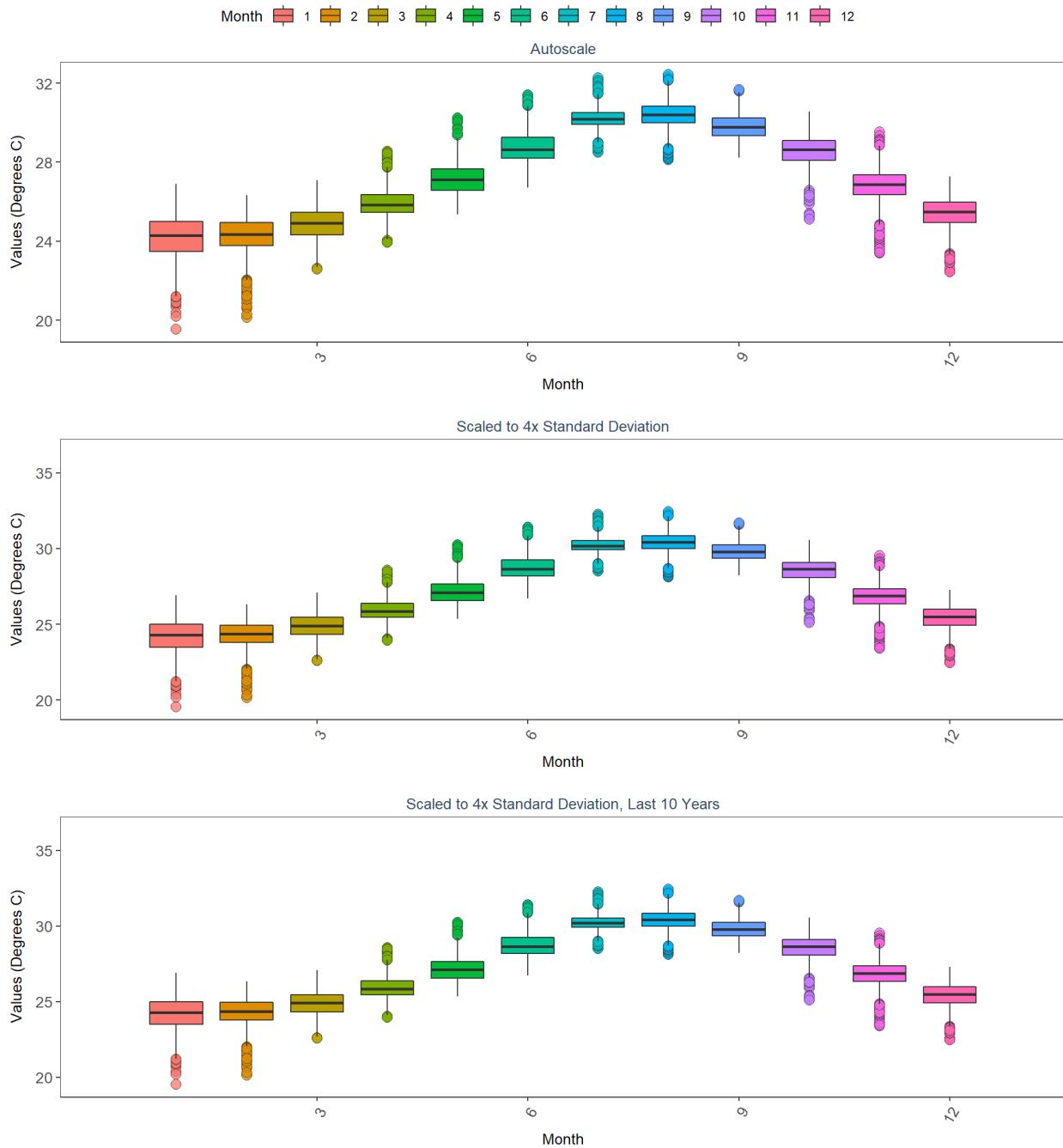
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986  
Water Temperature on Coral Reefs in the Florida Keys  
50  
By Year



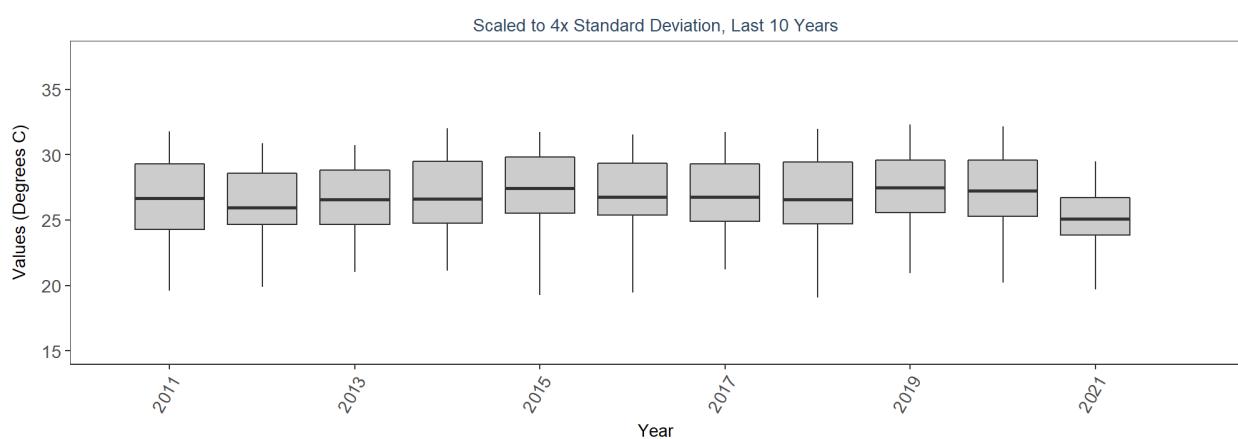
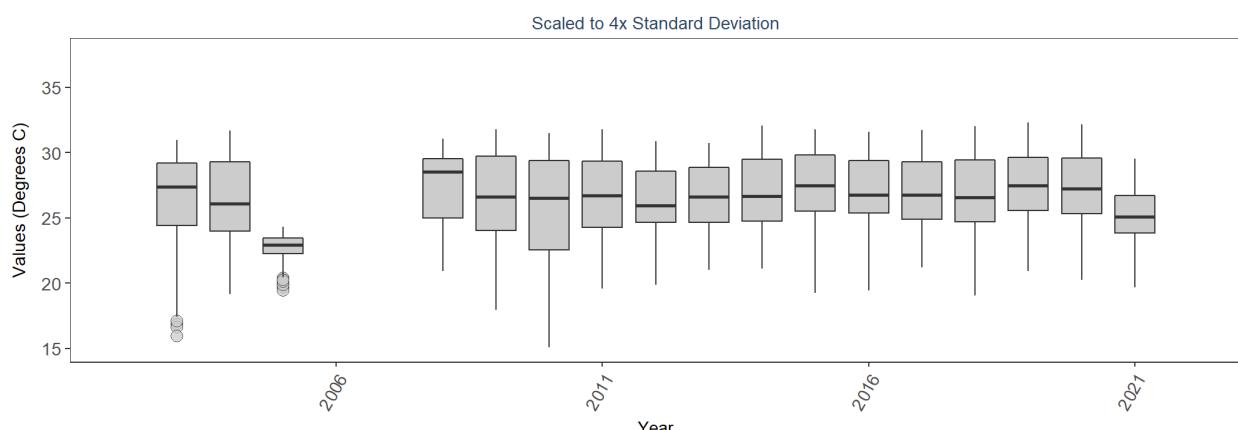
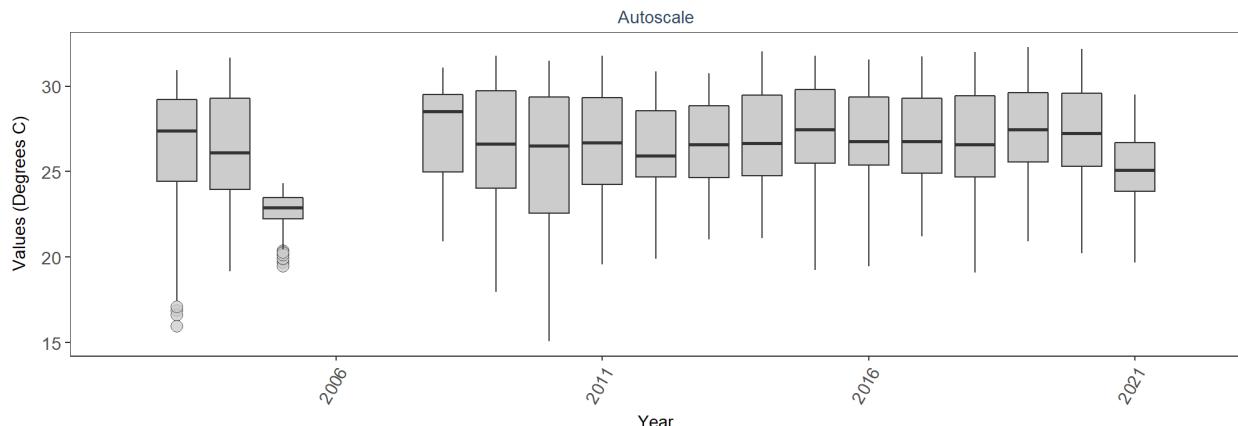
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



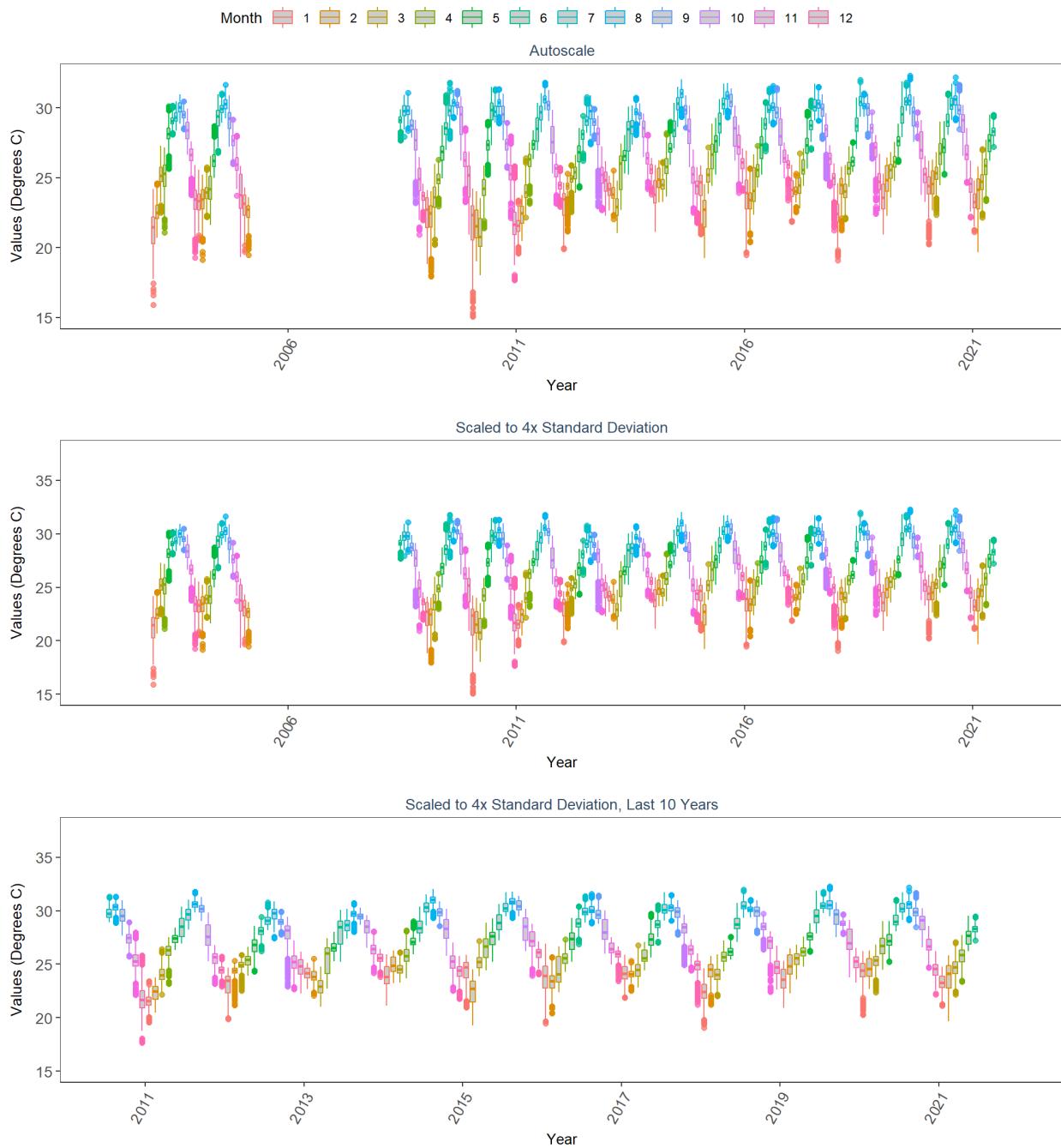
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 By Month



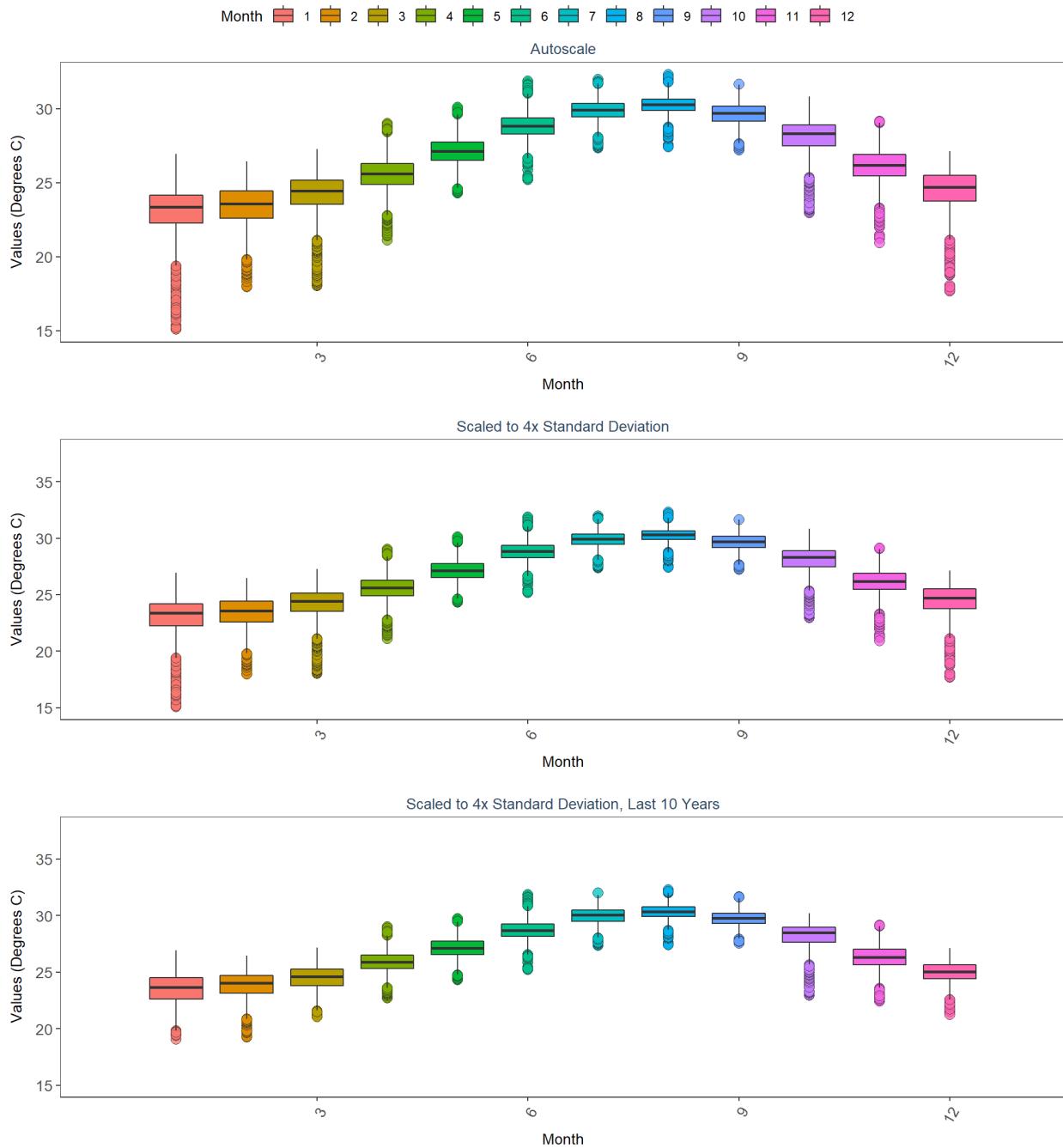
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Water Temperature on Coral Reefs in the Florida Keys  
51  
By Year



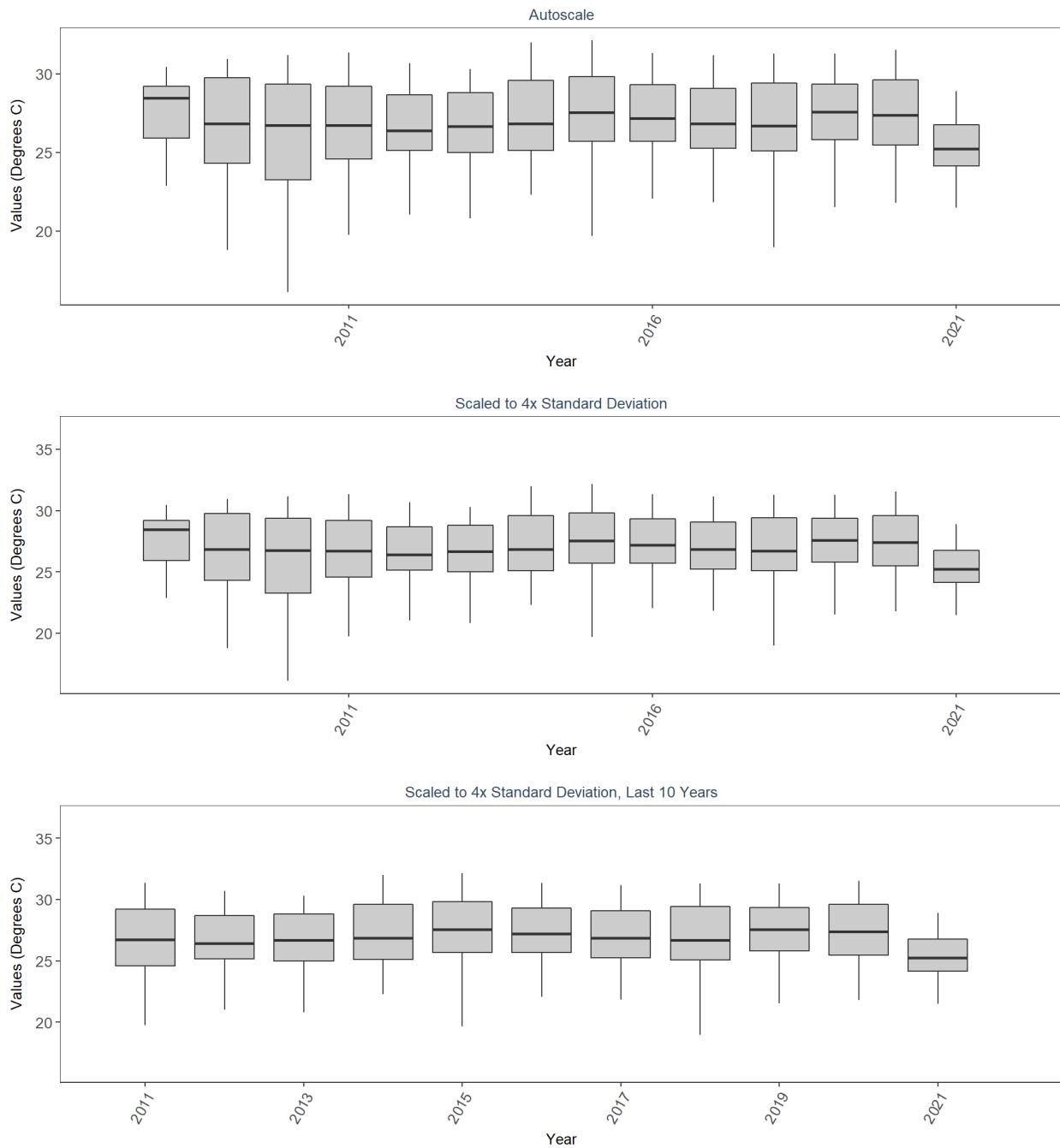
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 51  
 By Year & Month



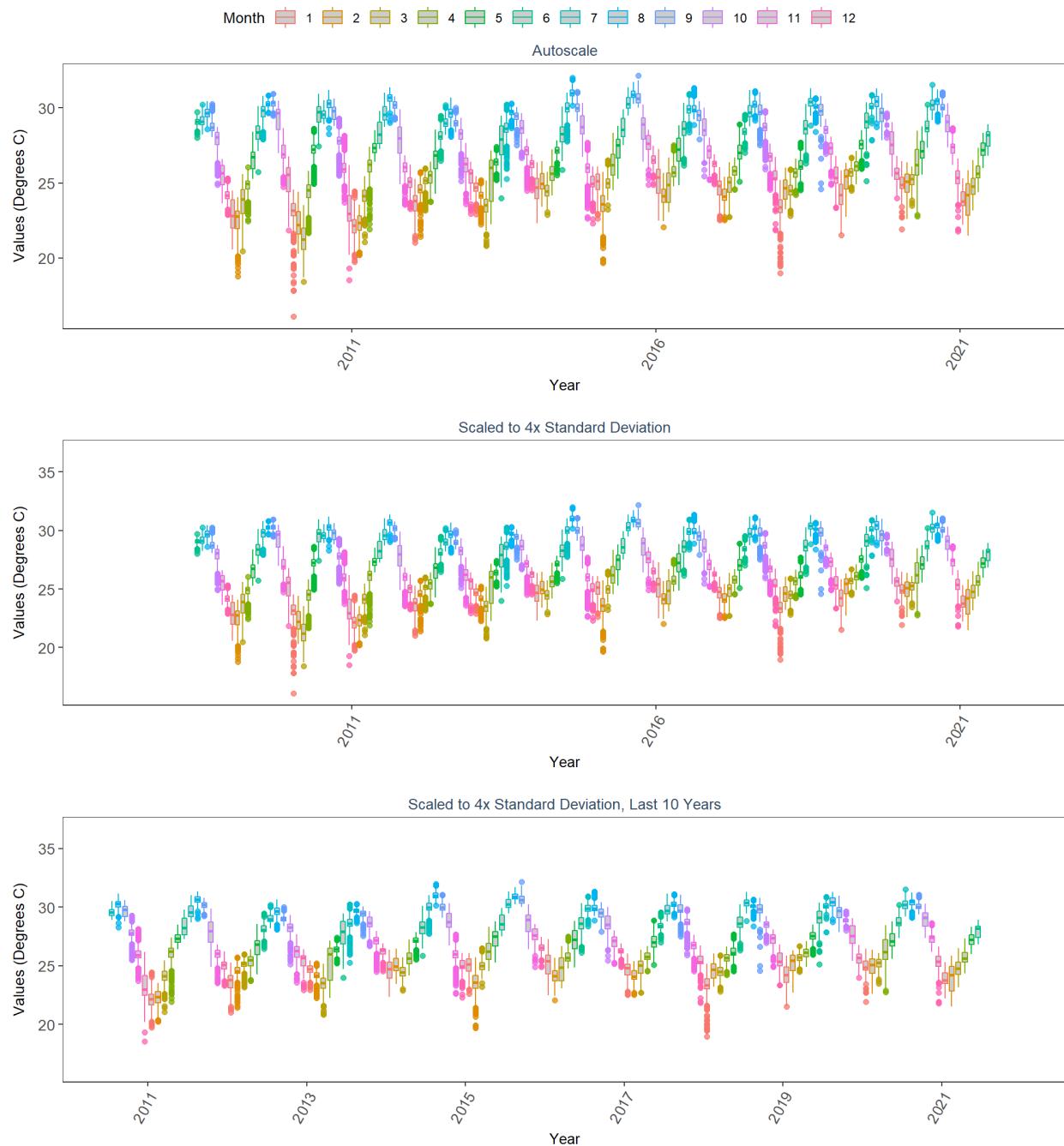
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 By Month



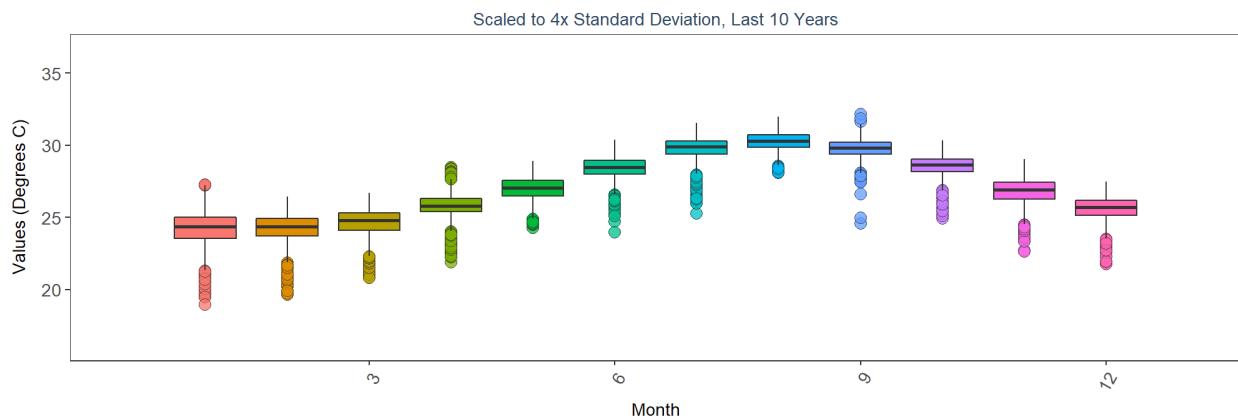
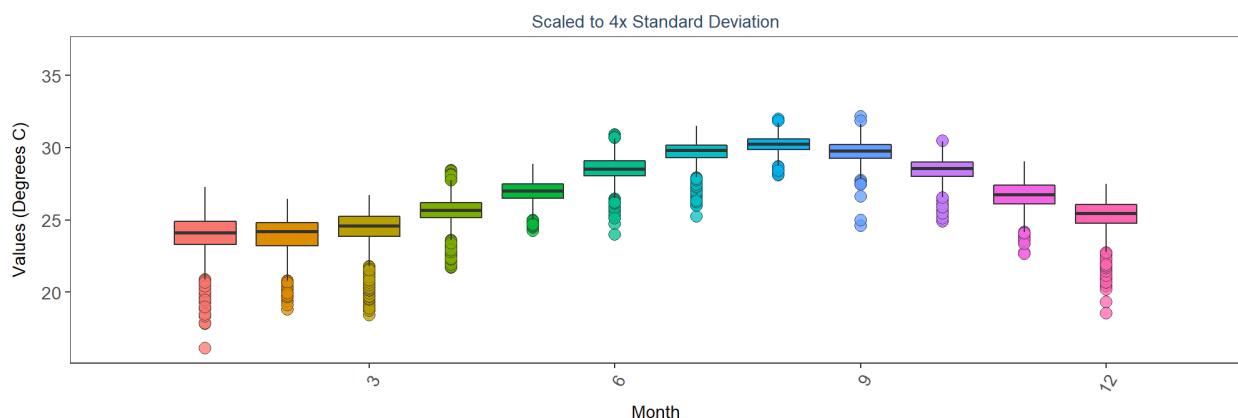
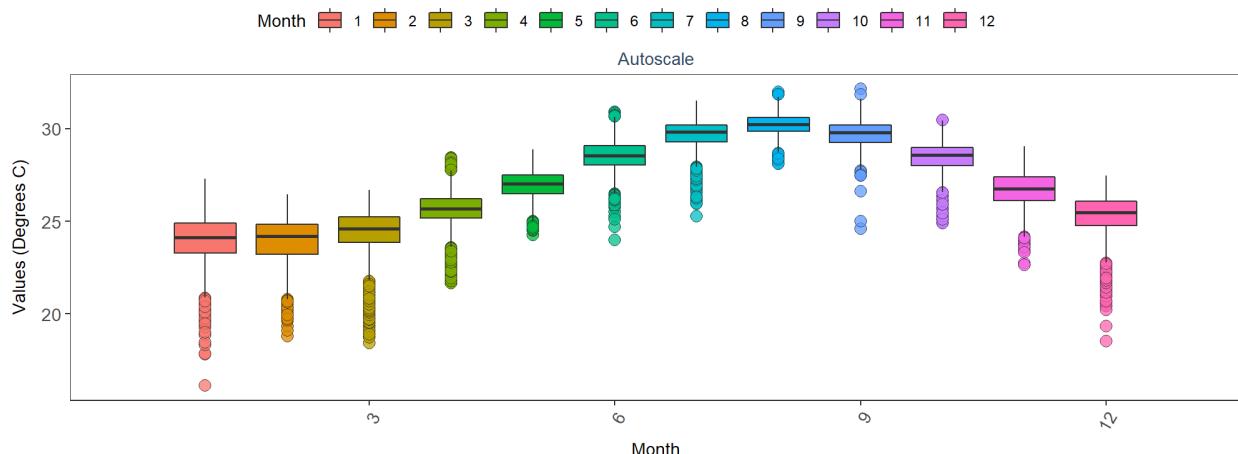
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52  
By Year



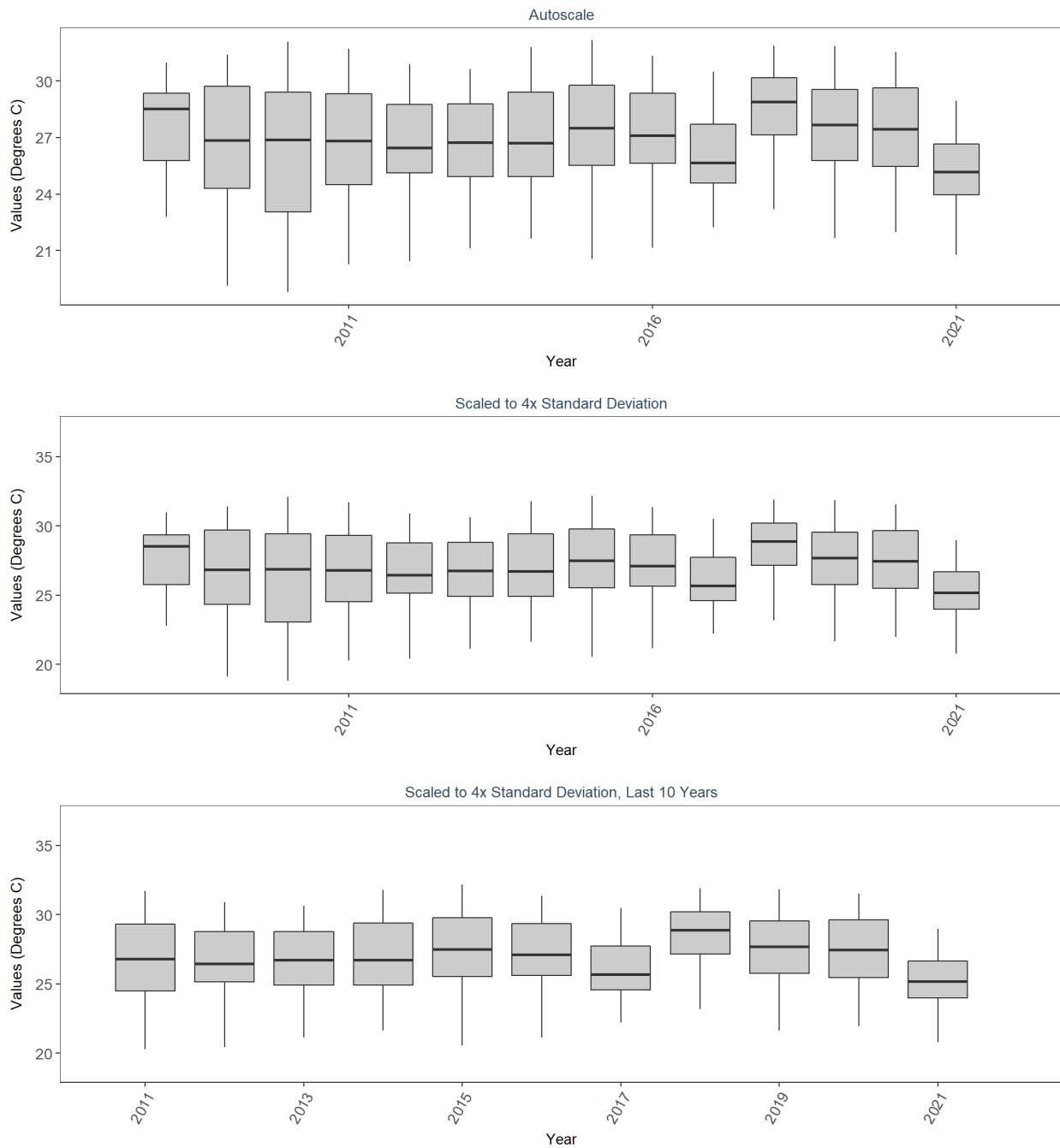
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**986**  
**Water Temperature on Coral Reefs in the Florida Keys**  
**52**  
**By Year & Month**



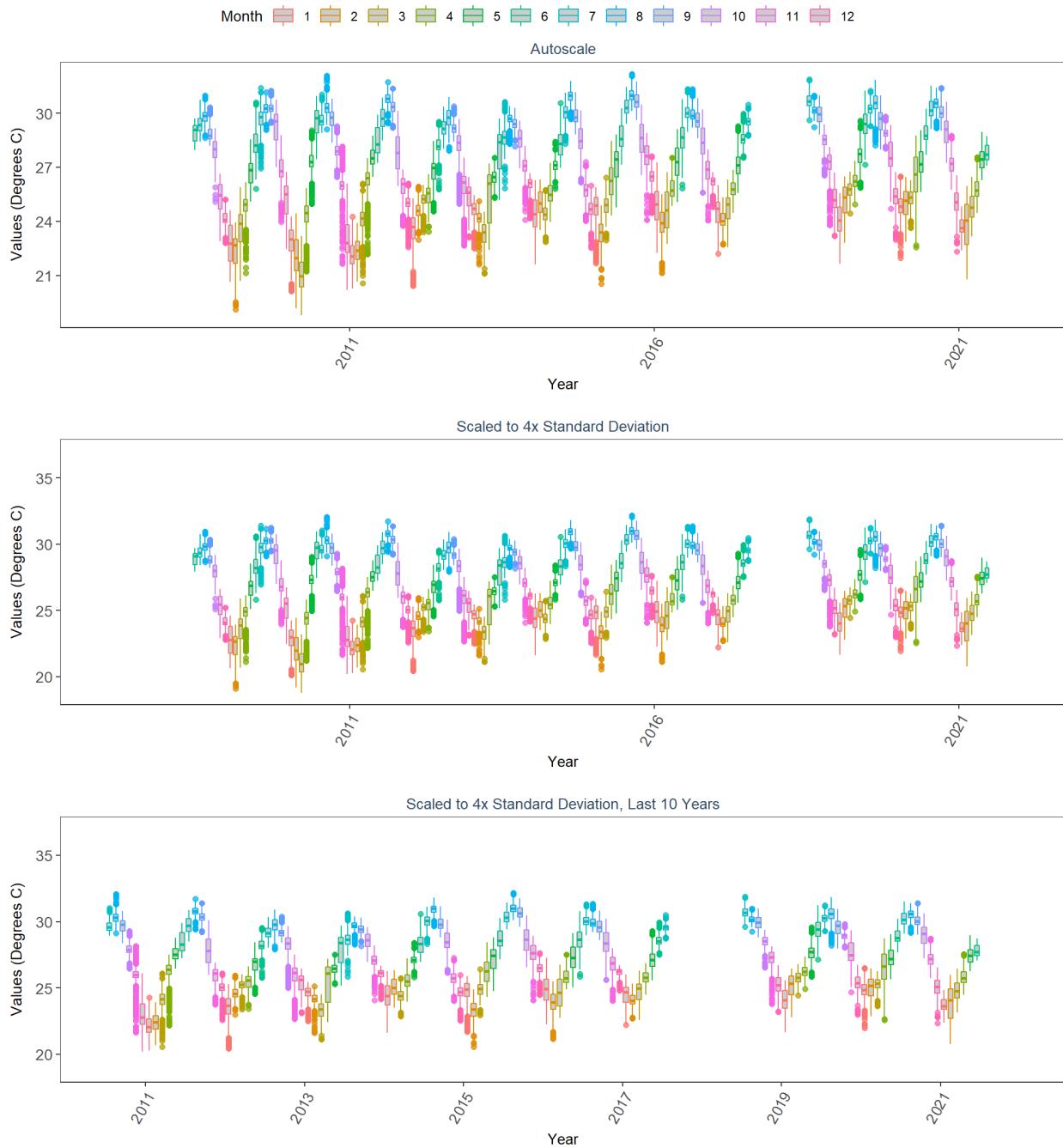
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 By Month



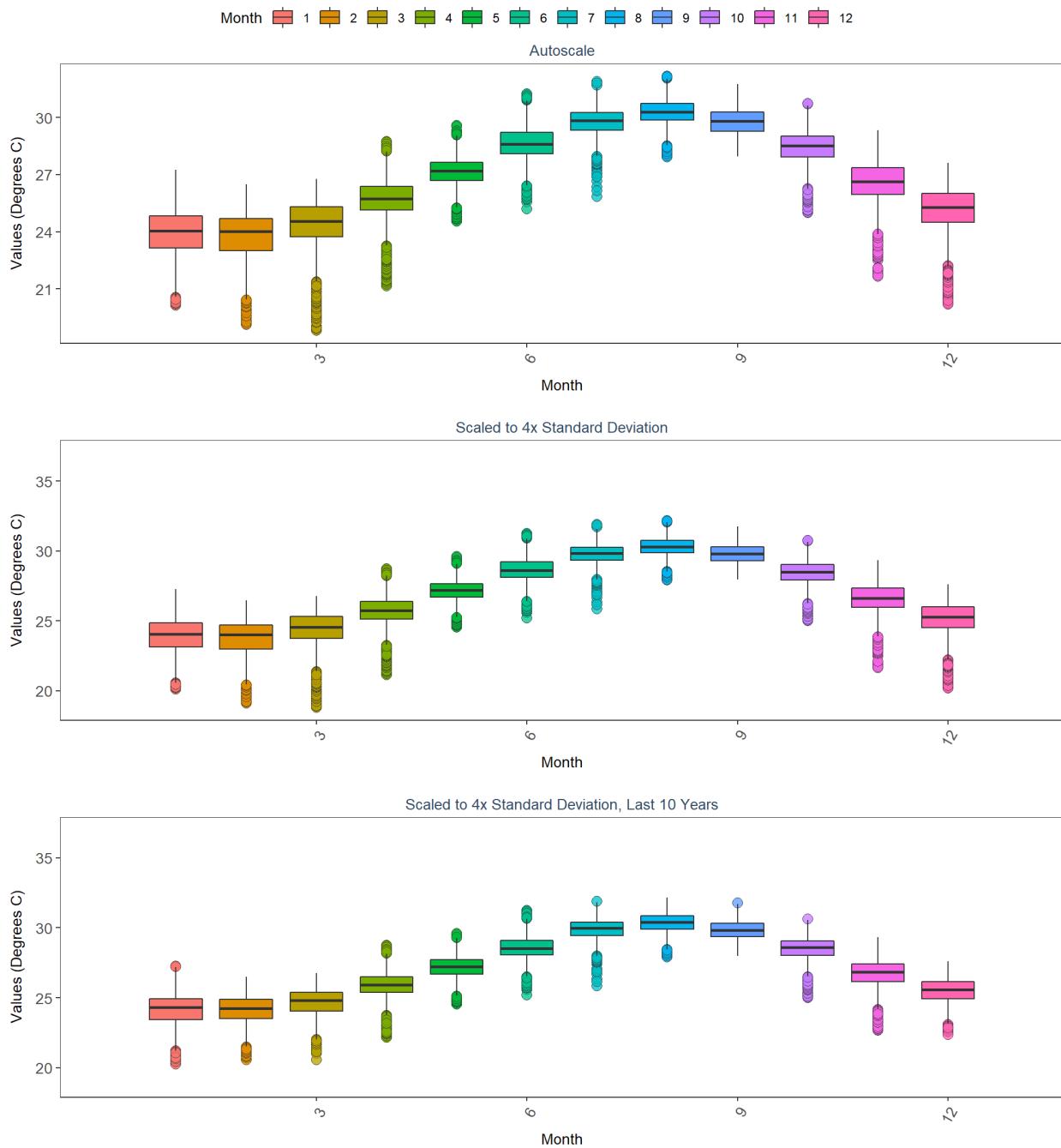
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 By Year



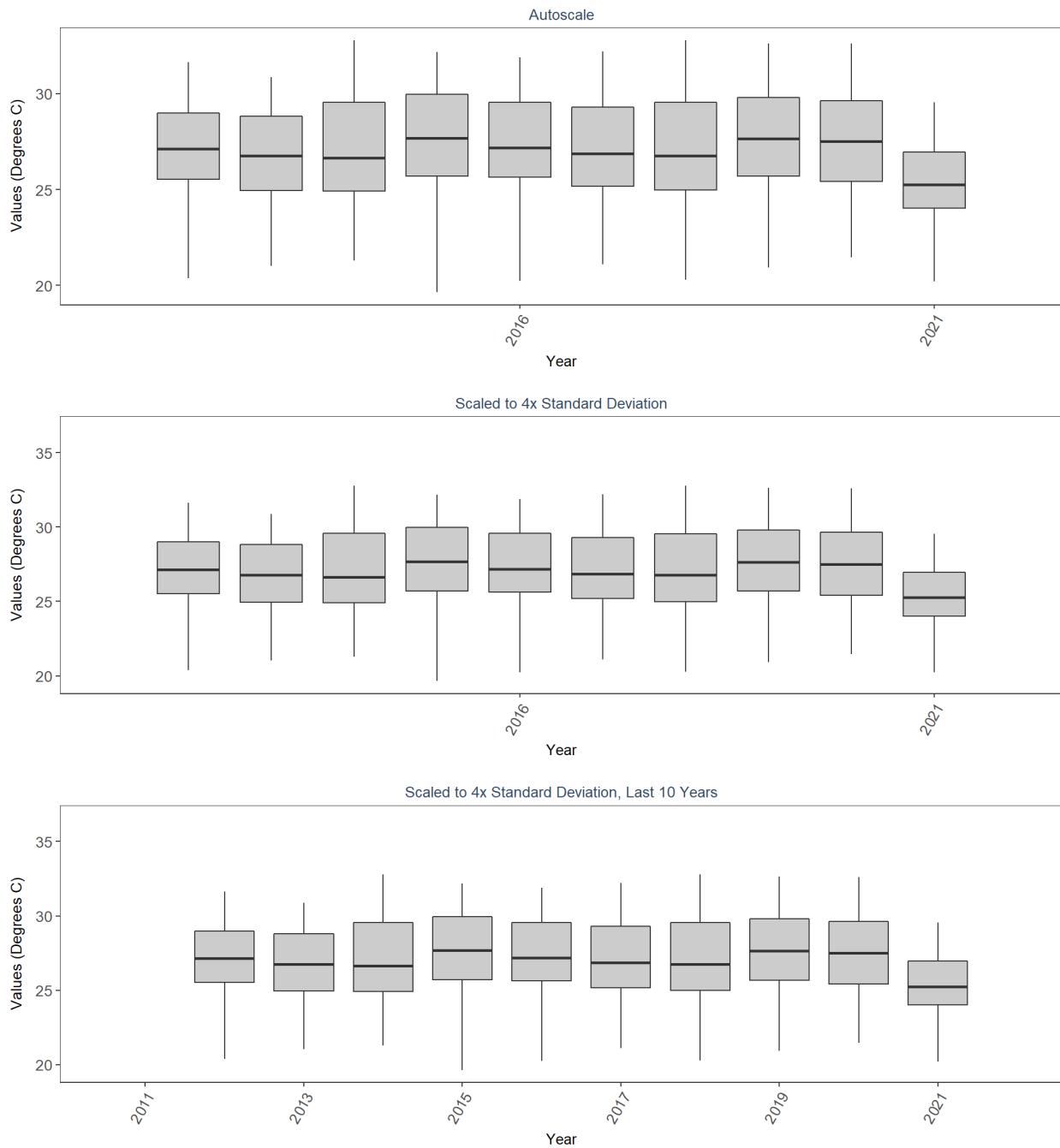
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 By Year & Month



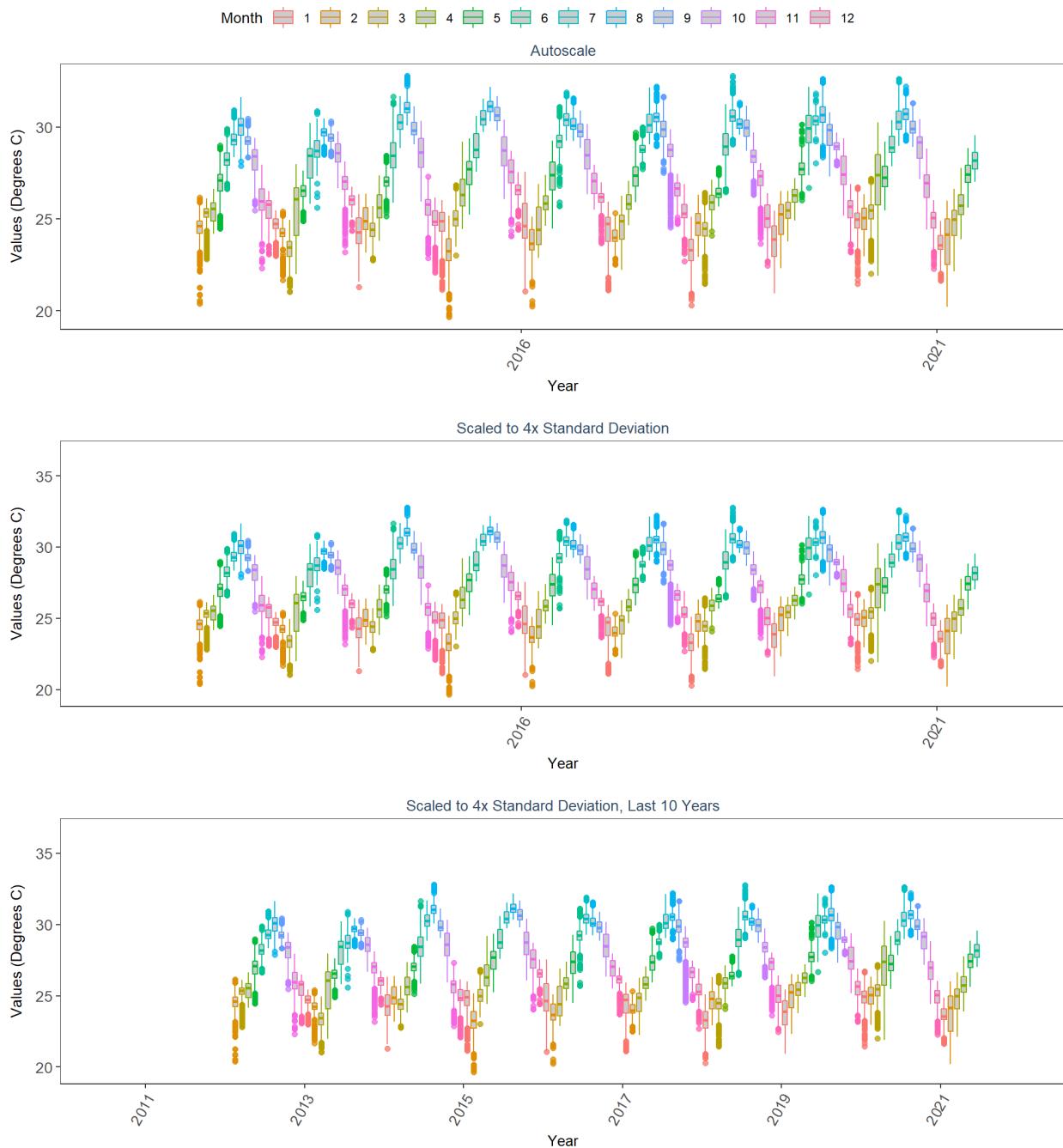
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 By Month



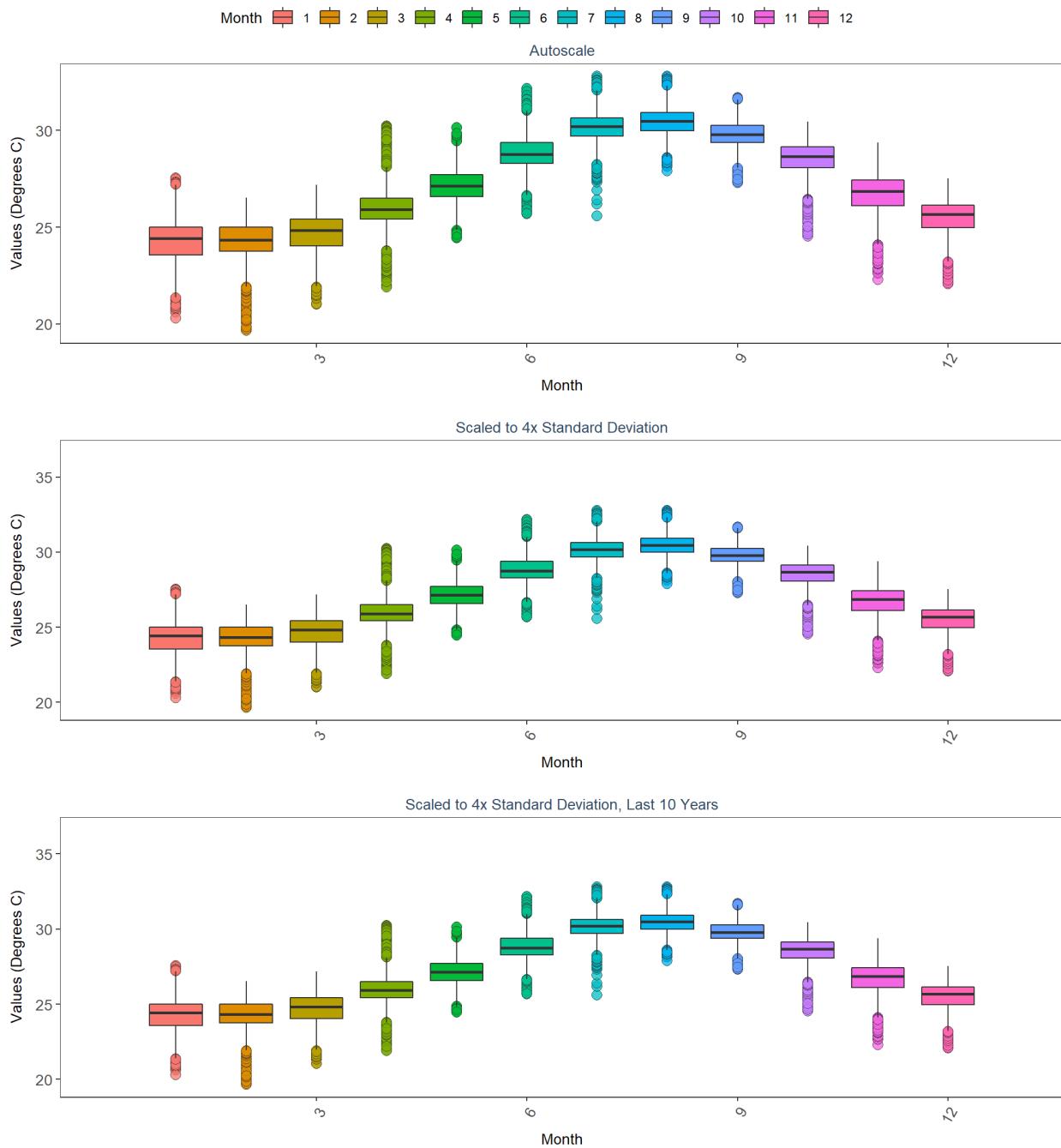
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Water Temperature on Coral Reefs in the Florida Keys  
54  
By Year



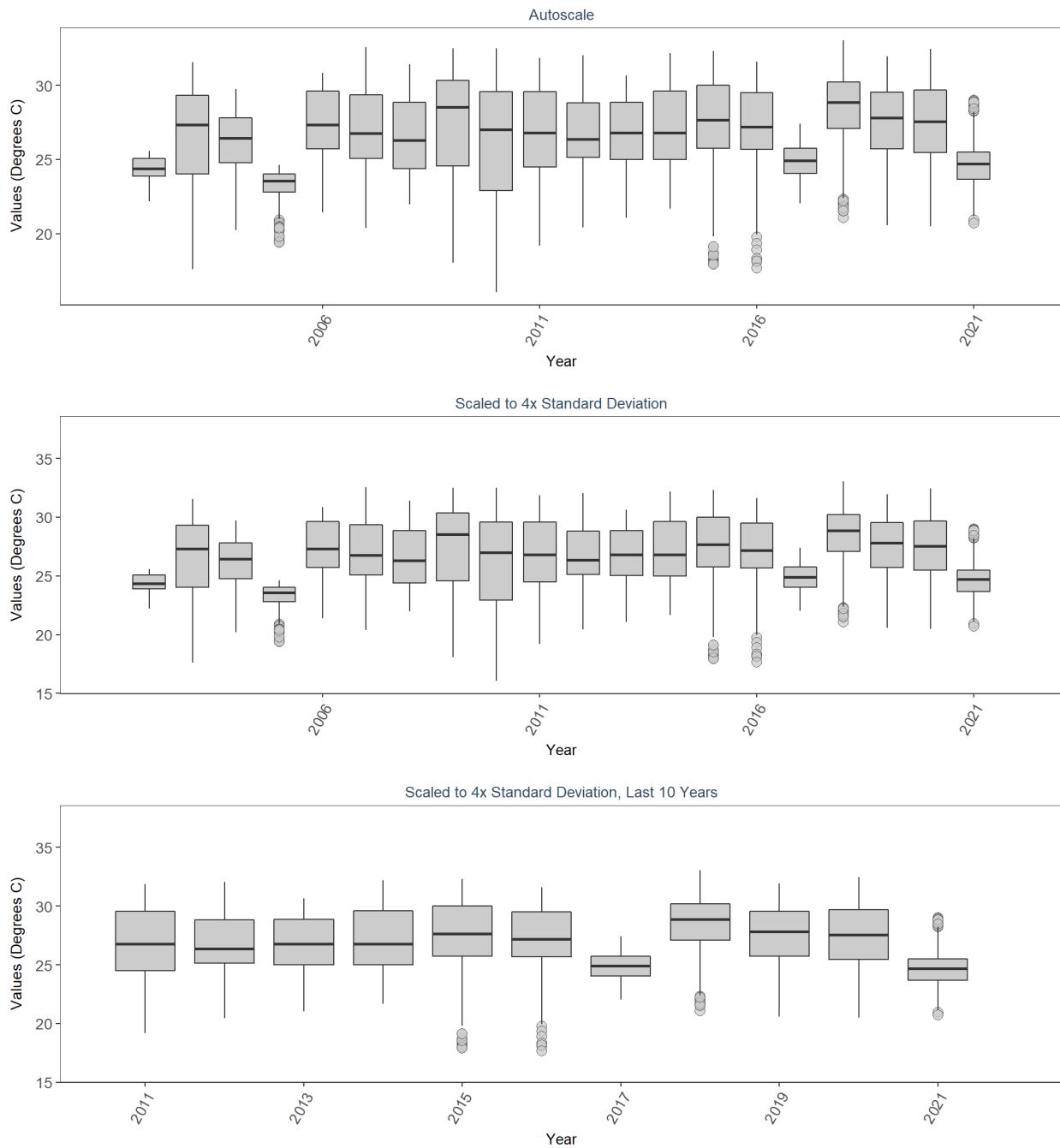
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 By Year & Month



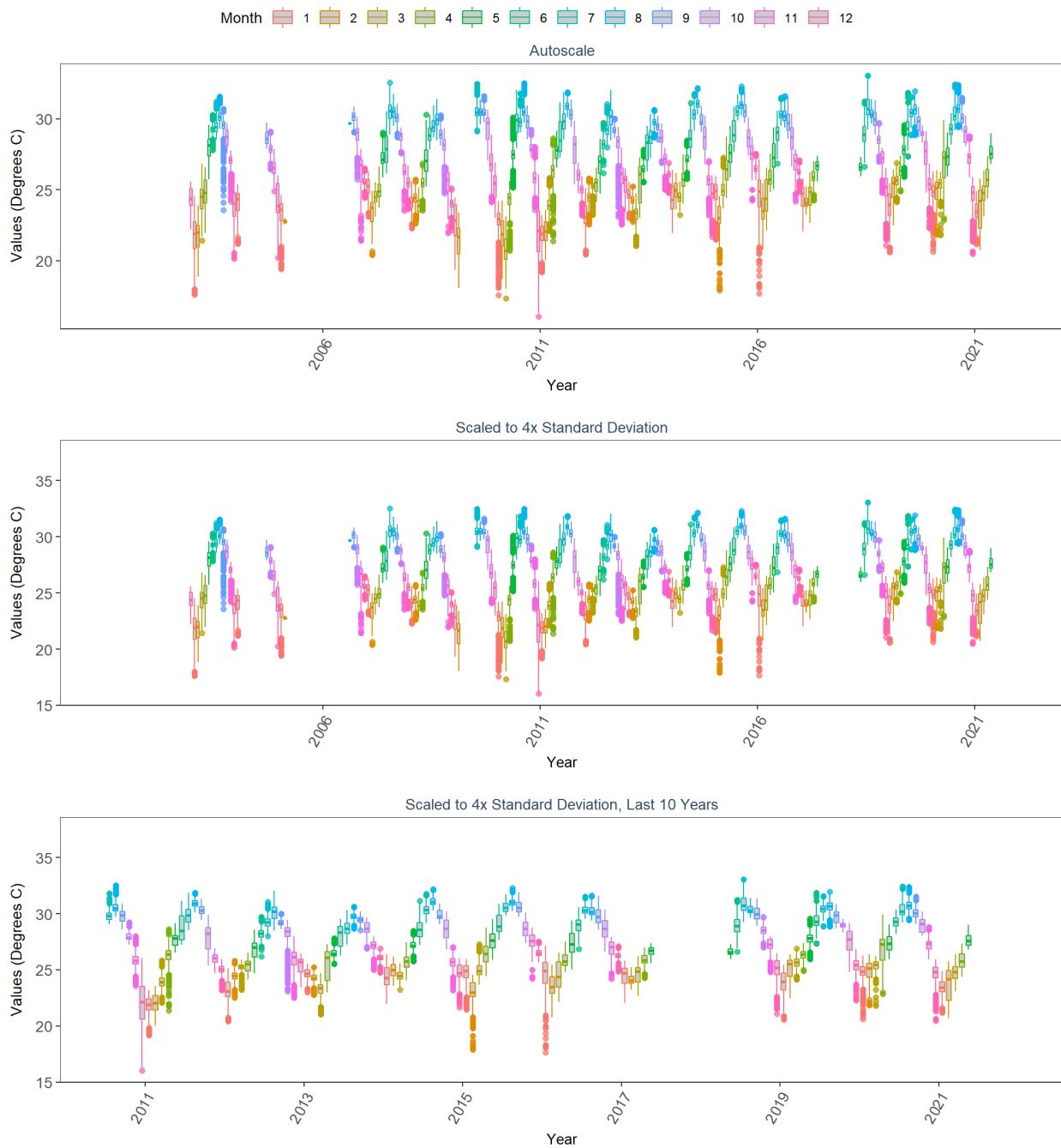
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 By Month



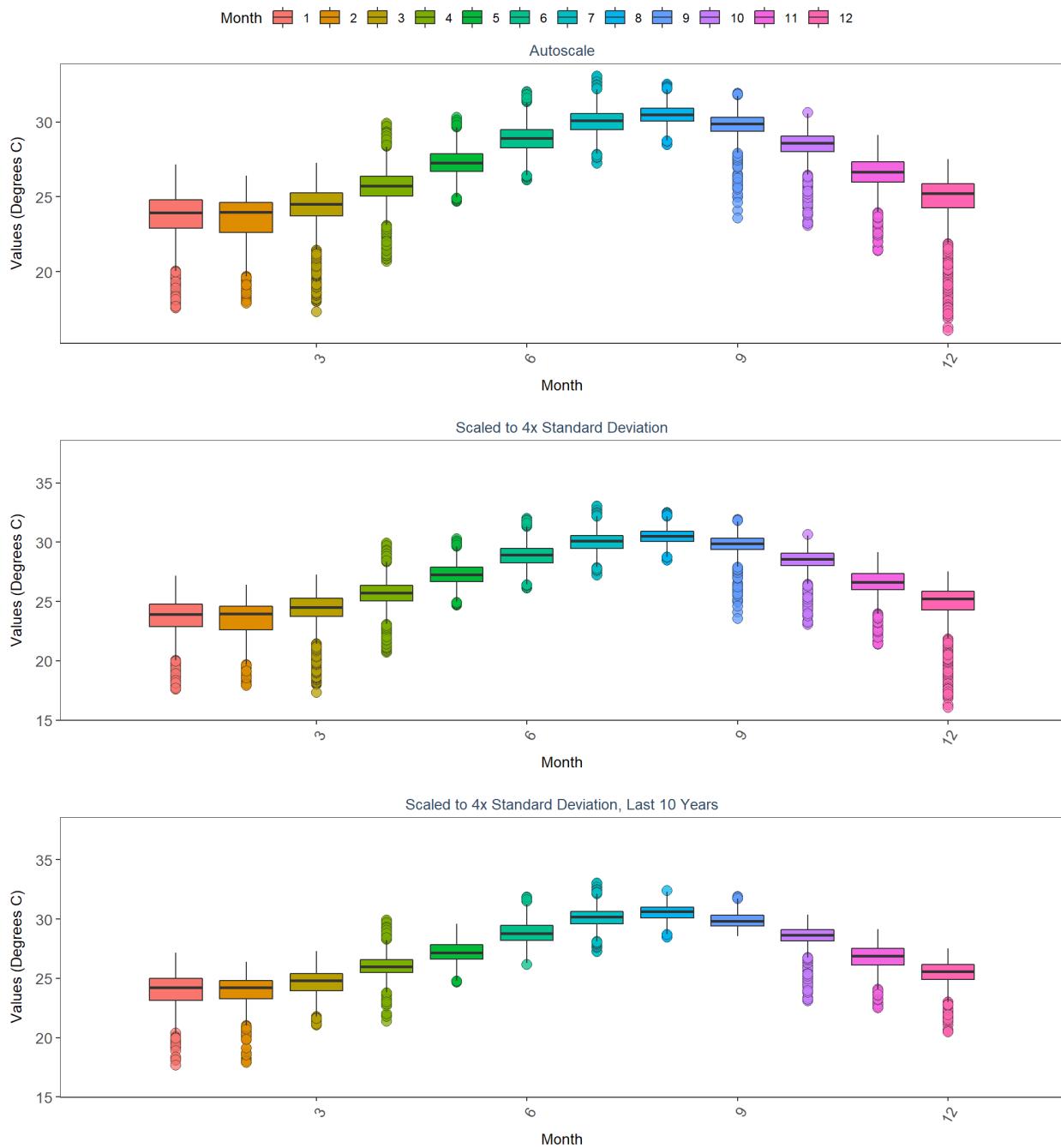
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Water Temperature on Coral Reefs in the Florida Keys  
55  
By Year



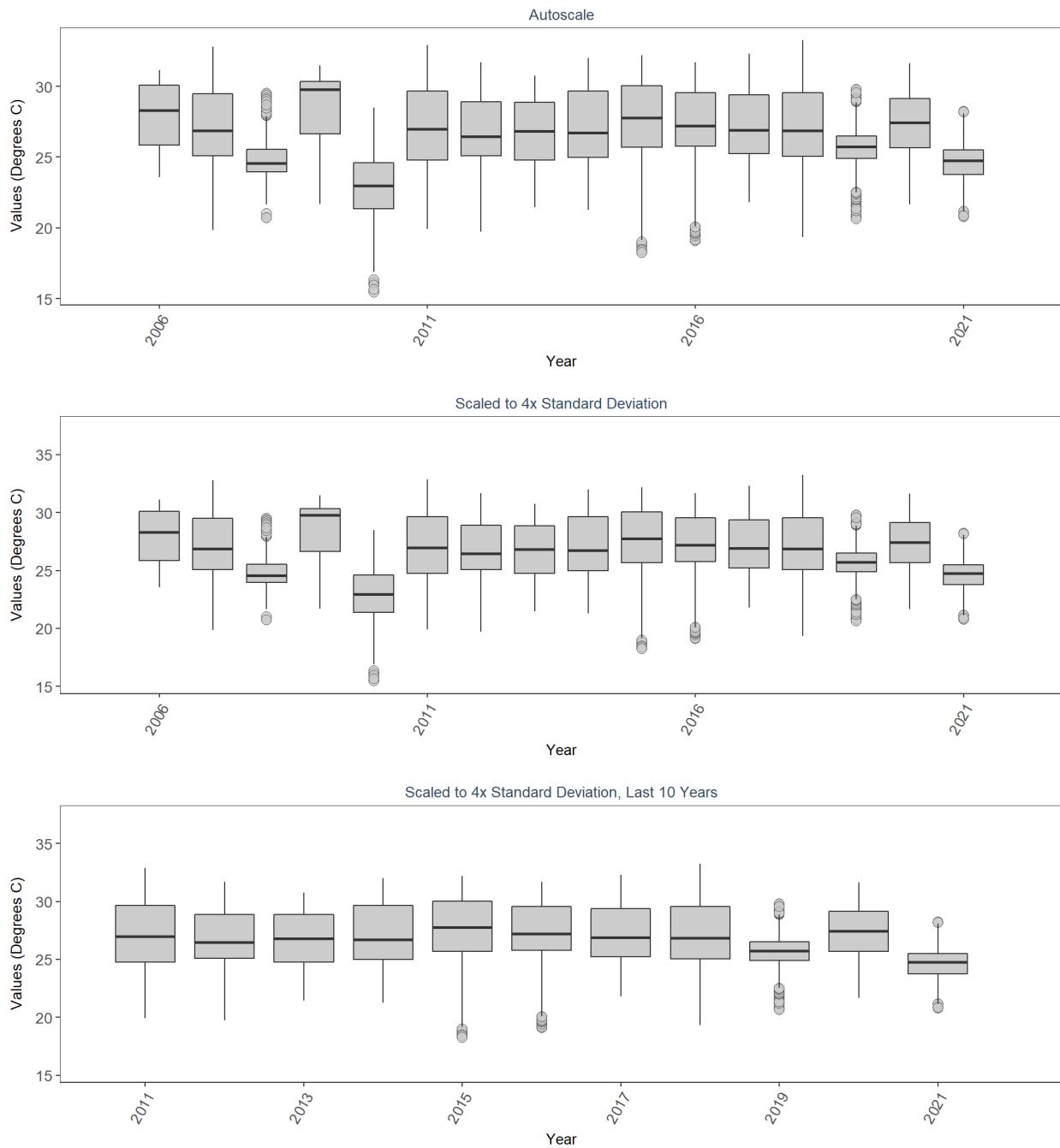
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



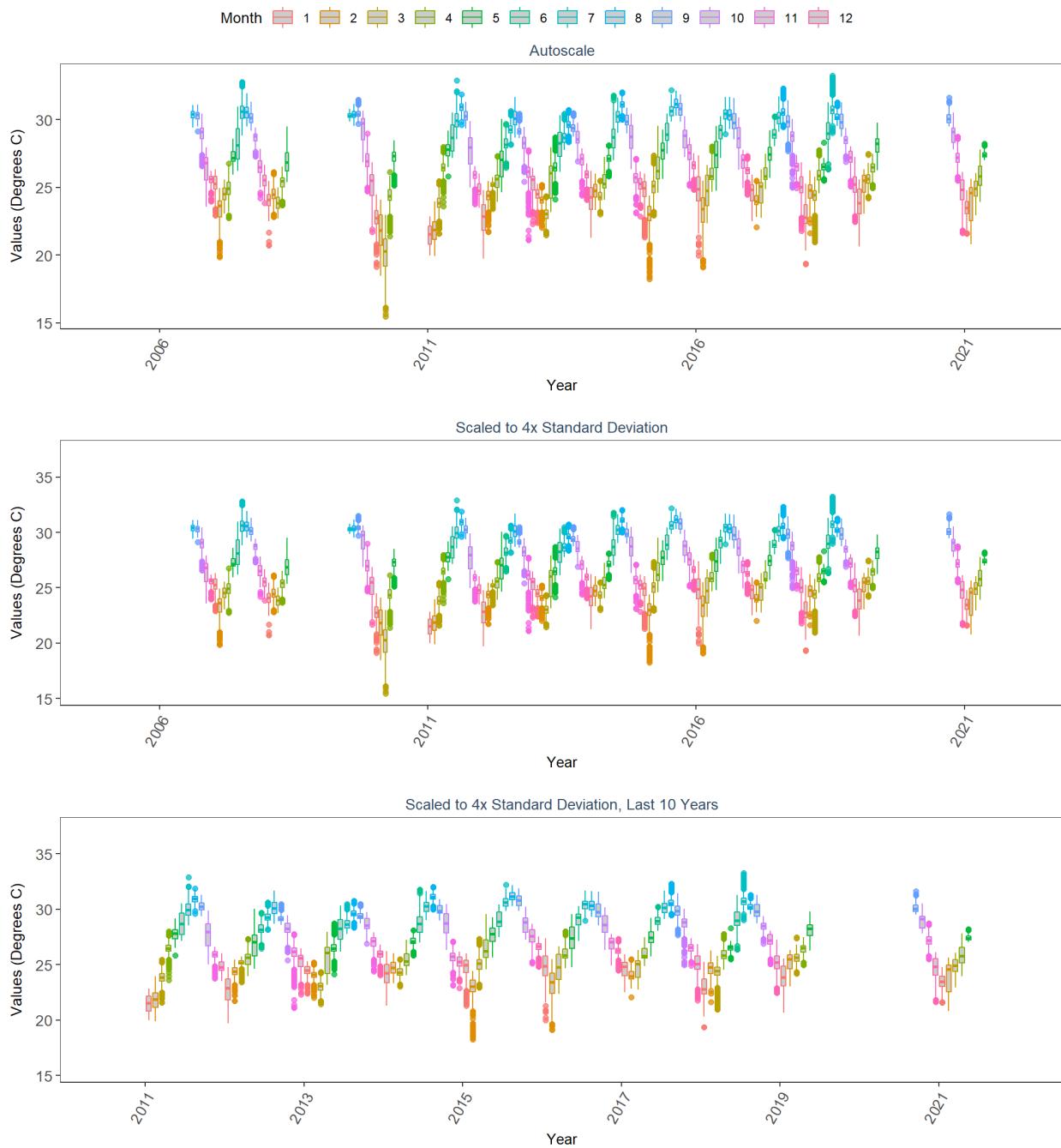
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



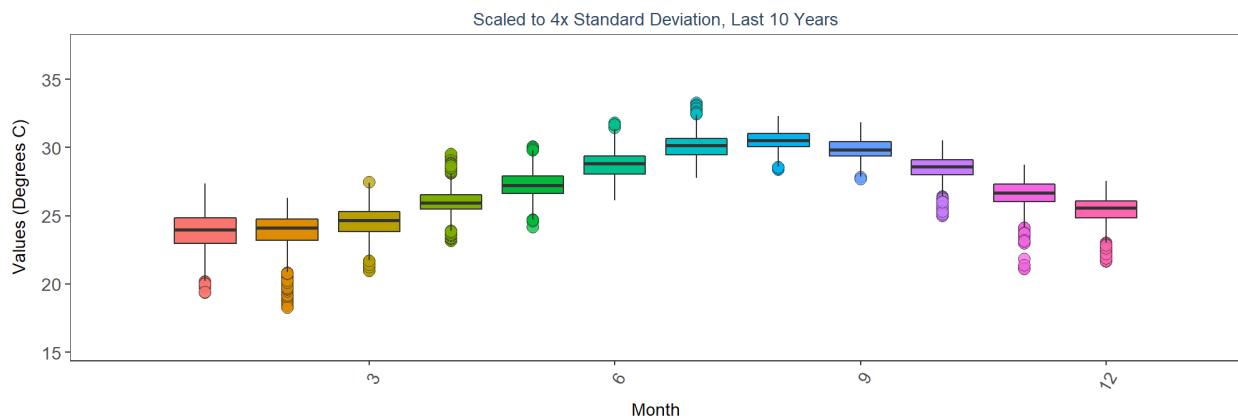
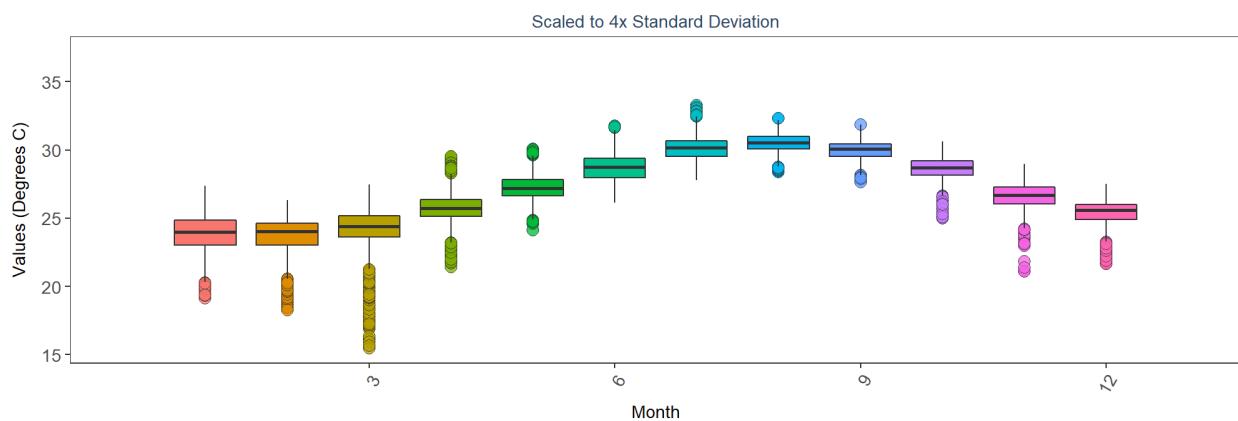
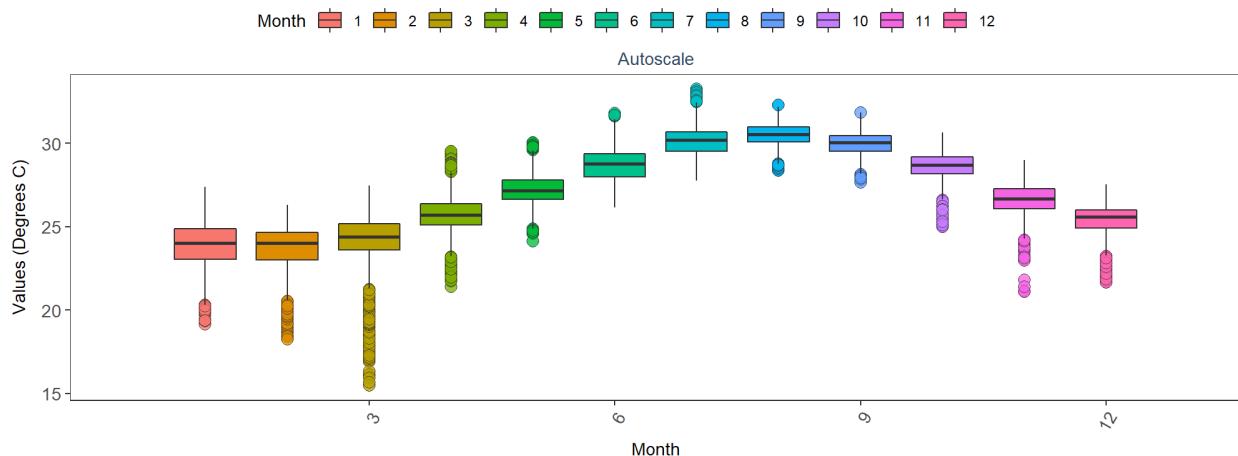
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year



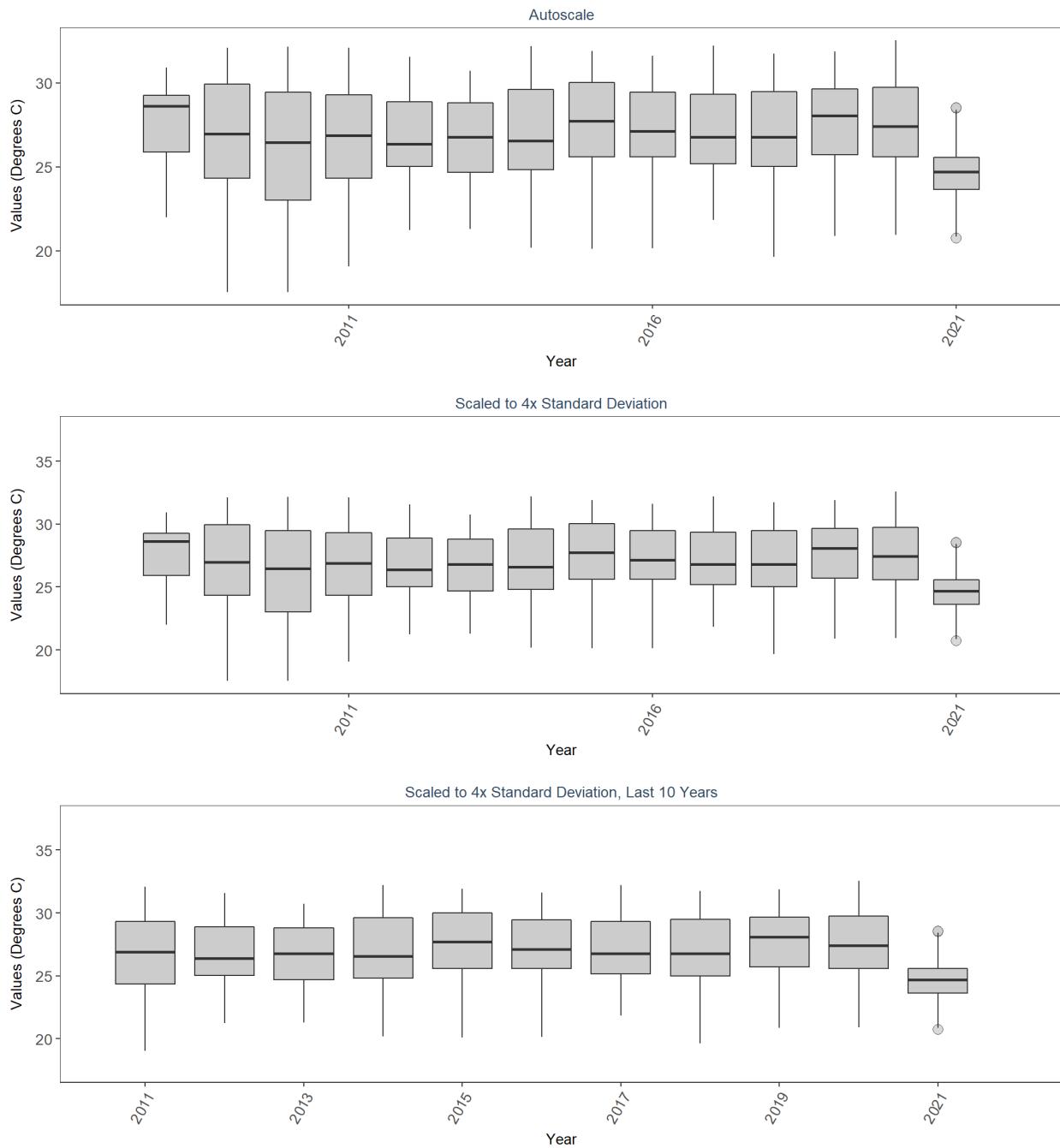
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**986**  
**Water Temperature on Coral Reefs in the Florida Keys**  
**56**  
**By Year & Month**



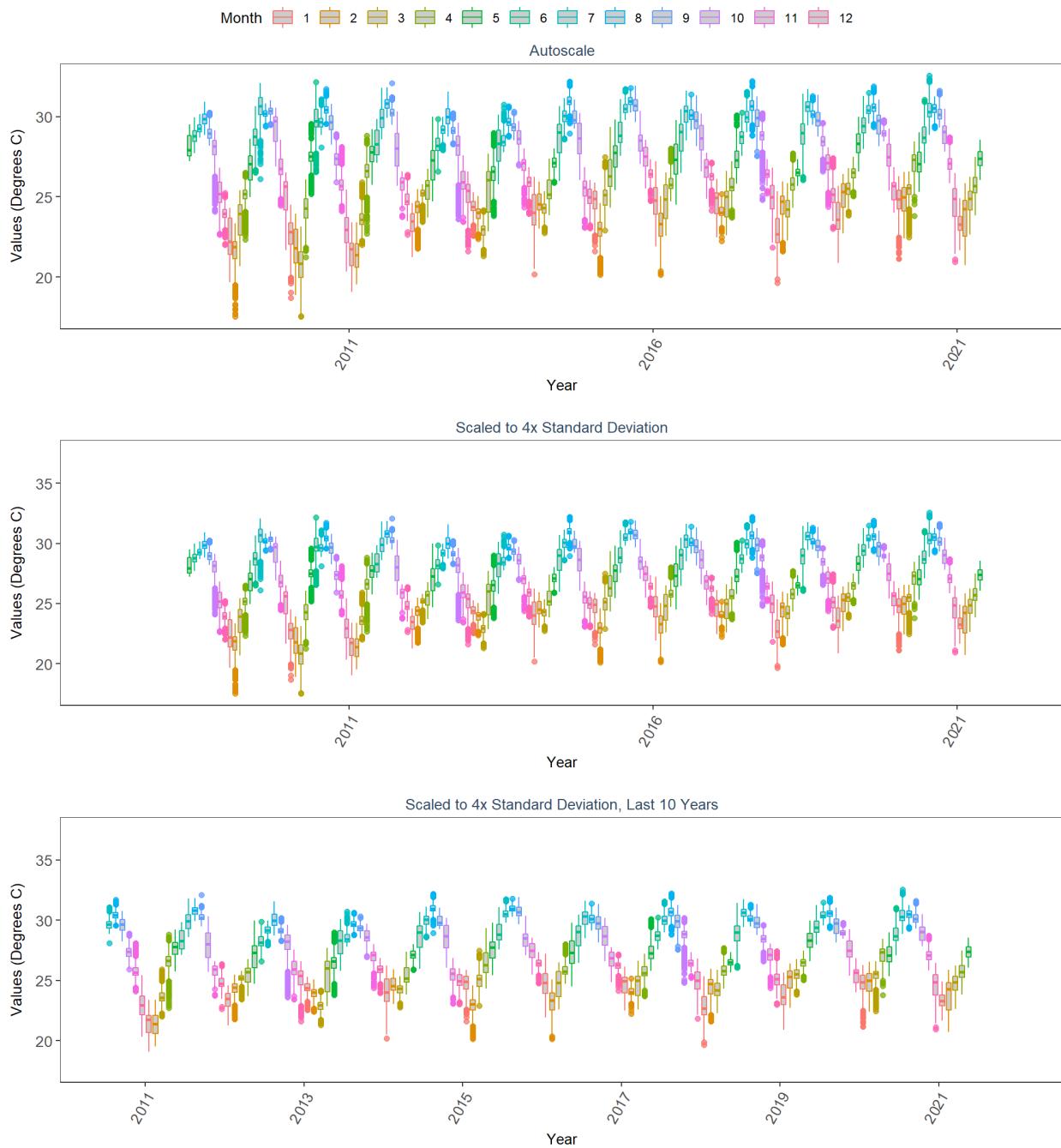
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



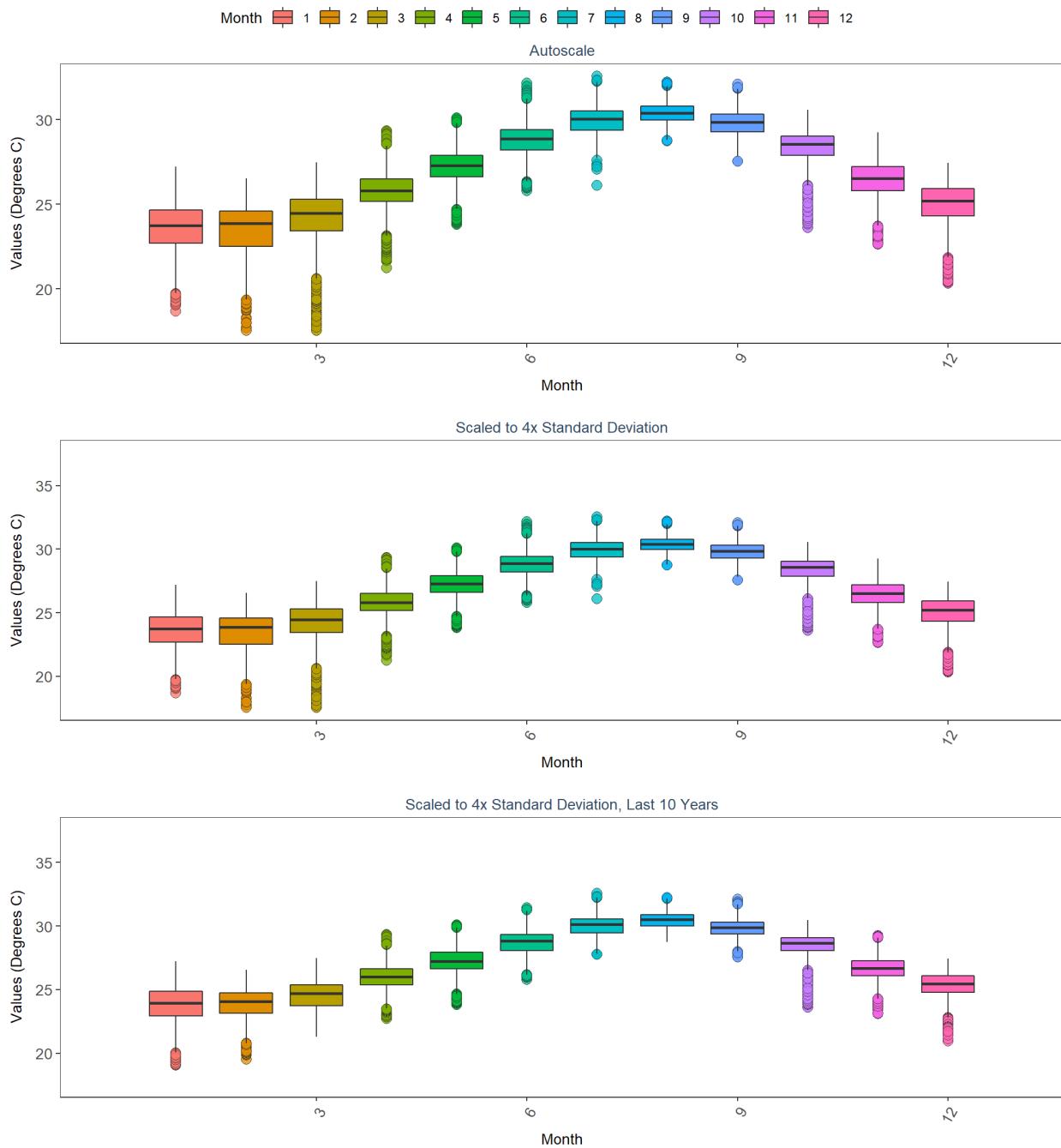
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year



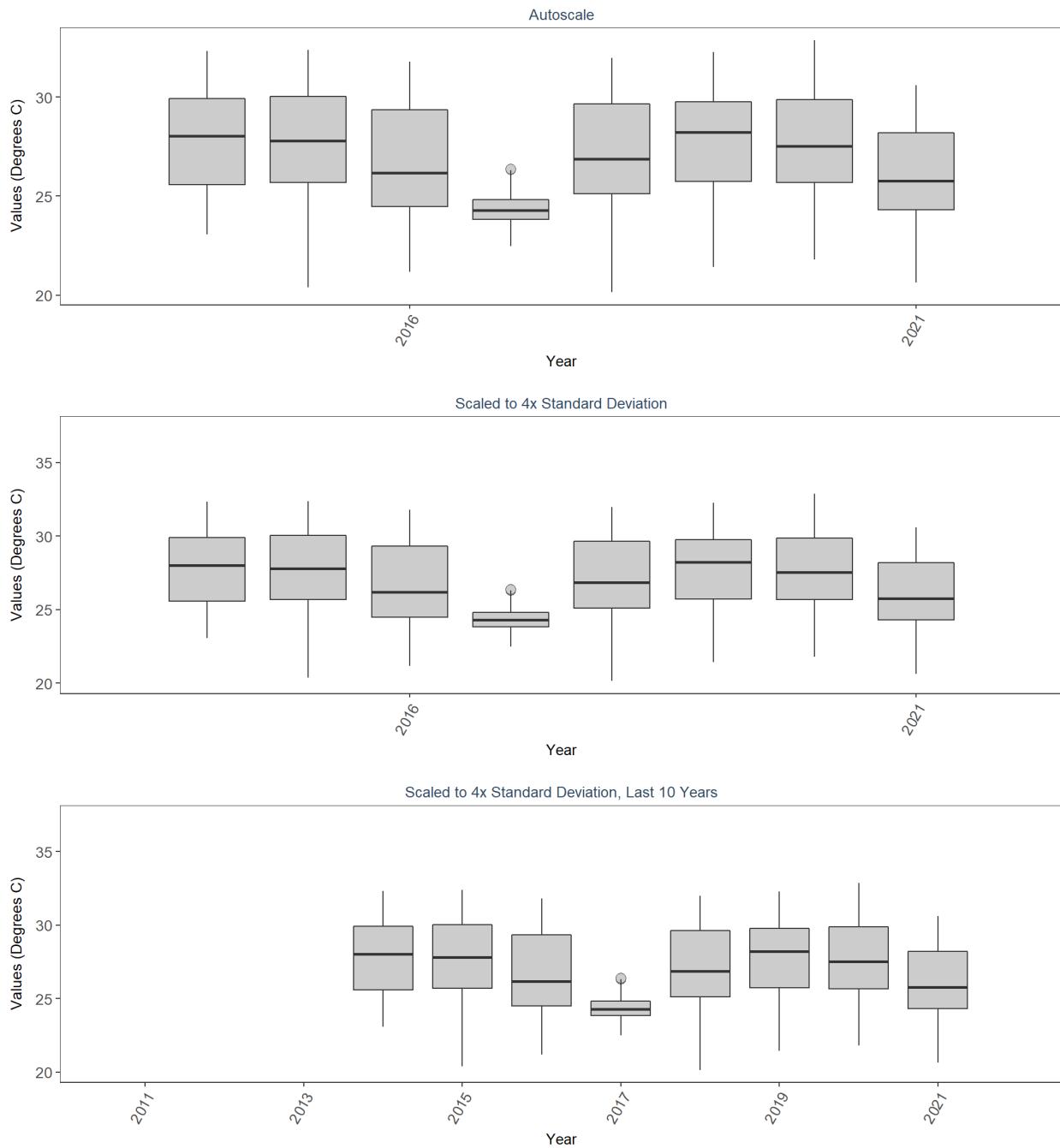
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



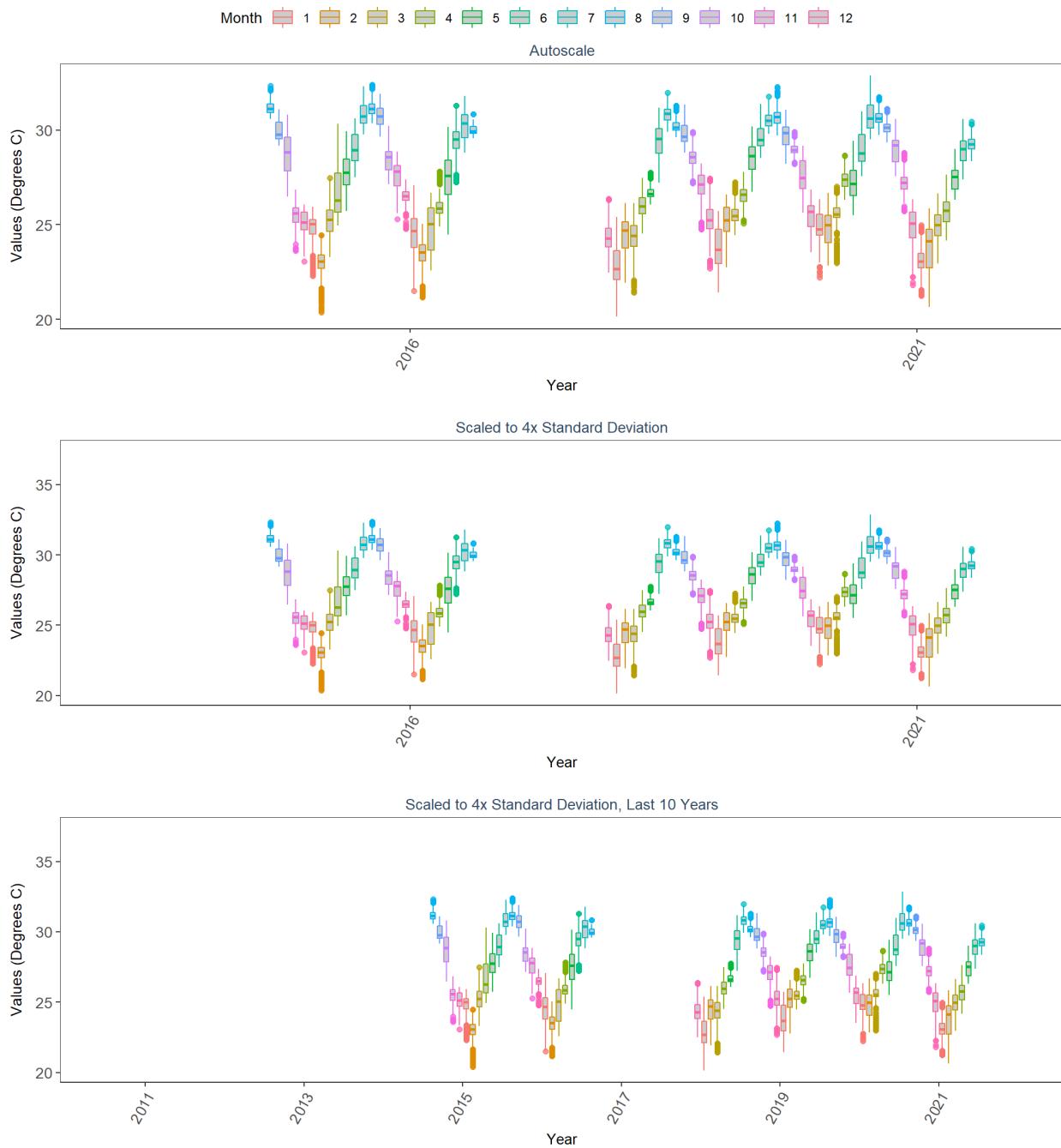
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



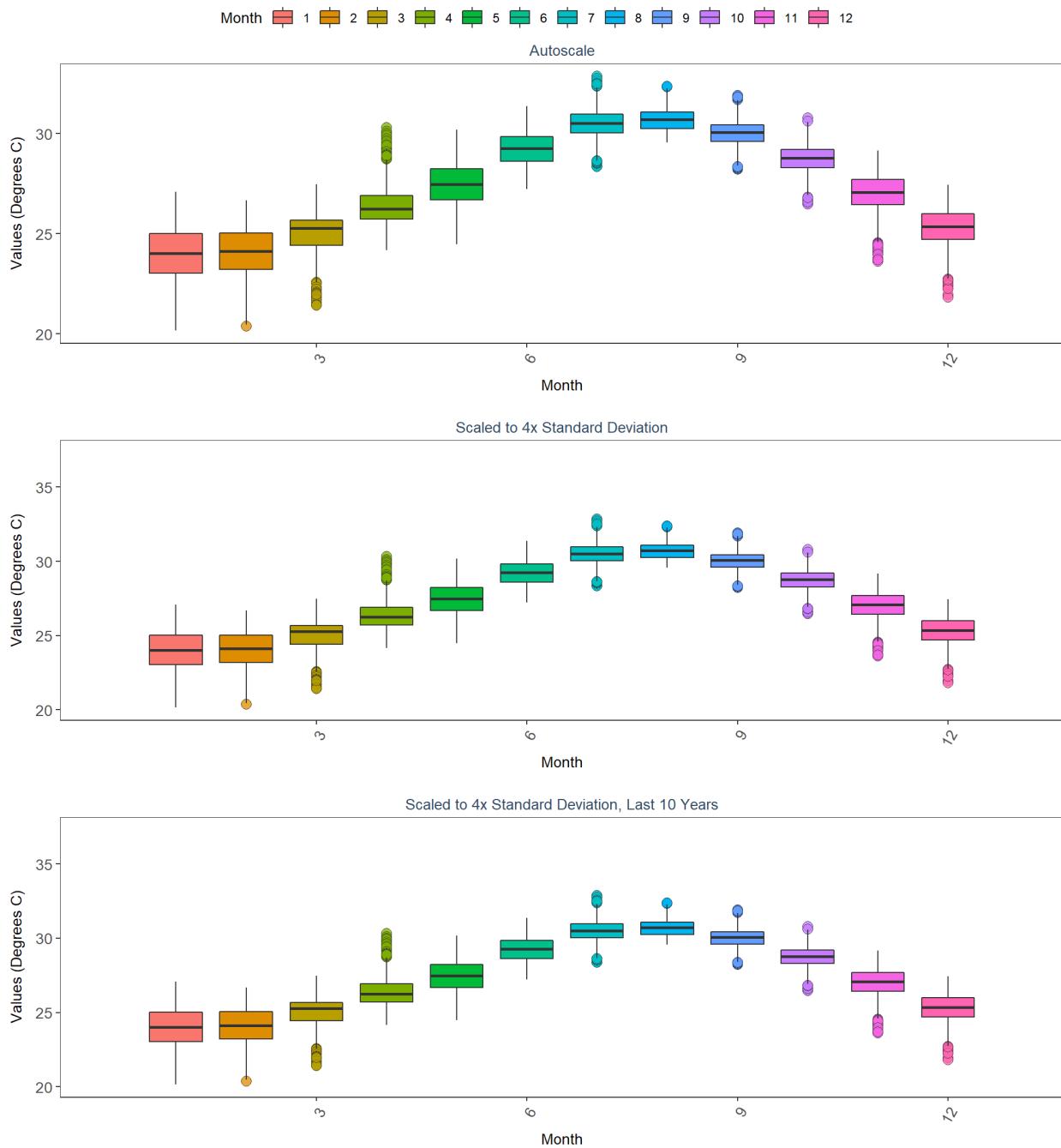
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year



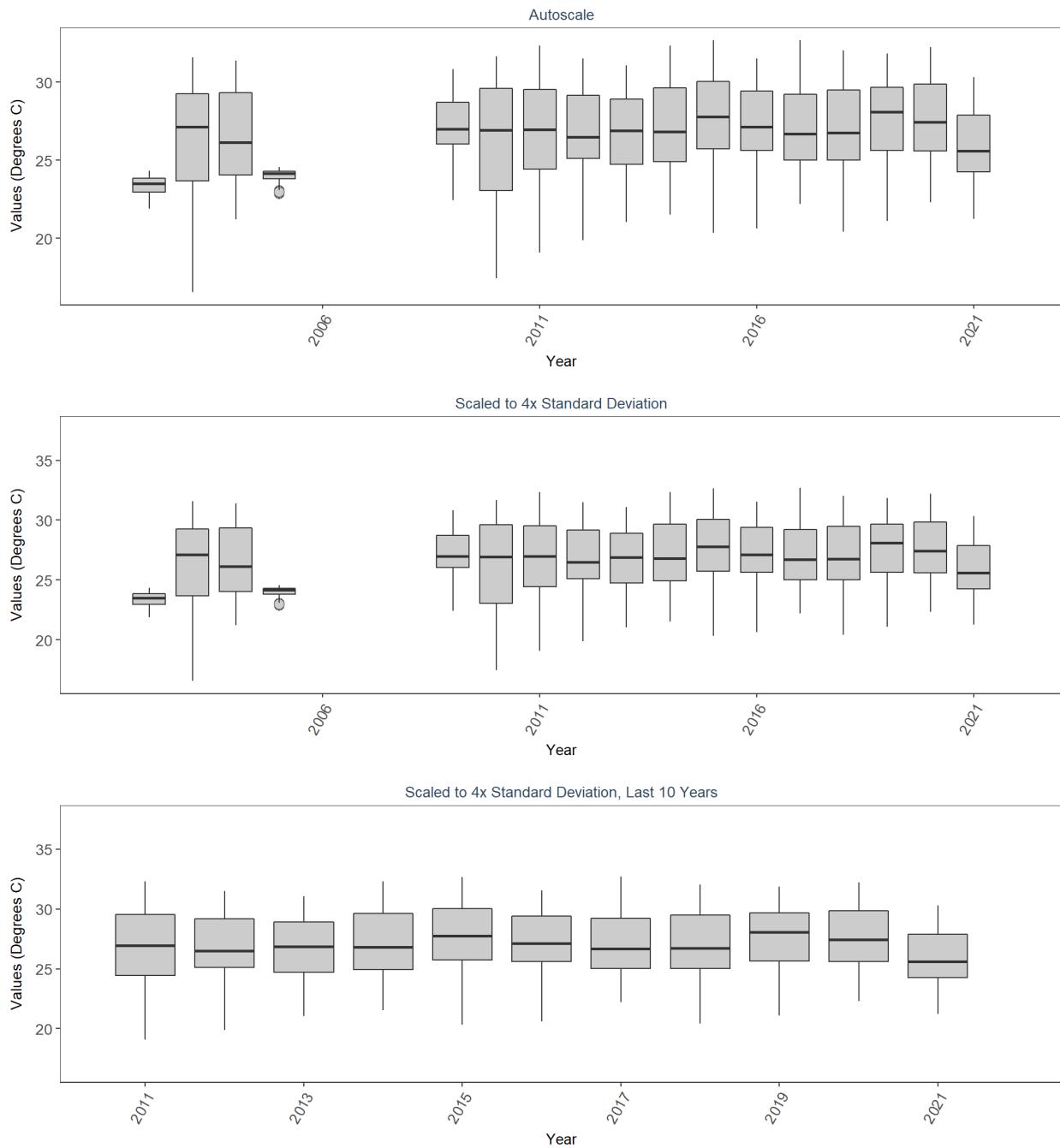
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



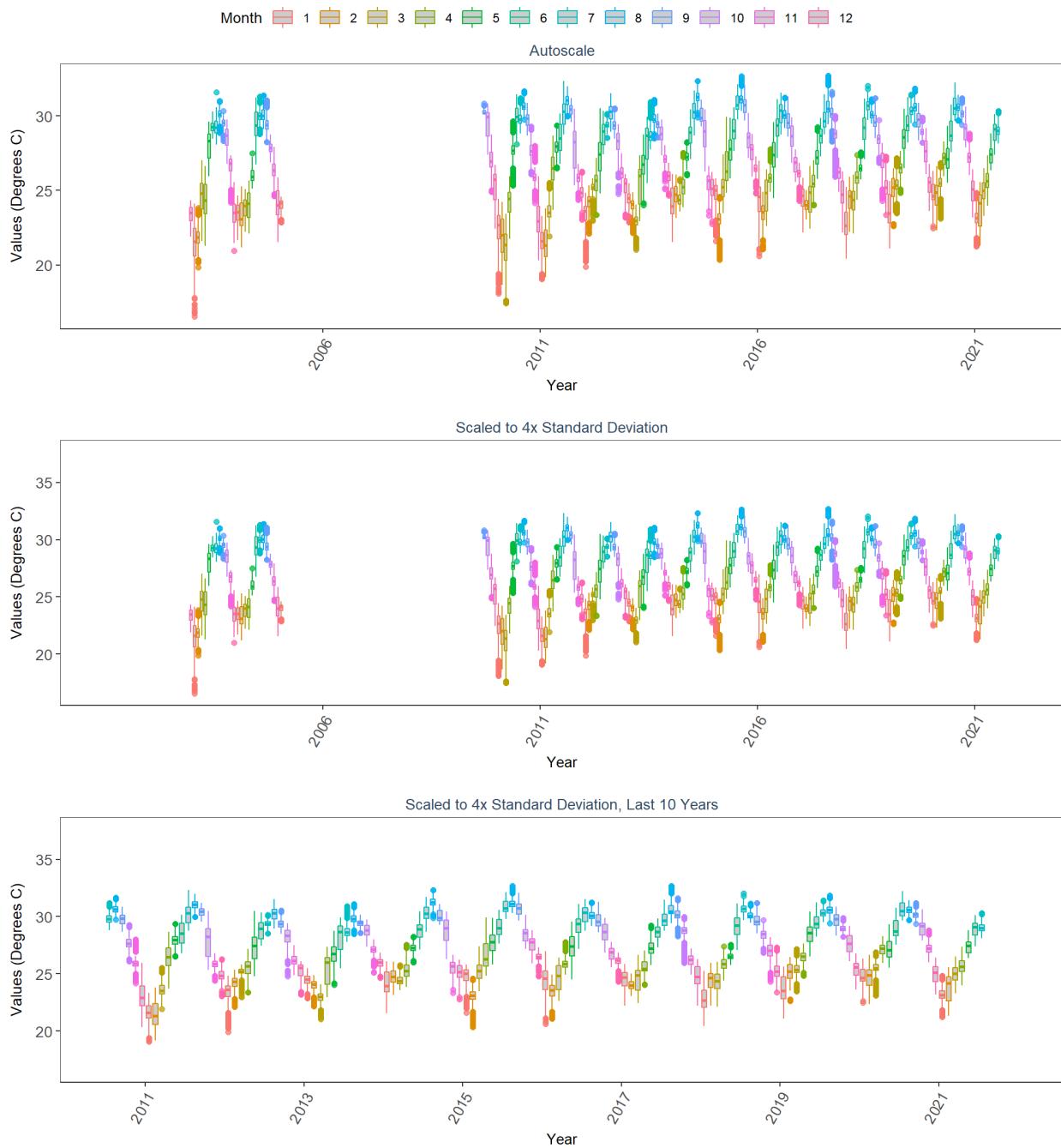
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



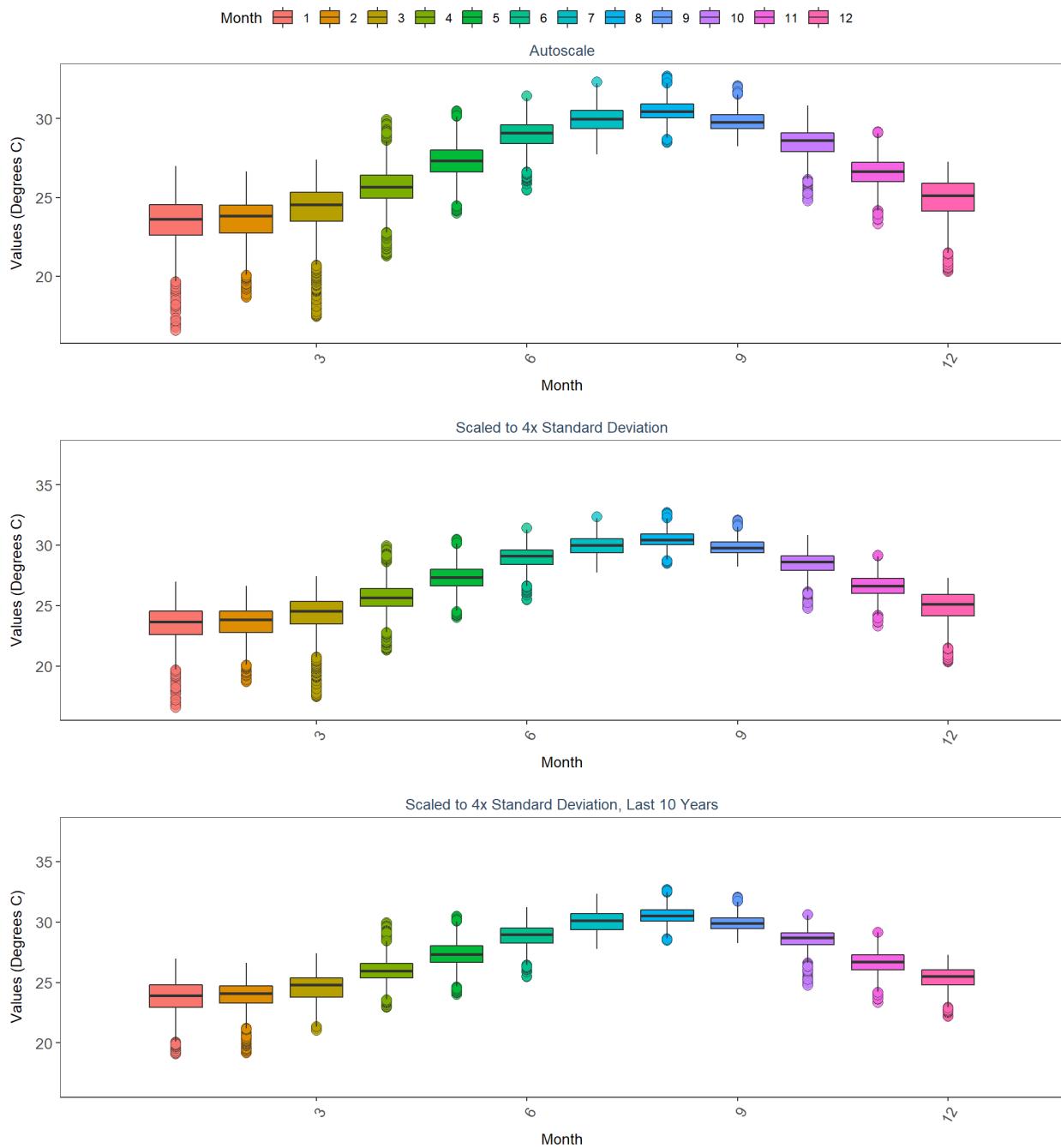
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Water Temperature on Coral Reefs in the Florida Keys  
59  
By Year



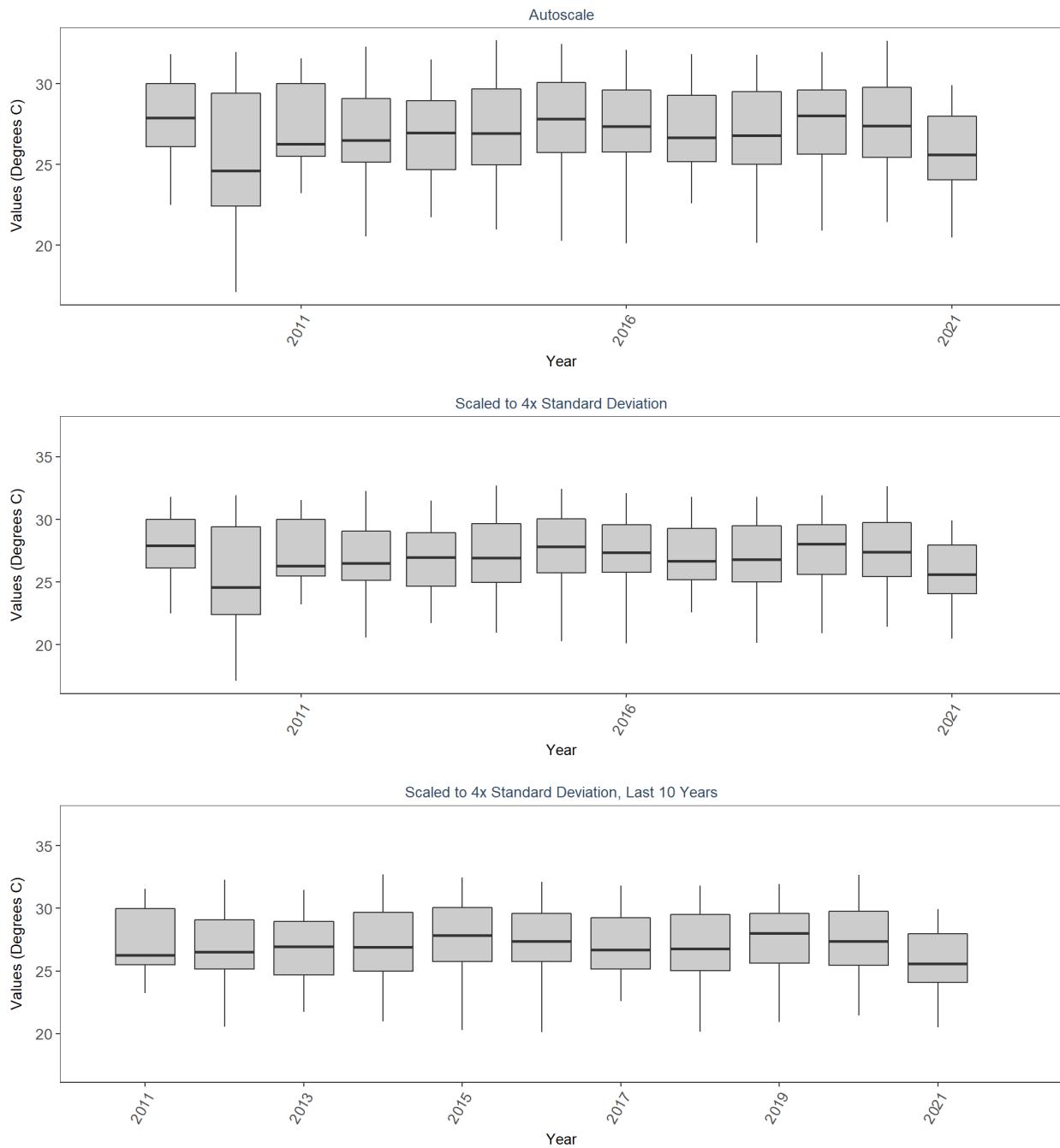
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**986**  
**Water Temperature on Coral Reefs in the Florida Keys**  
**59**  
**By Year & Month**



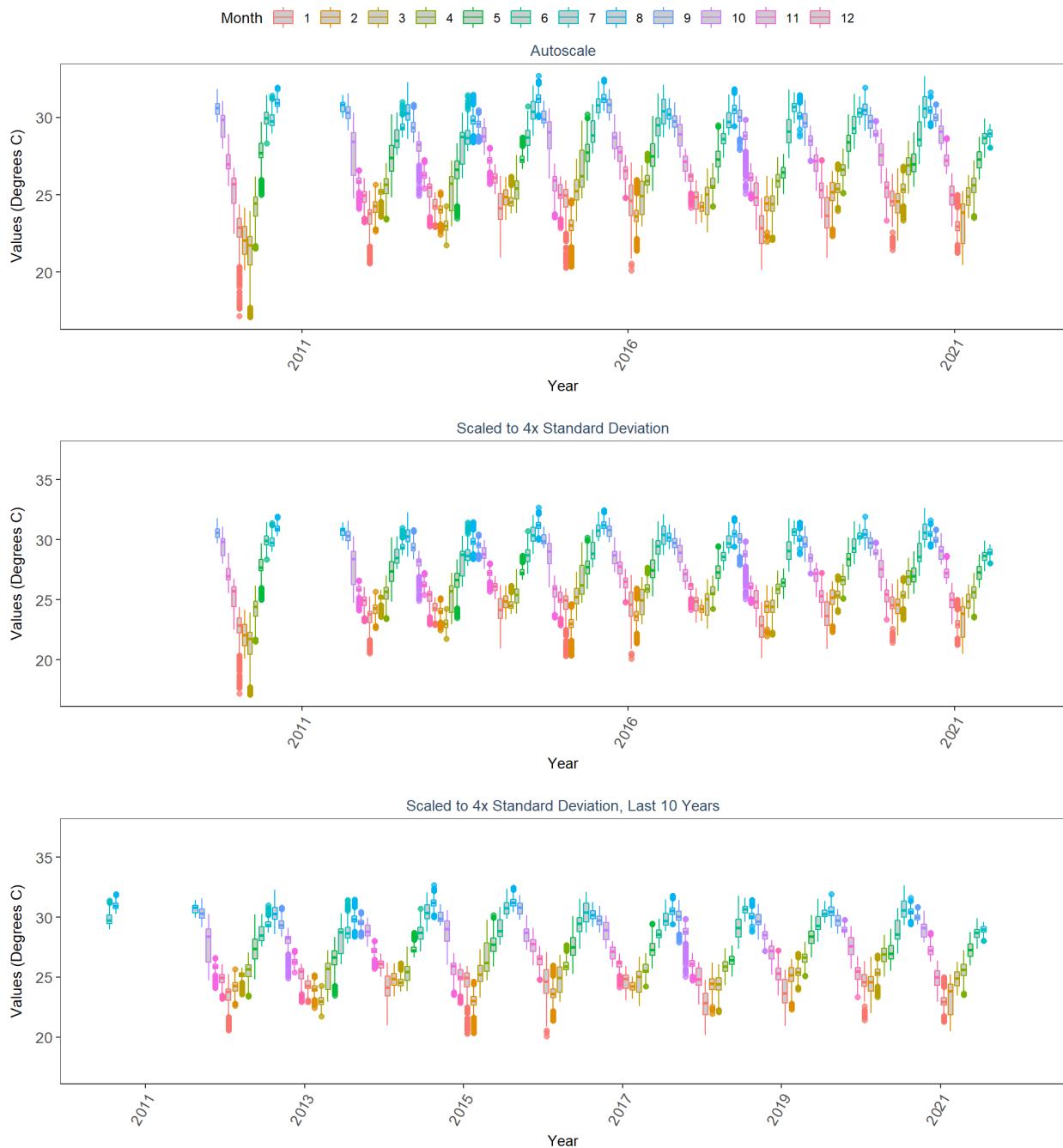
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 Water Temperature on Coral Reefs in the Florida Keys  
 59  
 By Month



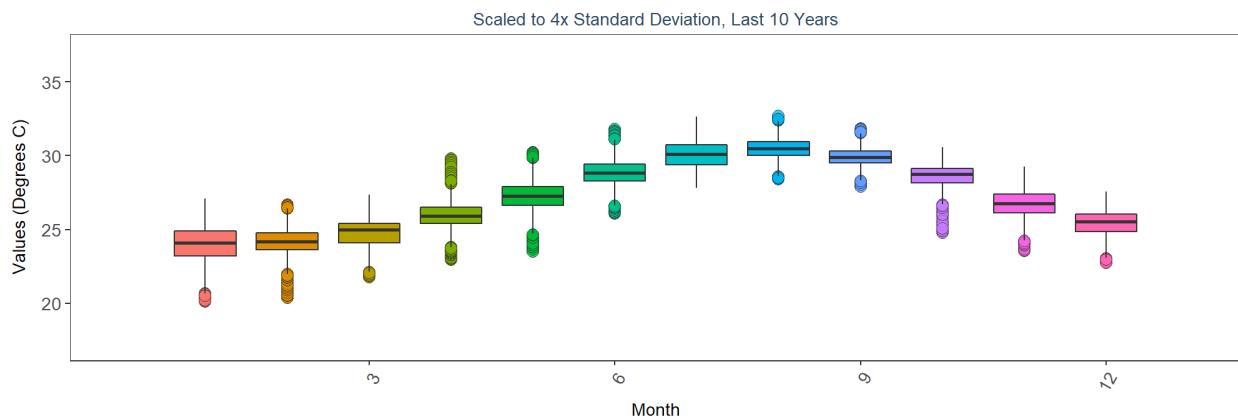
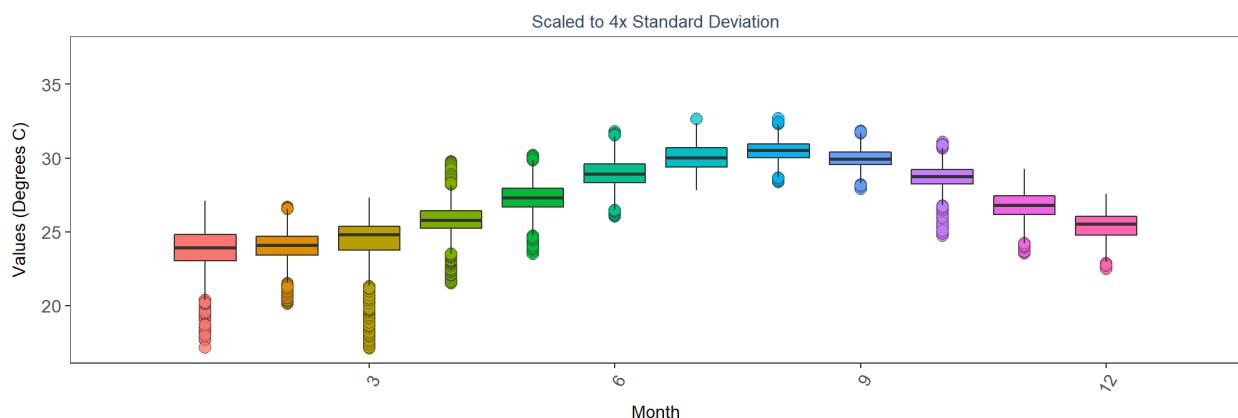
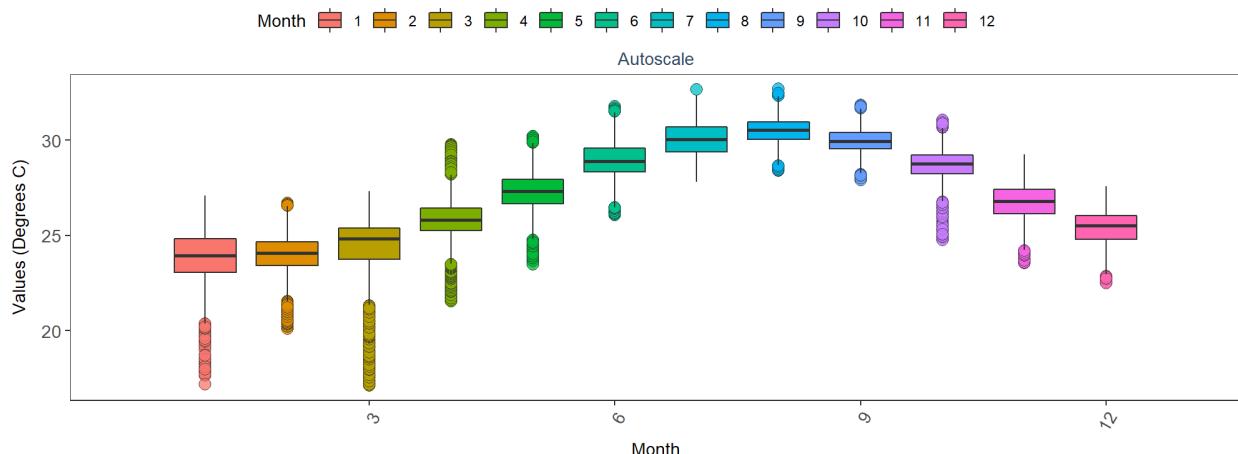
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Water Temperature on Coral Reefs in the Florida Keys  
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By Year



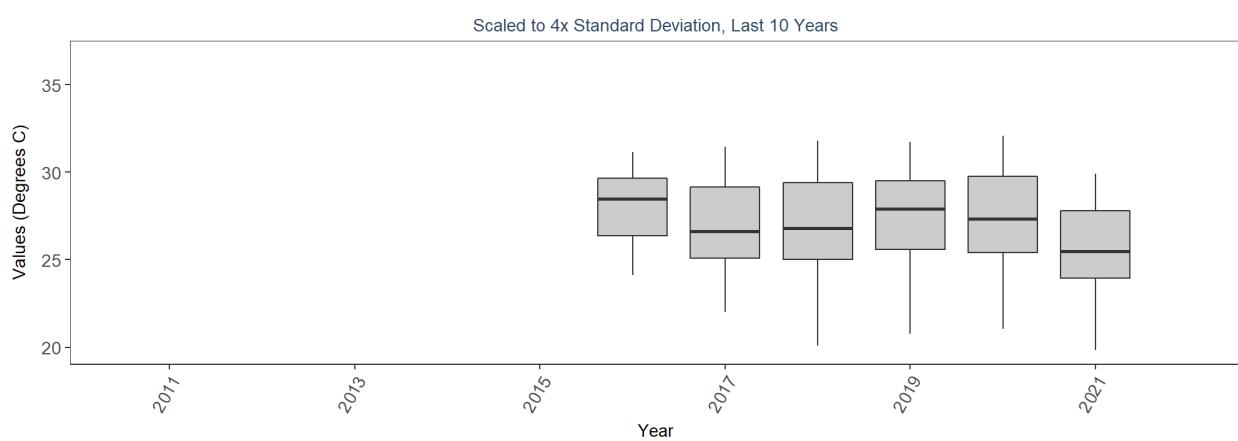
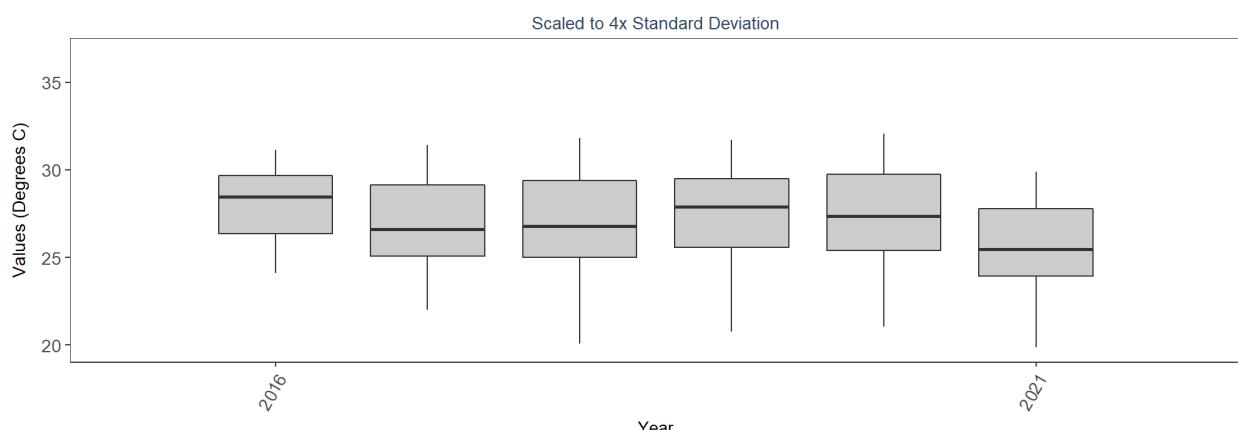
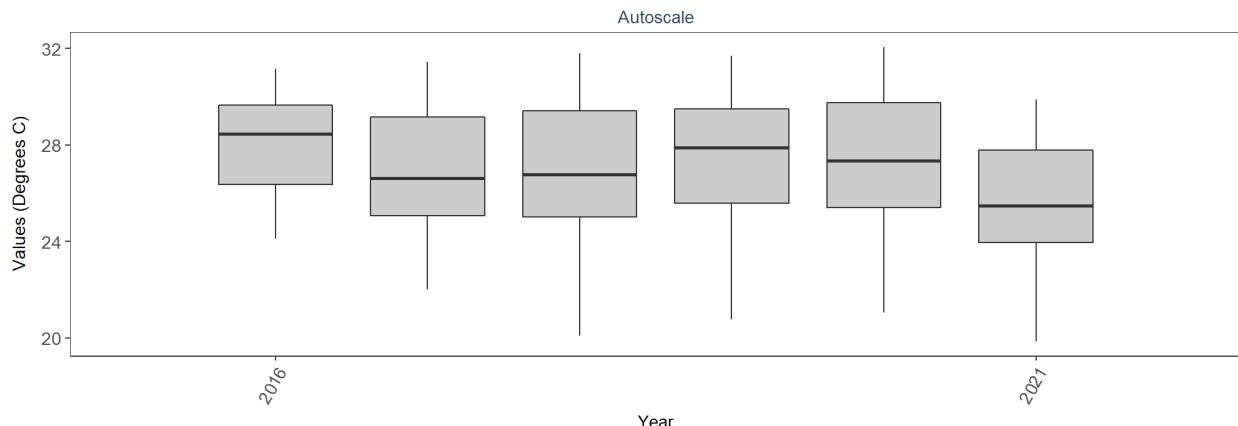
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**Water Temperature on Coral Reefs in the Florida Keys**  
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**By Year & Month**



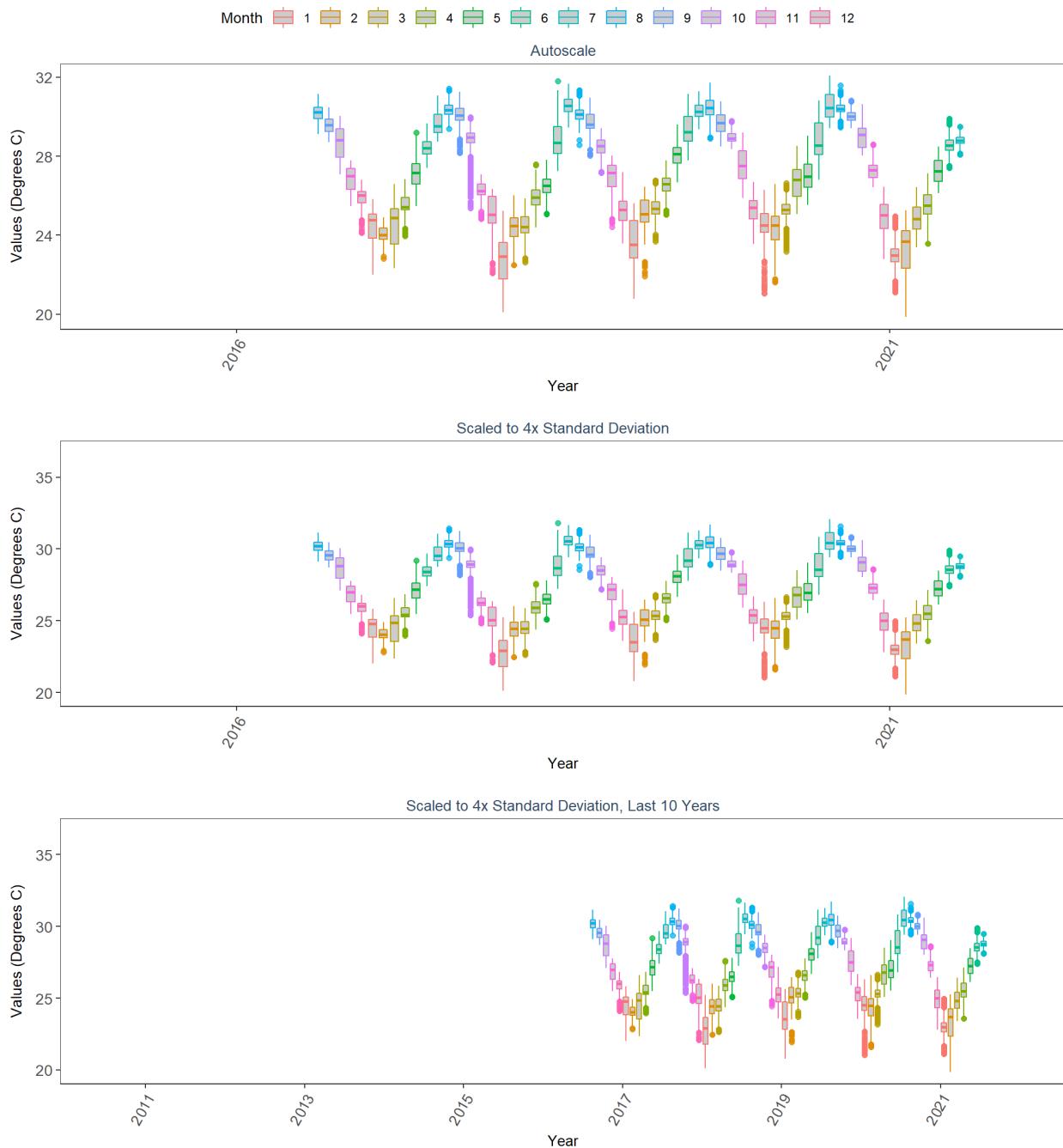
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 Water Temperature on Coral Reefs in the Florida Keys  
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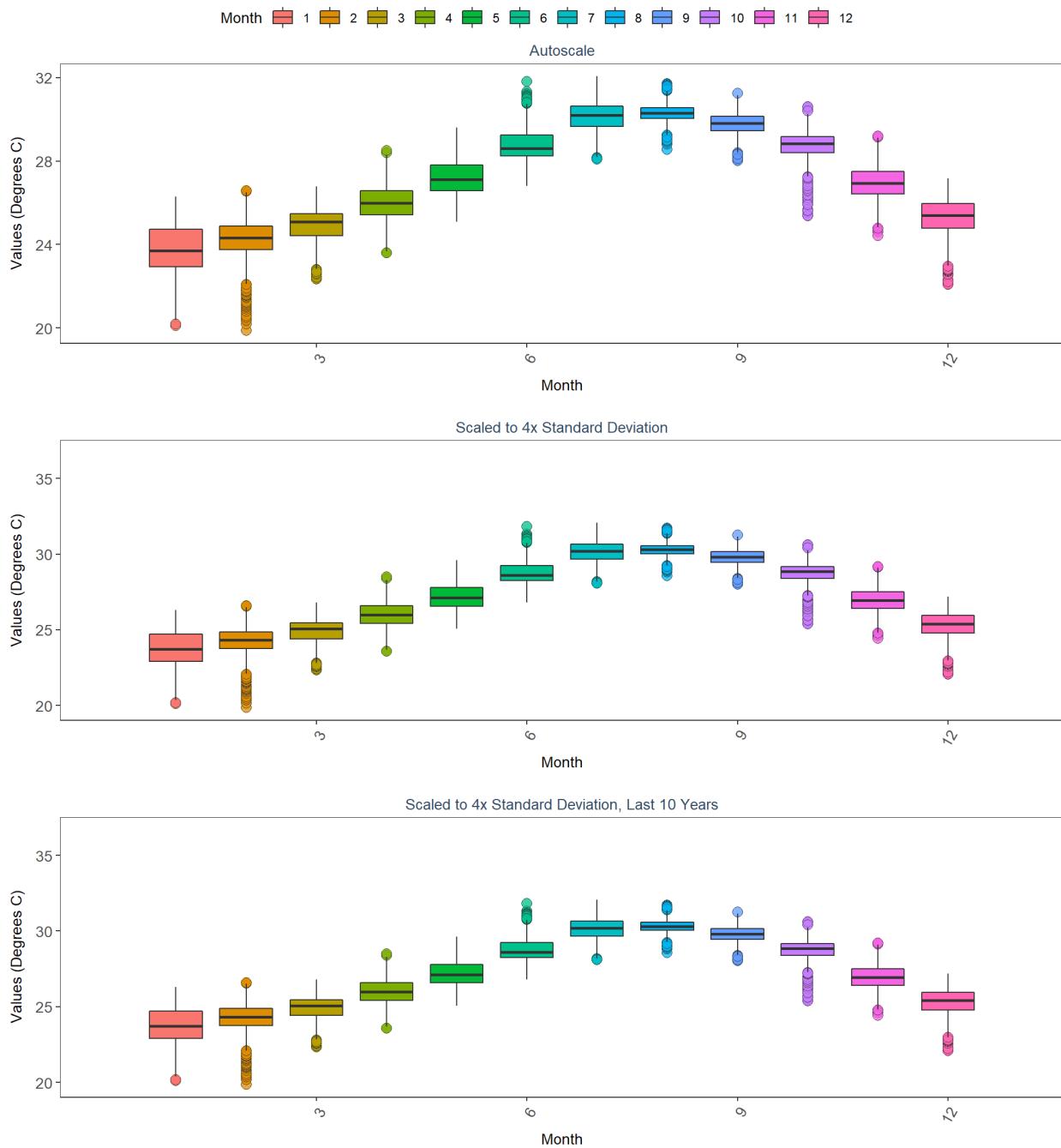
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By Year



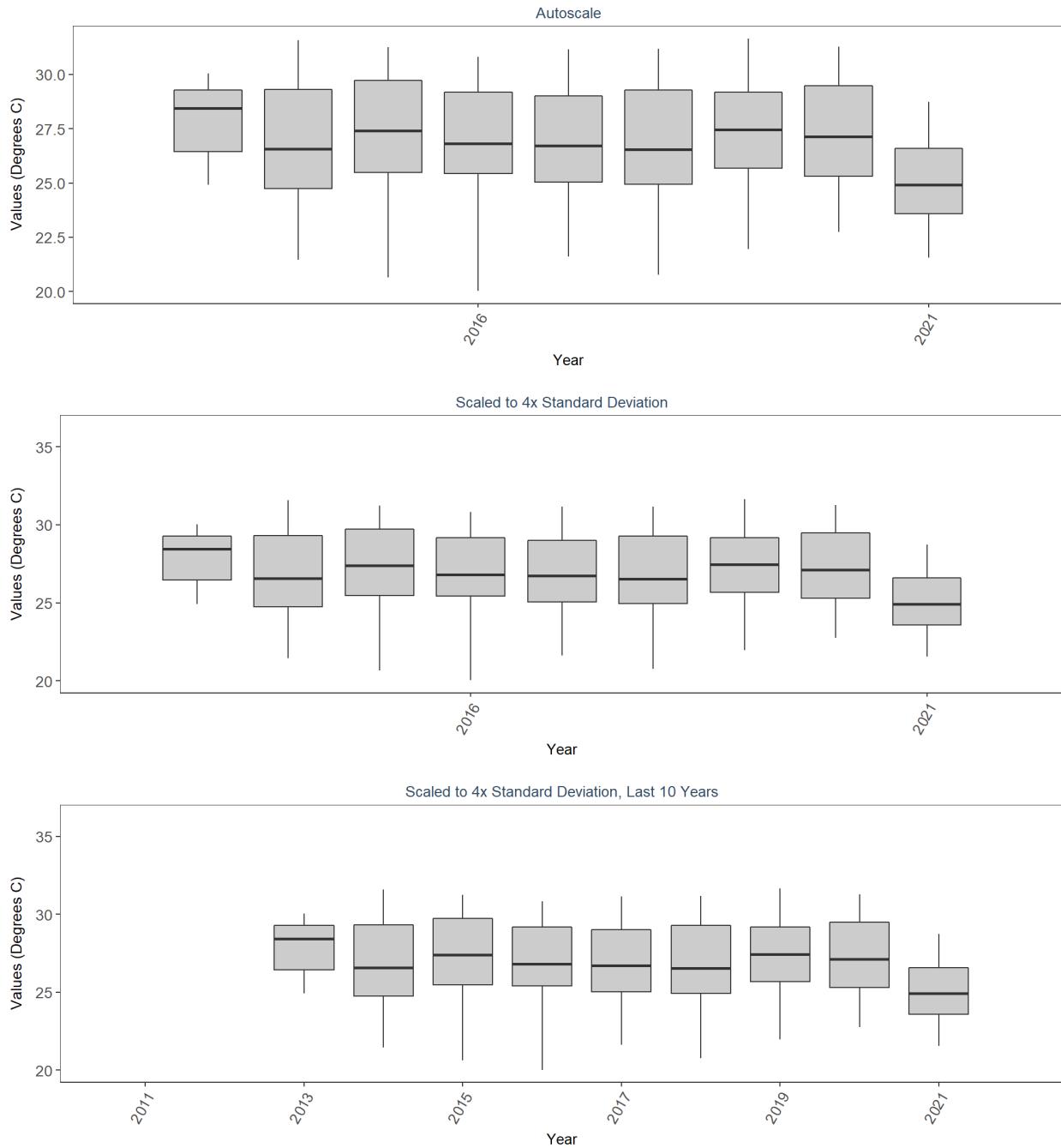
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 By Year & Month



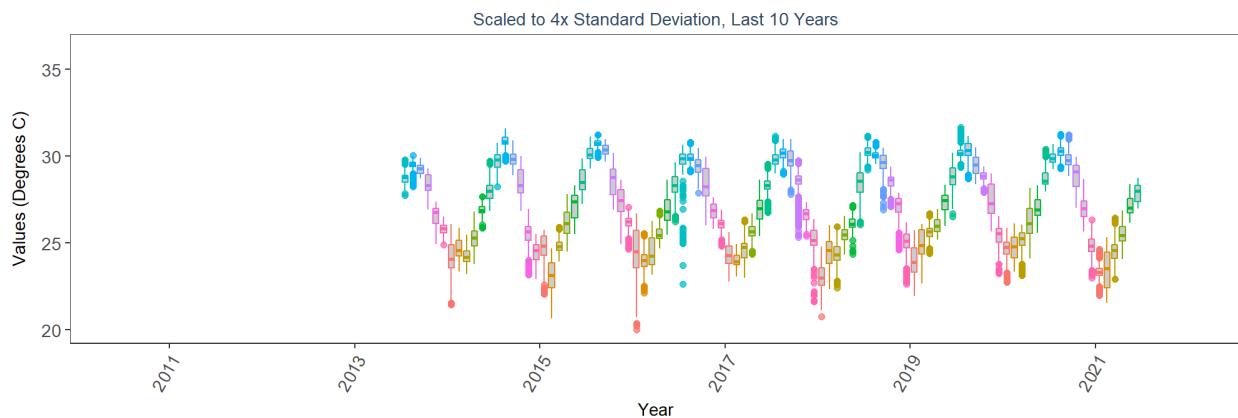
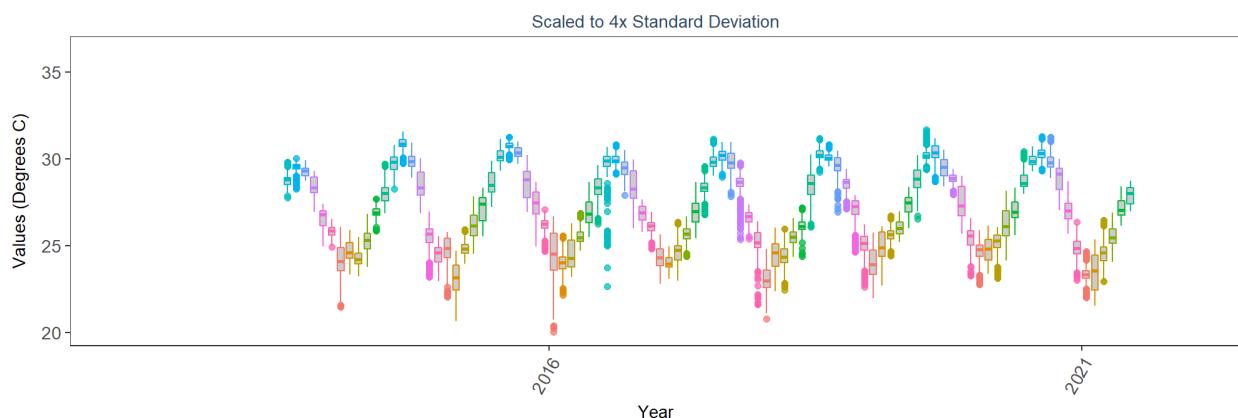
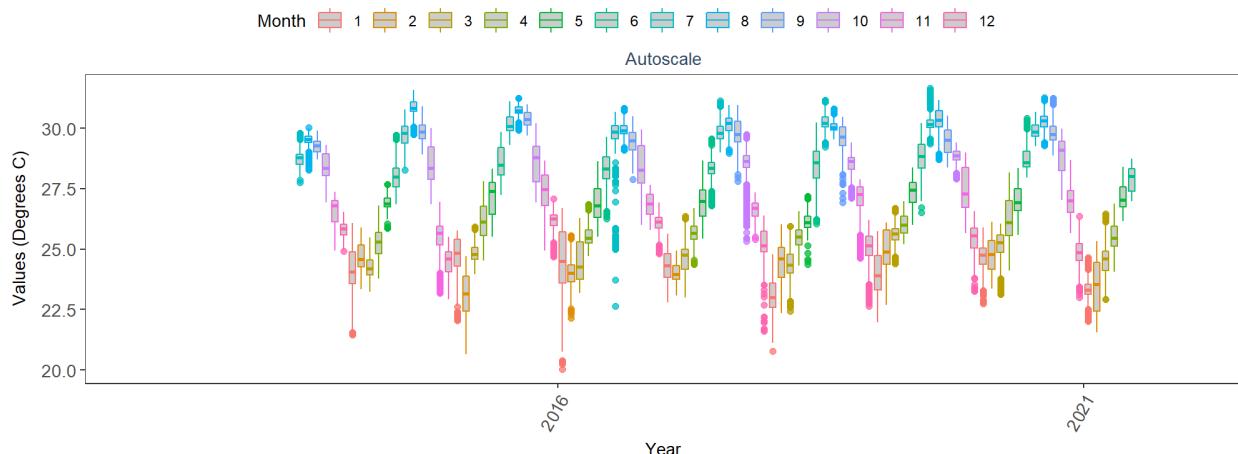
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 By Month



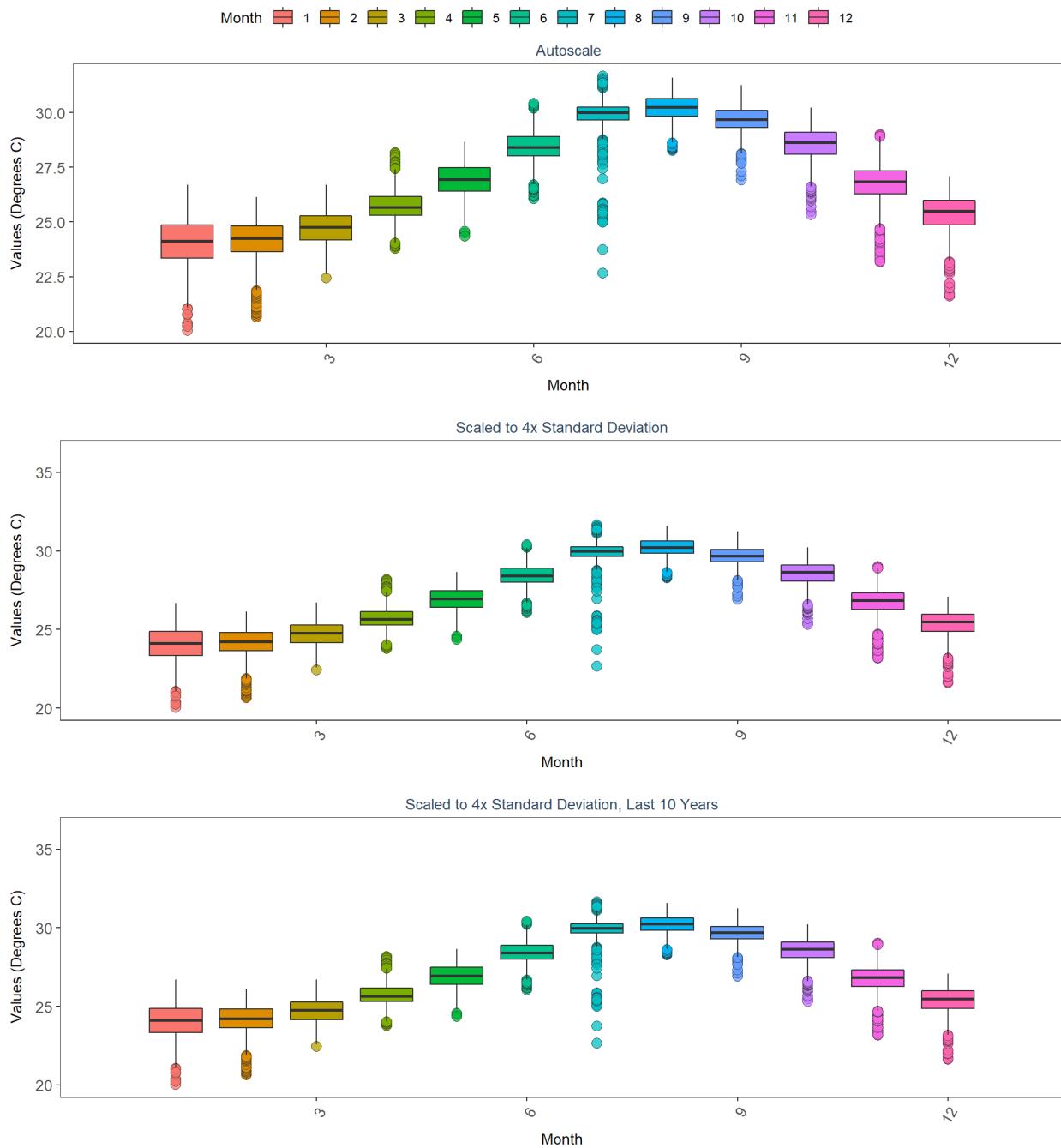
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Water Temperature on Coral Reefs in the Florida Keys  
70  
By Year



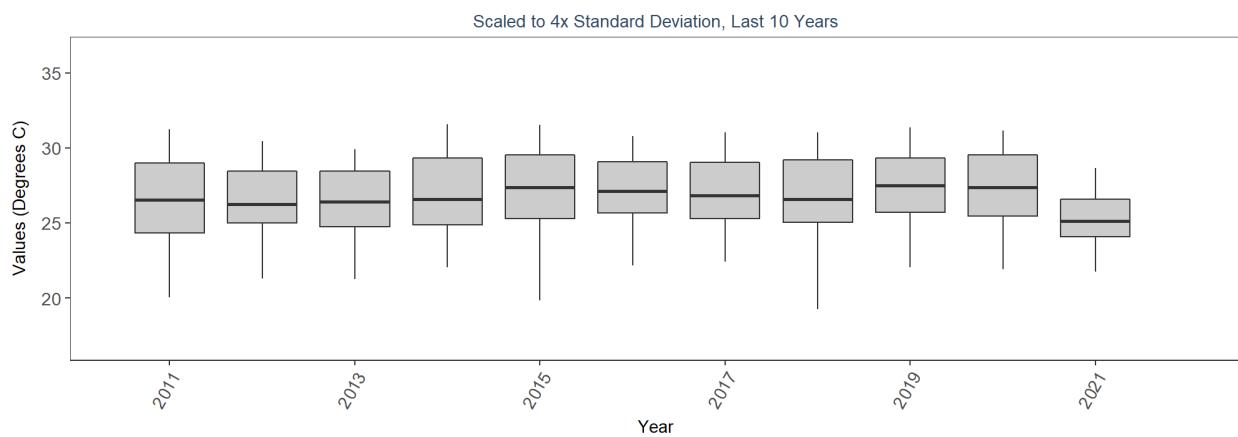
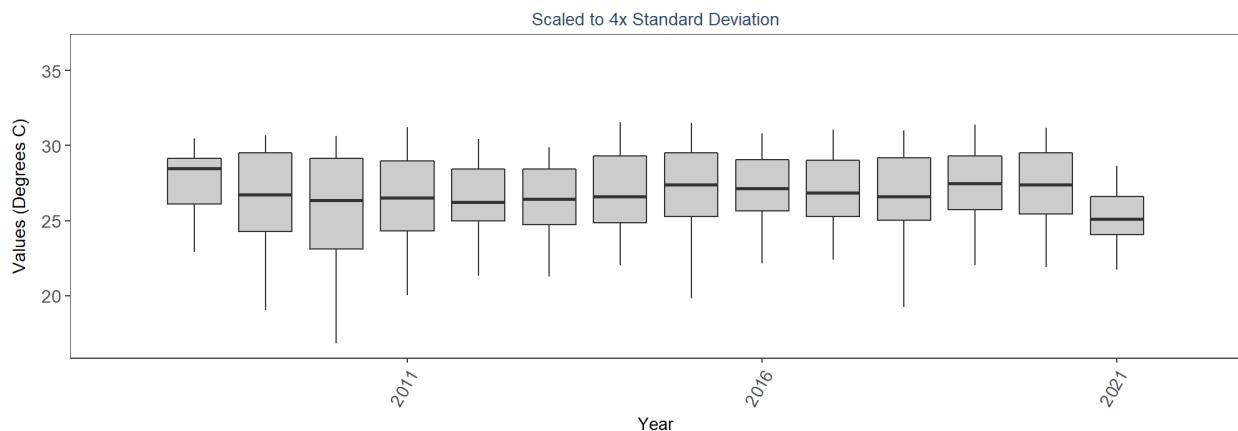
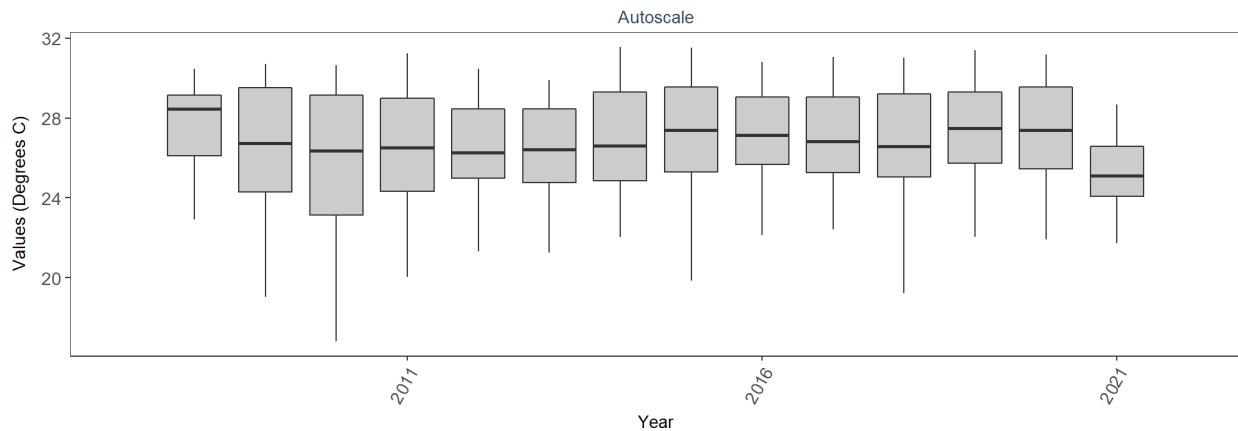
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



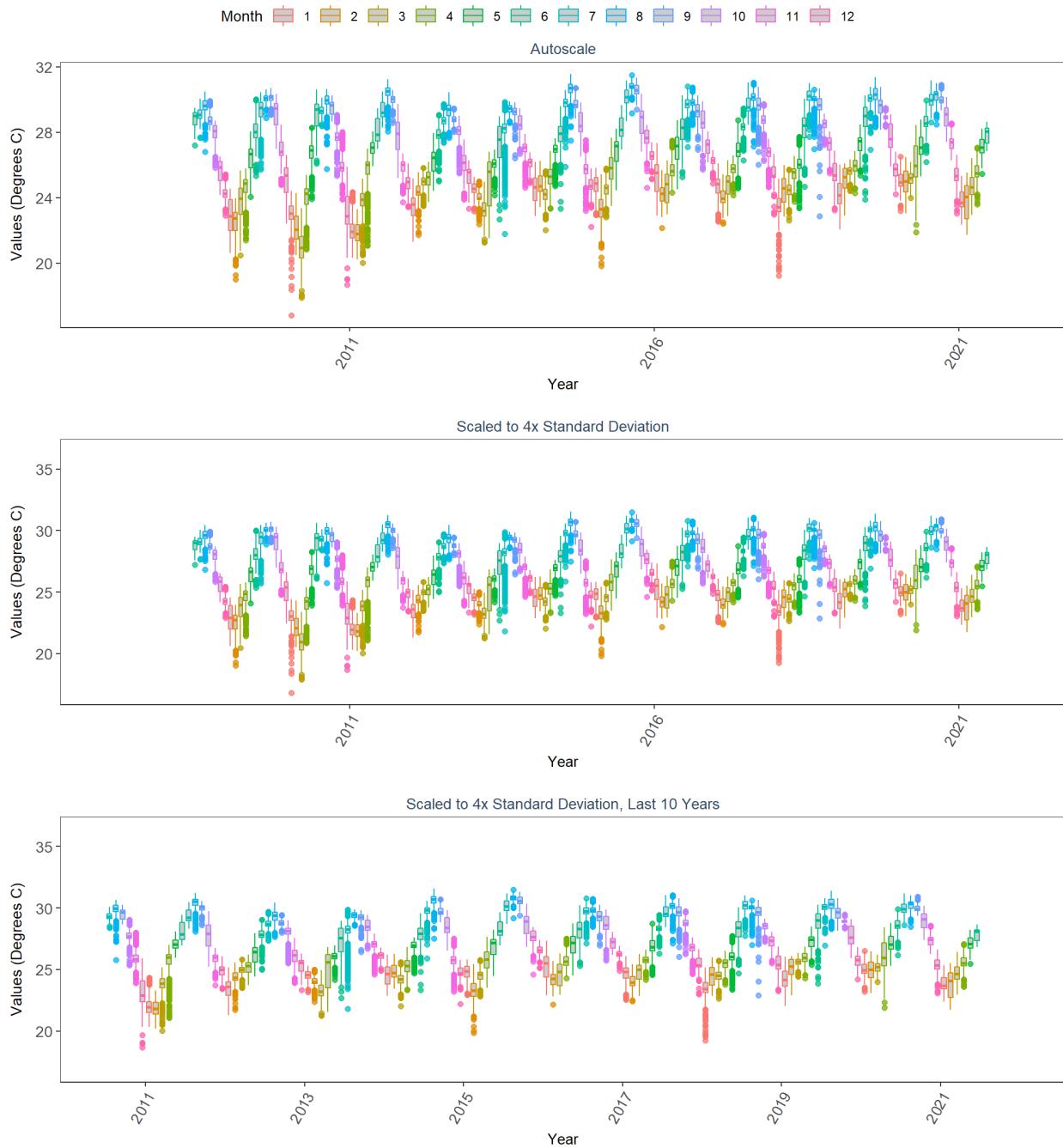
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



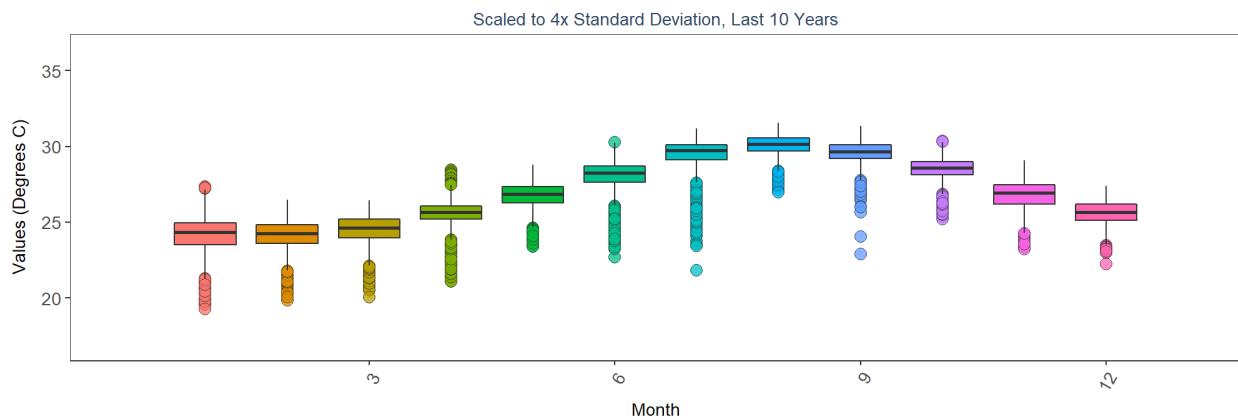
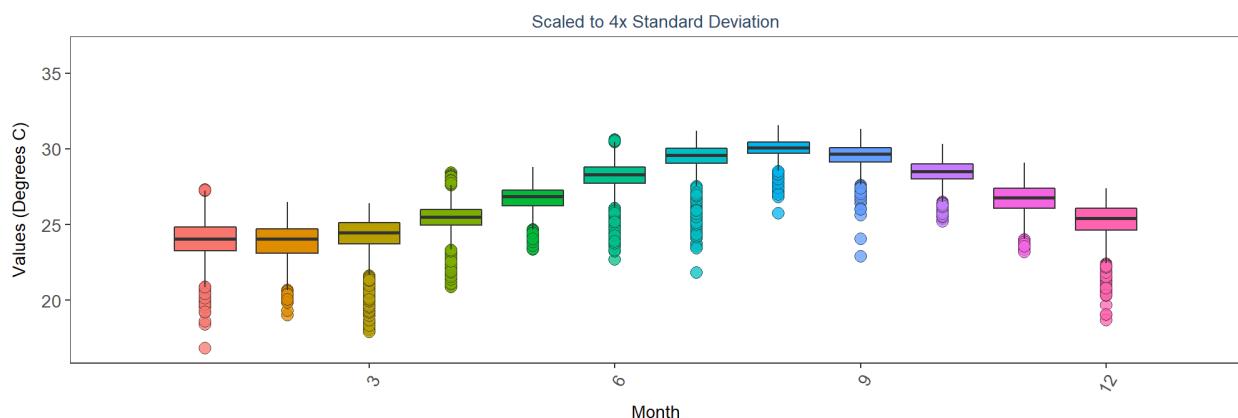
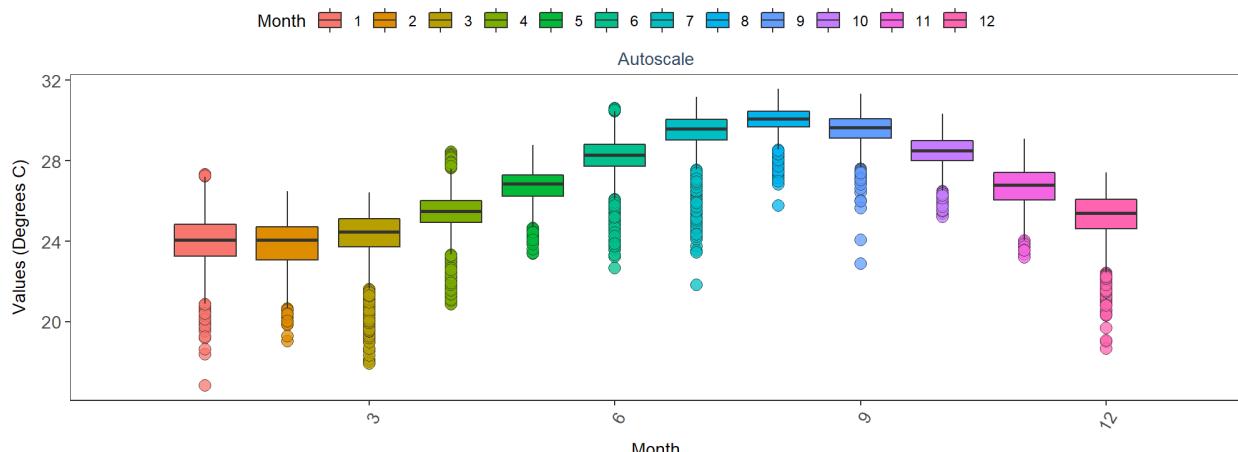
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By Year



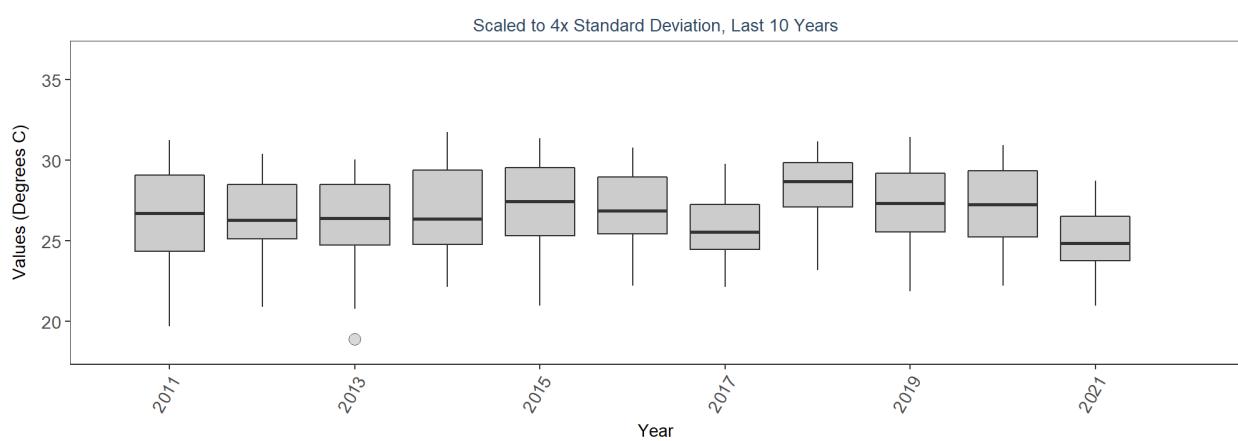
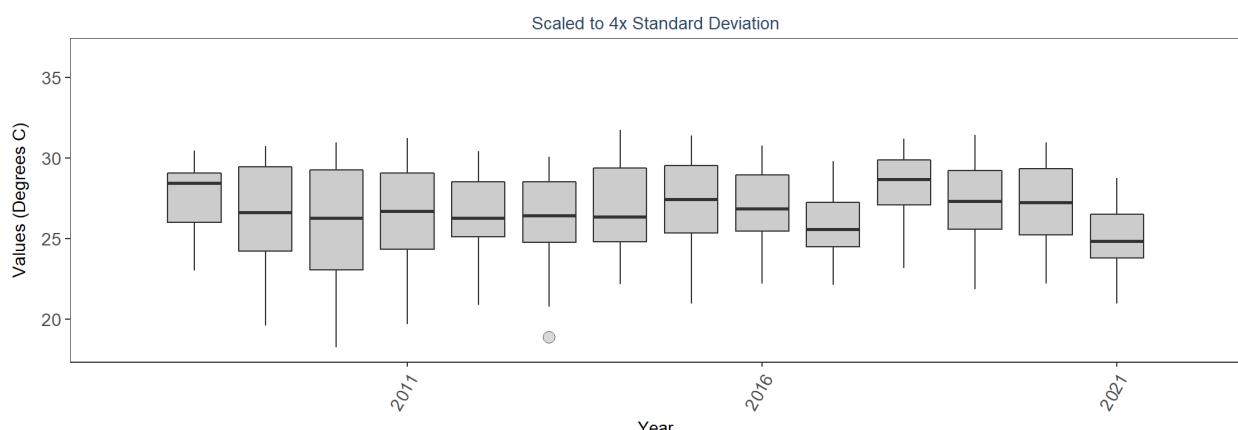
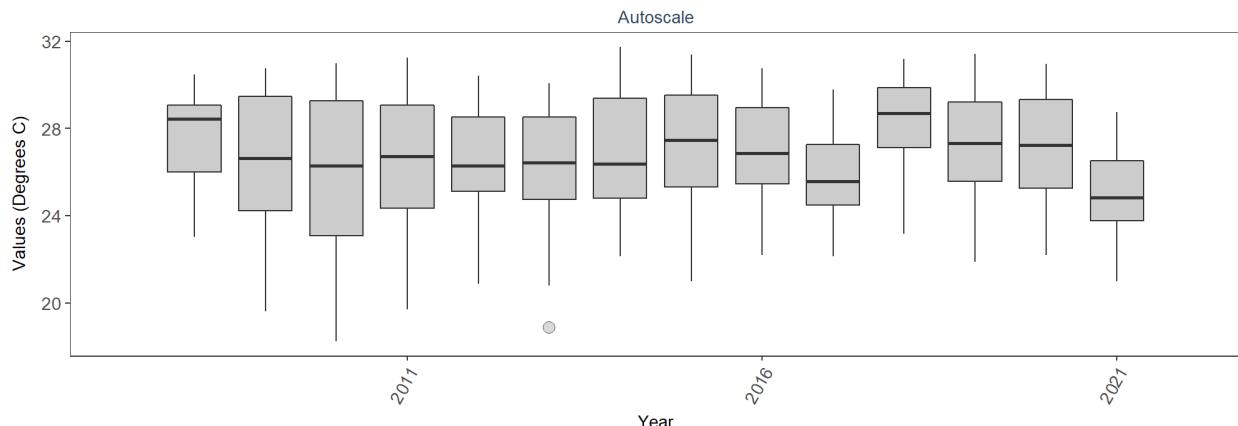
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Year & Month



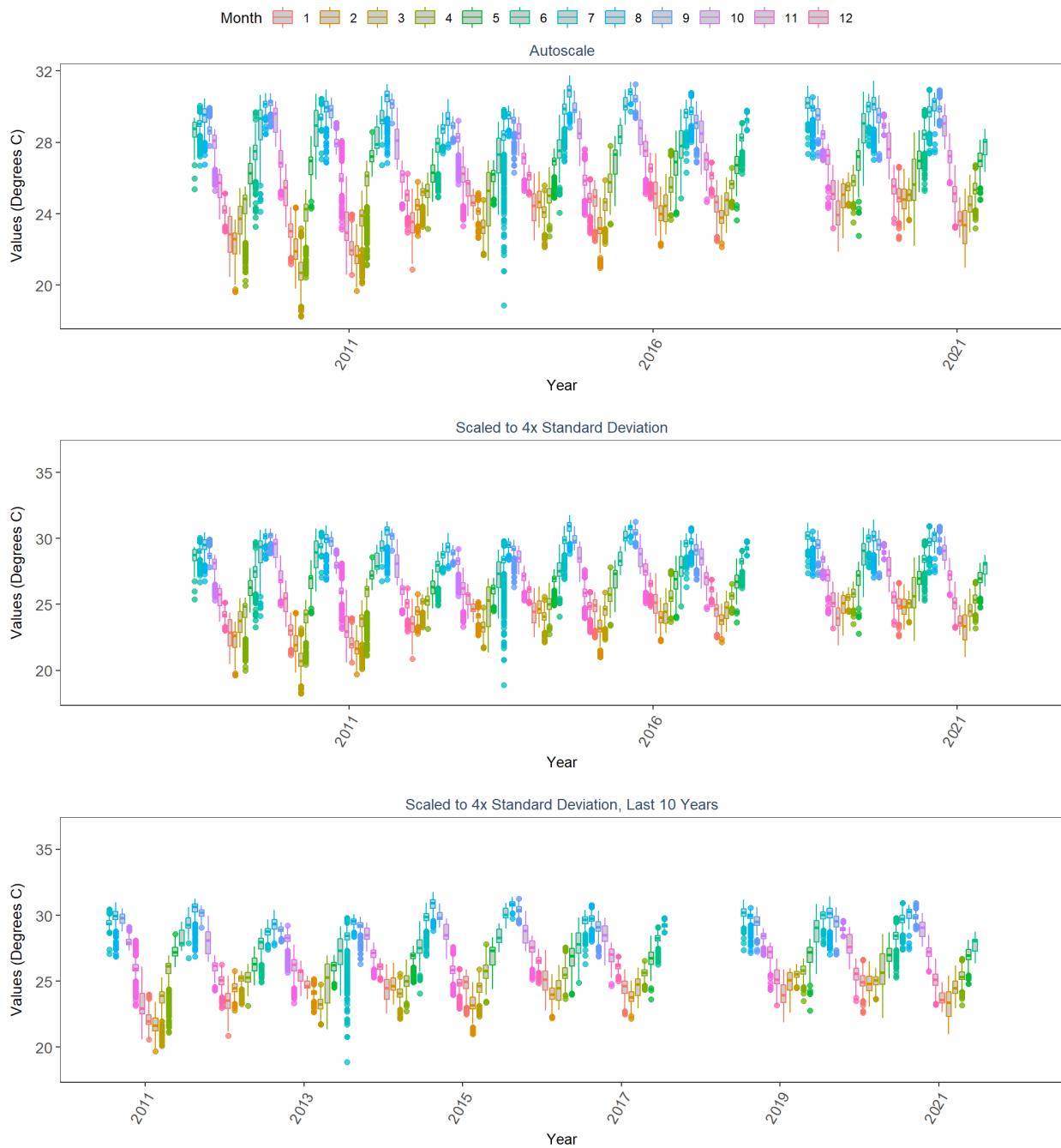
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 By Month



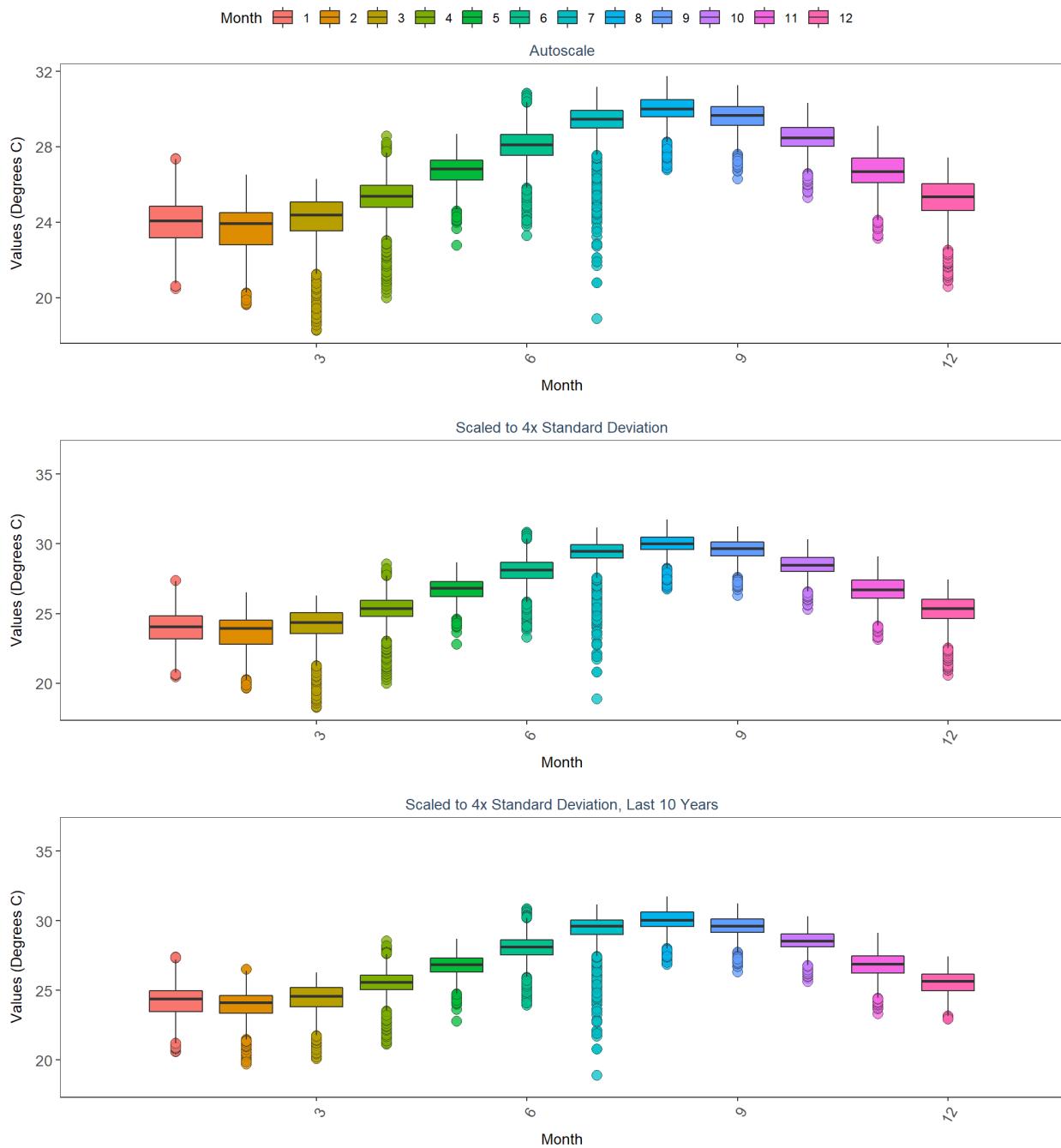
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 By Year



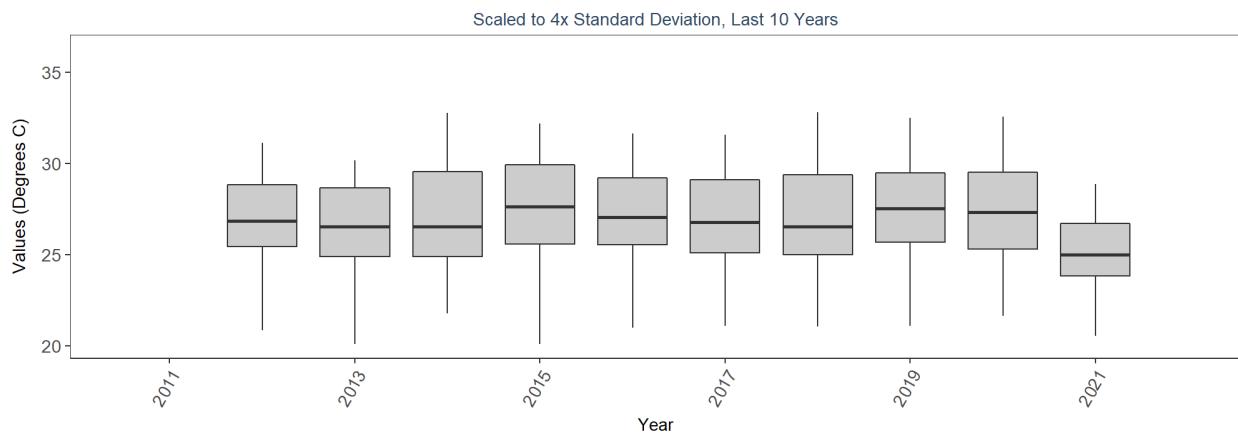
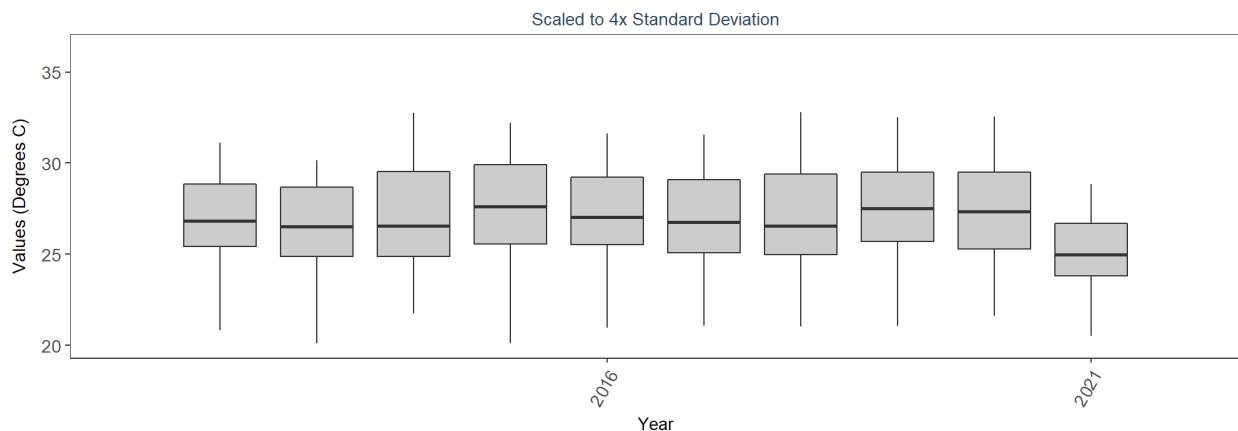
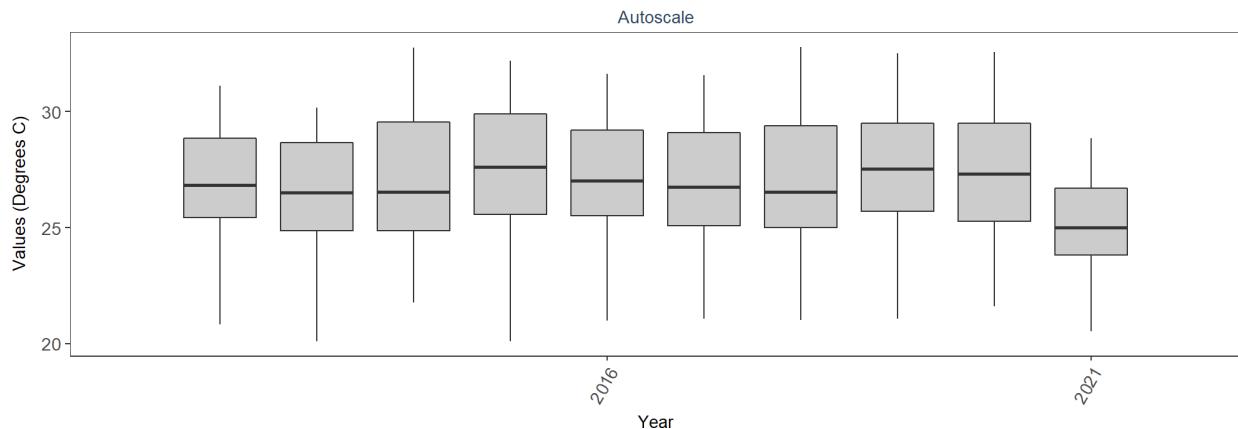
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**Water Temperature on Coral Reefs in the Florida Keys**  
 73  
 By Year & Month



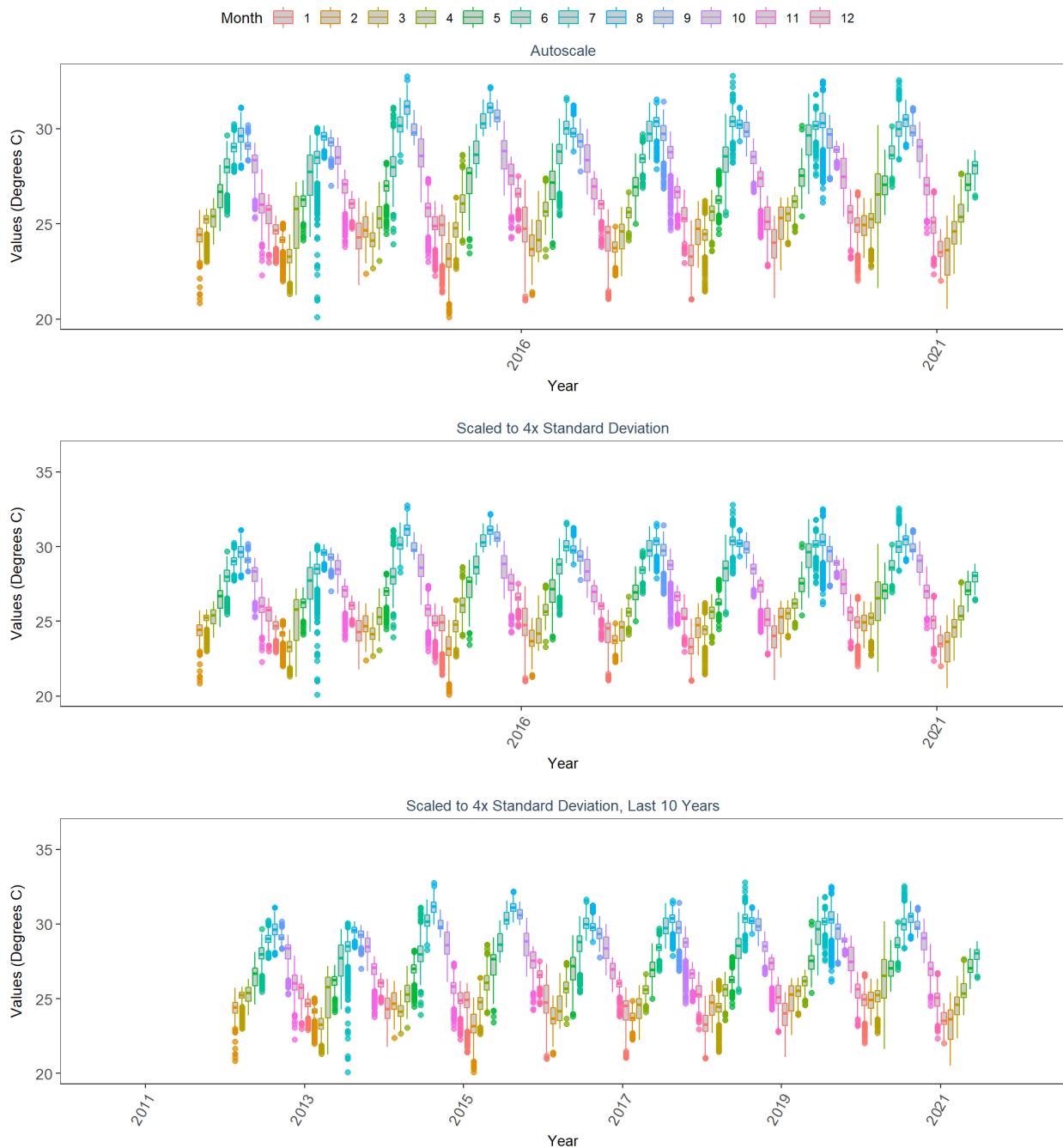
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



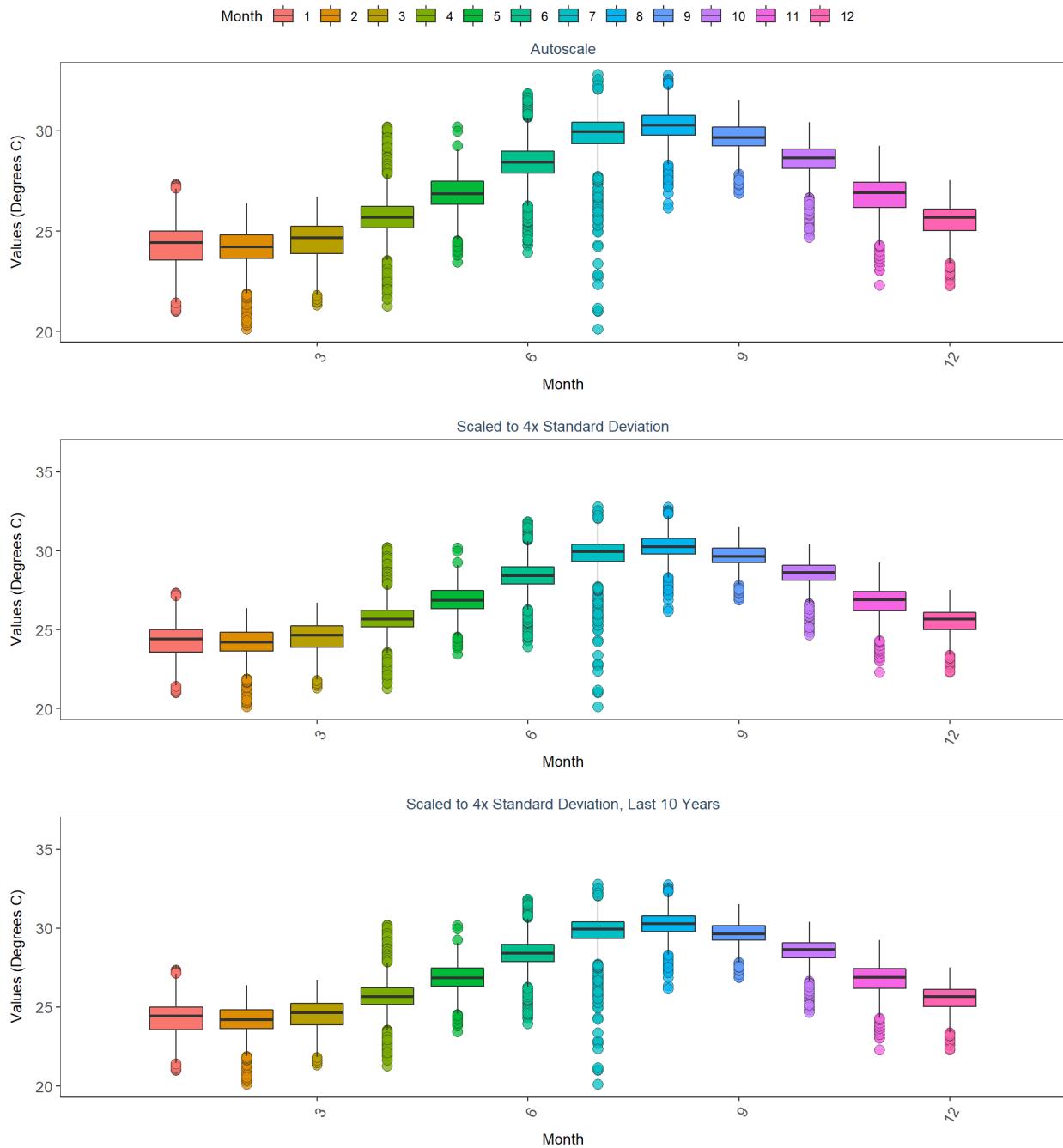
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Water Temperature on Coral Reefs in the Florida Keys  
74  
By Year



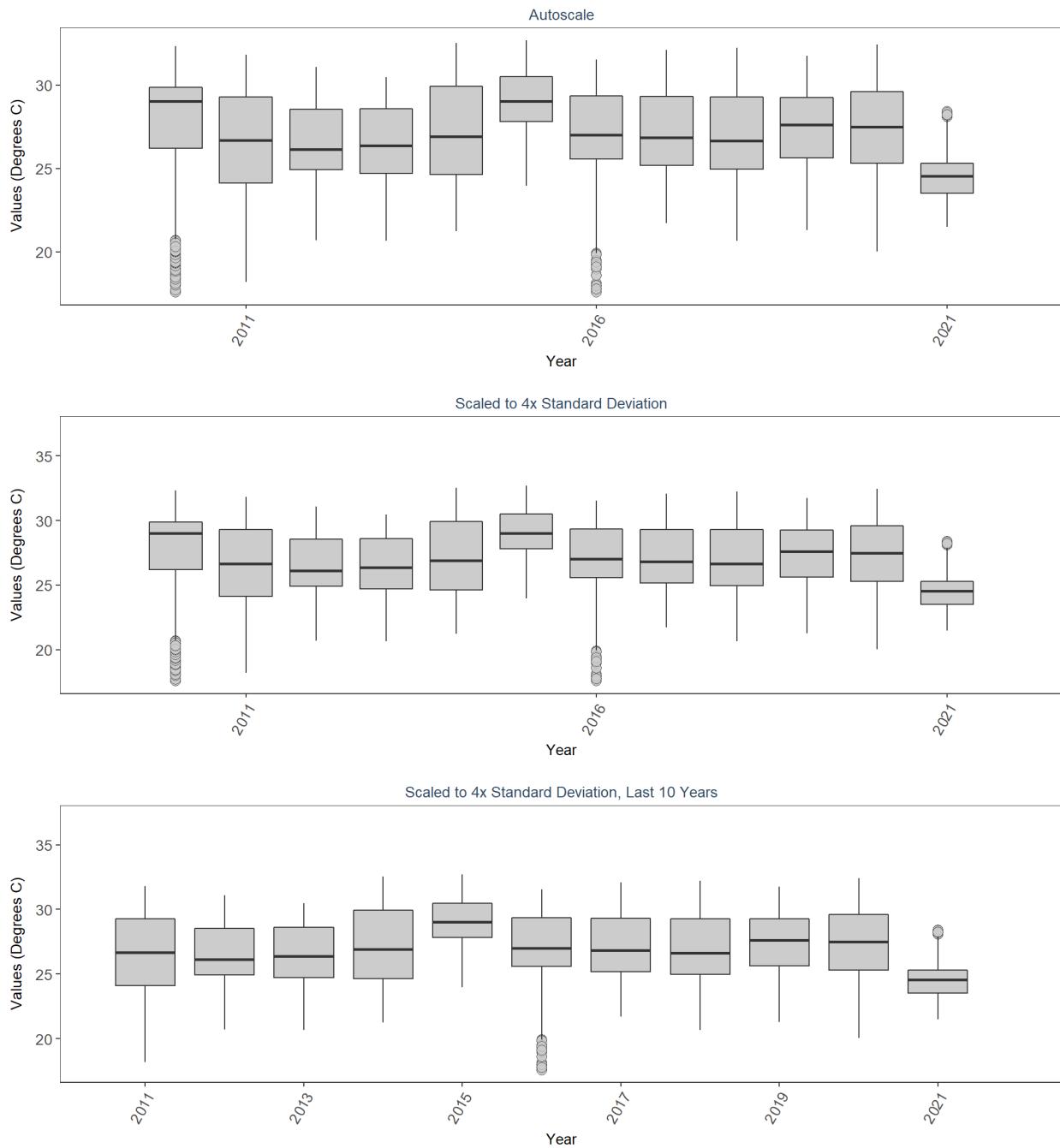
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 Water Temperature on Coral Reefs in the Florida Keys  
 74  
 By Year & Month



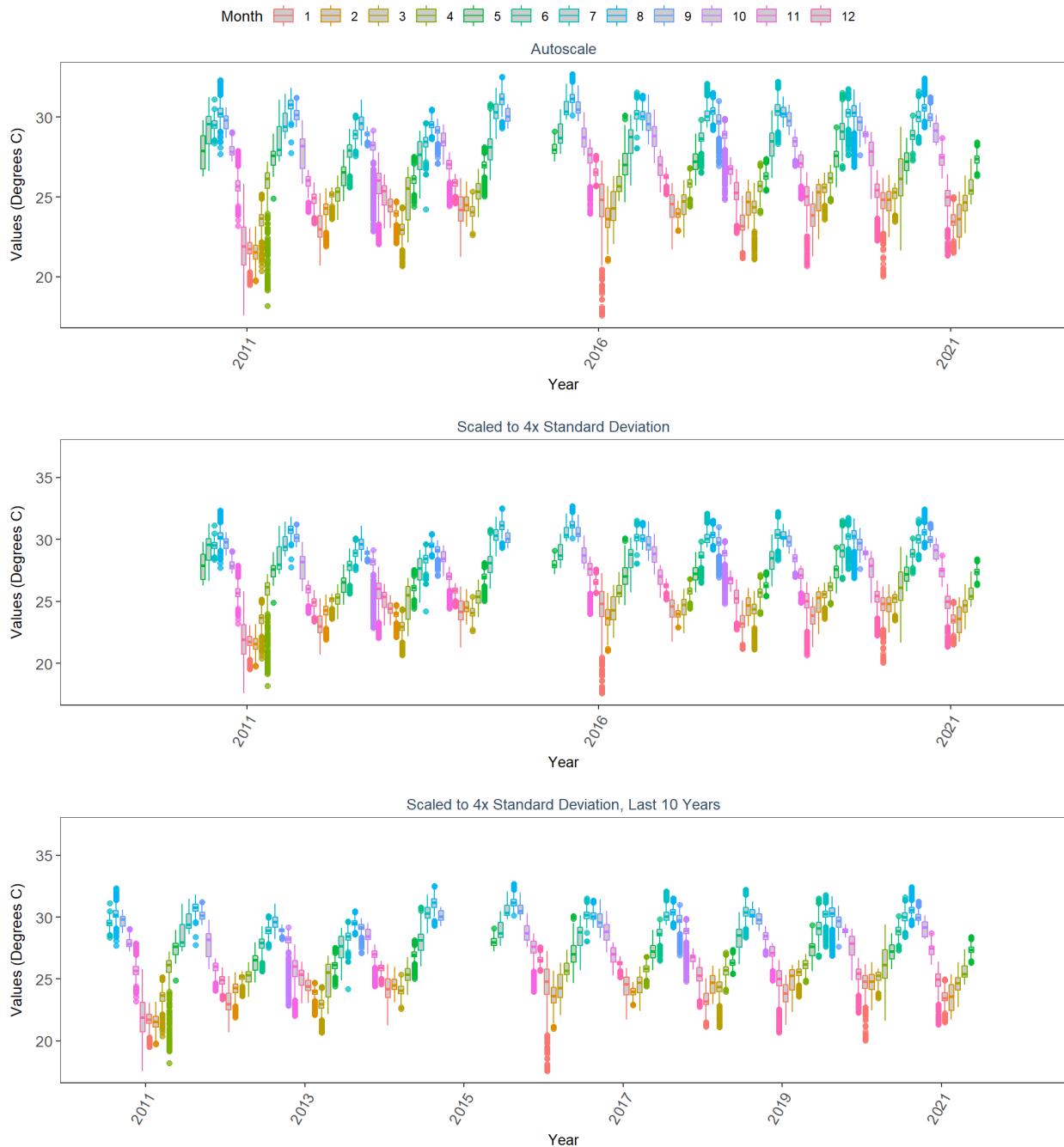
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 Water Temperature on Coral Reefs in the Florida Keys  
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 By Month



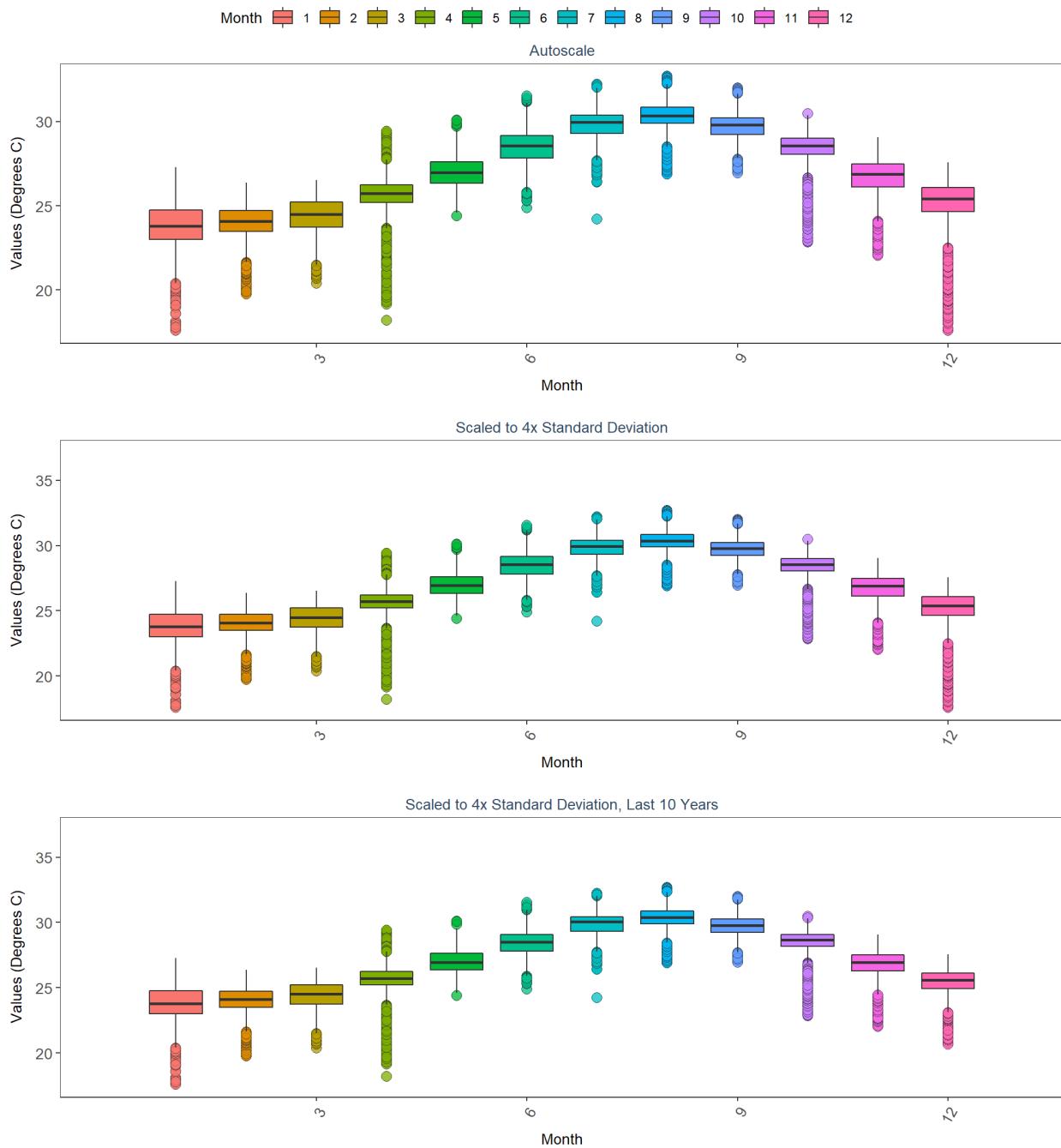
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Water Temperature on Coral Reefs in the Florida Keys  
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By Year



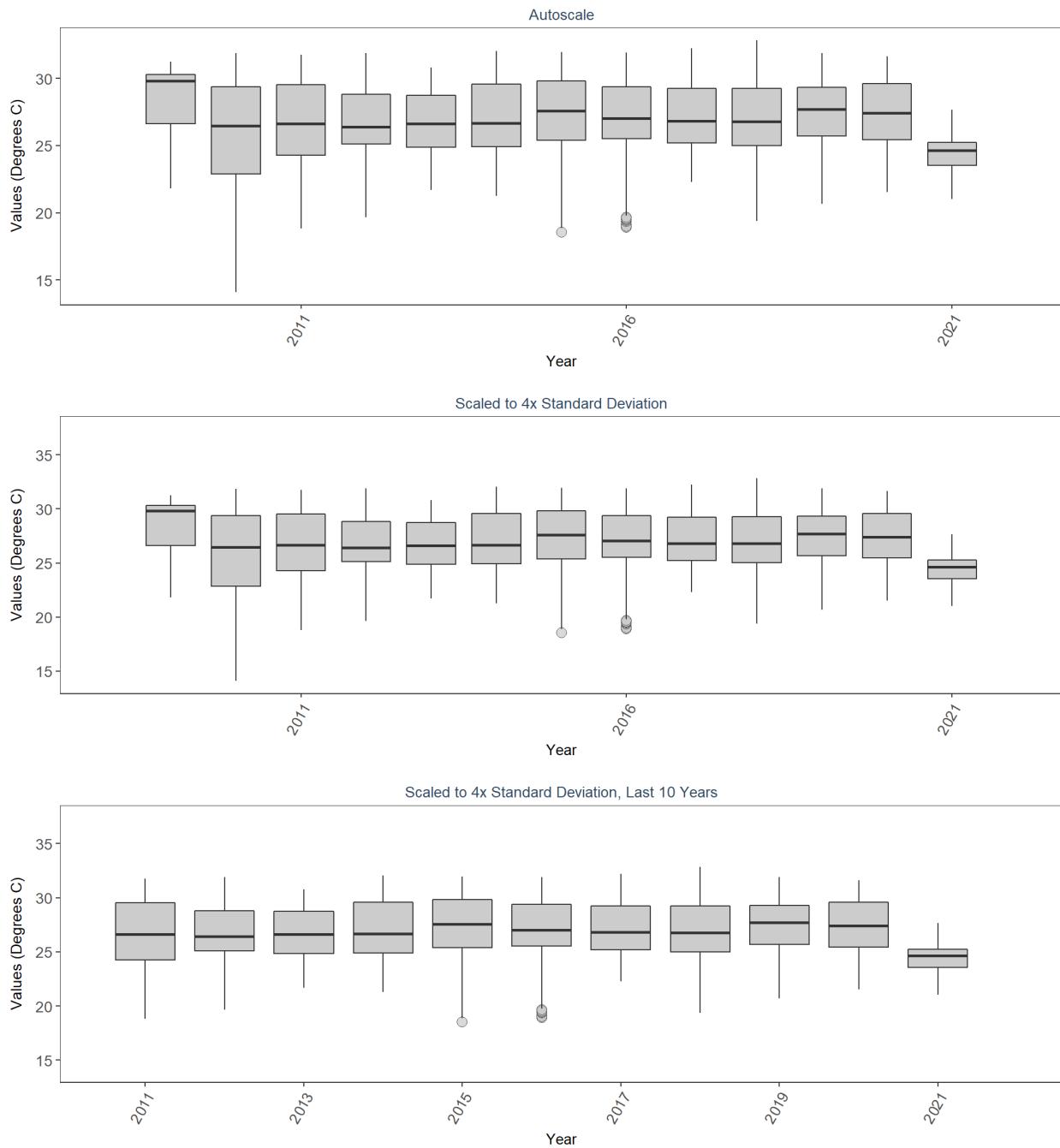
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 Water Temperature on Coral Reefs in the Florida Keys  
 75  
 By Year & Month



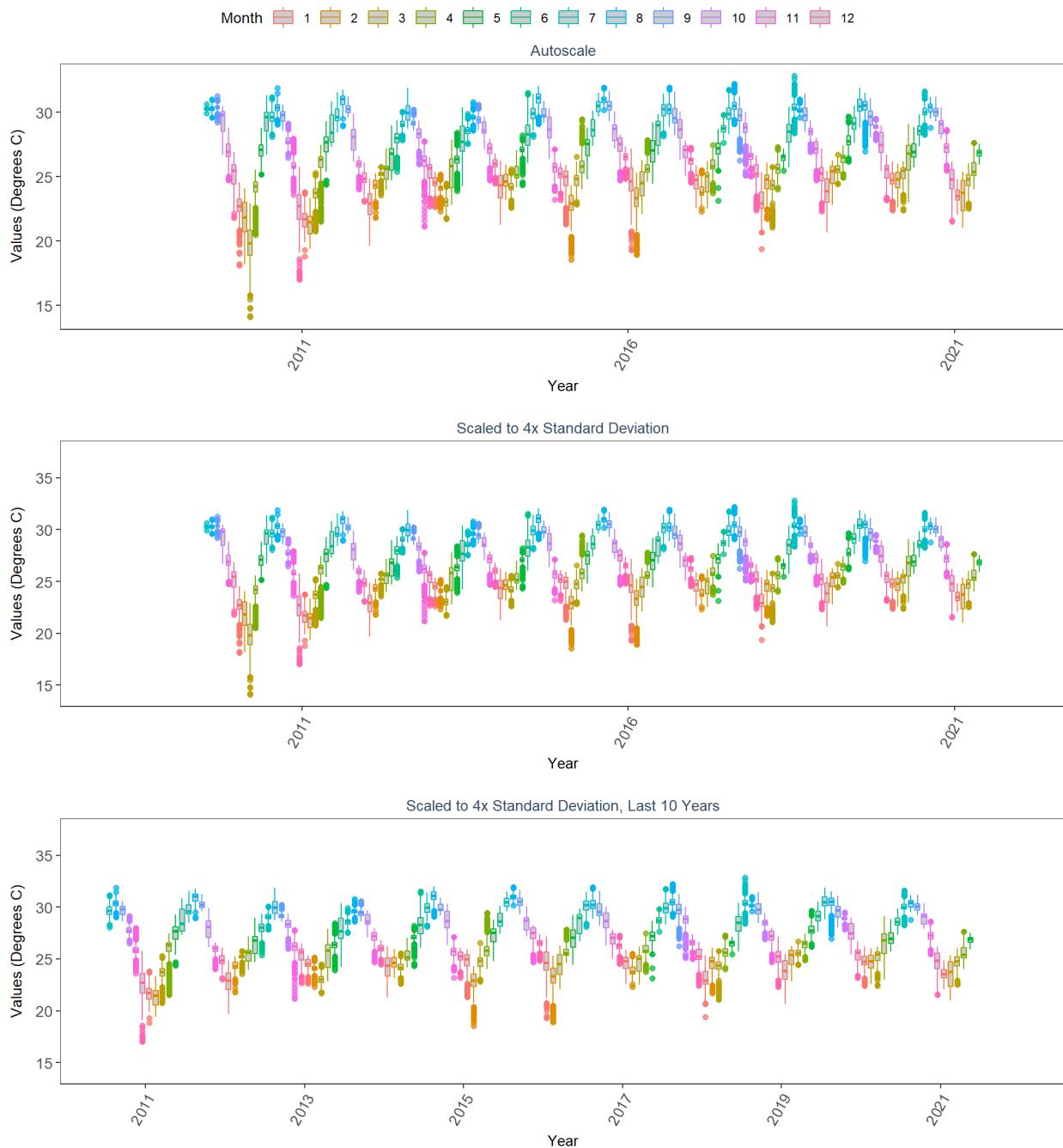
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 Water Temperature on Coral Reefs in the Florida Keys  
 75  
 By Month



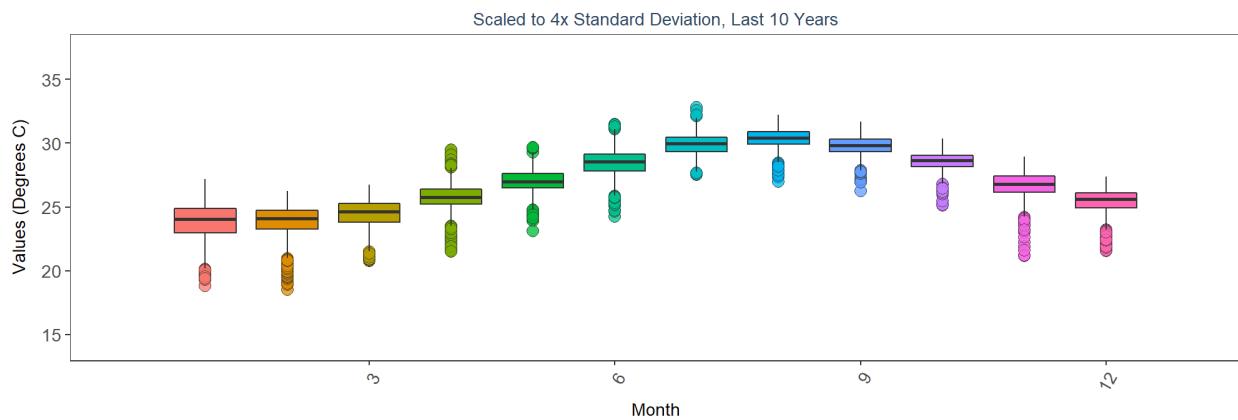
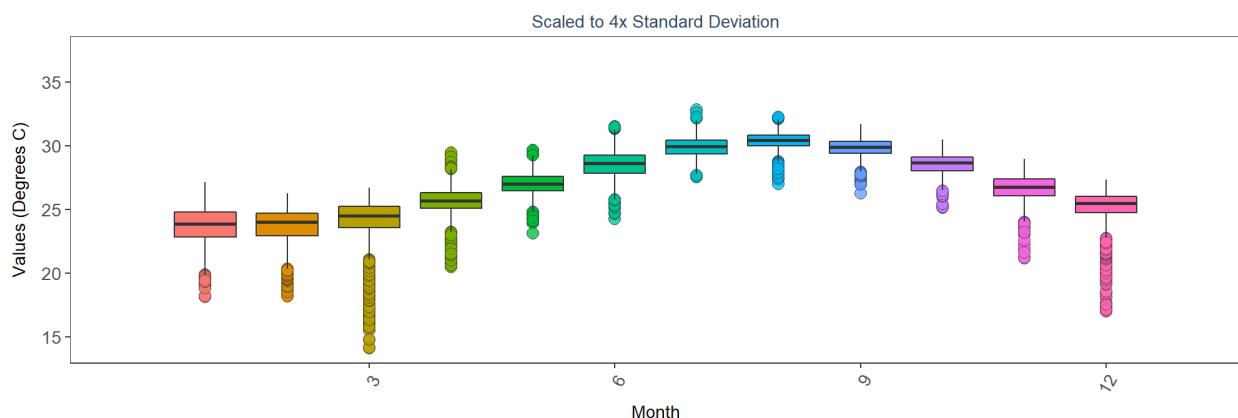
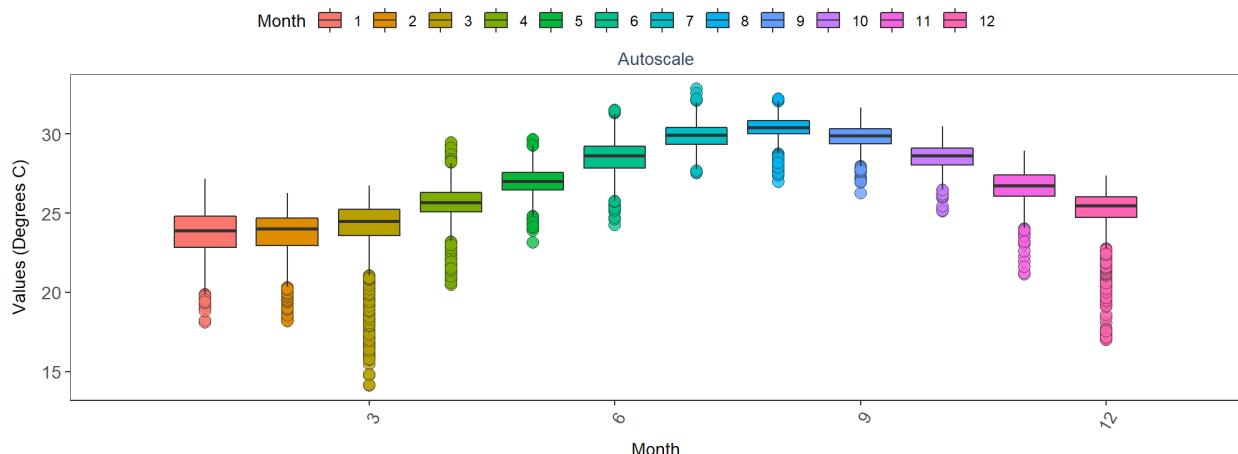
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Water Temperature on Coral Reefs in the Florida Keys  
76  
By Year



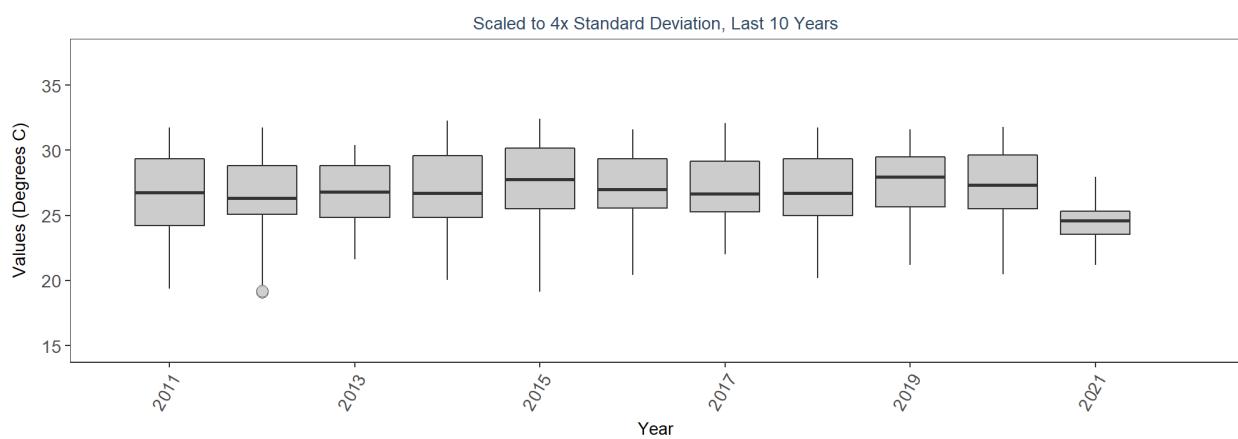
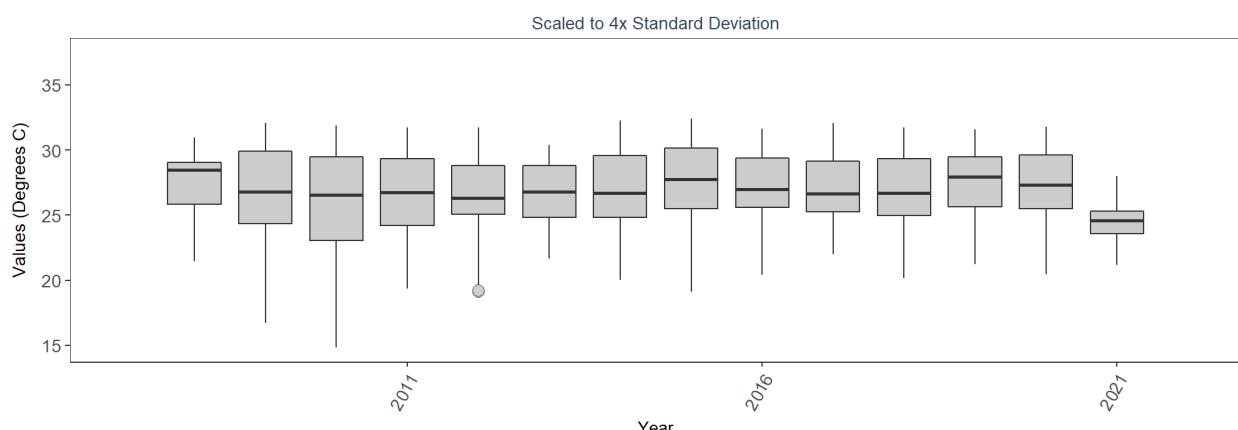
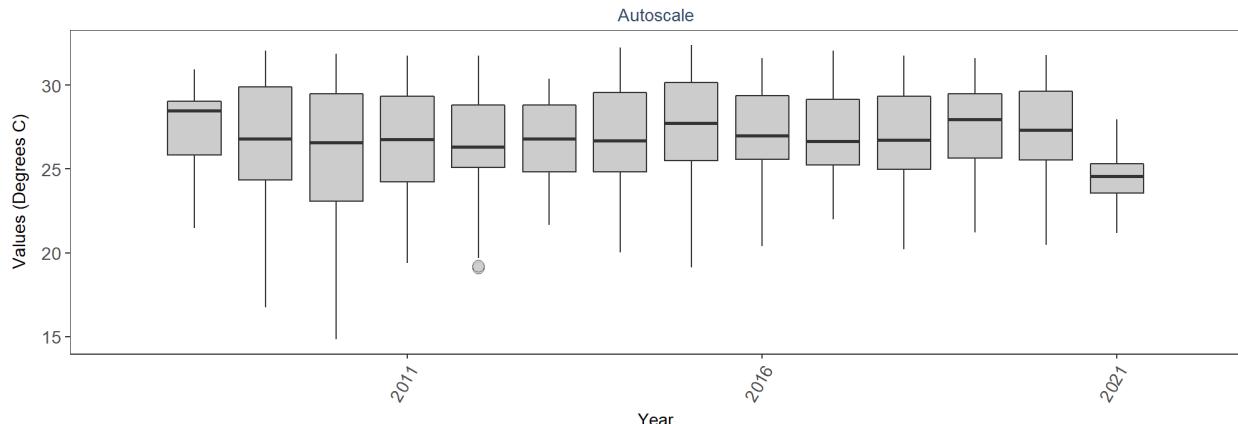
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**Water Temperature on Coral Reefs in the Florida Keys**  
 76  
 By Year & Month



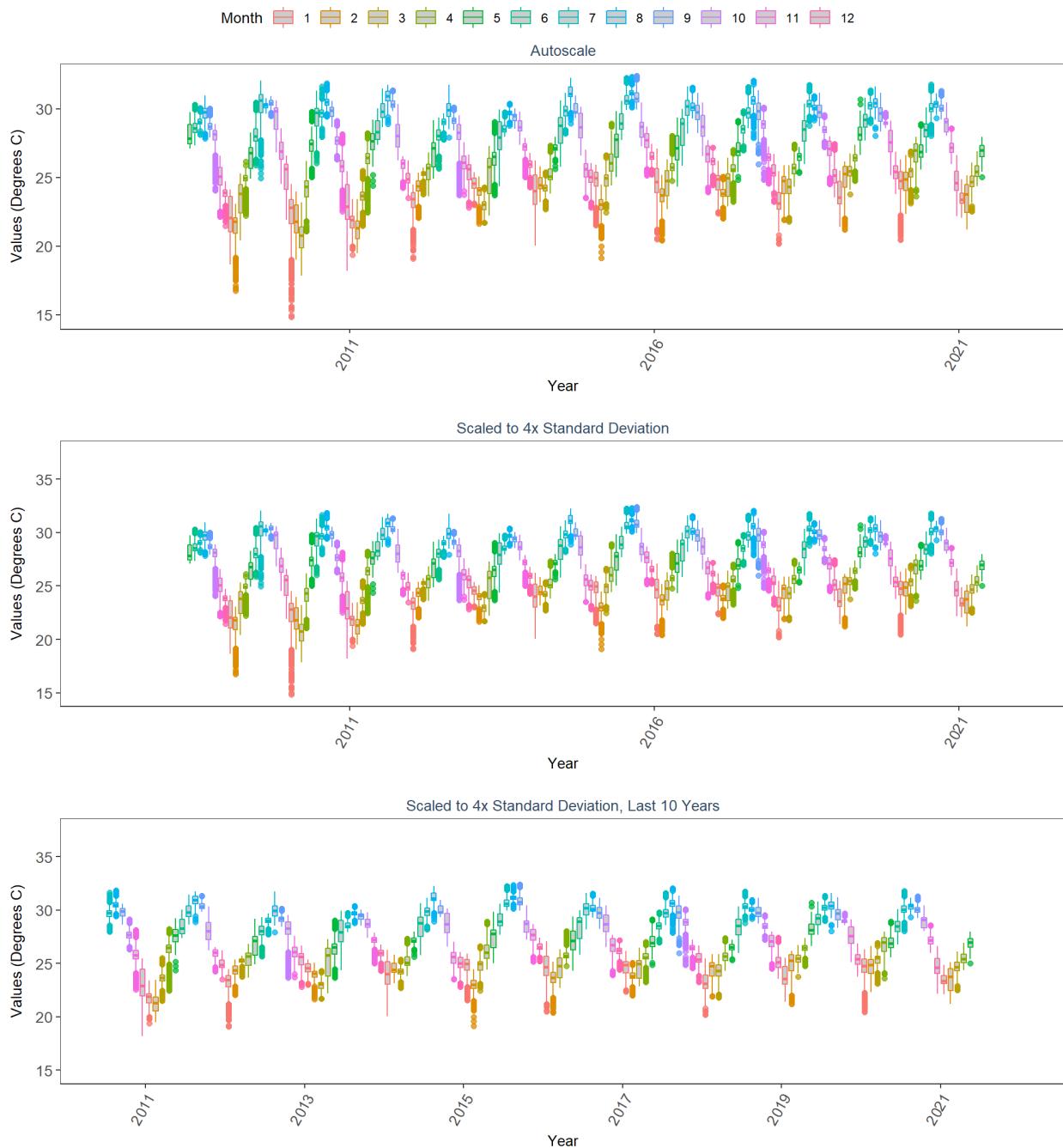
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 76  
 By Month



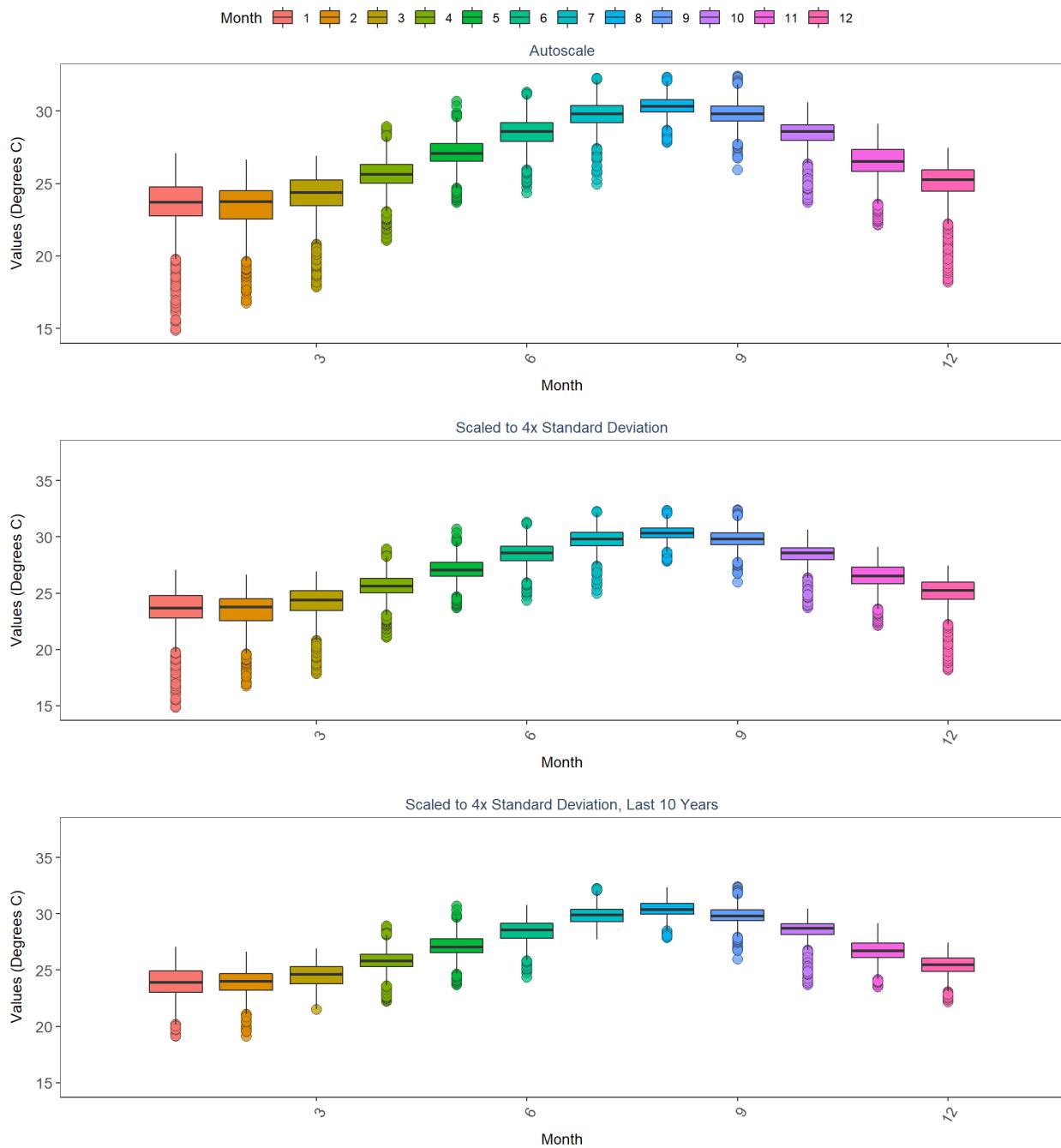
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77  
By Year



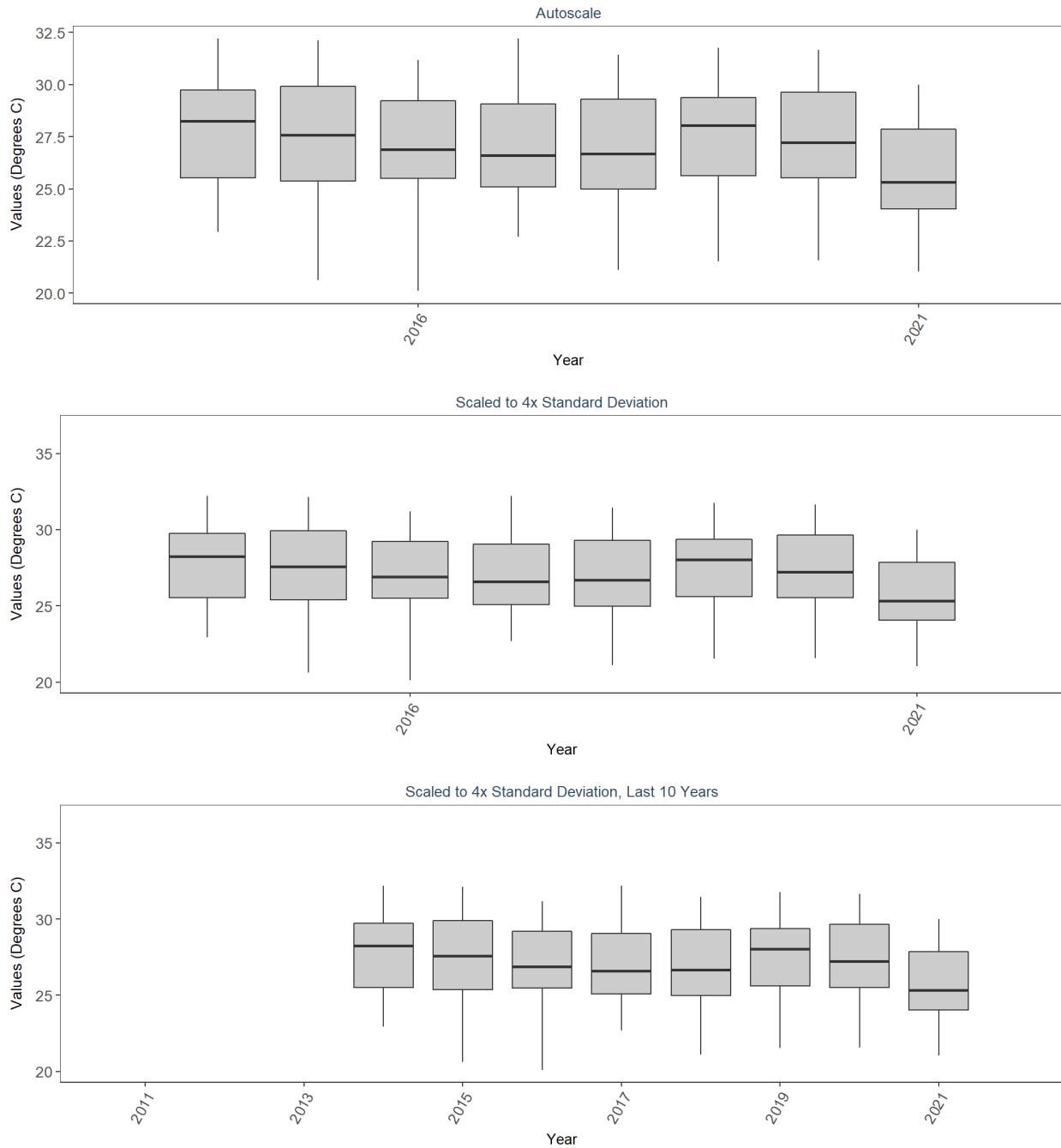
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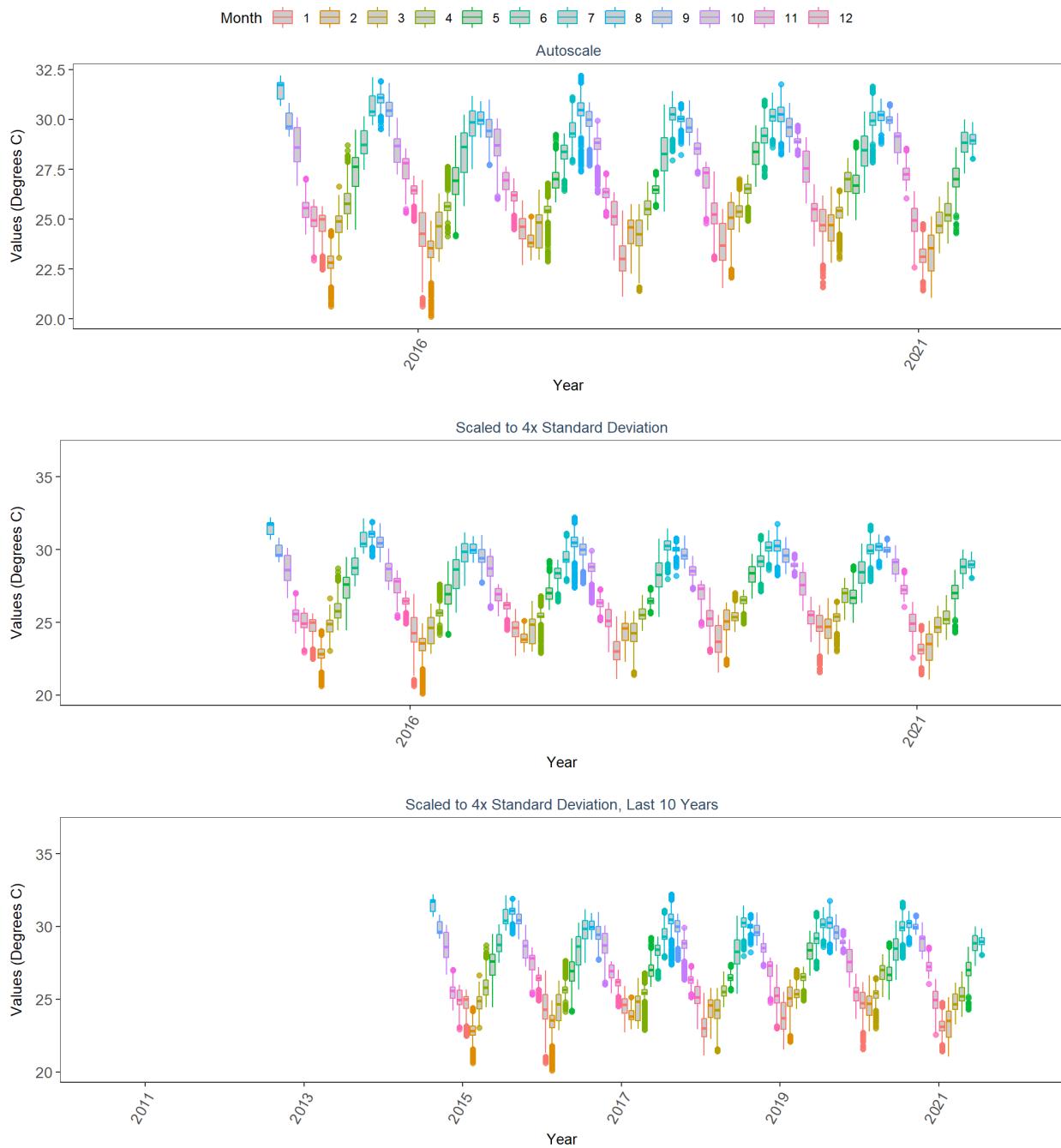
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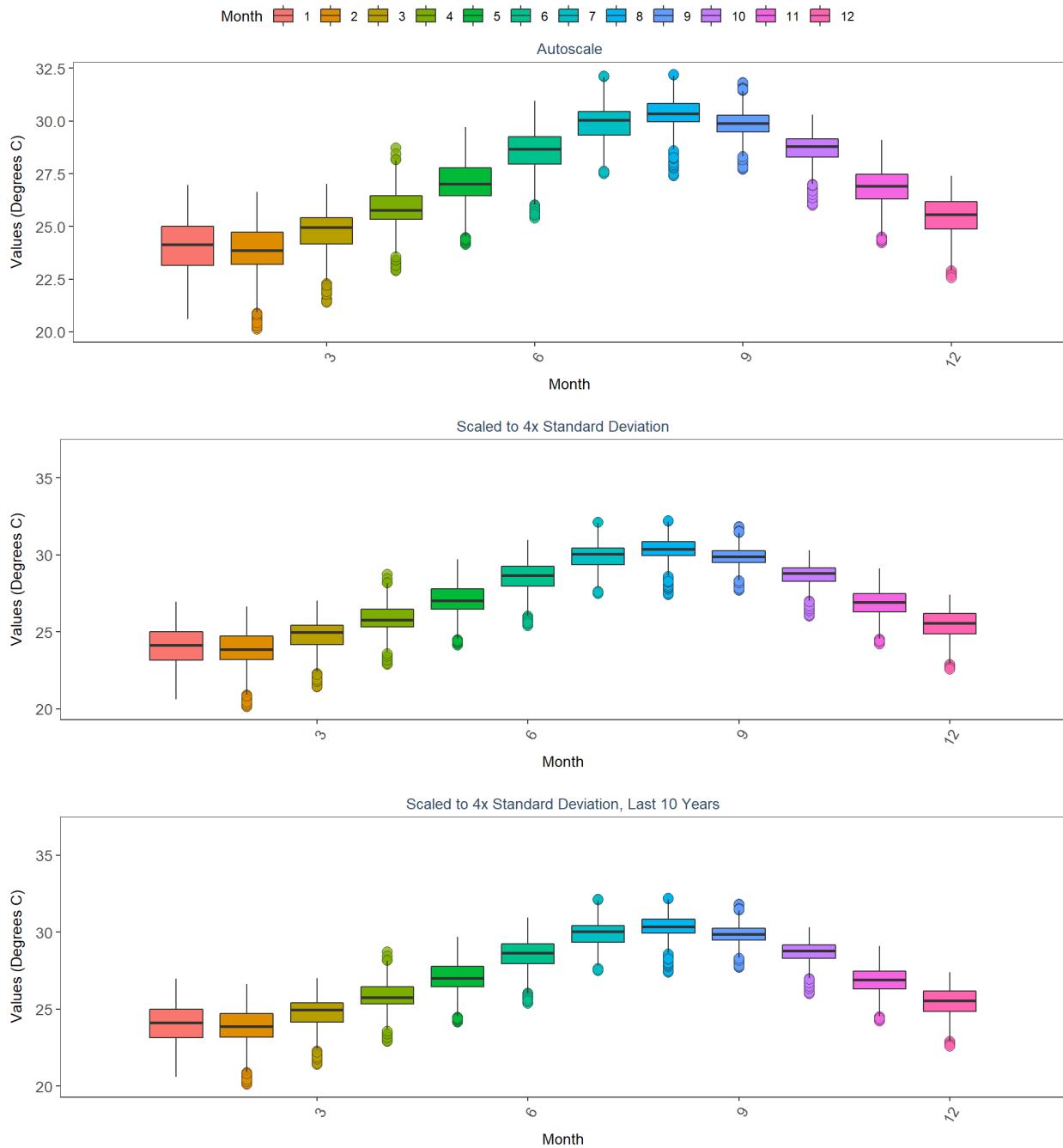
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By Year



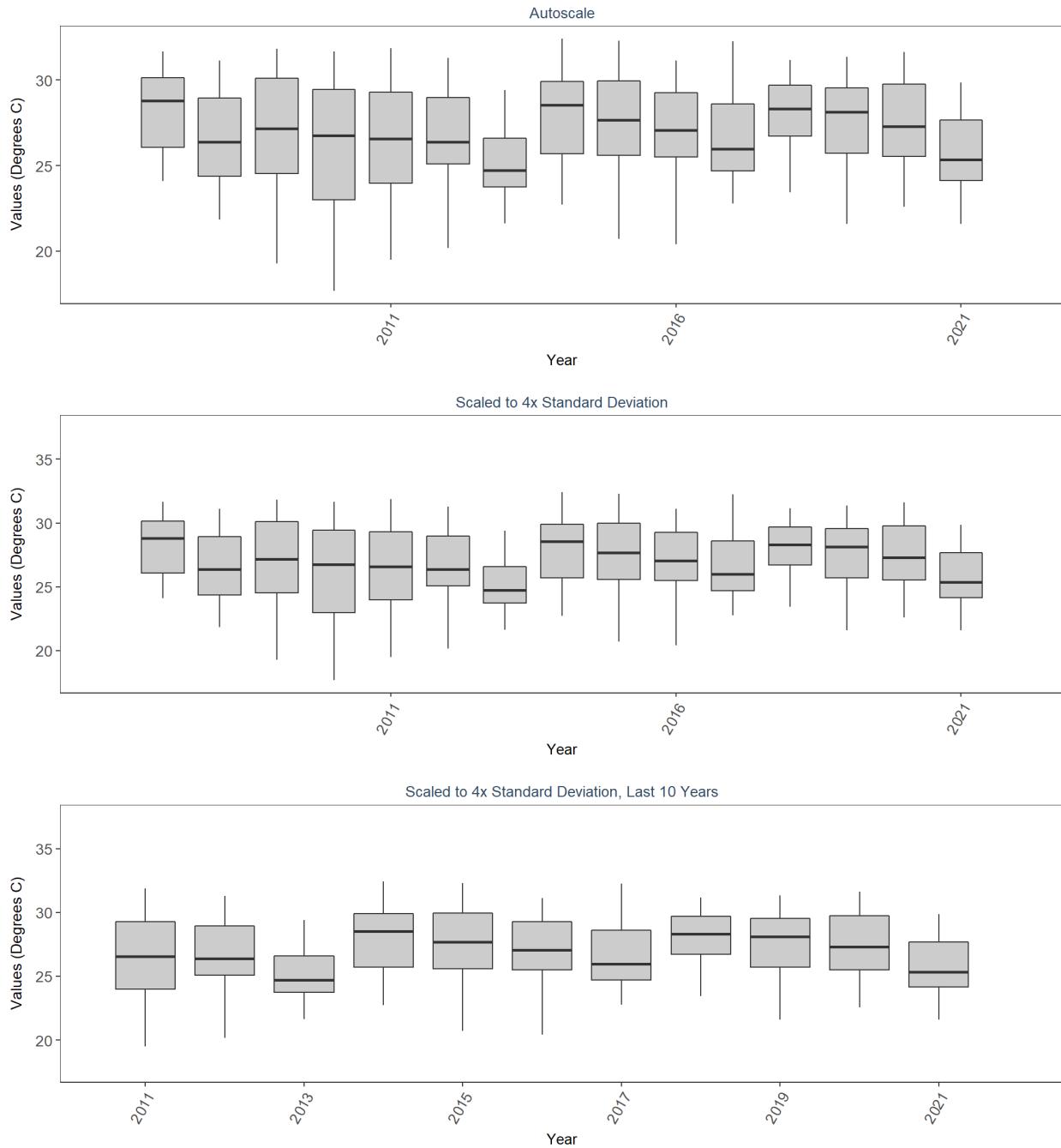
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 By Year & Month



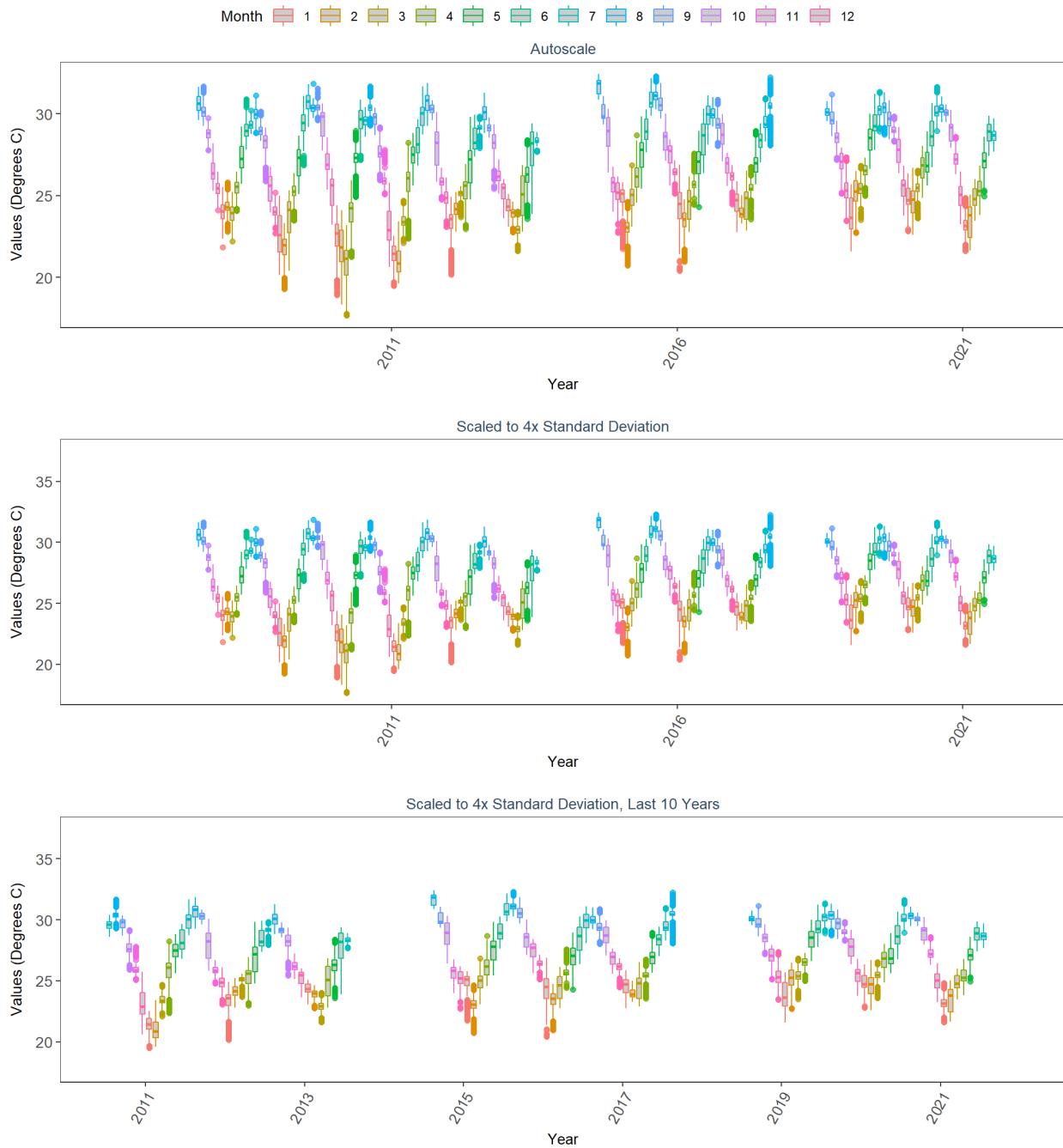
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 By Month



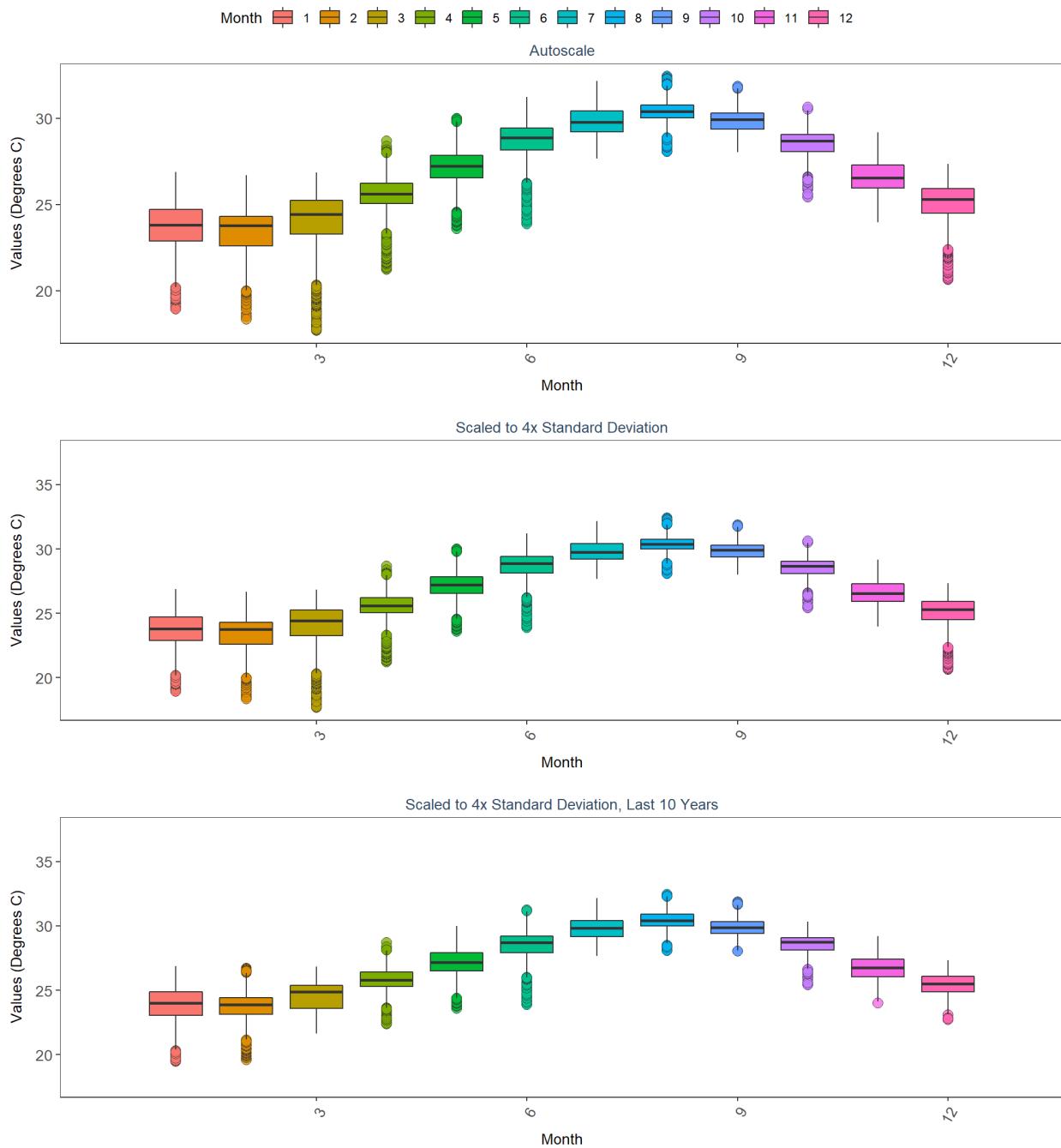
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79  
By Year



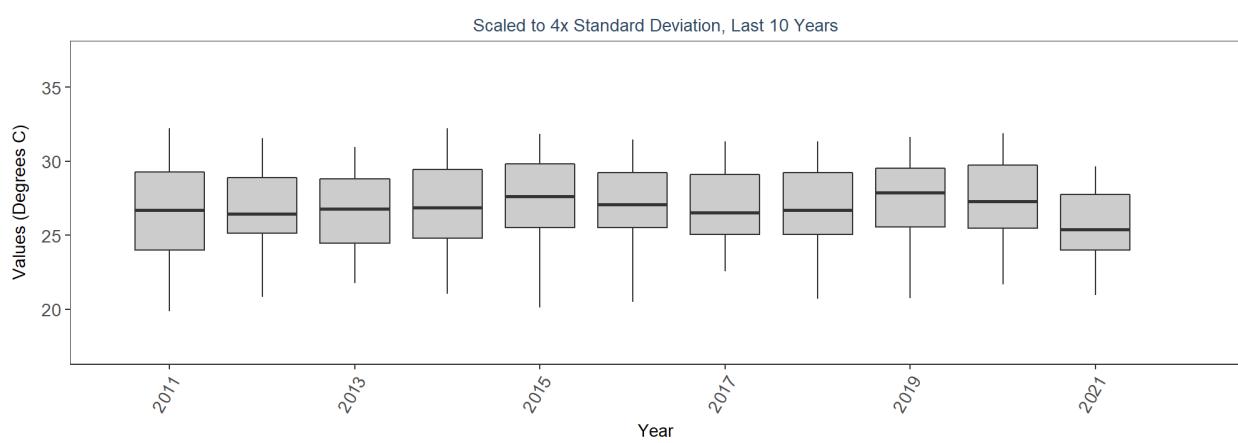
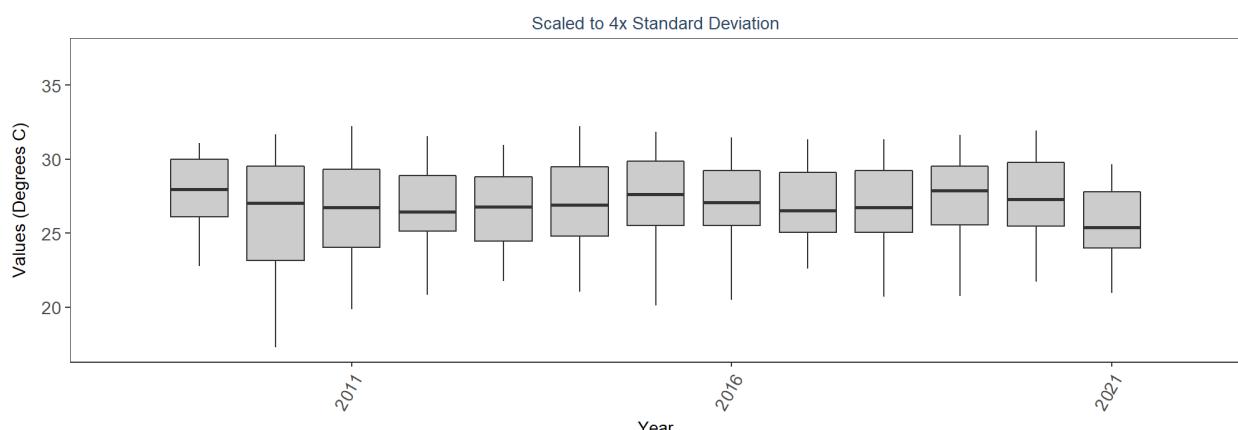
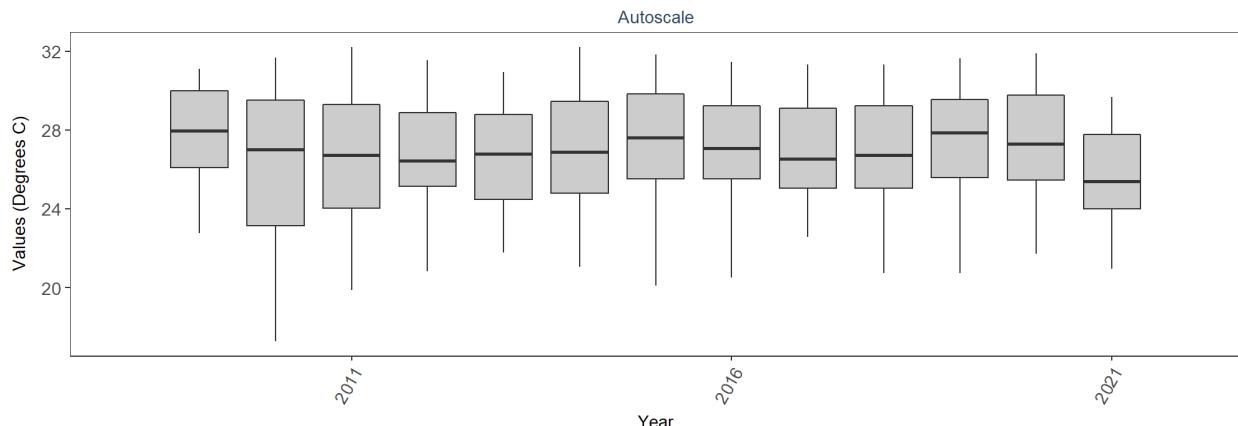
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 By Year & Month



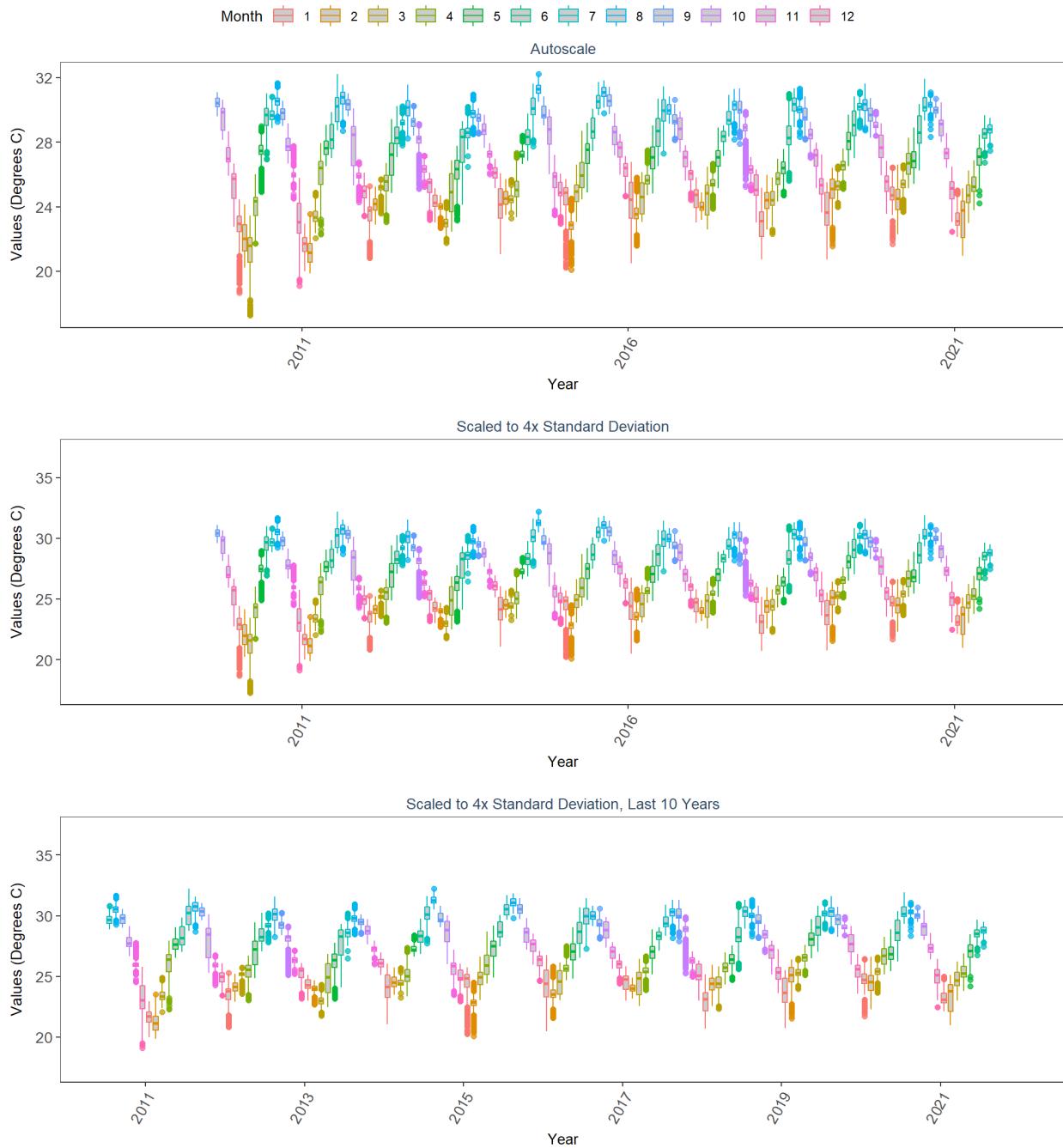
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 By Month



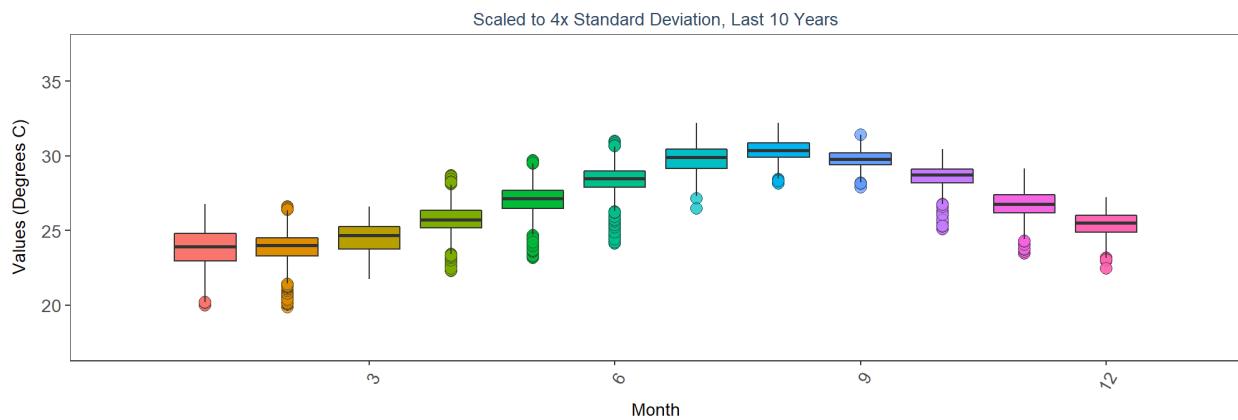
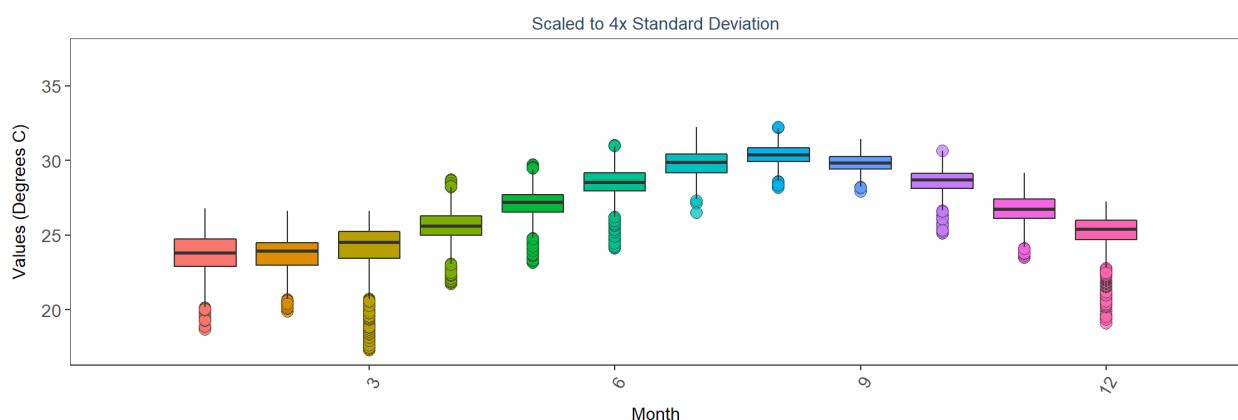
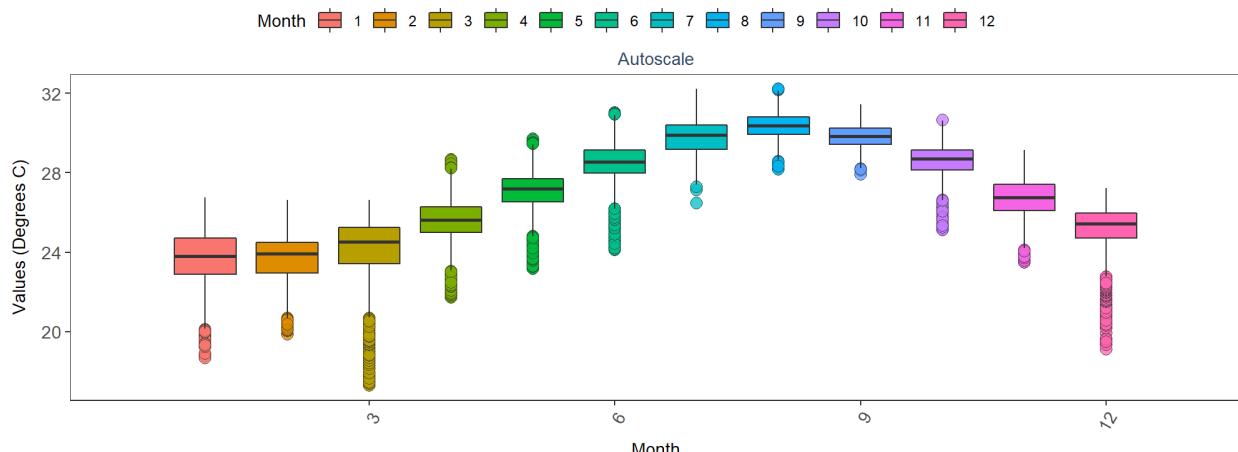
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By Year



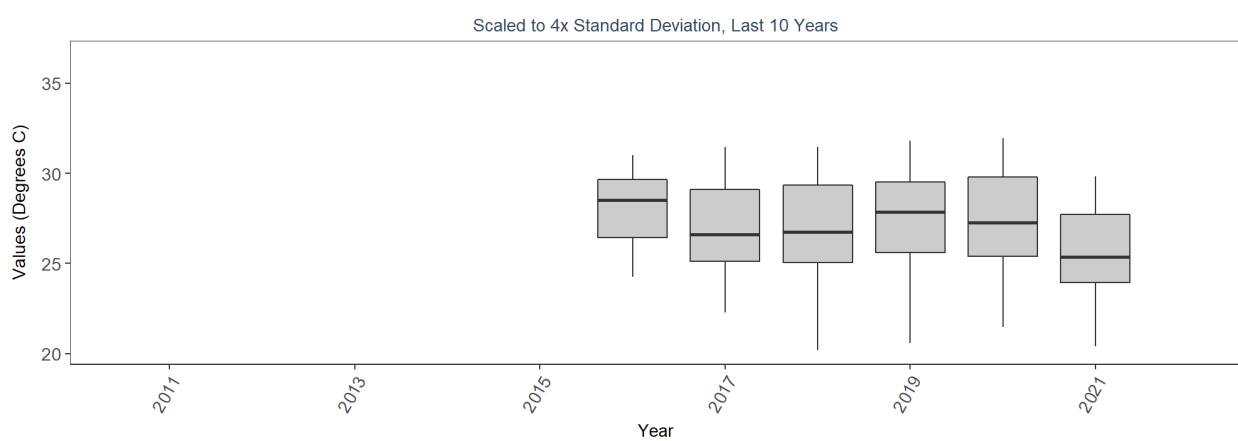
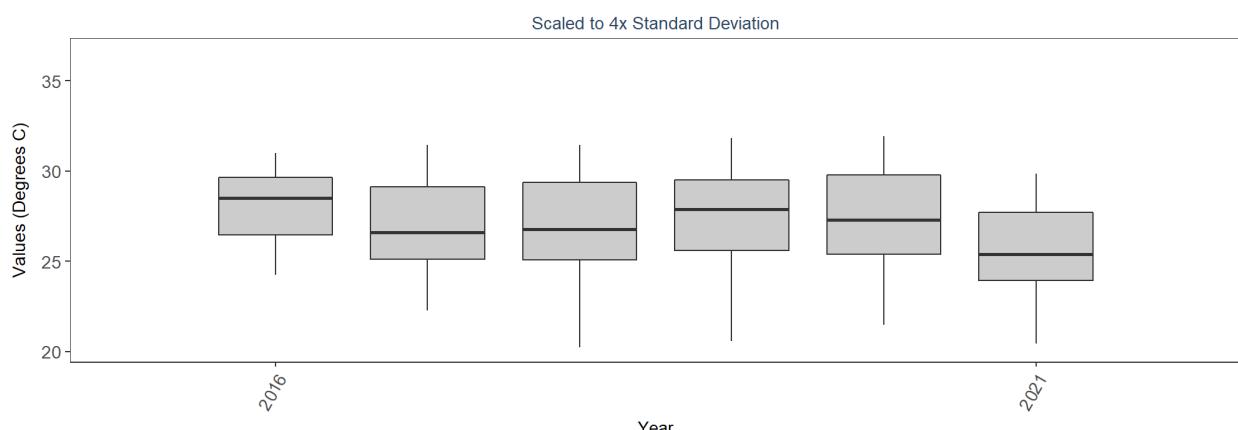
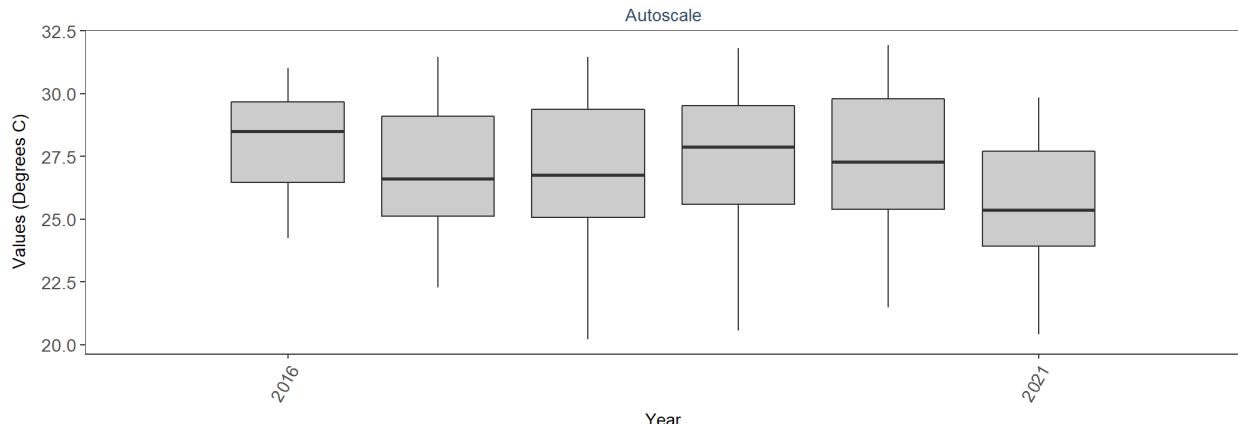
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**By Year & Month**



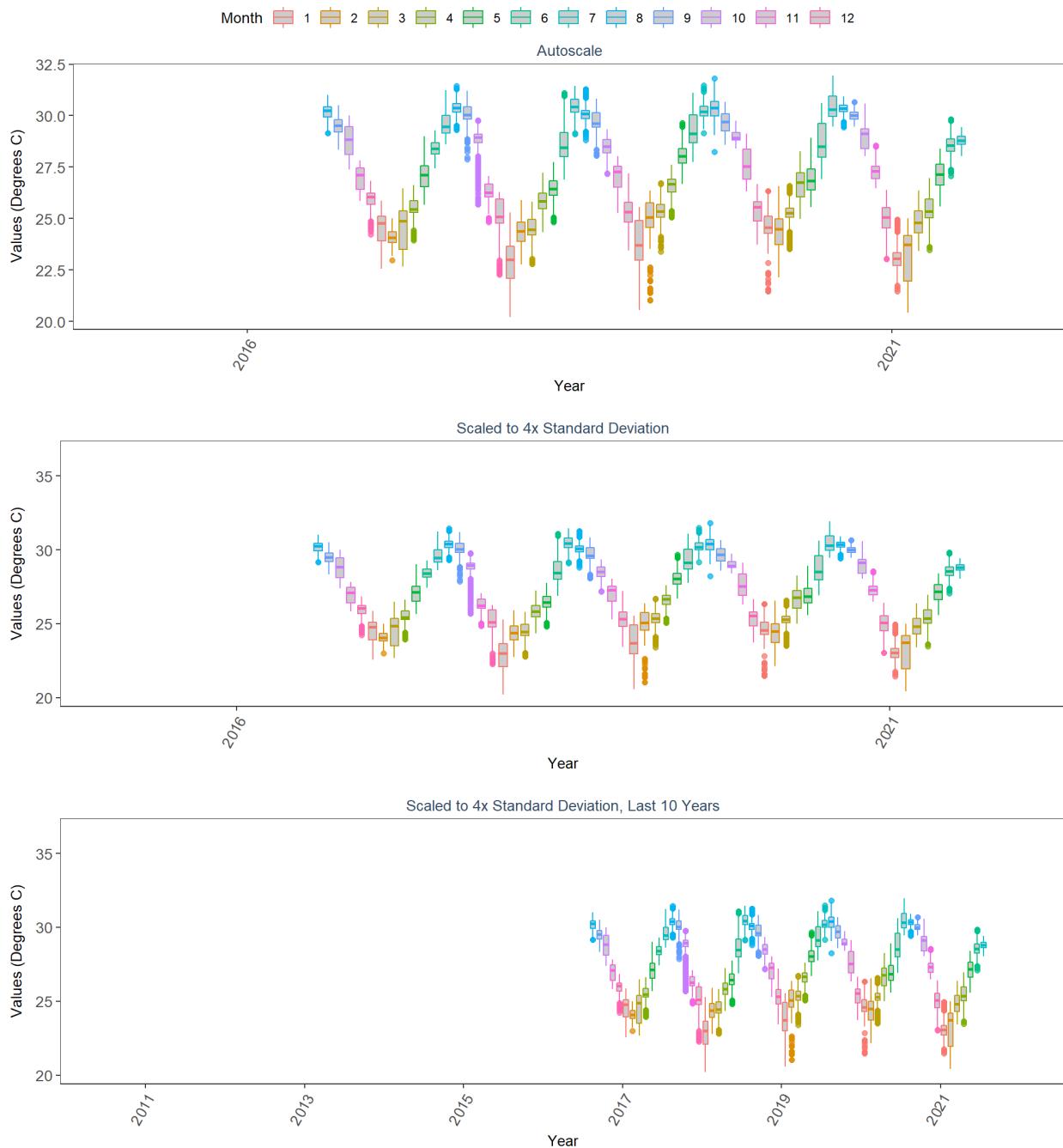
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 By Month



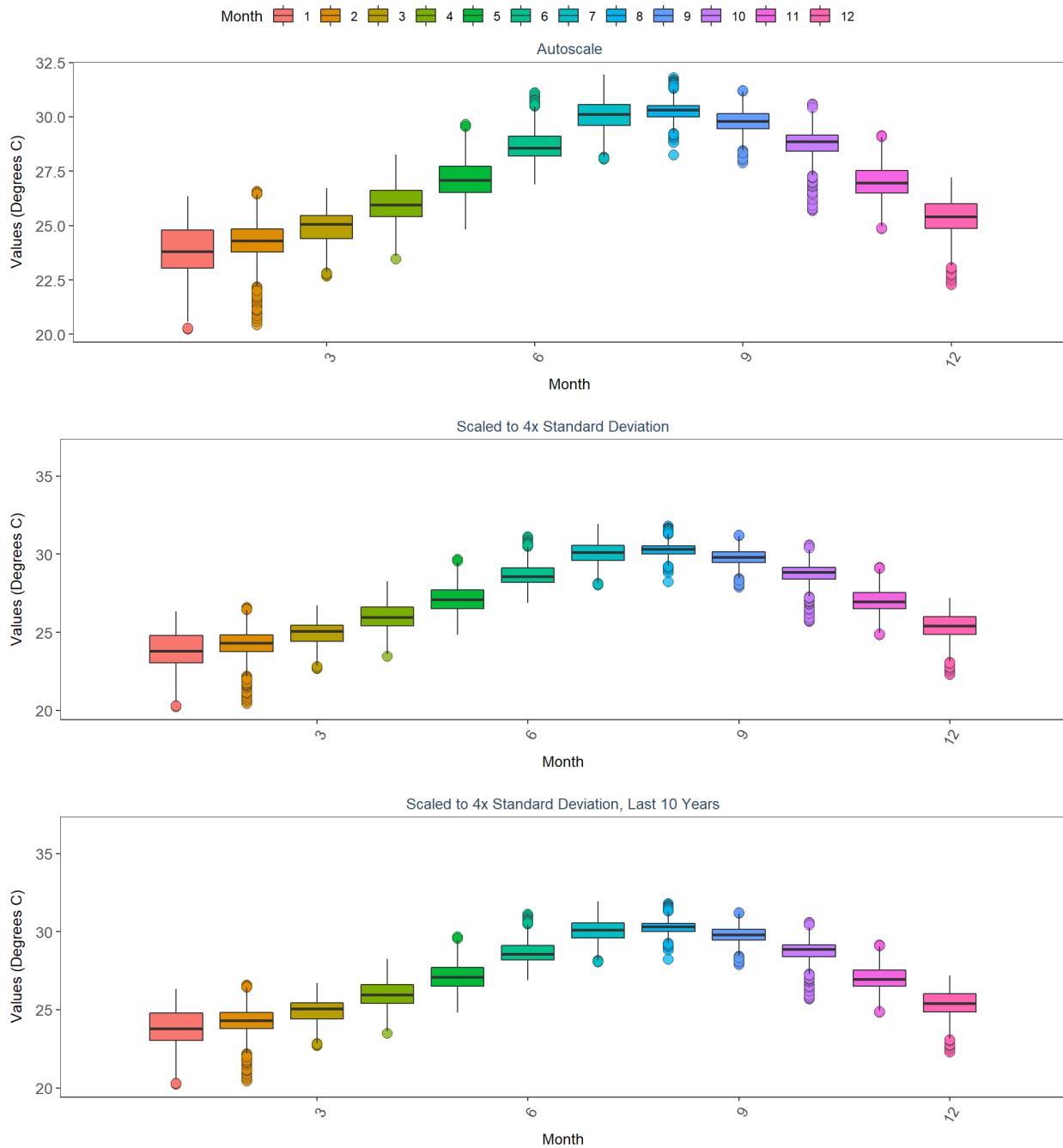
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81  
By Year



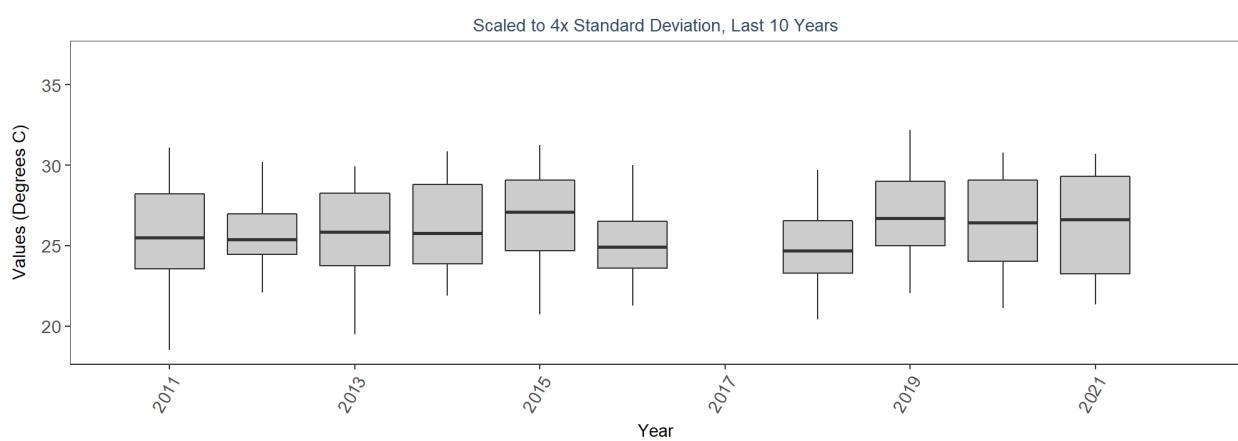
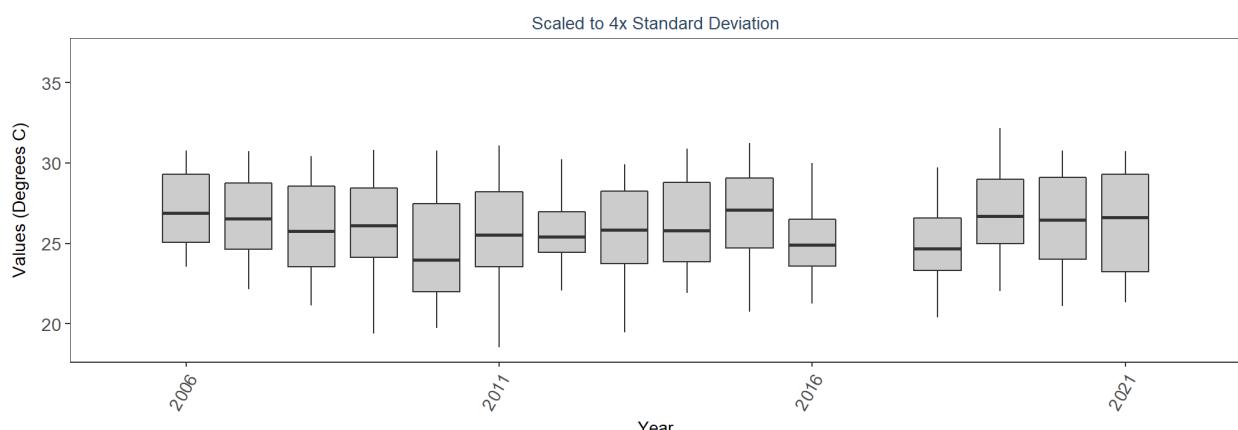
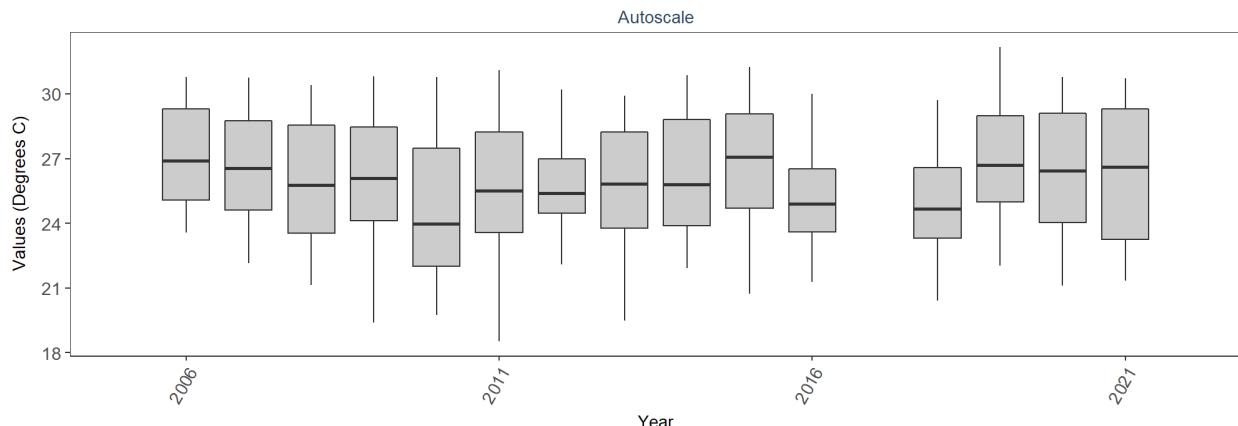
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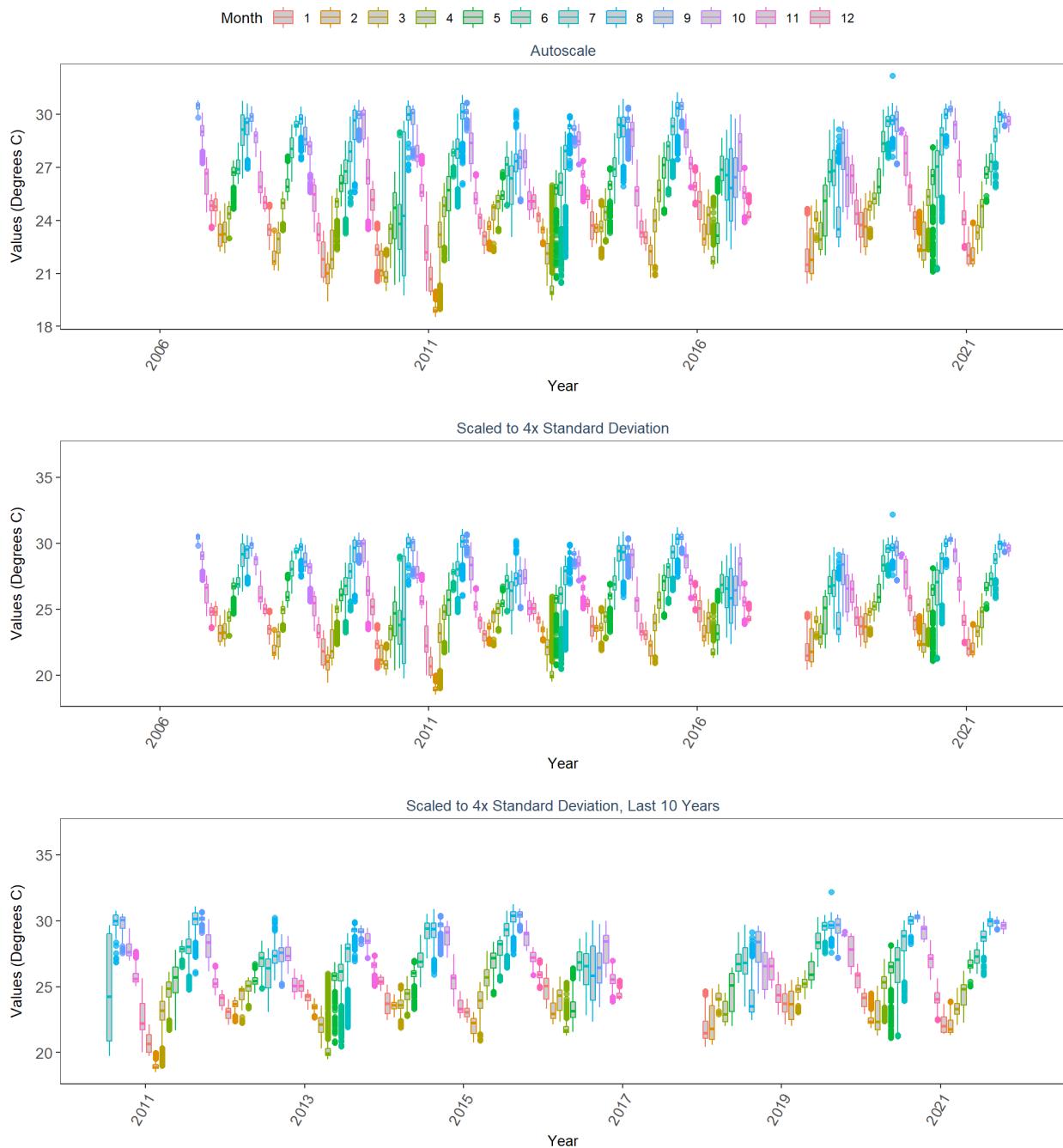
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 By Month



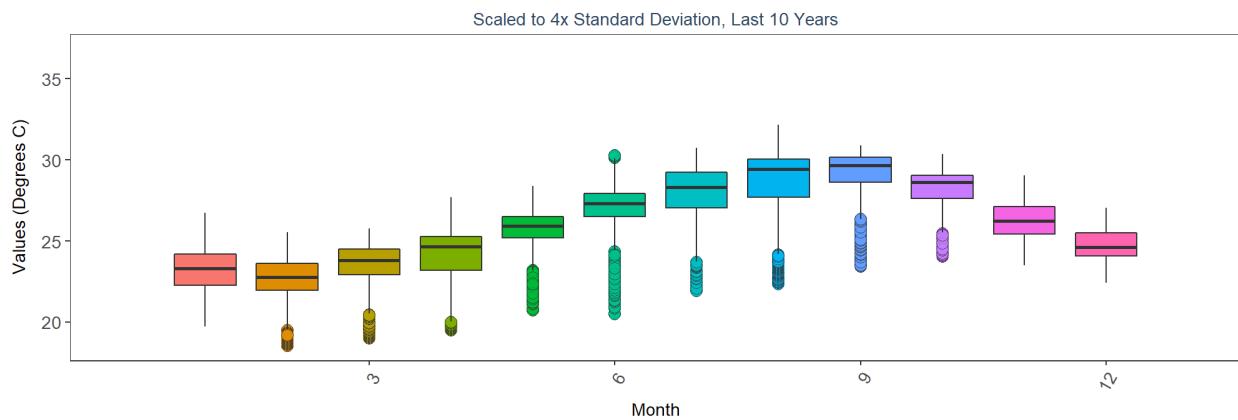
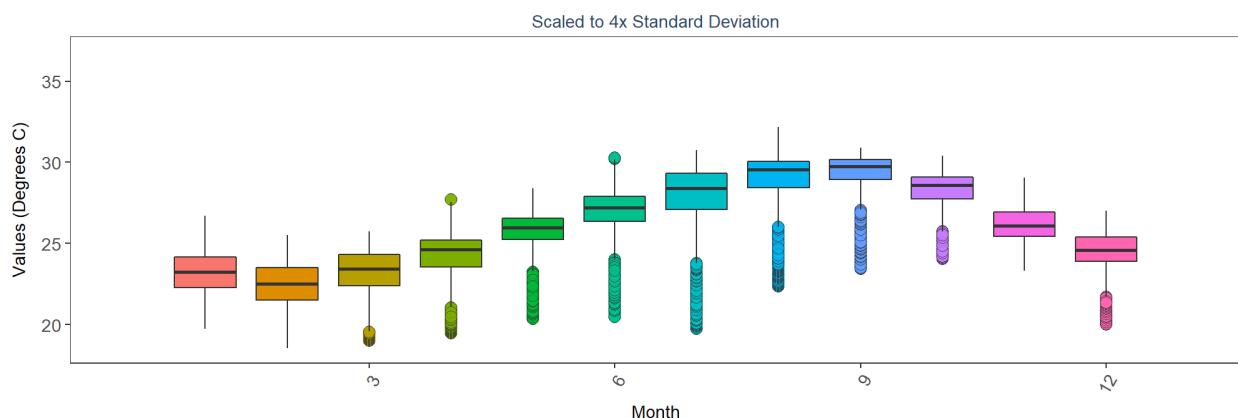
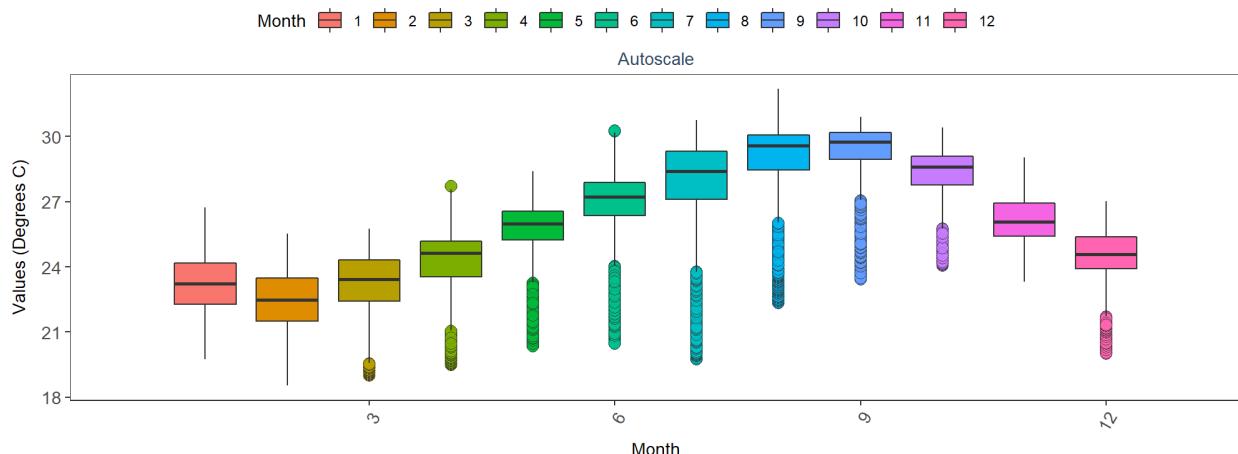
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 By Year



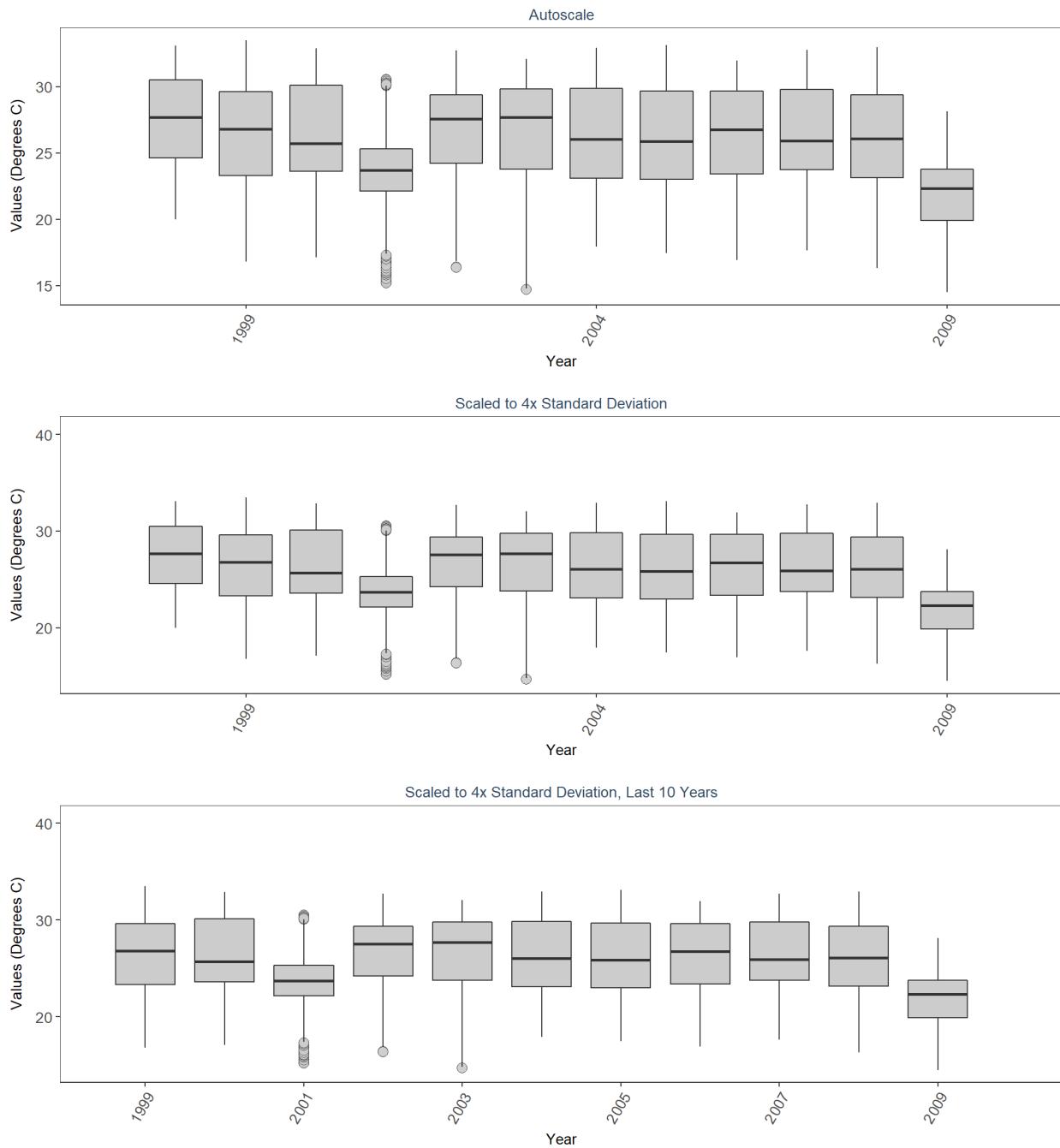
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 By Year & Month



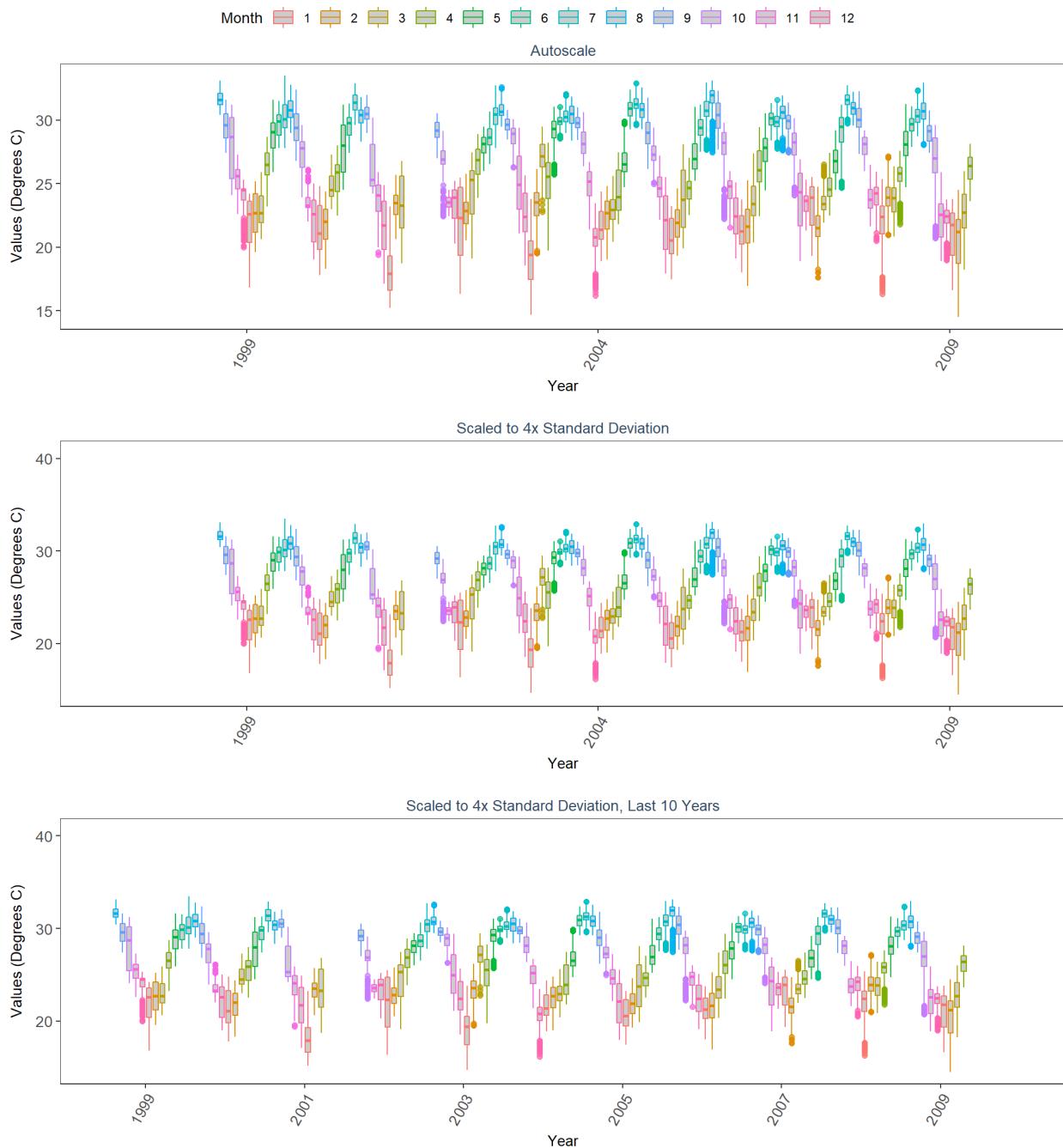
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 By Month



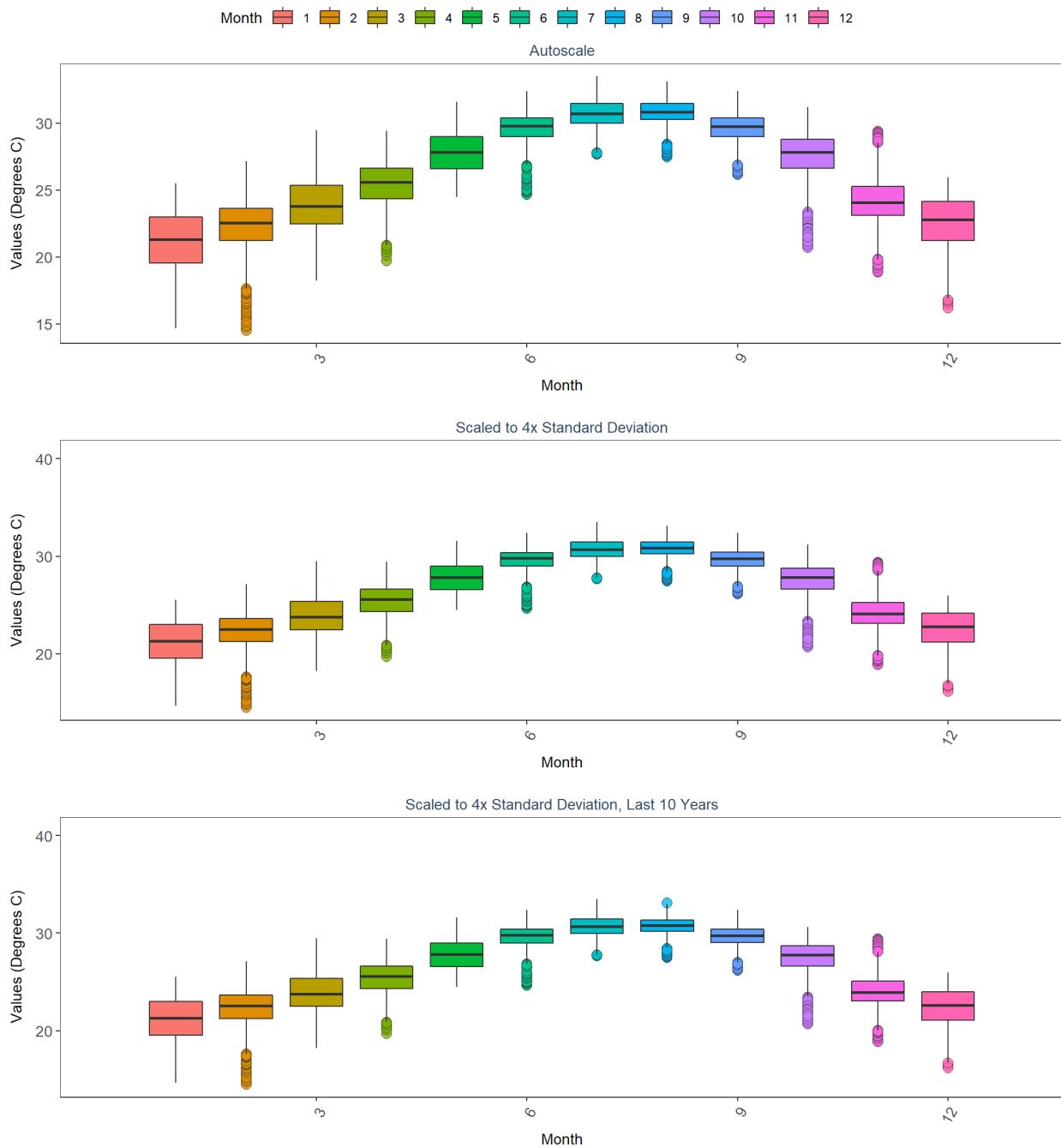
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 By Year



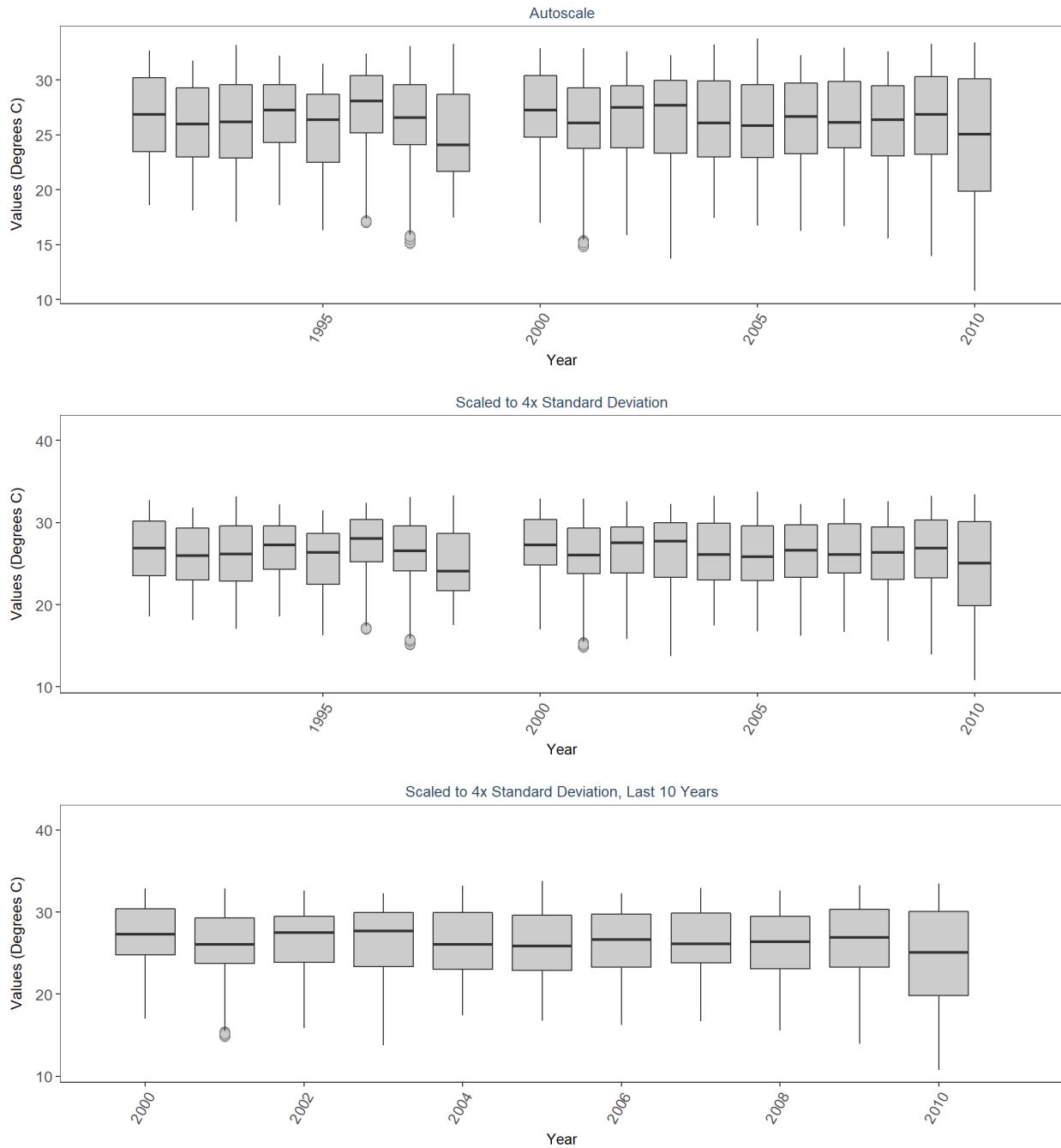
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 By Year & Month



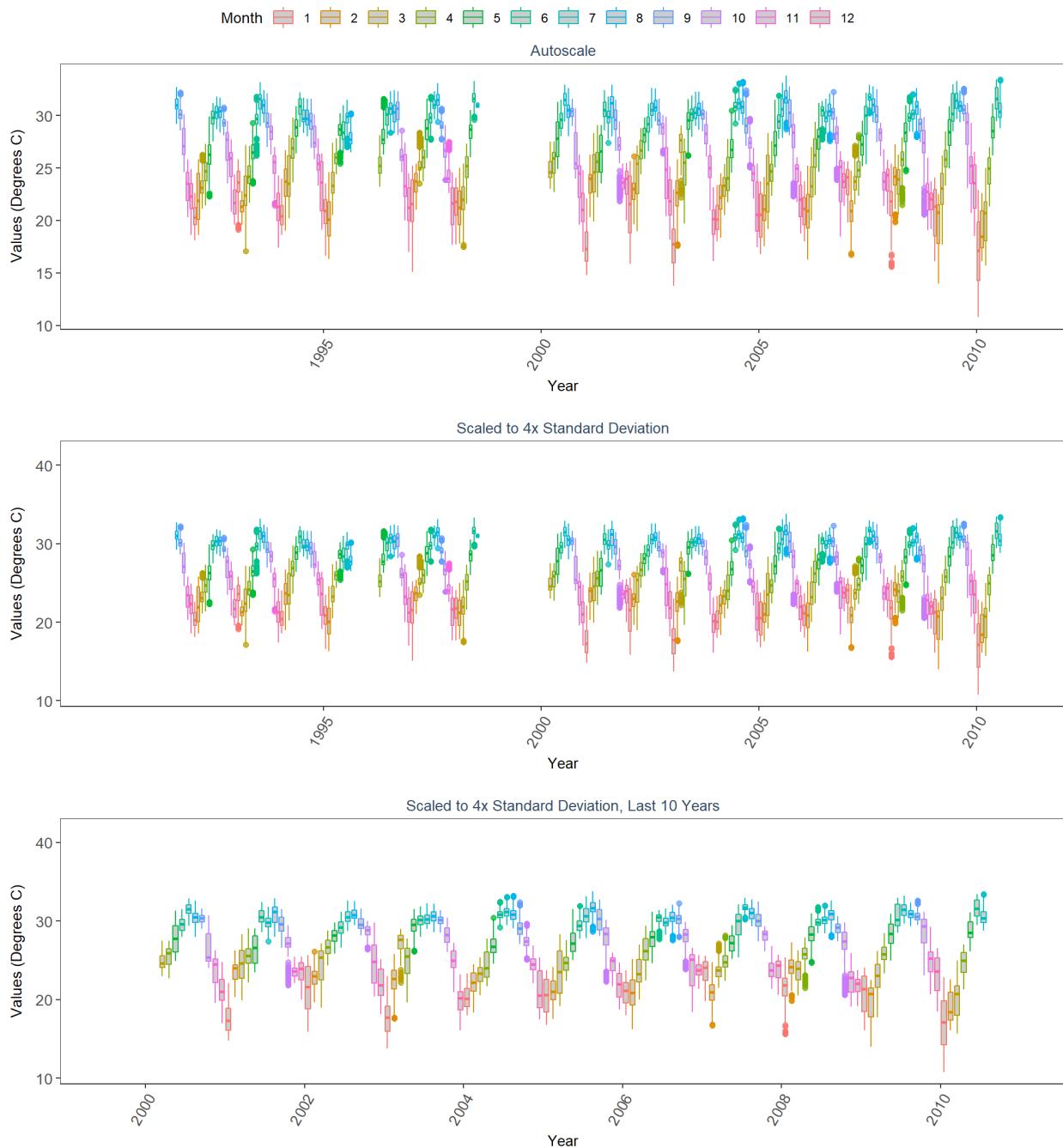
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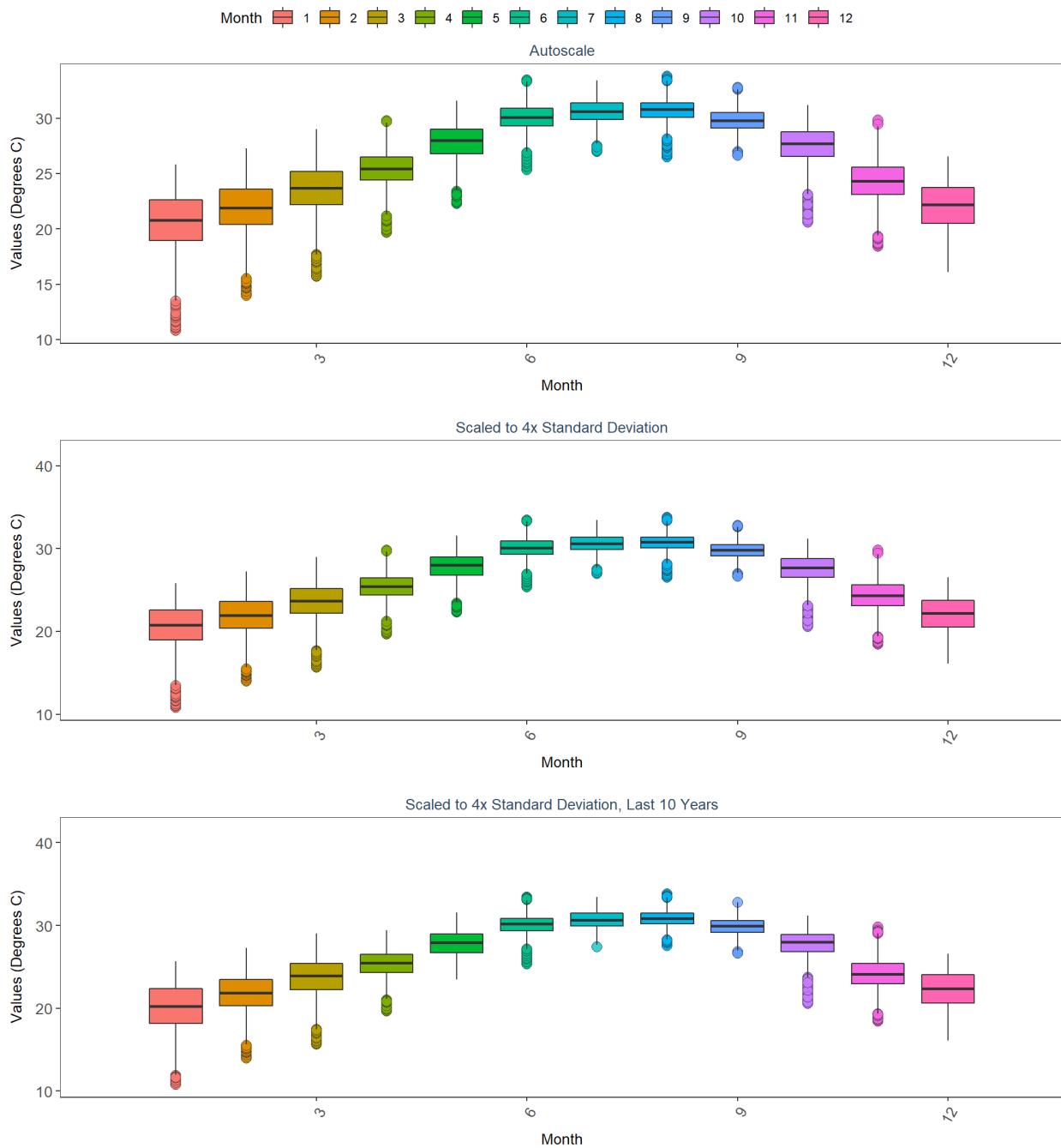
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By Year



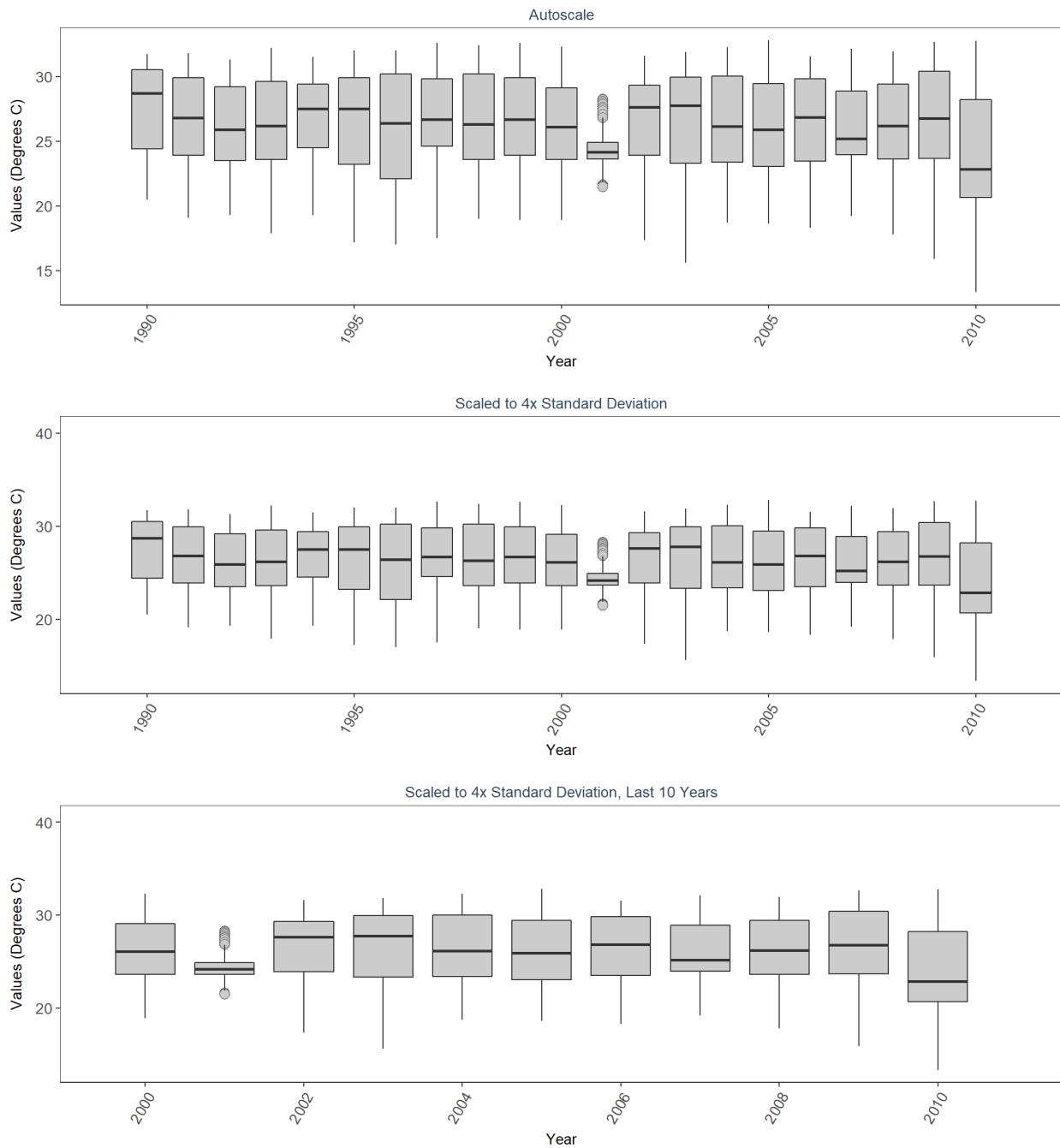
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 By Year & Month



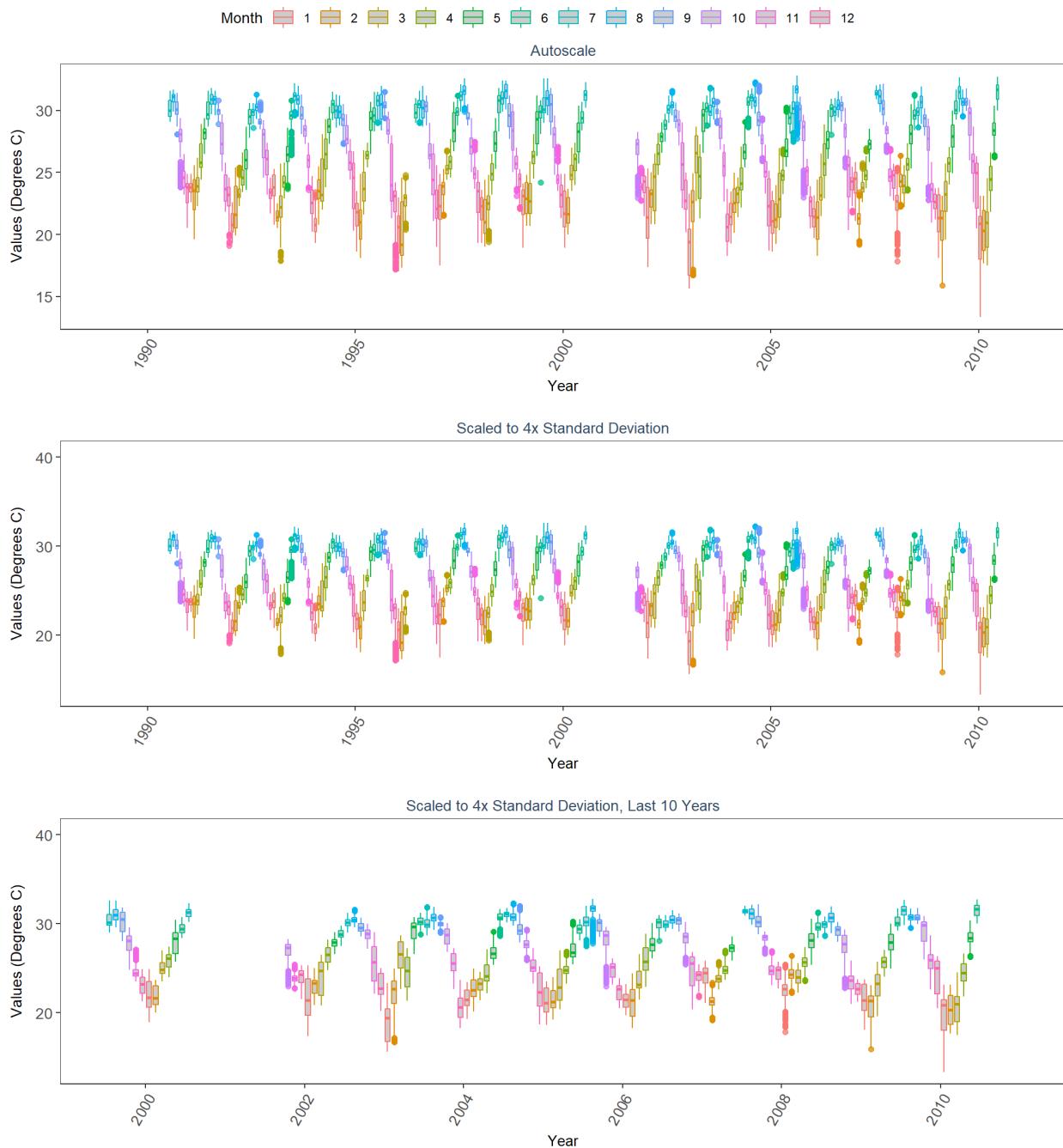
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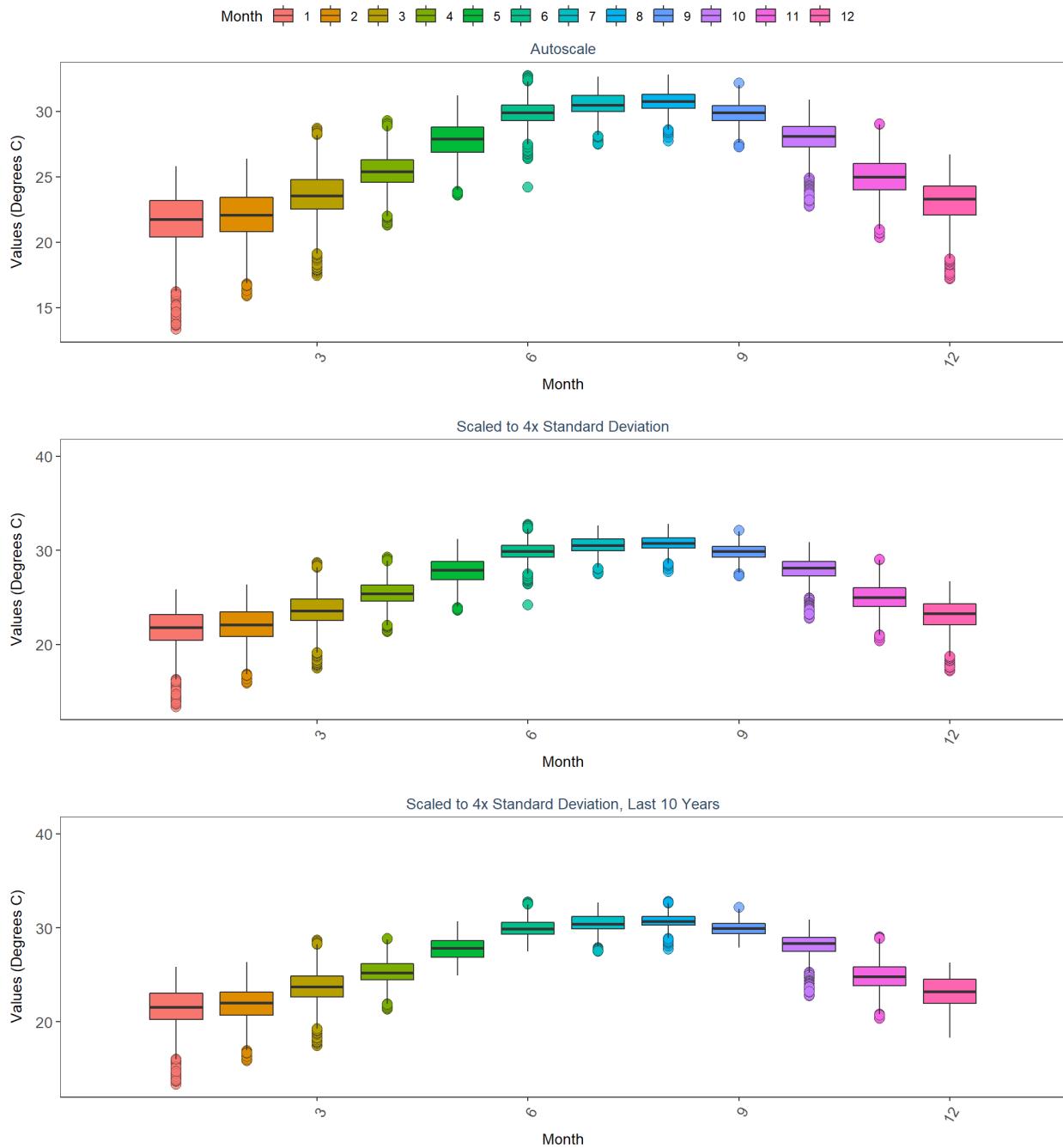
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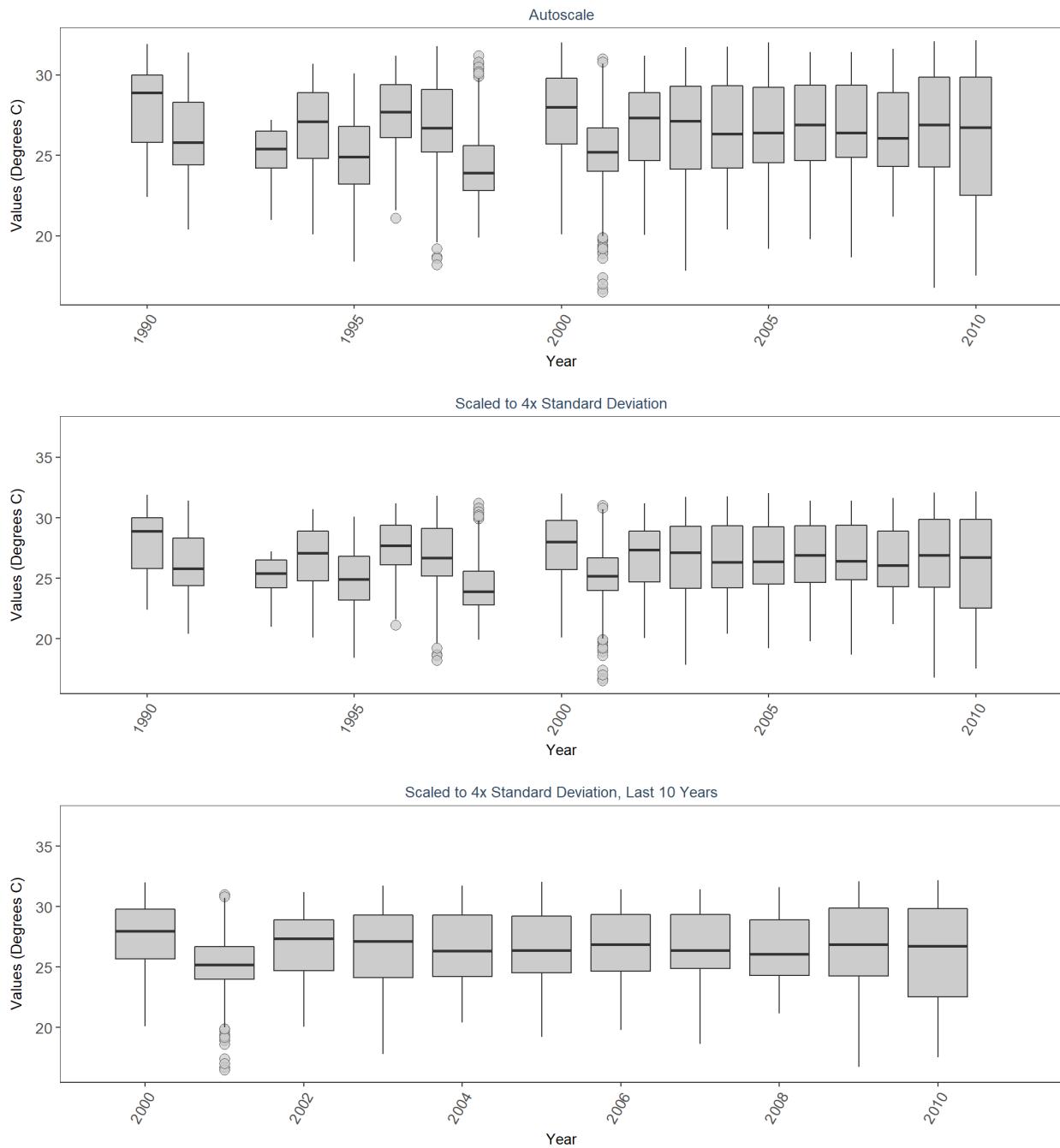
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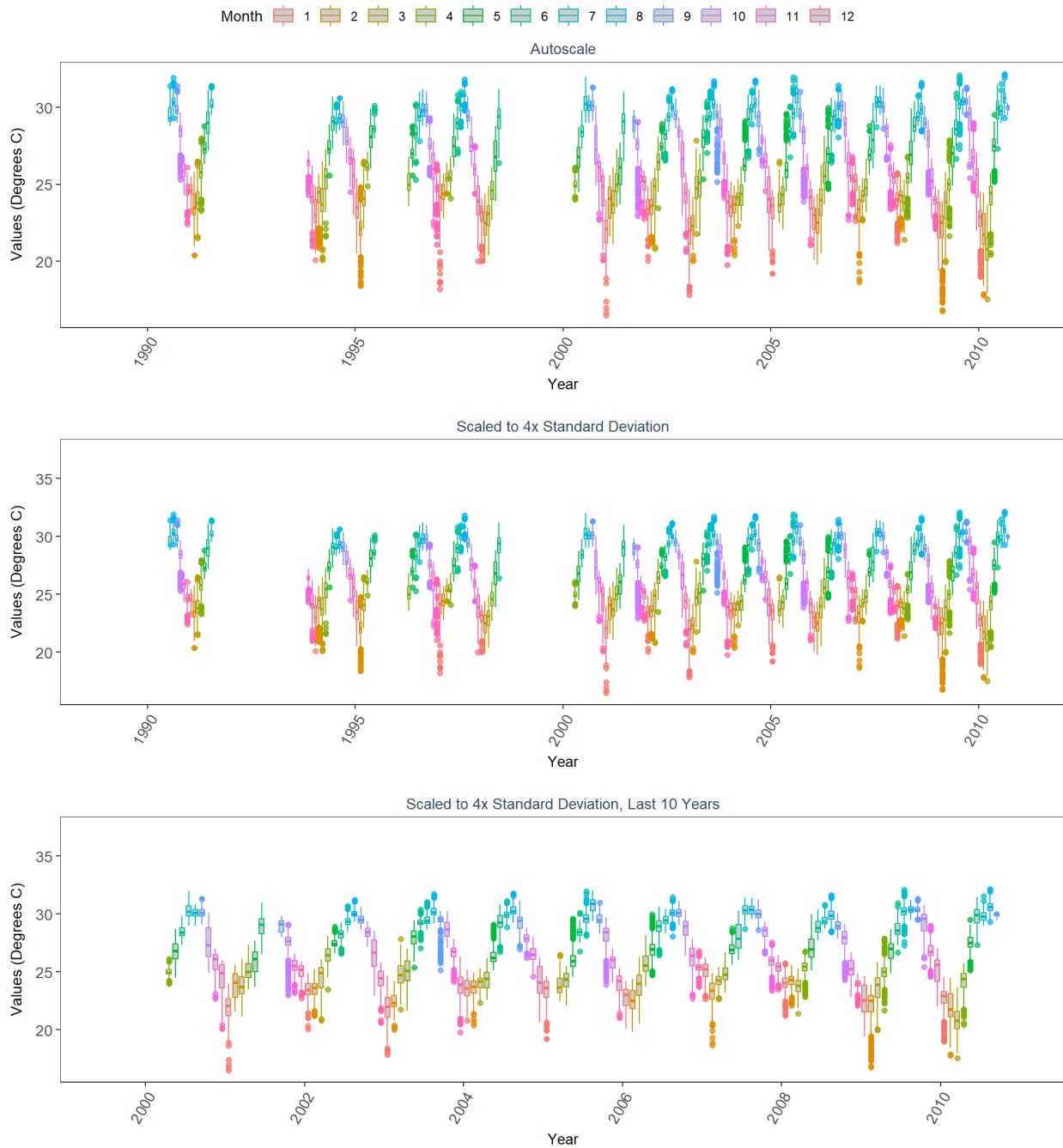
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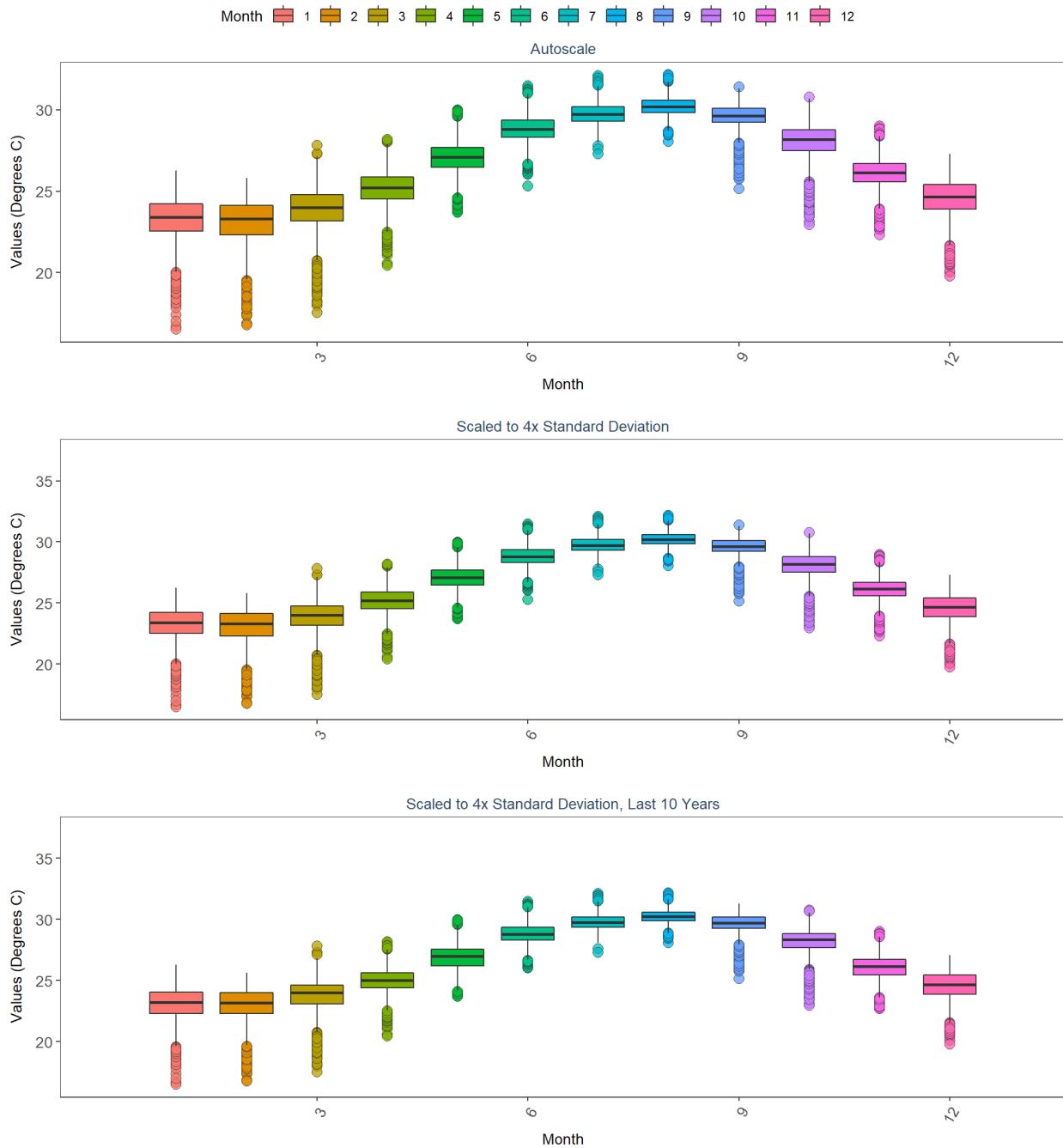
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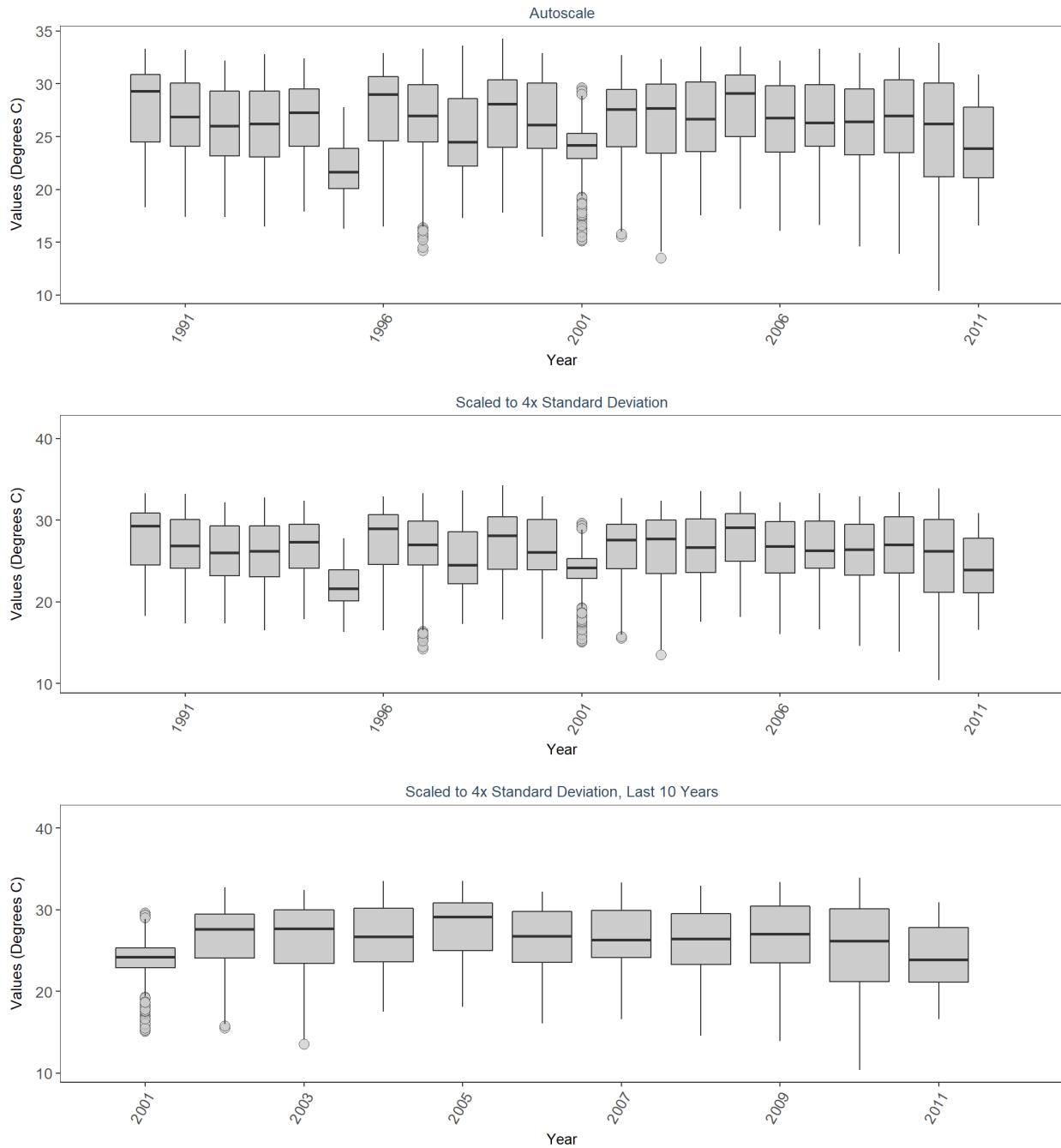
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 By Year & Month



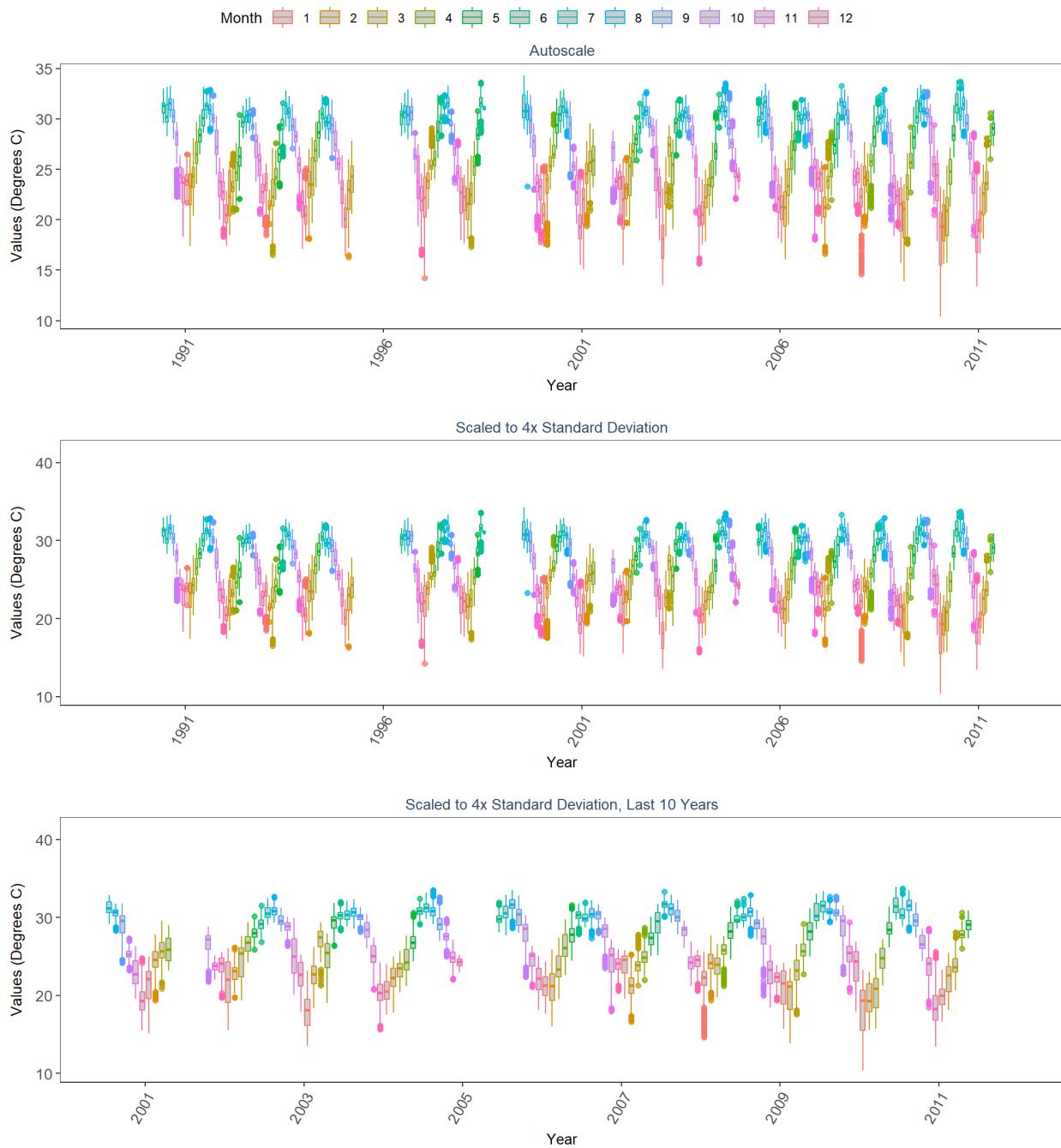
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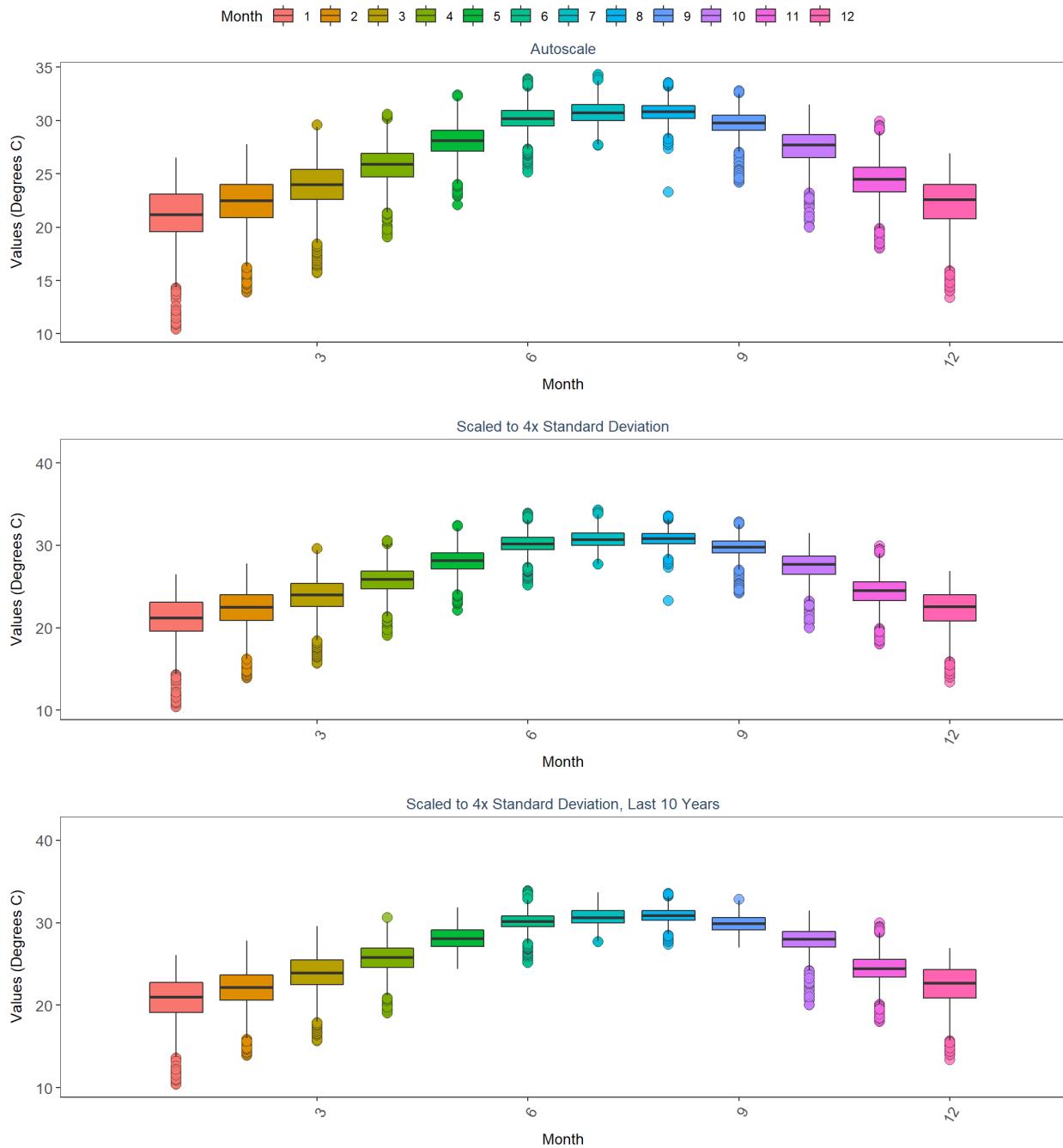
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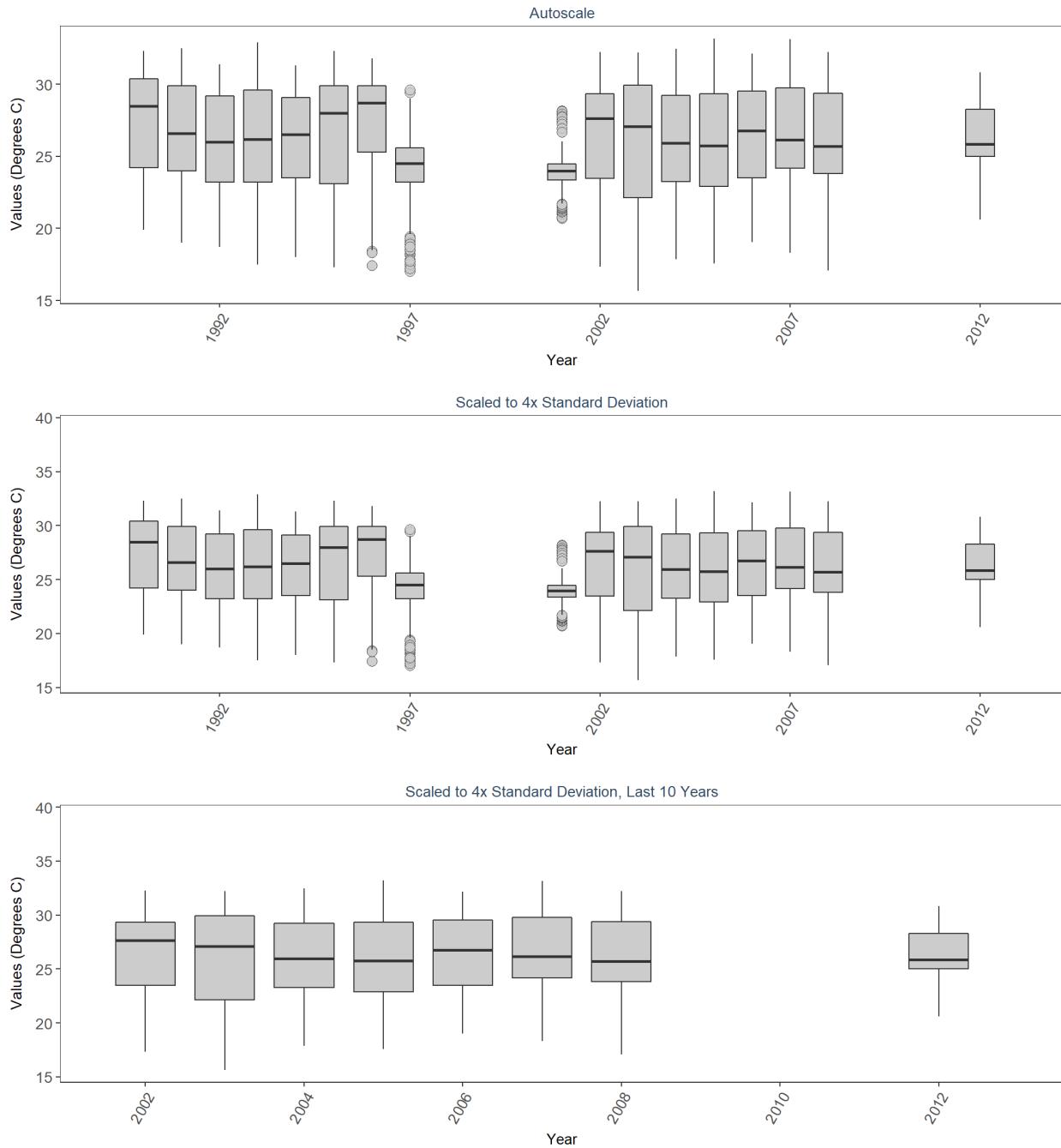
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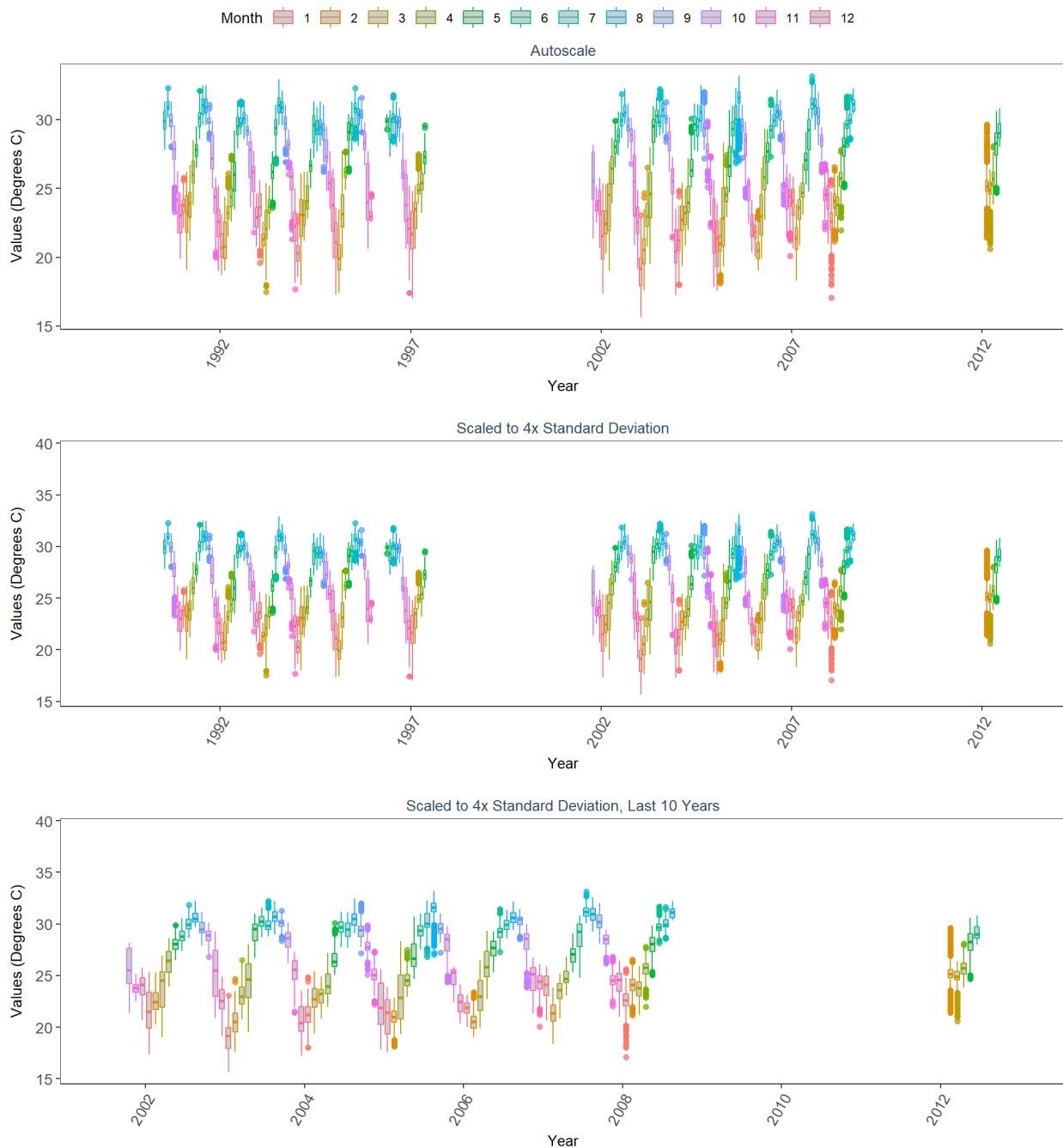
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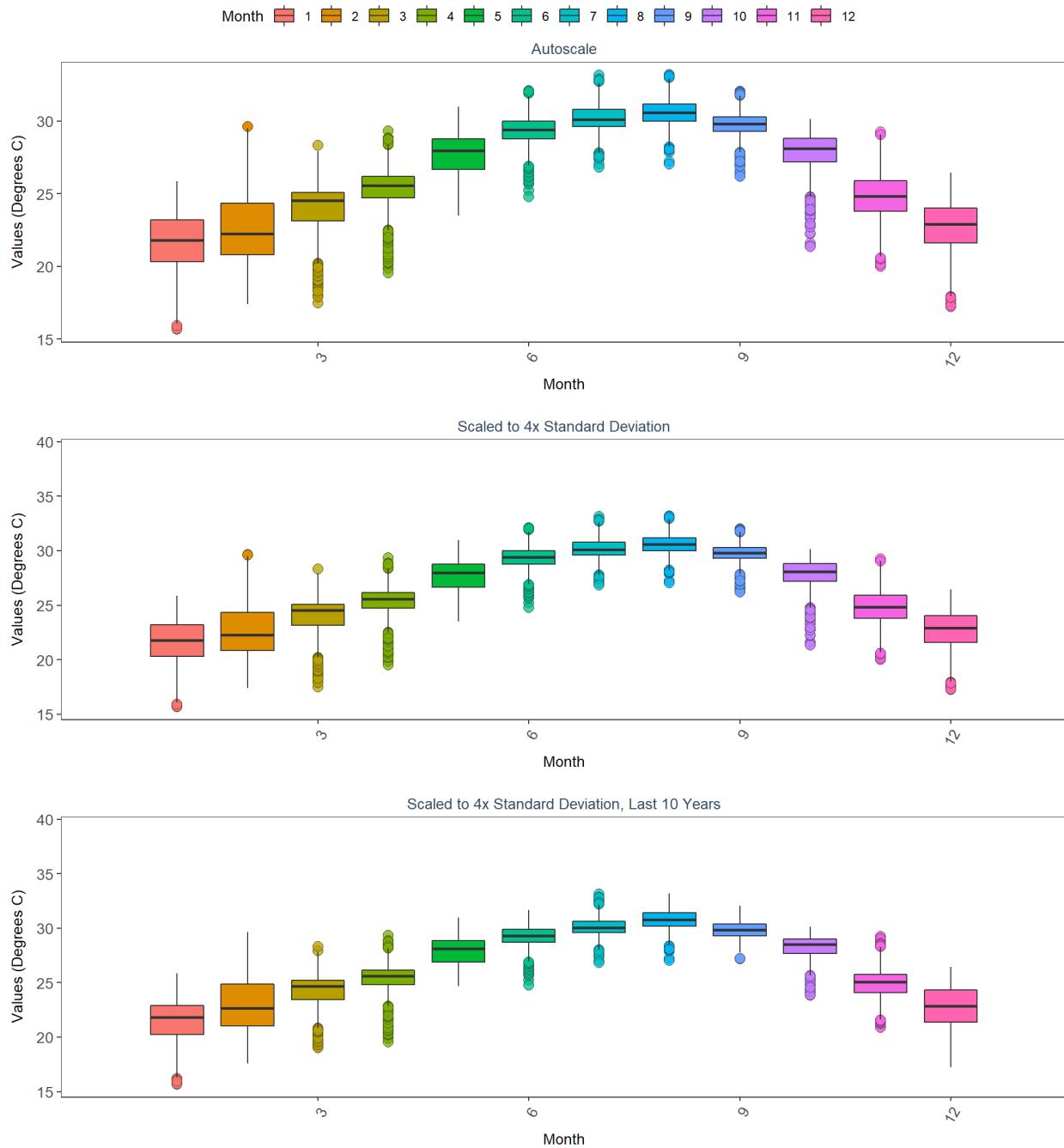
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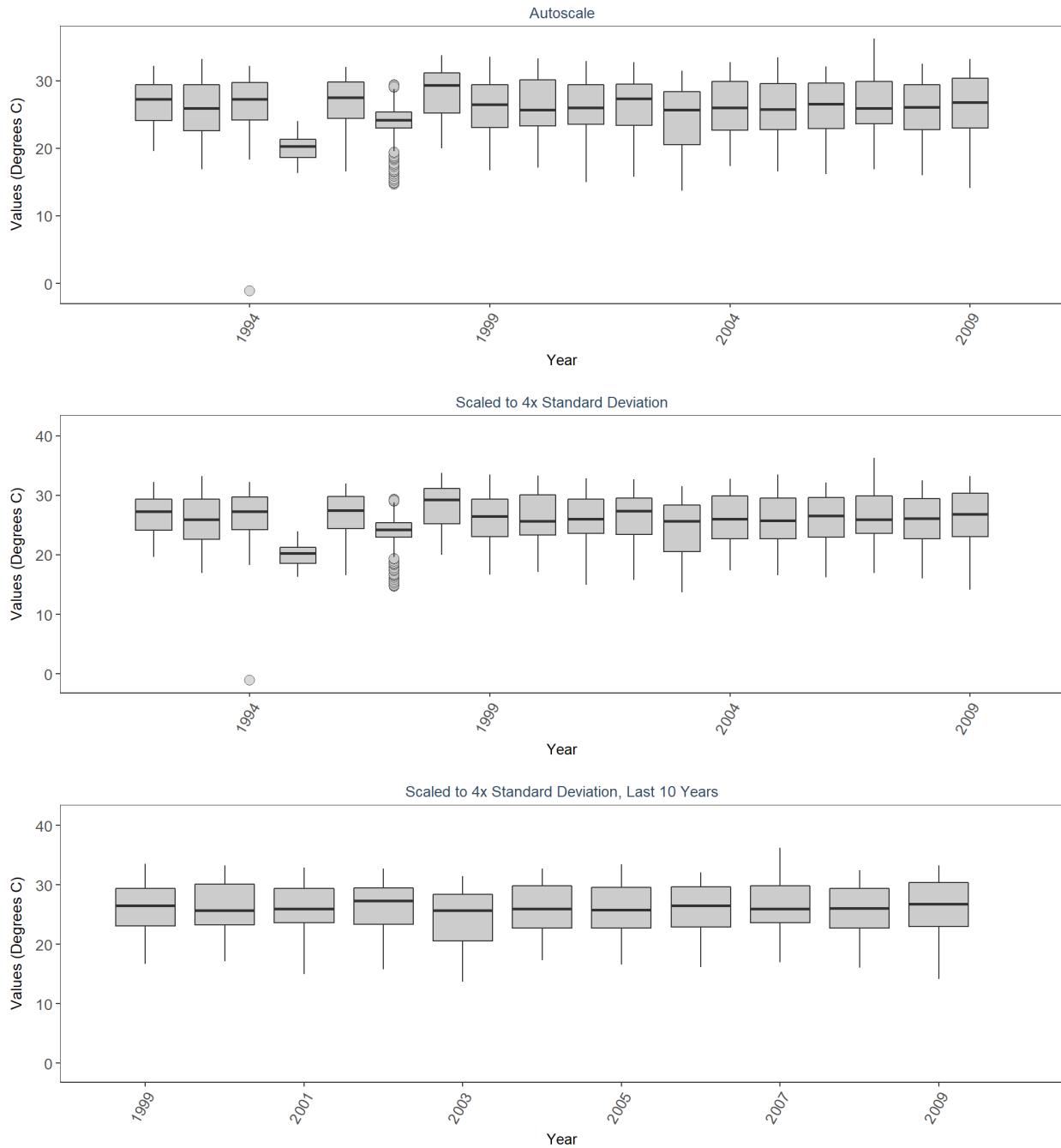
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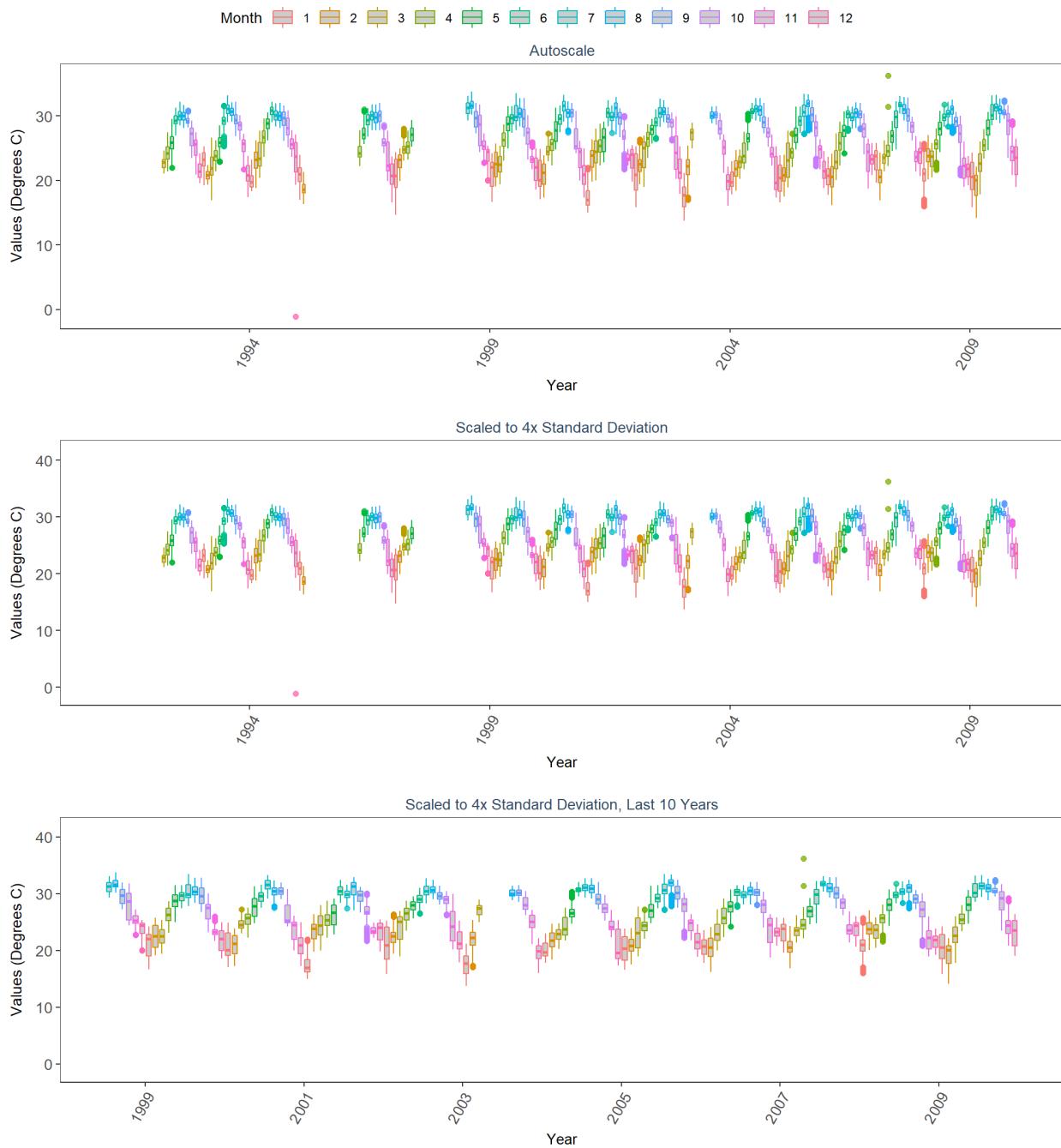
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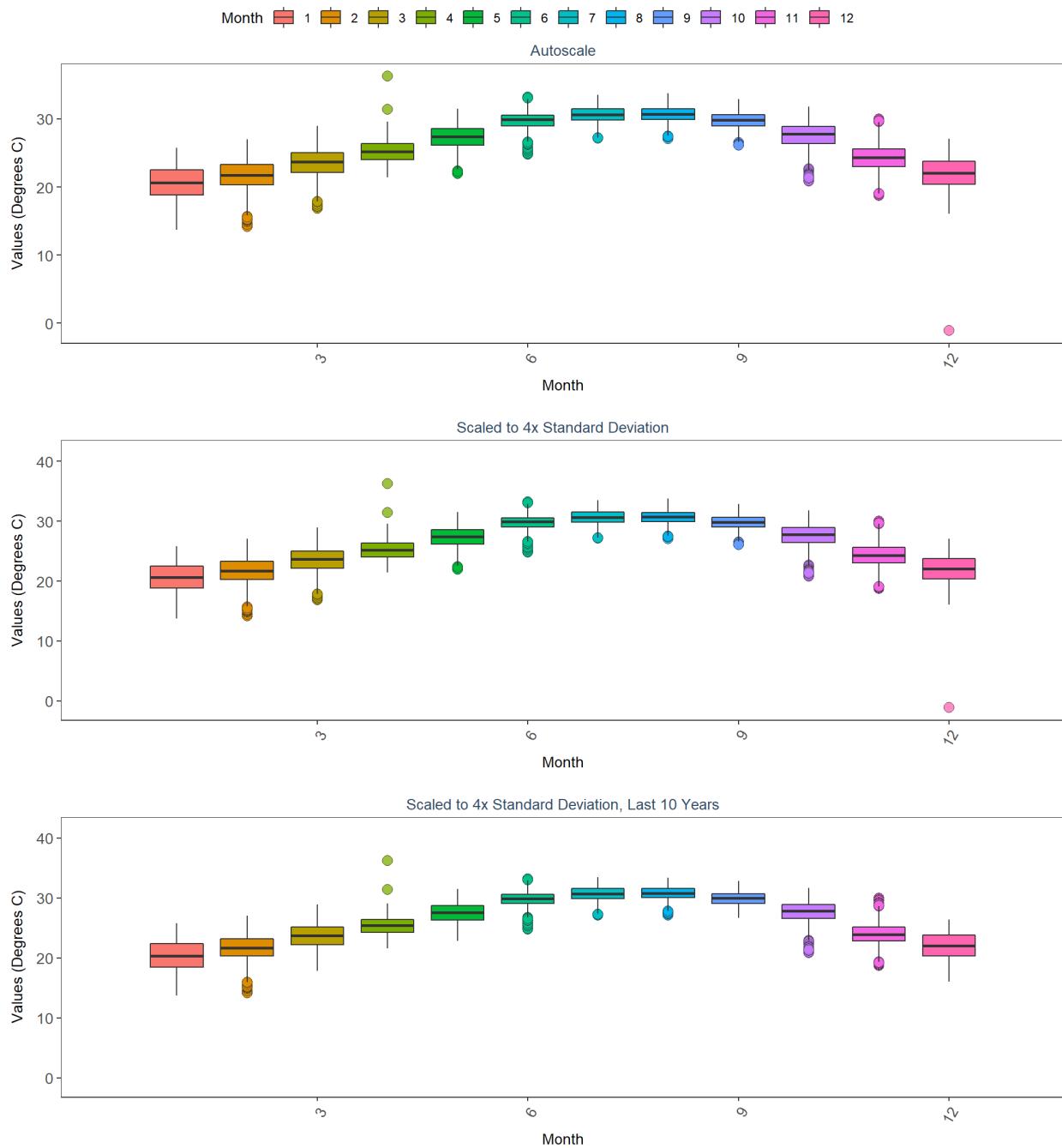
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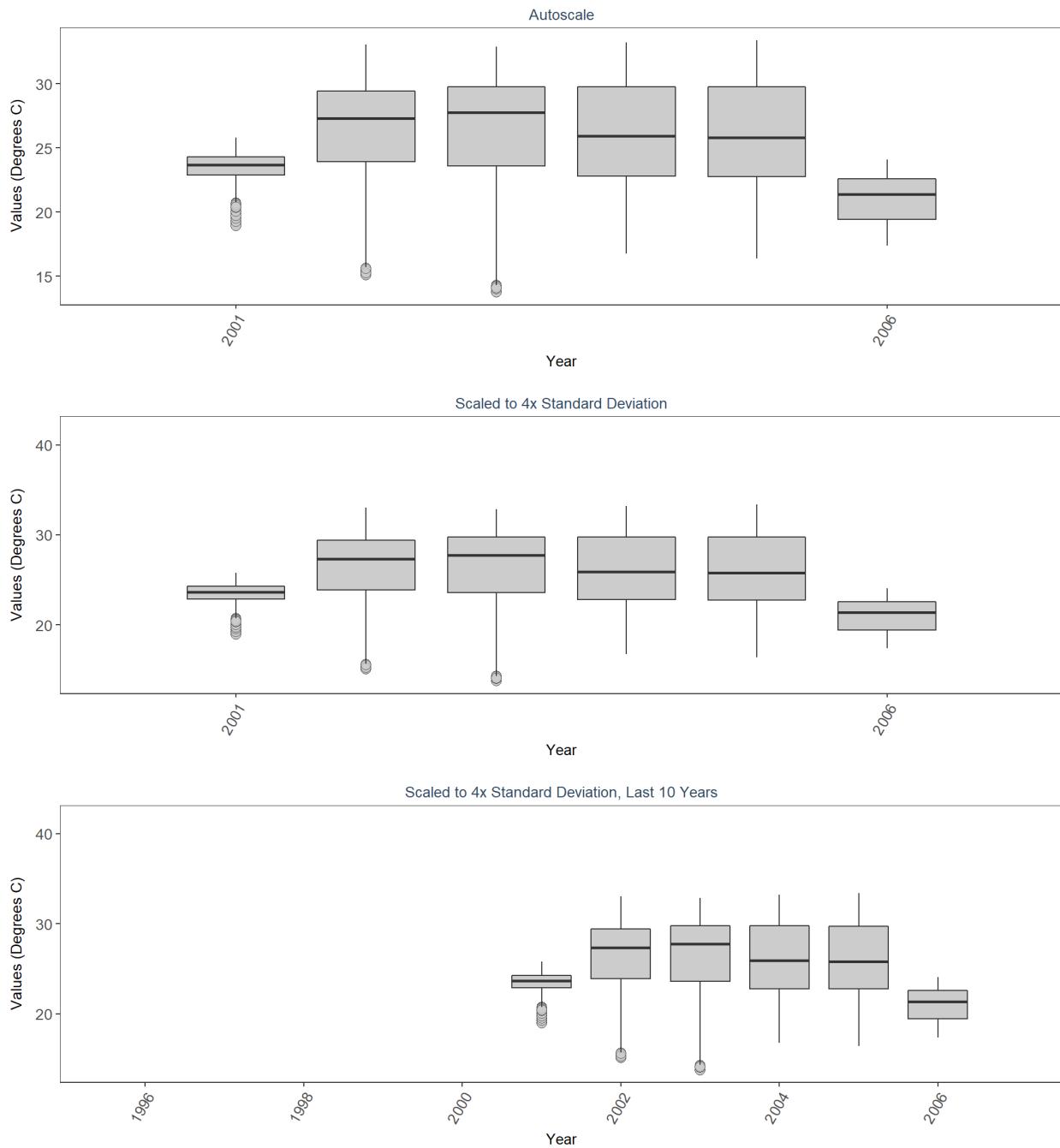
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 By Year & Month



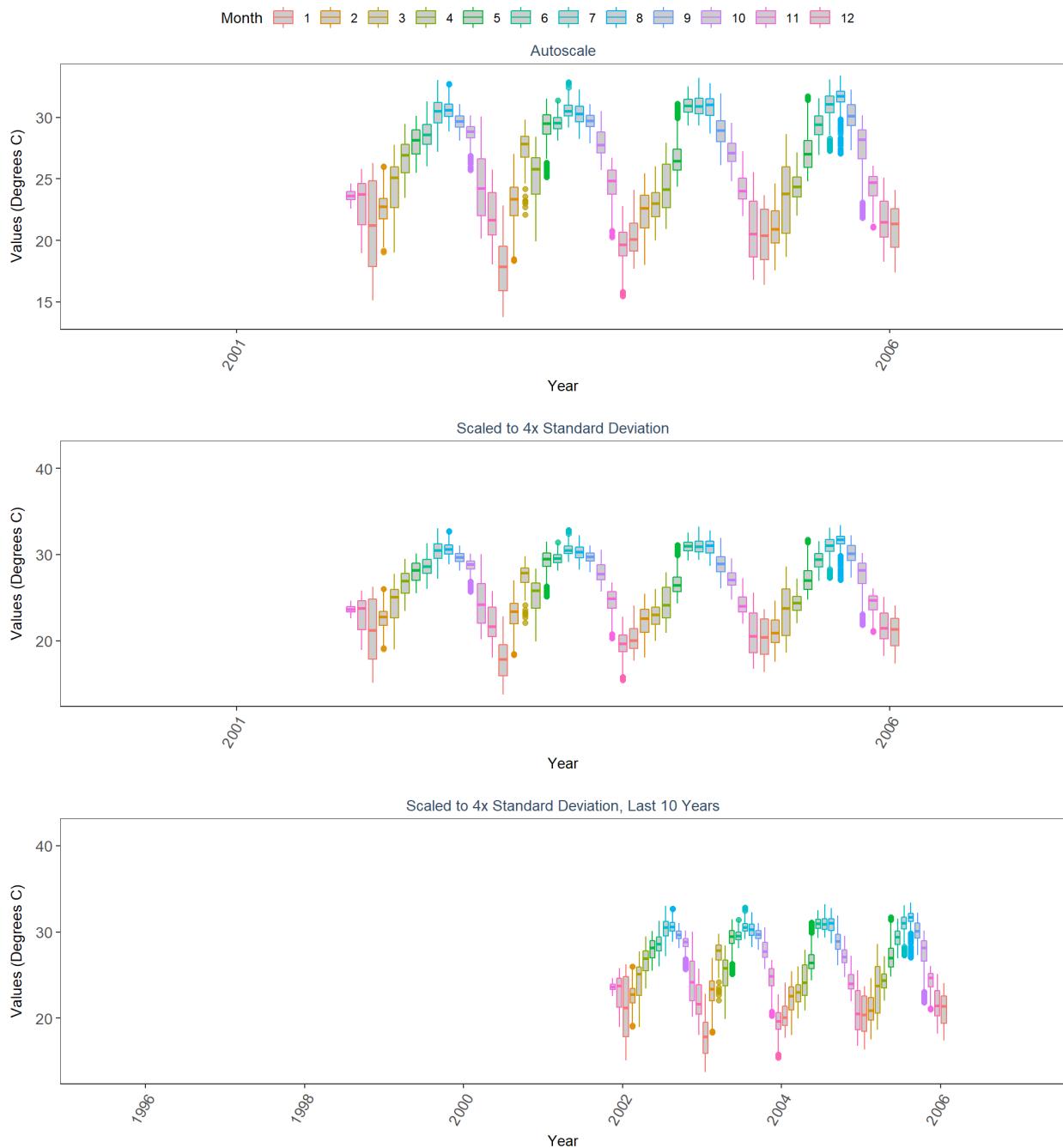
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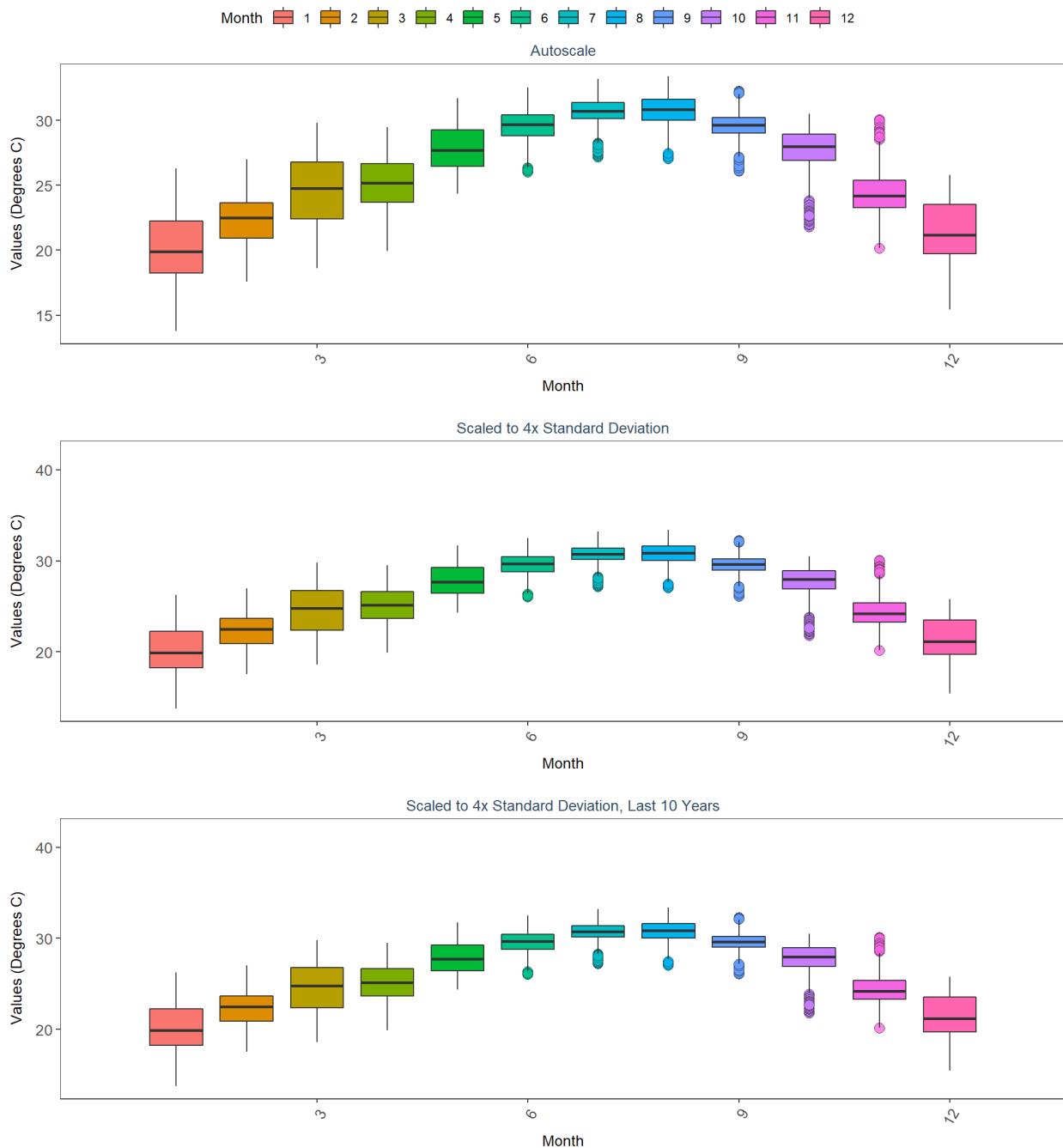
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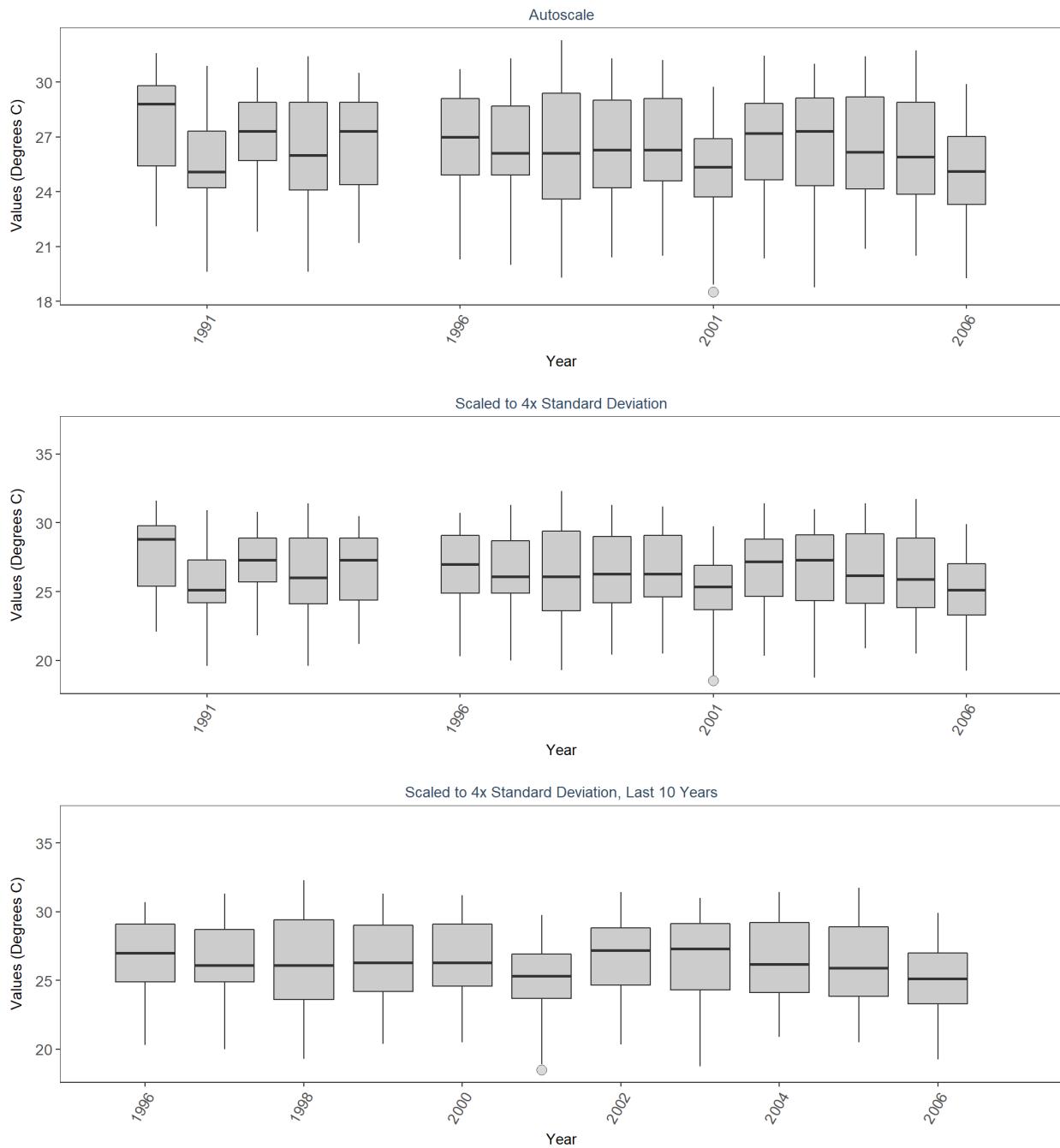
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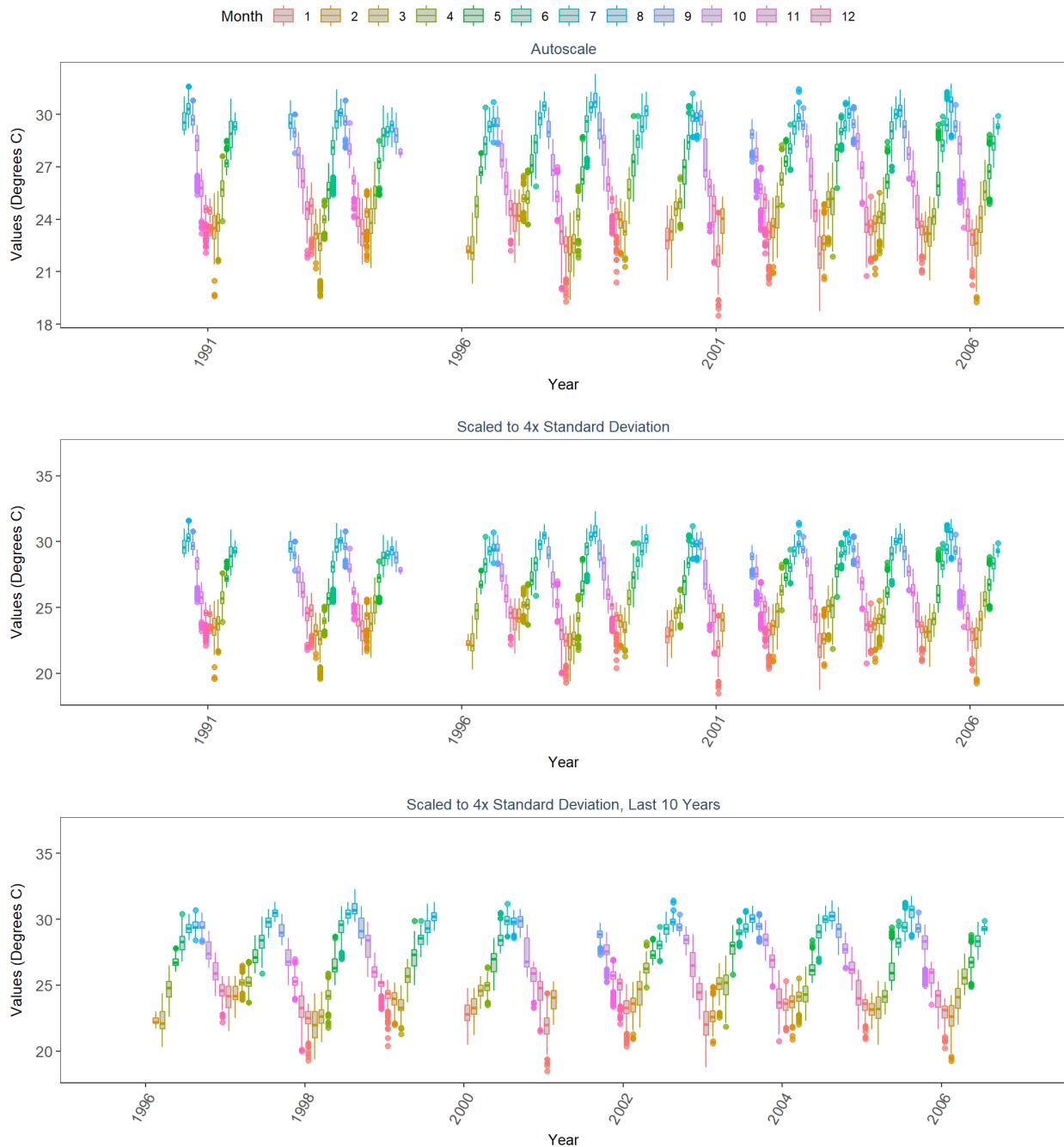
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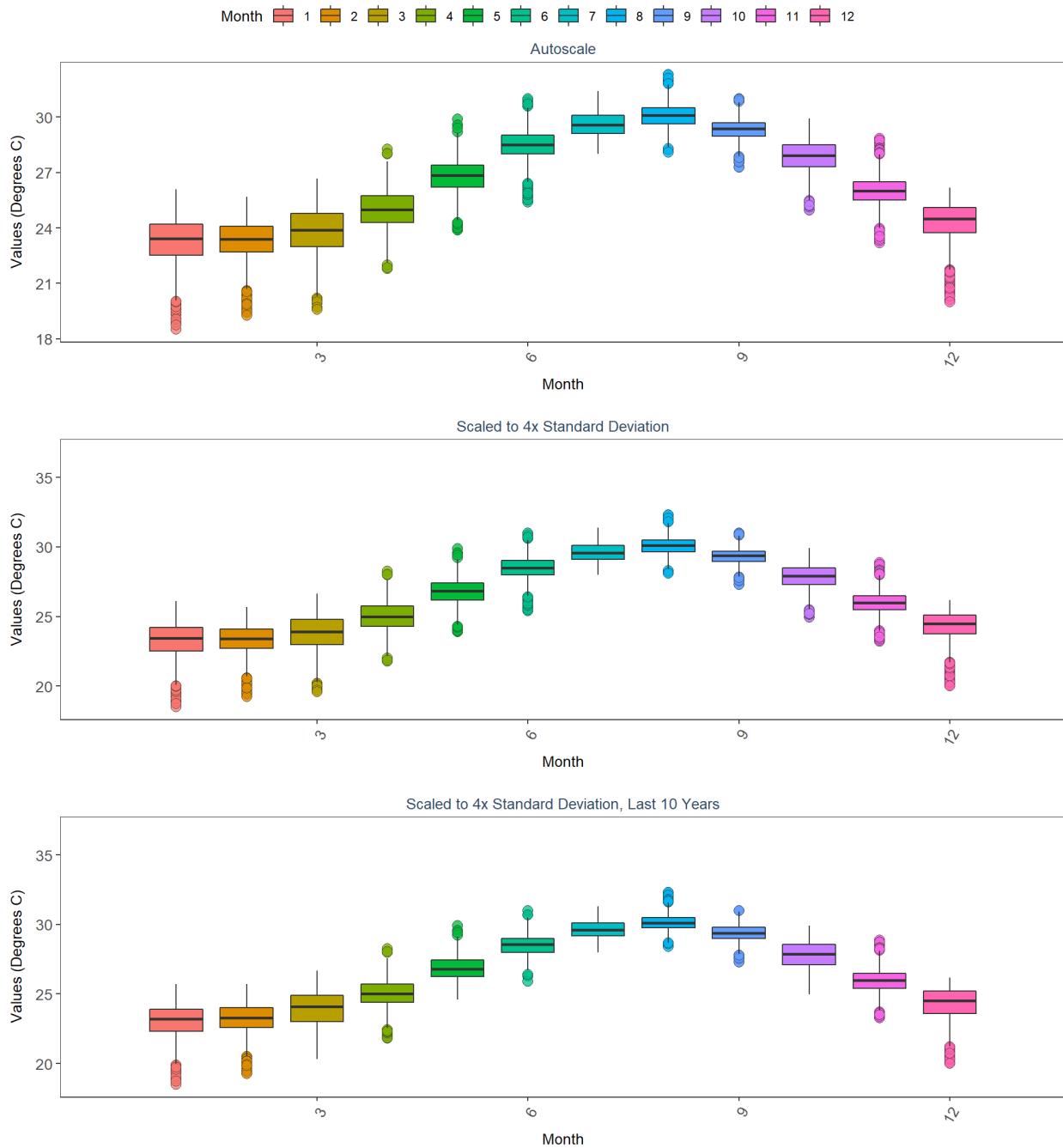
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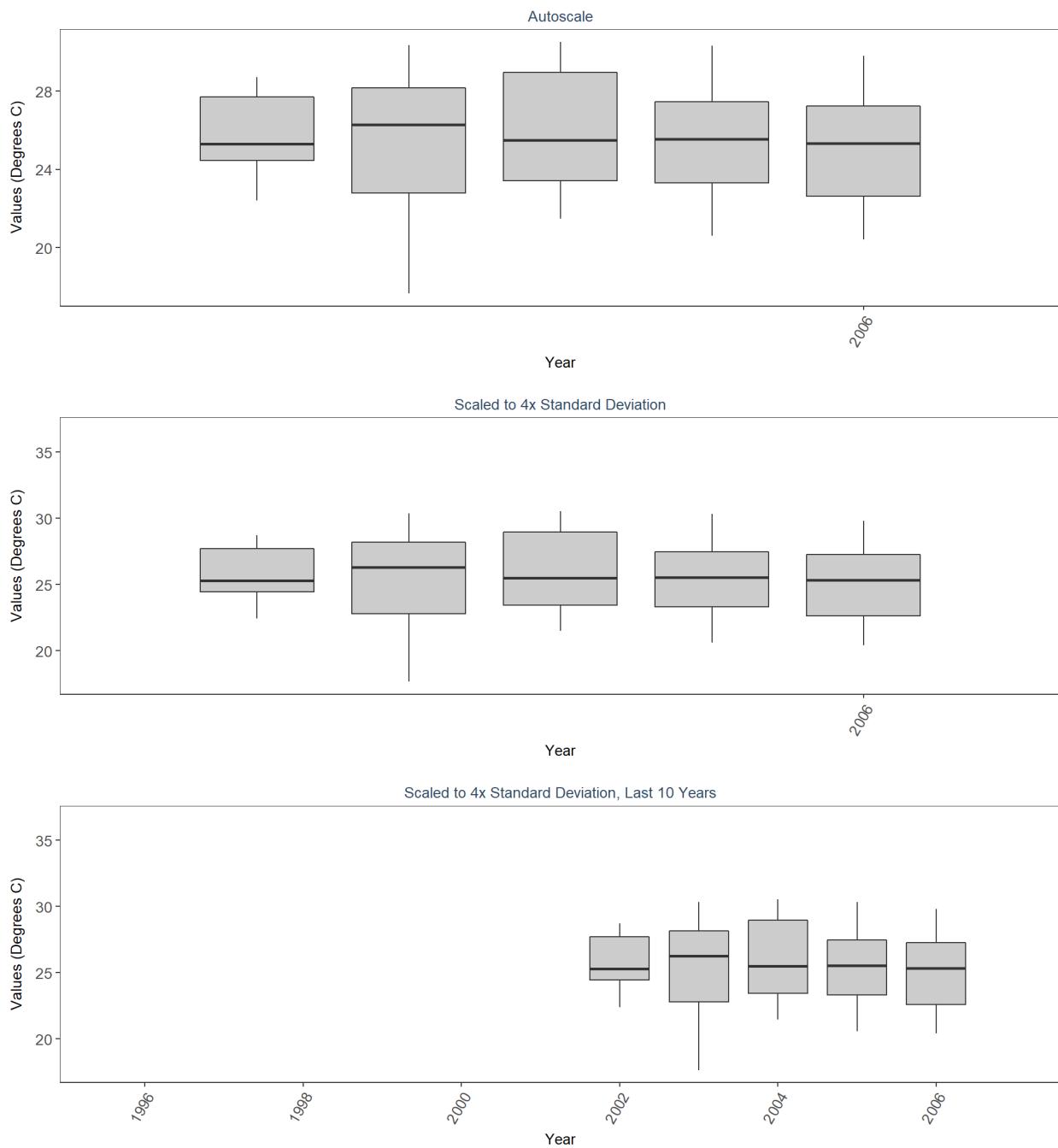
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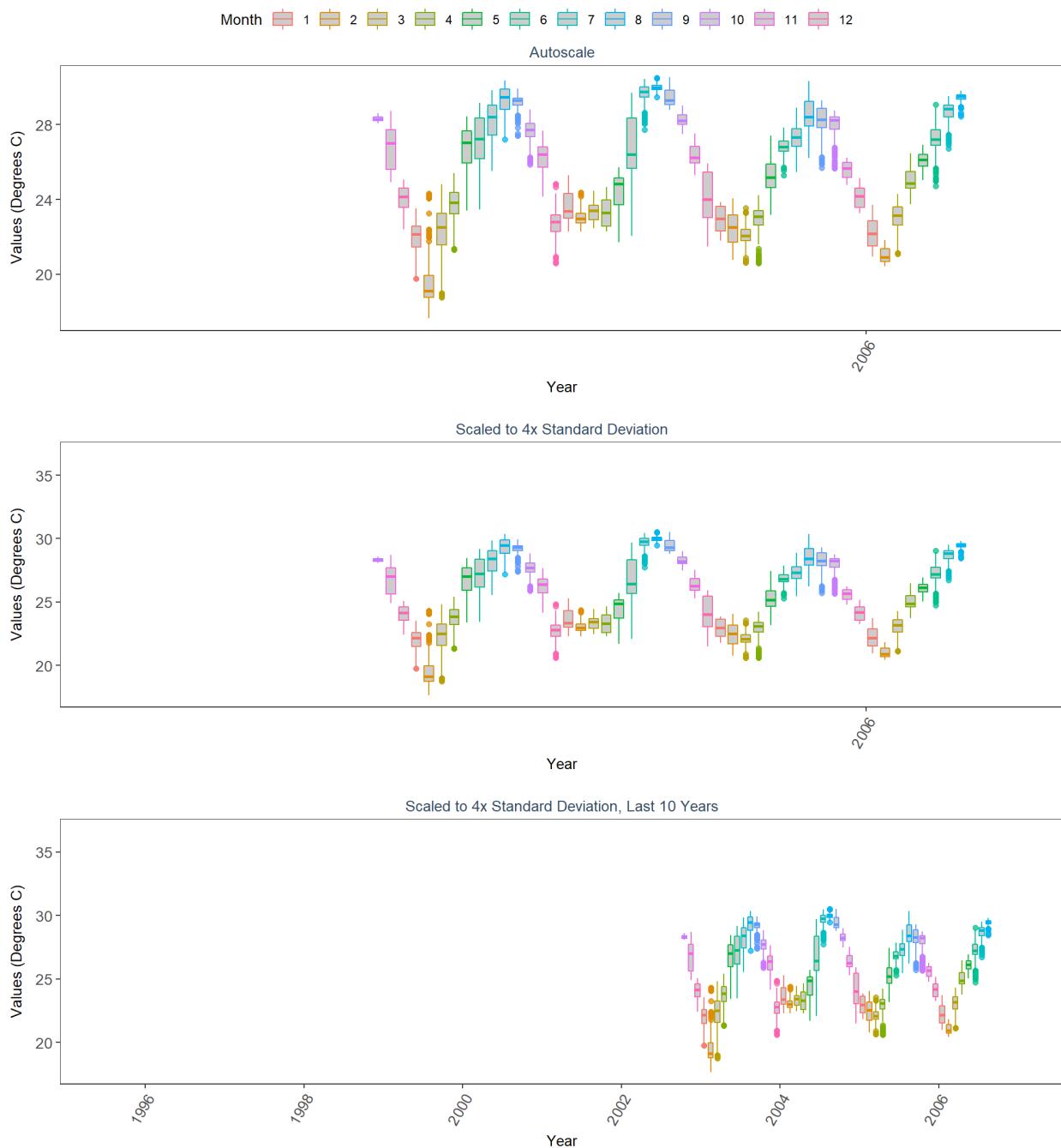
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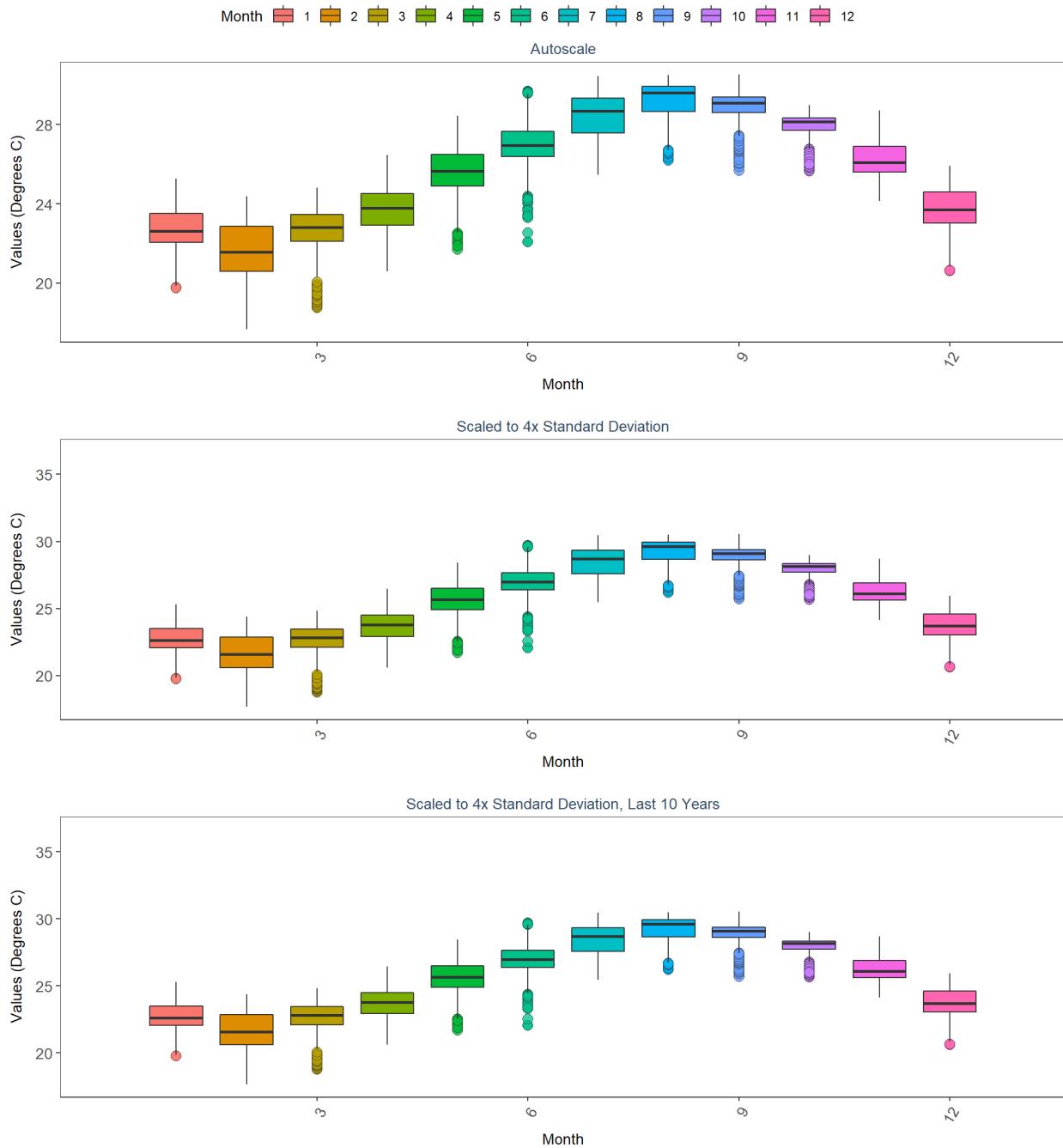
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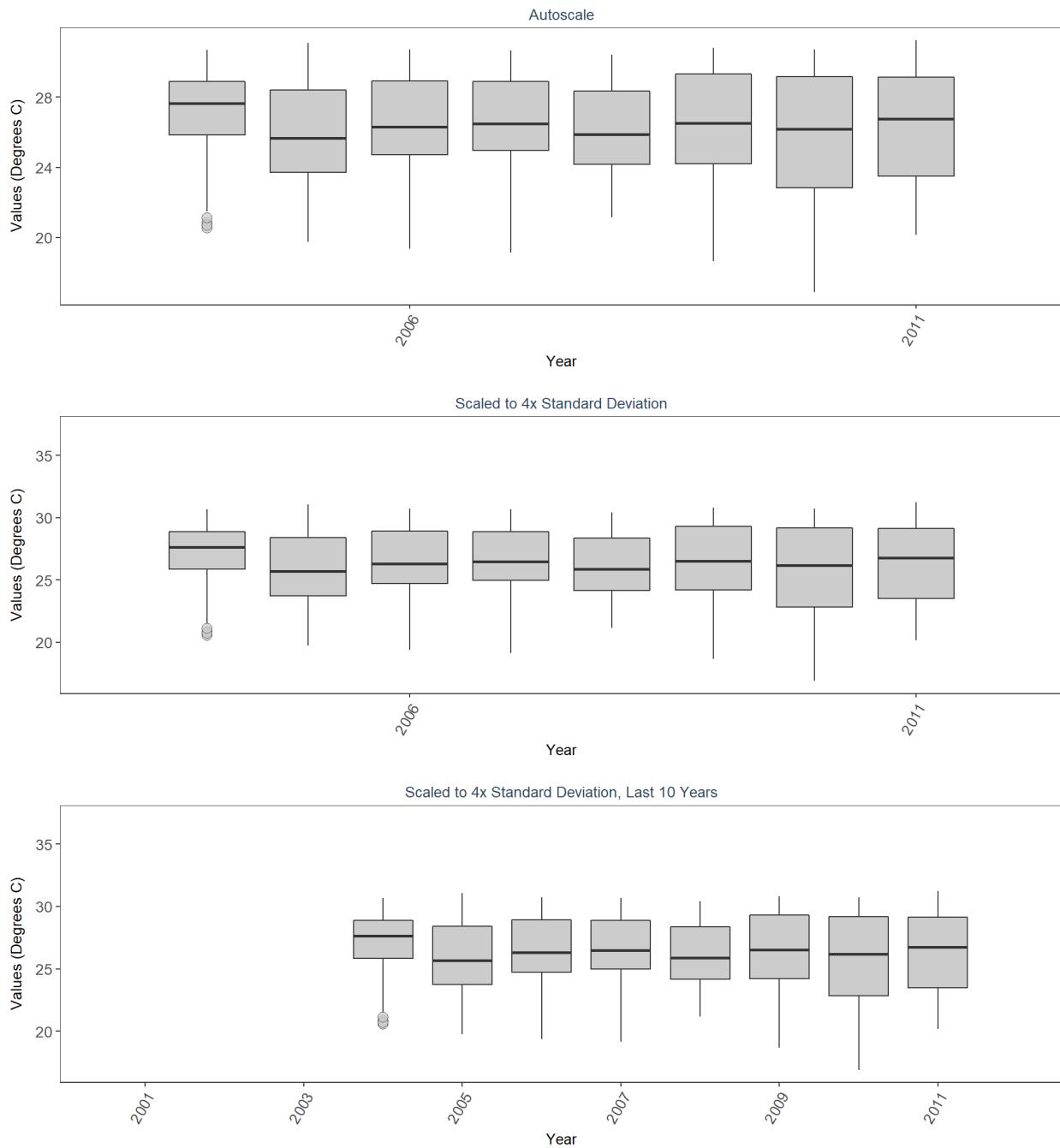
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 By Year & Month



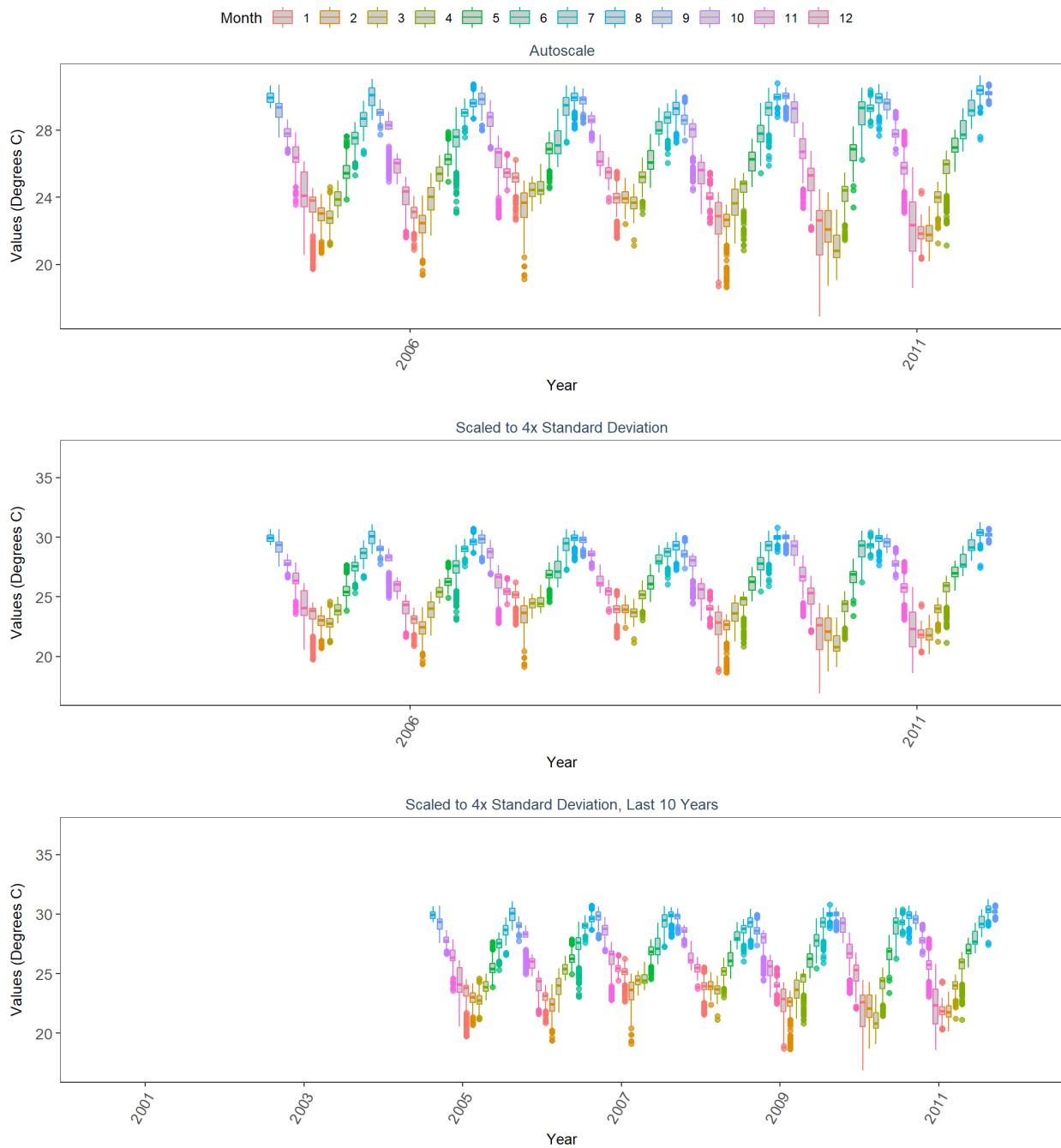
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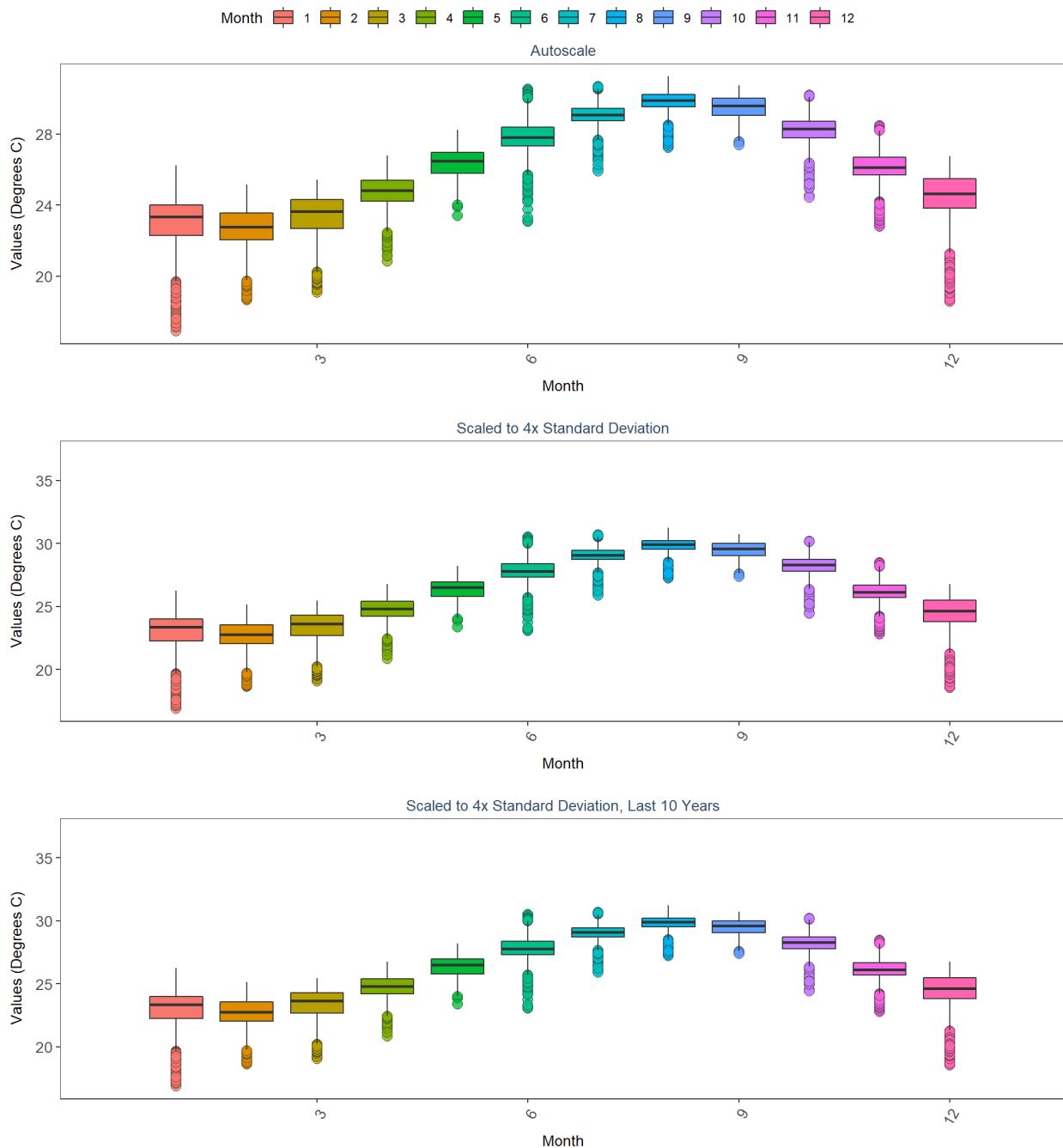
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By Year



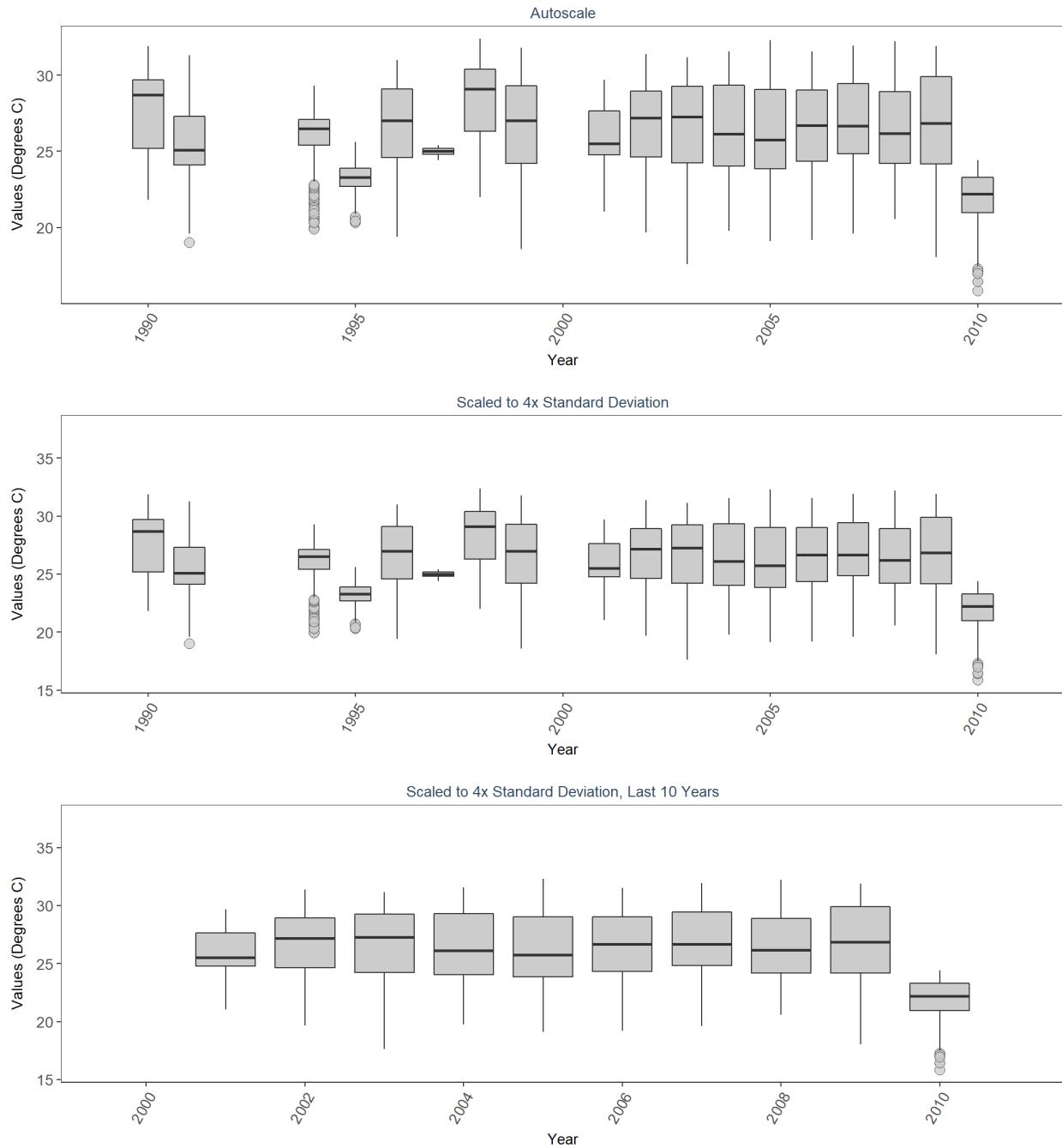
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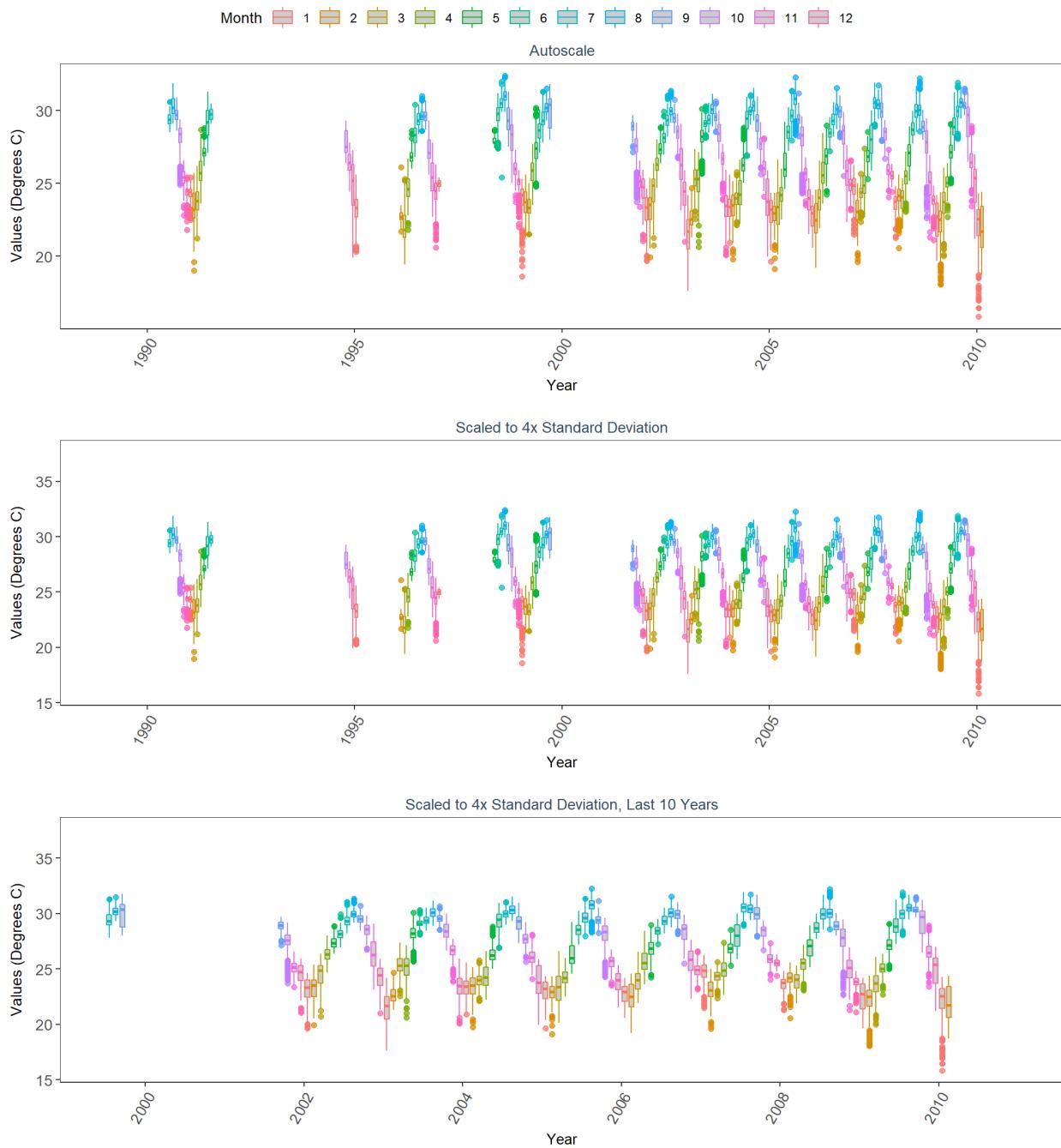
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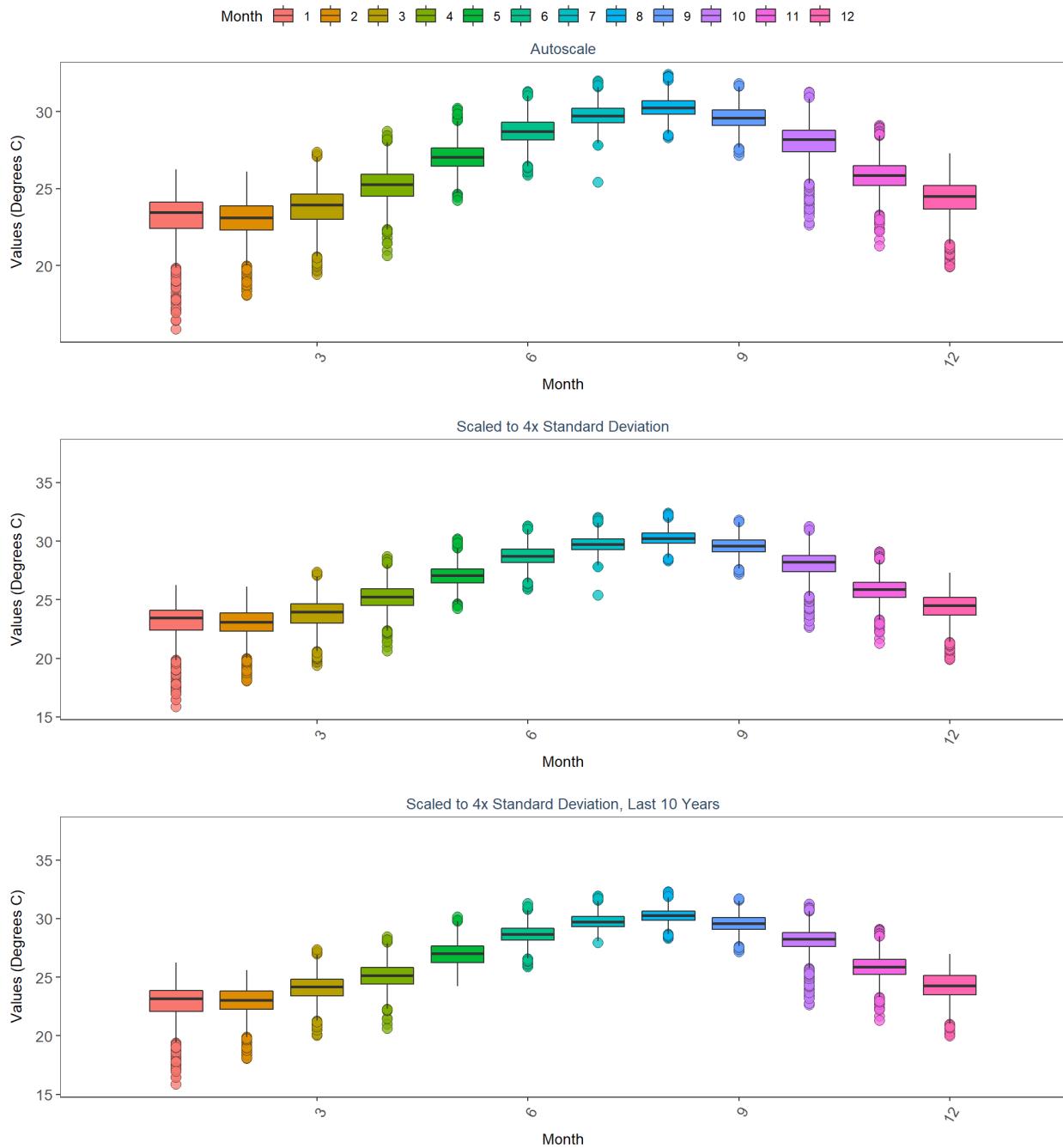
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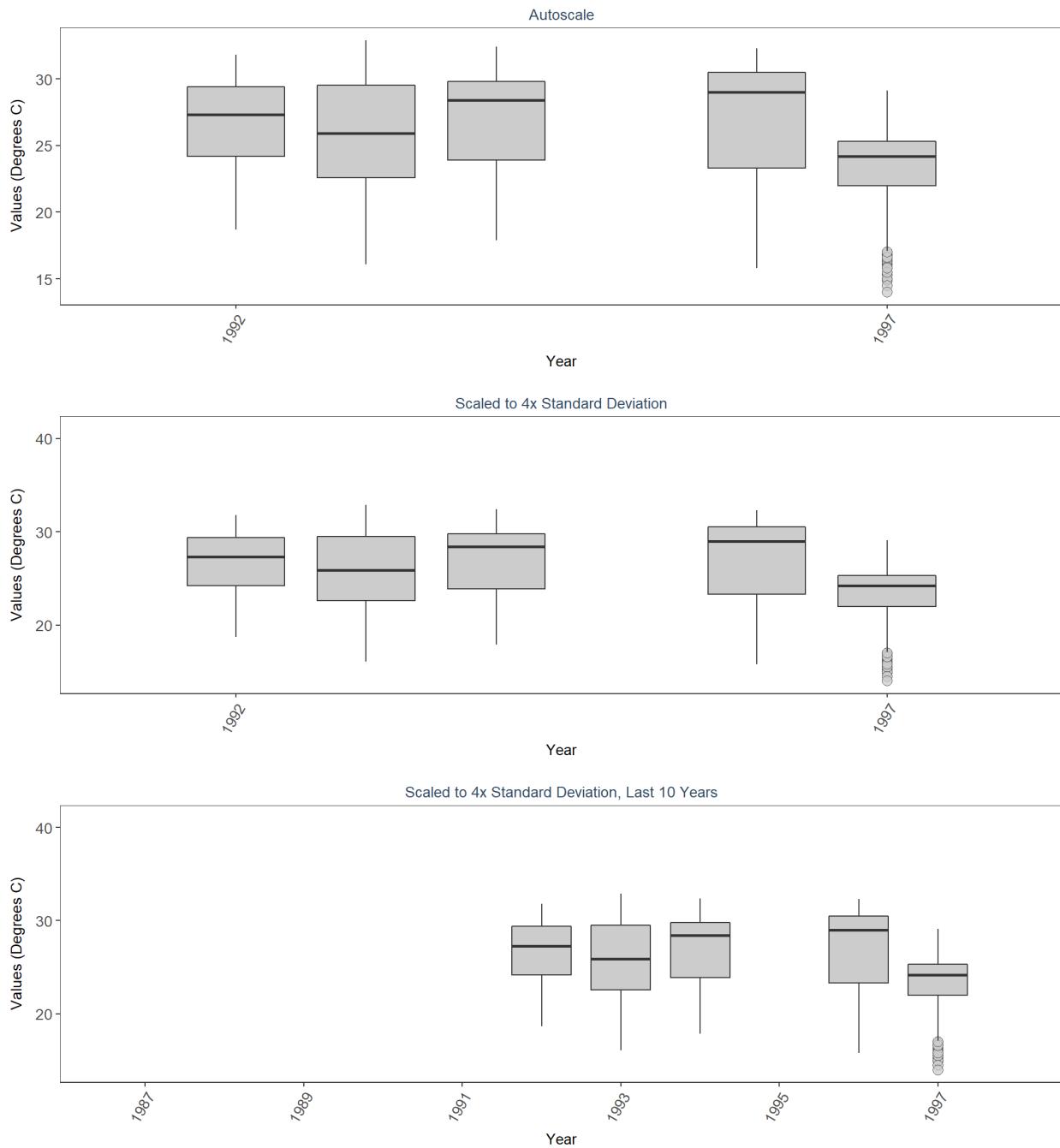
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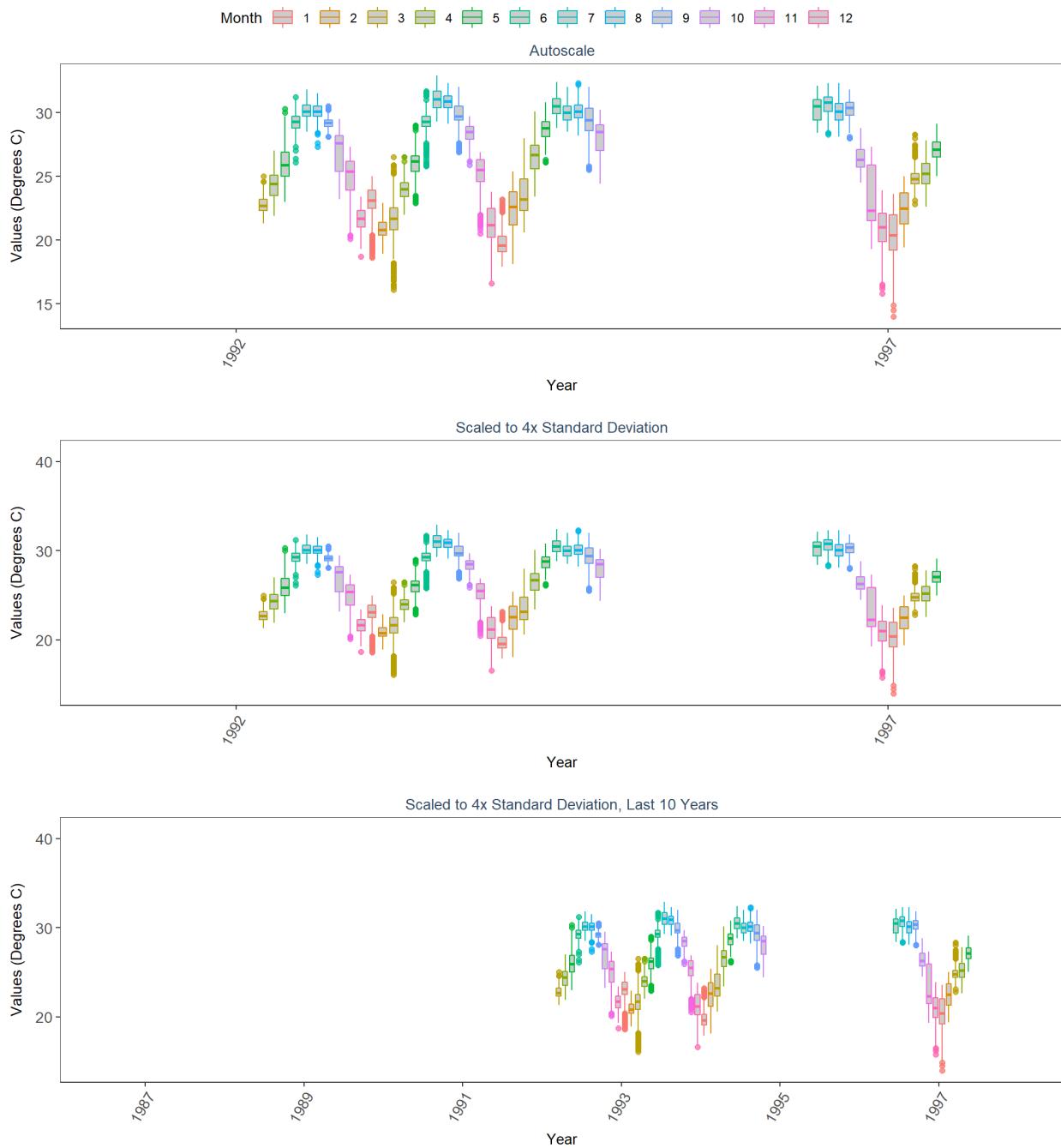
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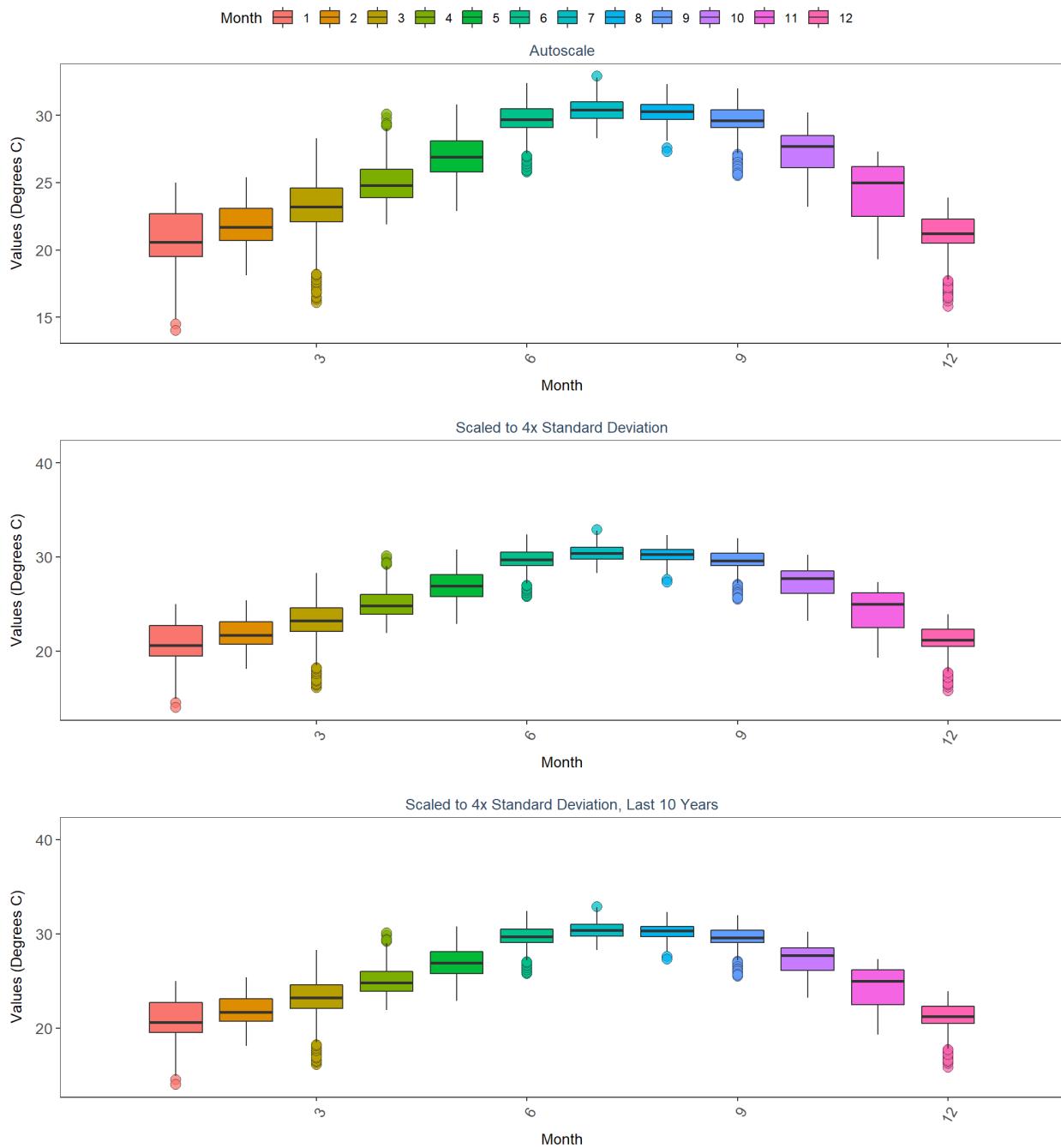
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 By Year



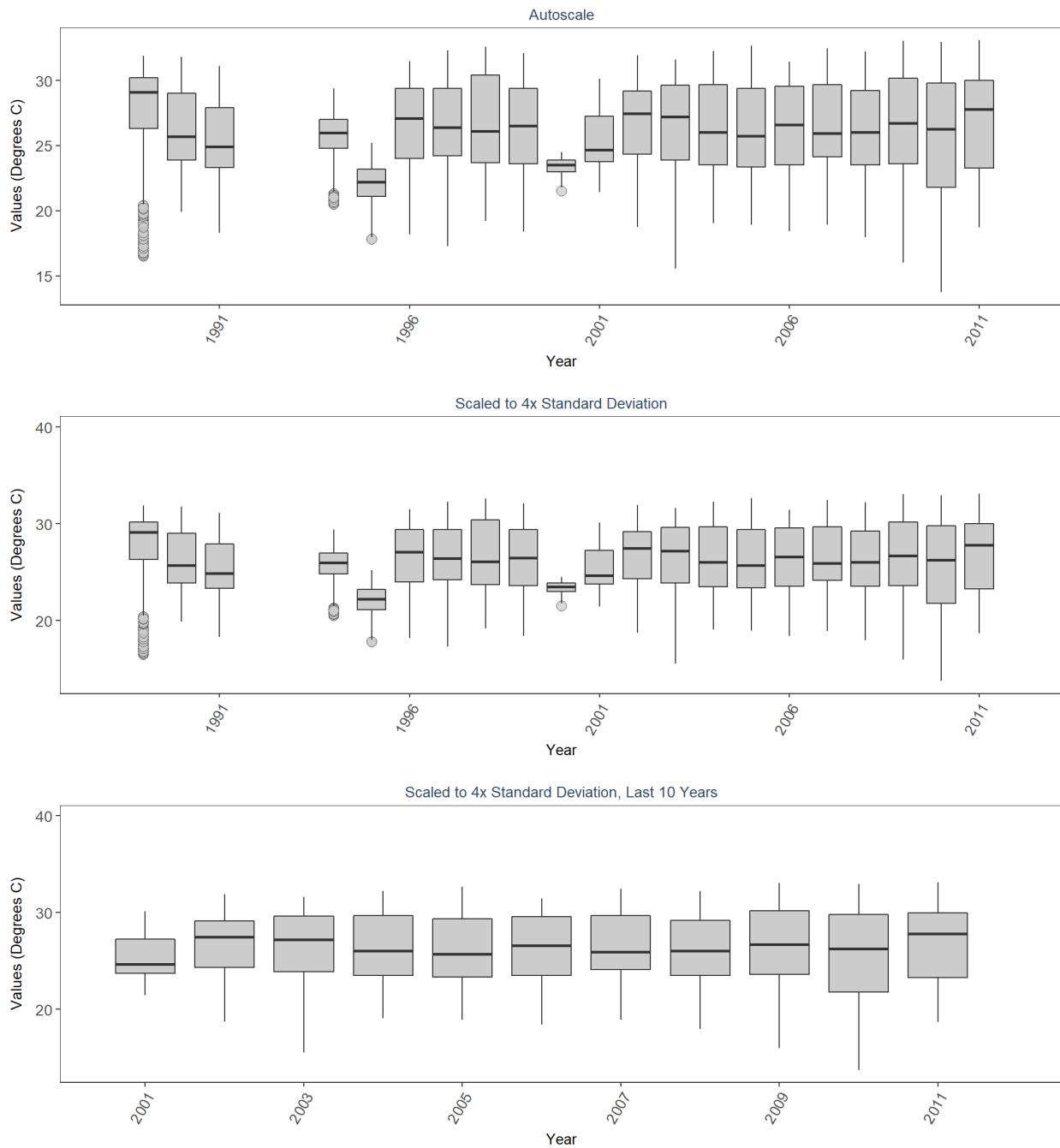
Florida Keys National Marine Sanctuary  
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_HARBORKEY**  
 By Year & Month



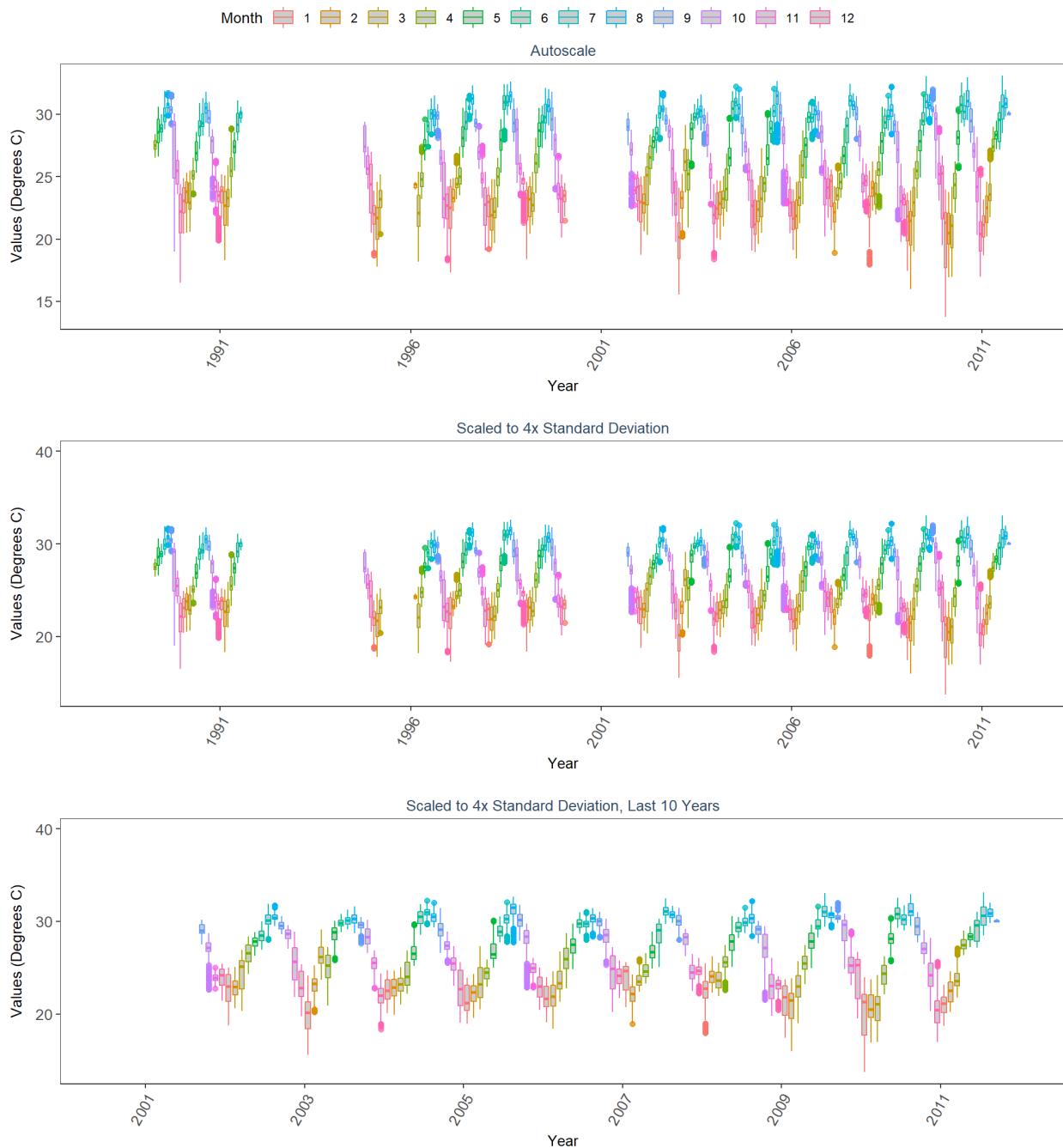
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 FKNMS\_HARBORKEY  
 By Month



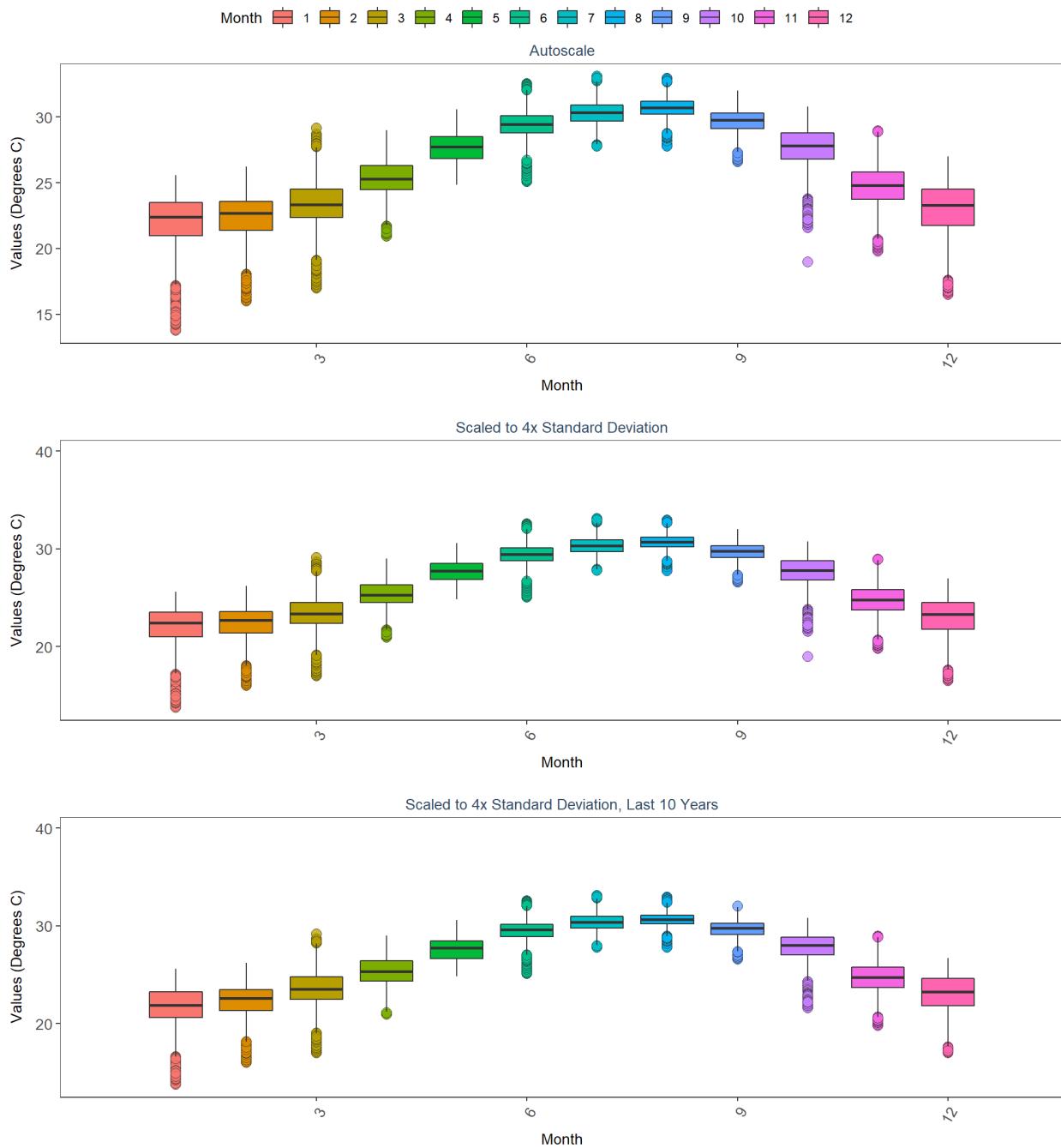
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 FKNMS\_HEN&CHIX  
 By Year



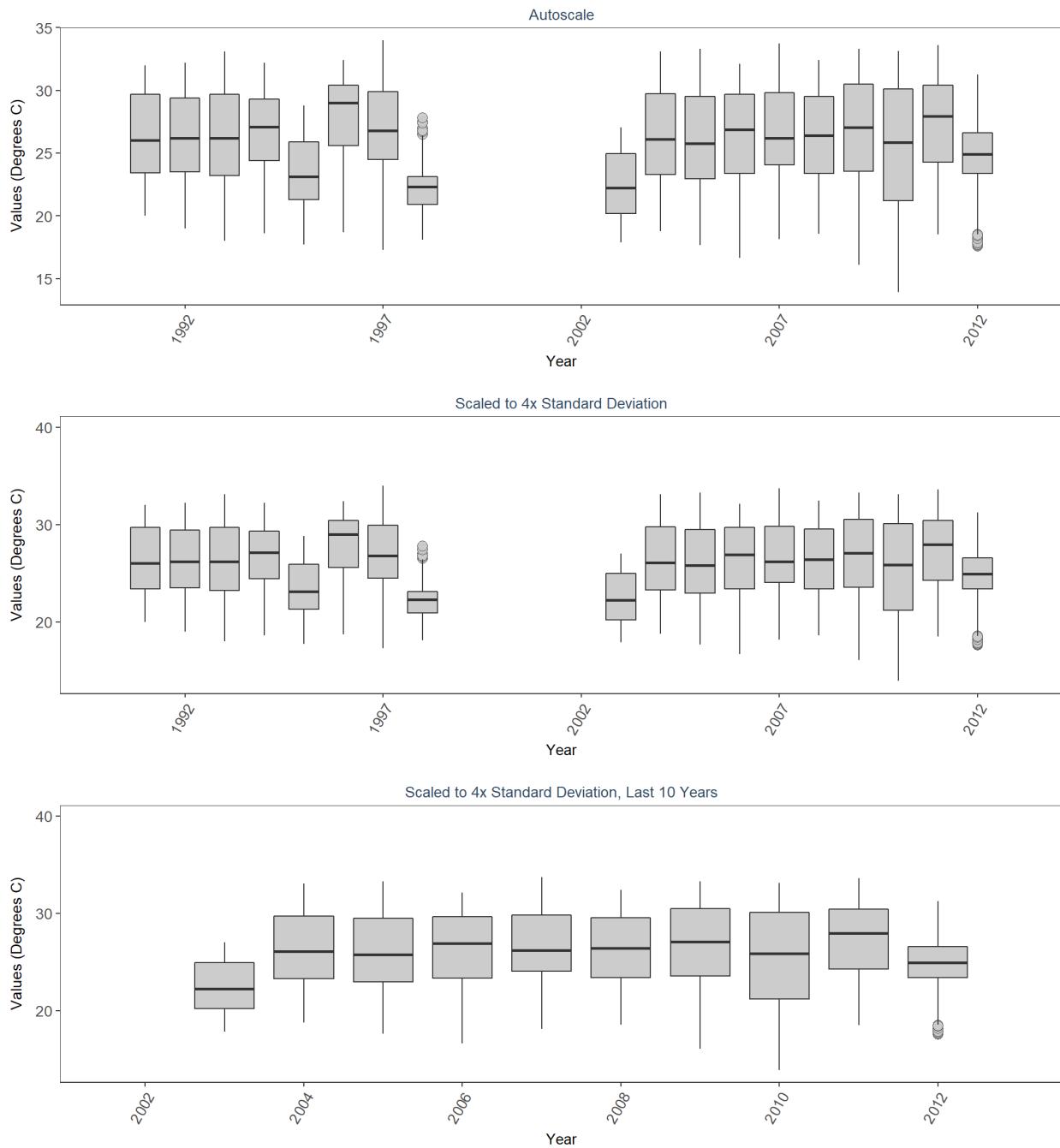
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 FKNMS\_HEN&CHIX  
 By Year & Month



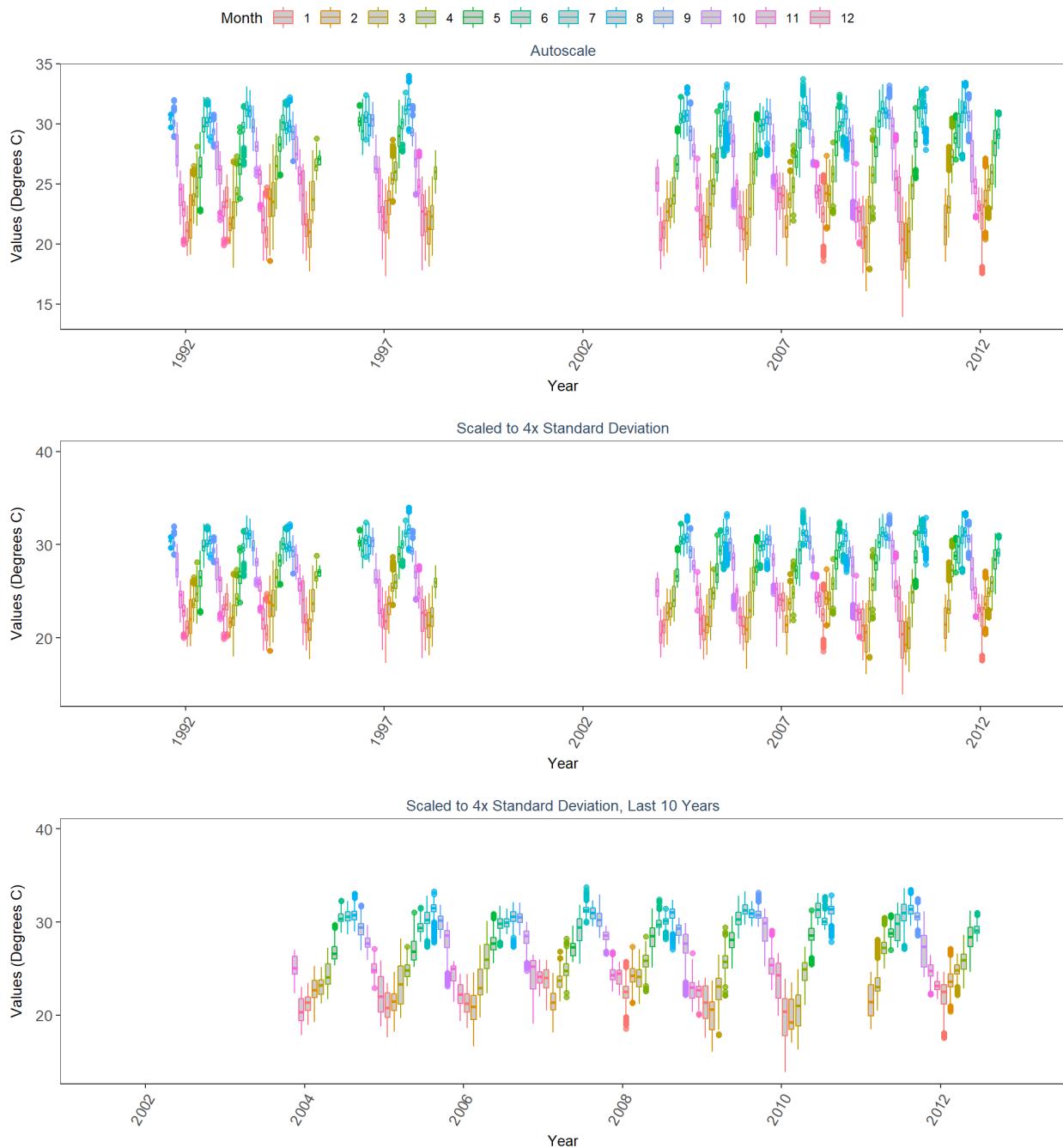
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 By Month



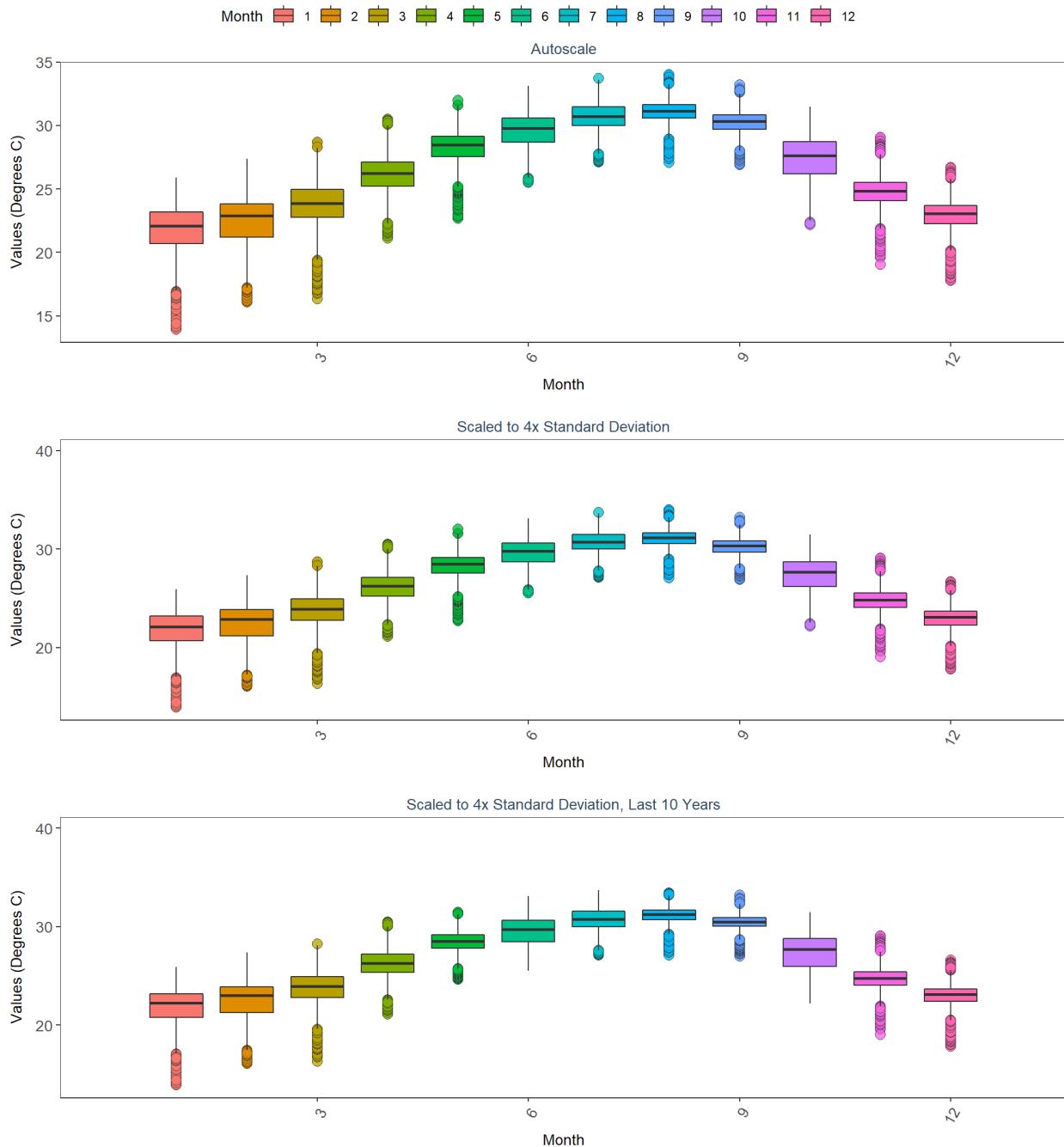
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 By Year



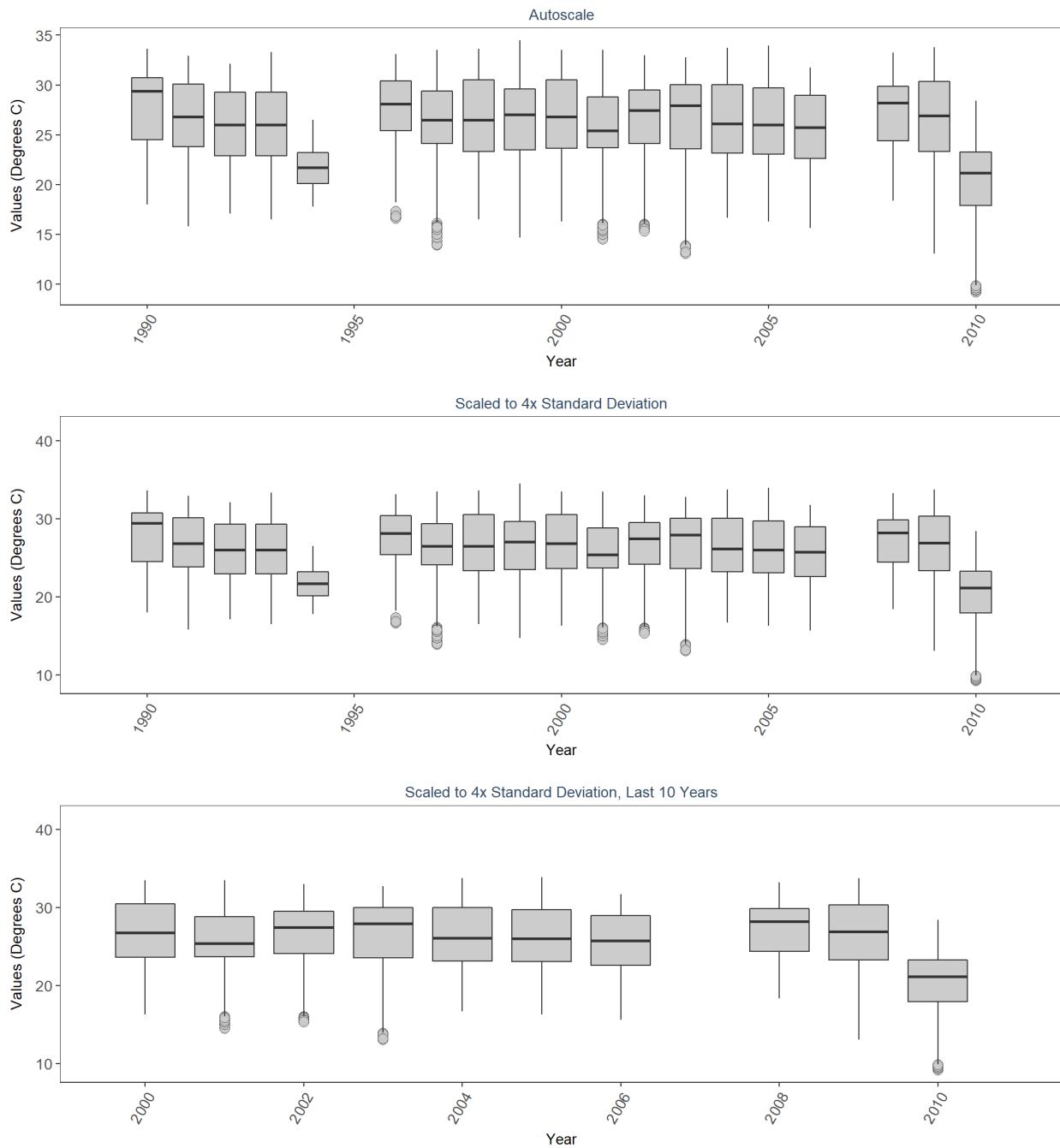
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 By Year & Month



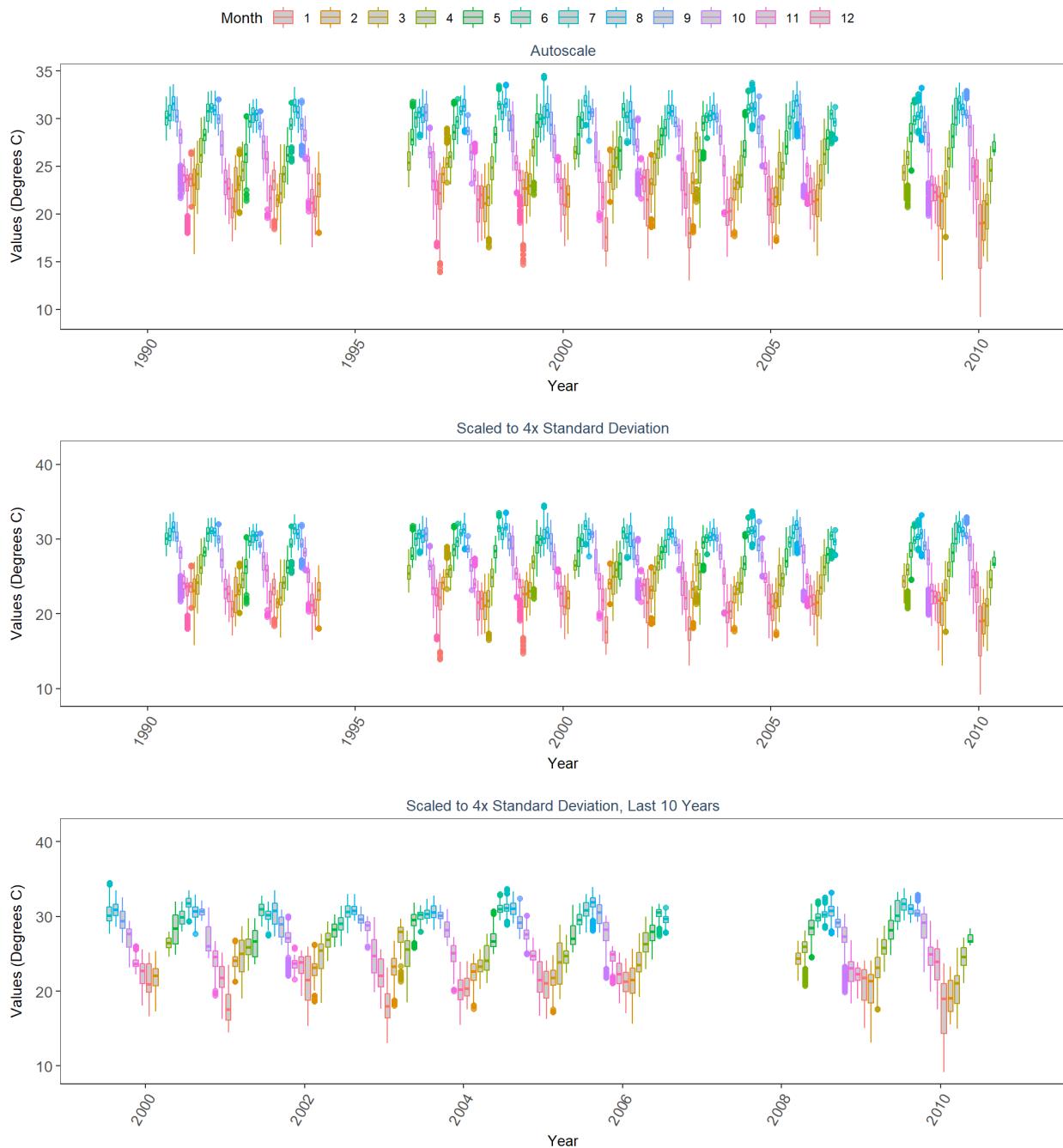
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 FKNMS\_KW\_CHANL  
 By Month



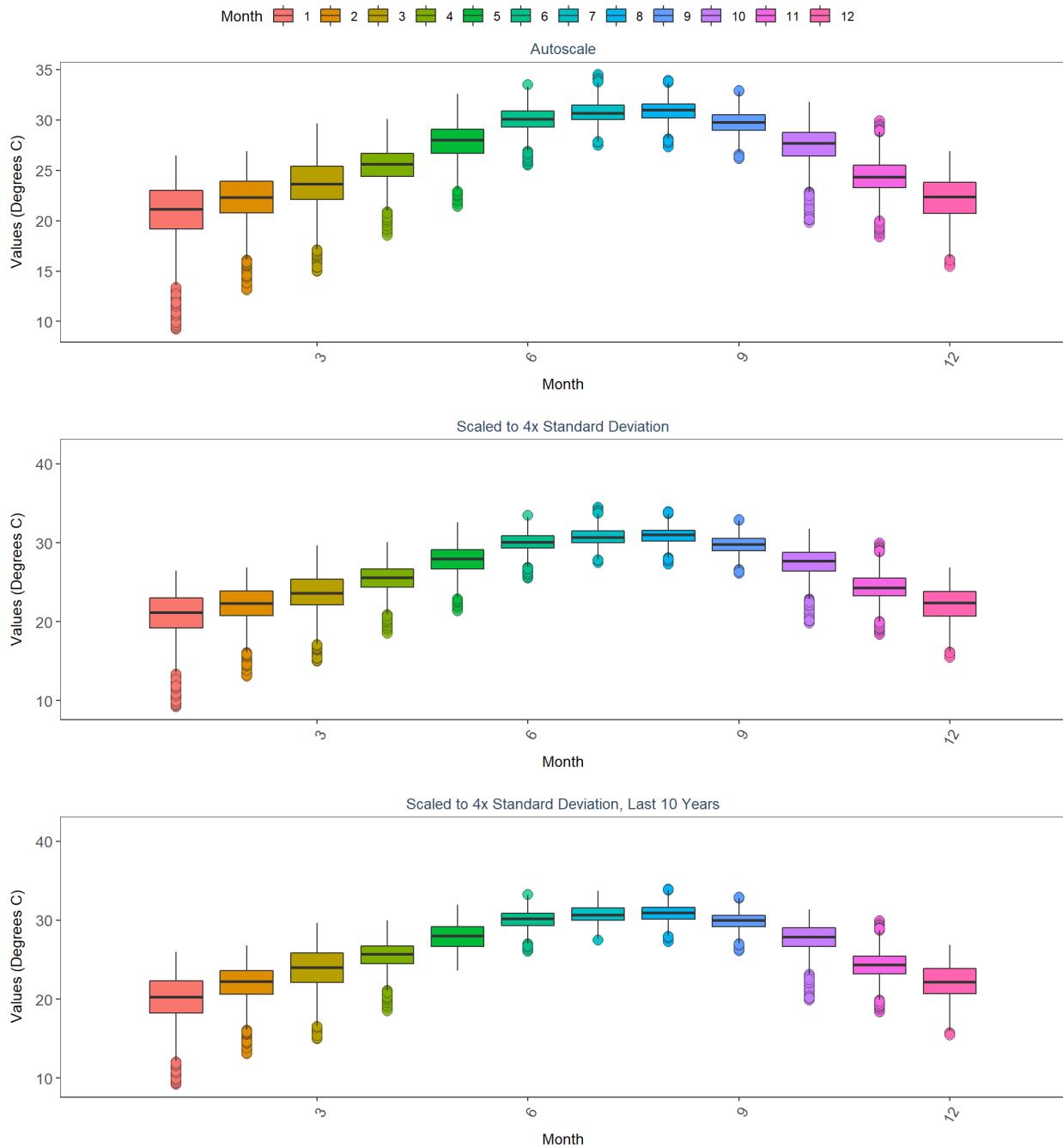
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 By Year



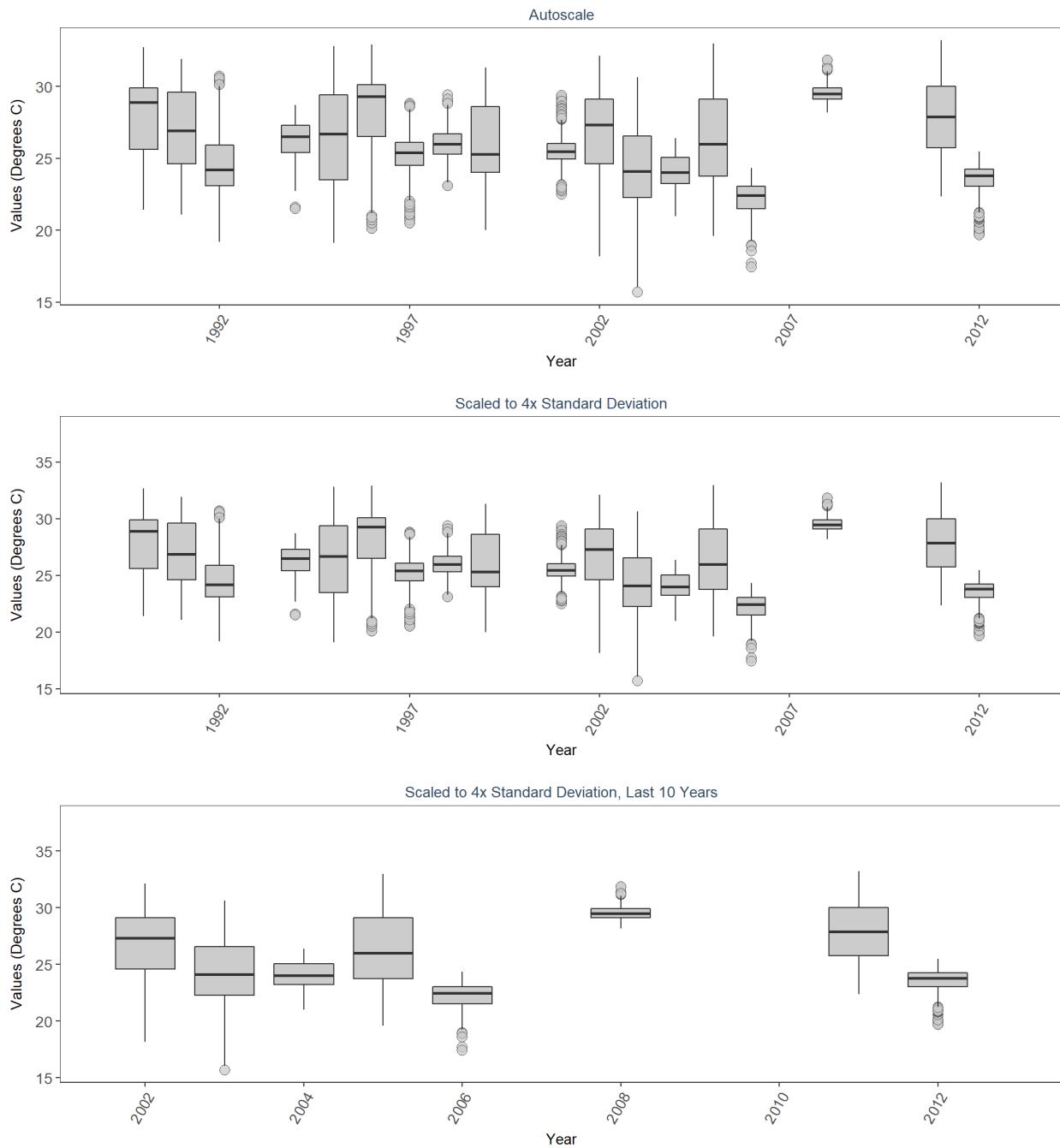
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 FKNMS\_LONG\_KEY  
 By Year & Month



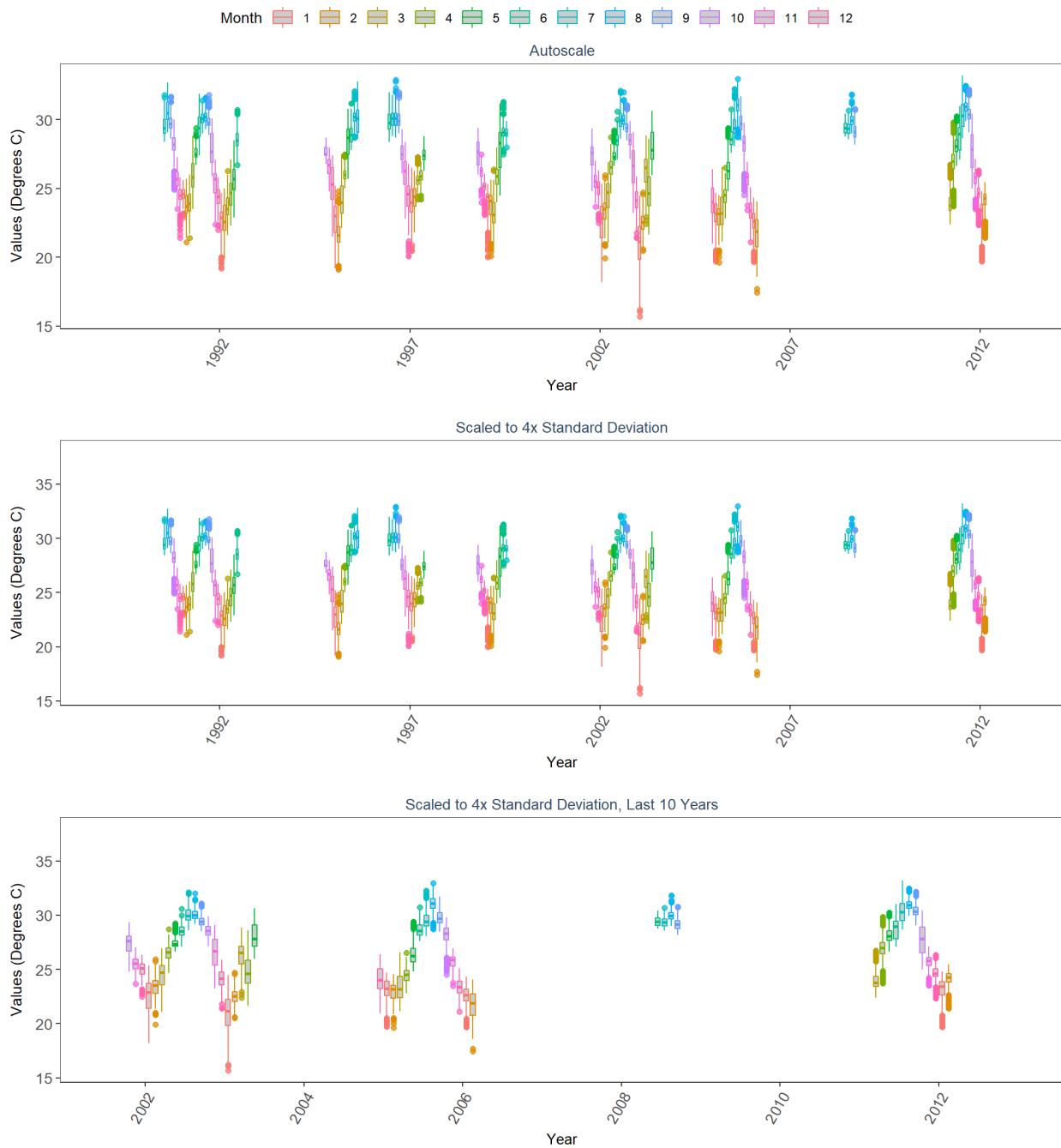
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 By Month



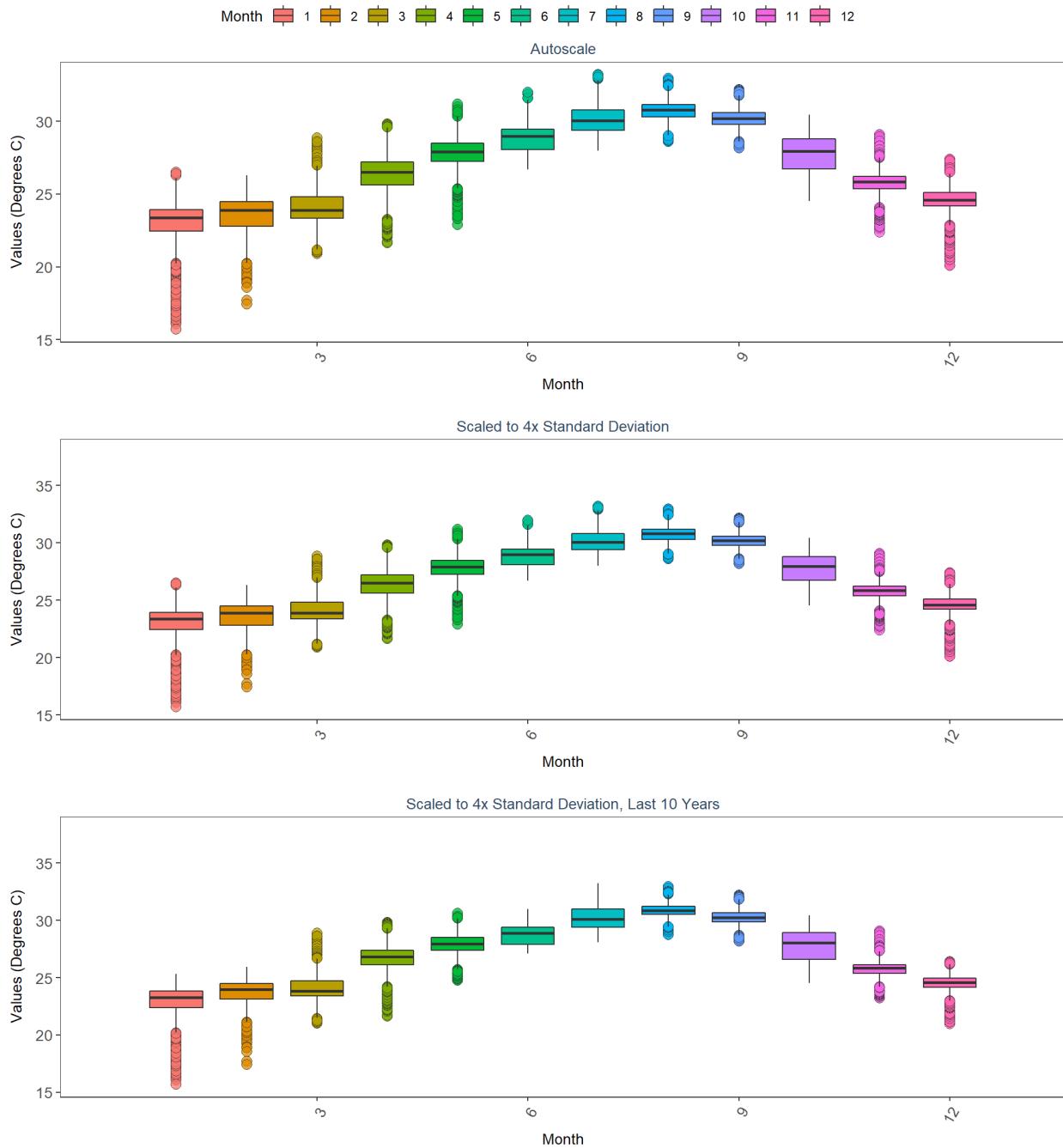
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 FKNMS\_LOOE\_BACK  
 By Year



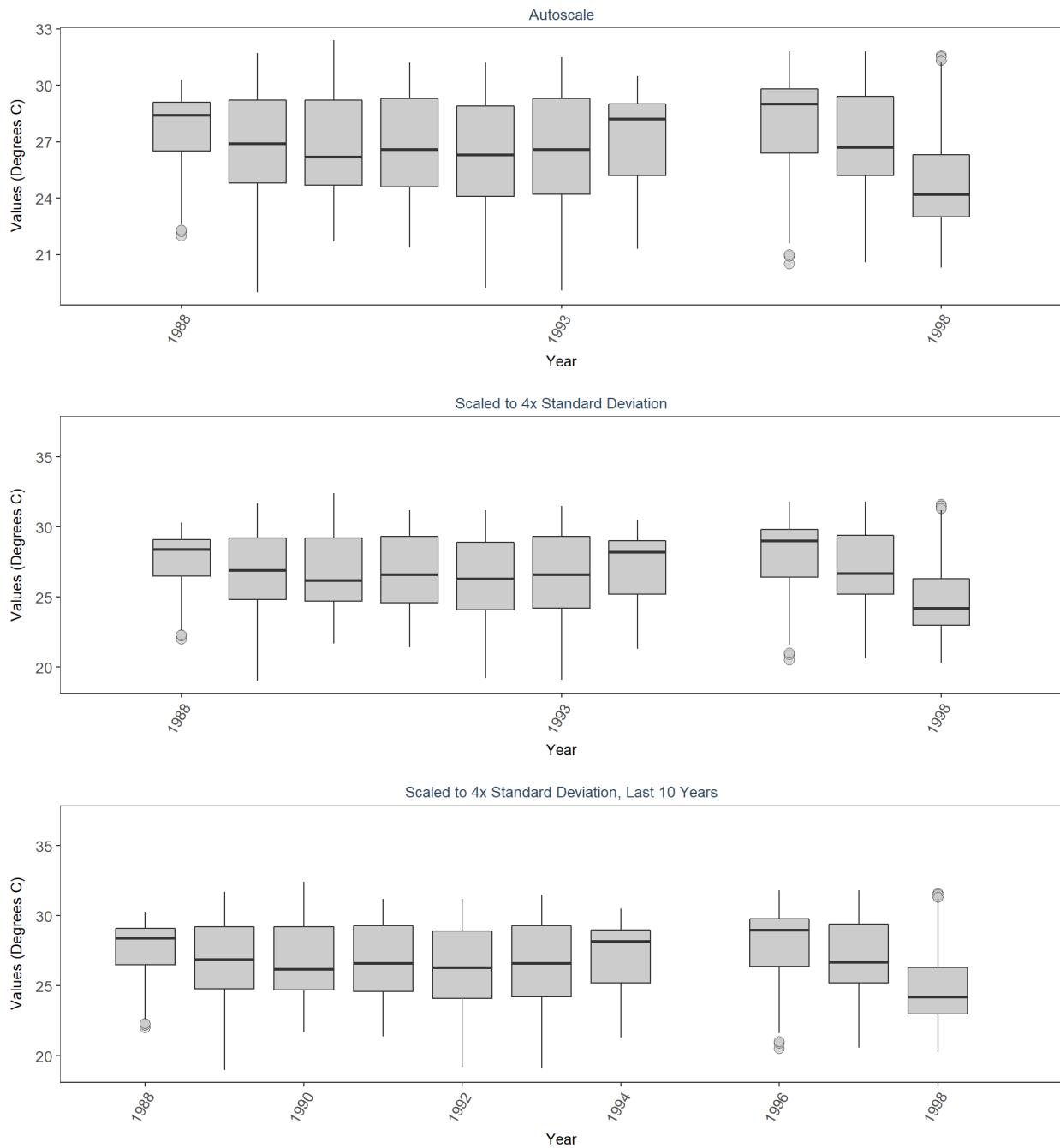
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 FKNMS\_LOOE\_BACK  
 By Year & Month



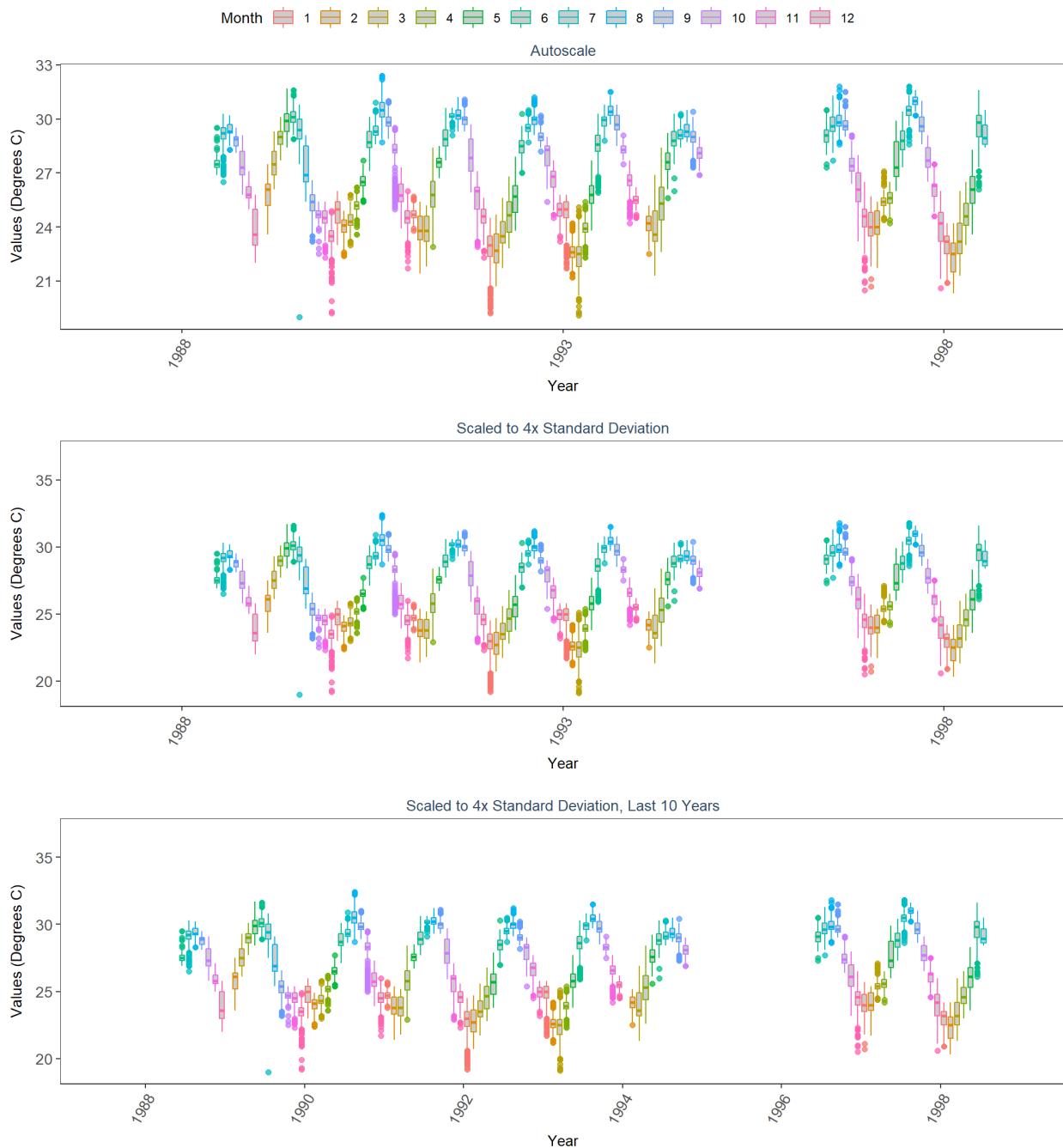
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 FKNMS\_LOOE\_BACK  
 By Month



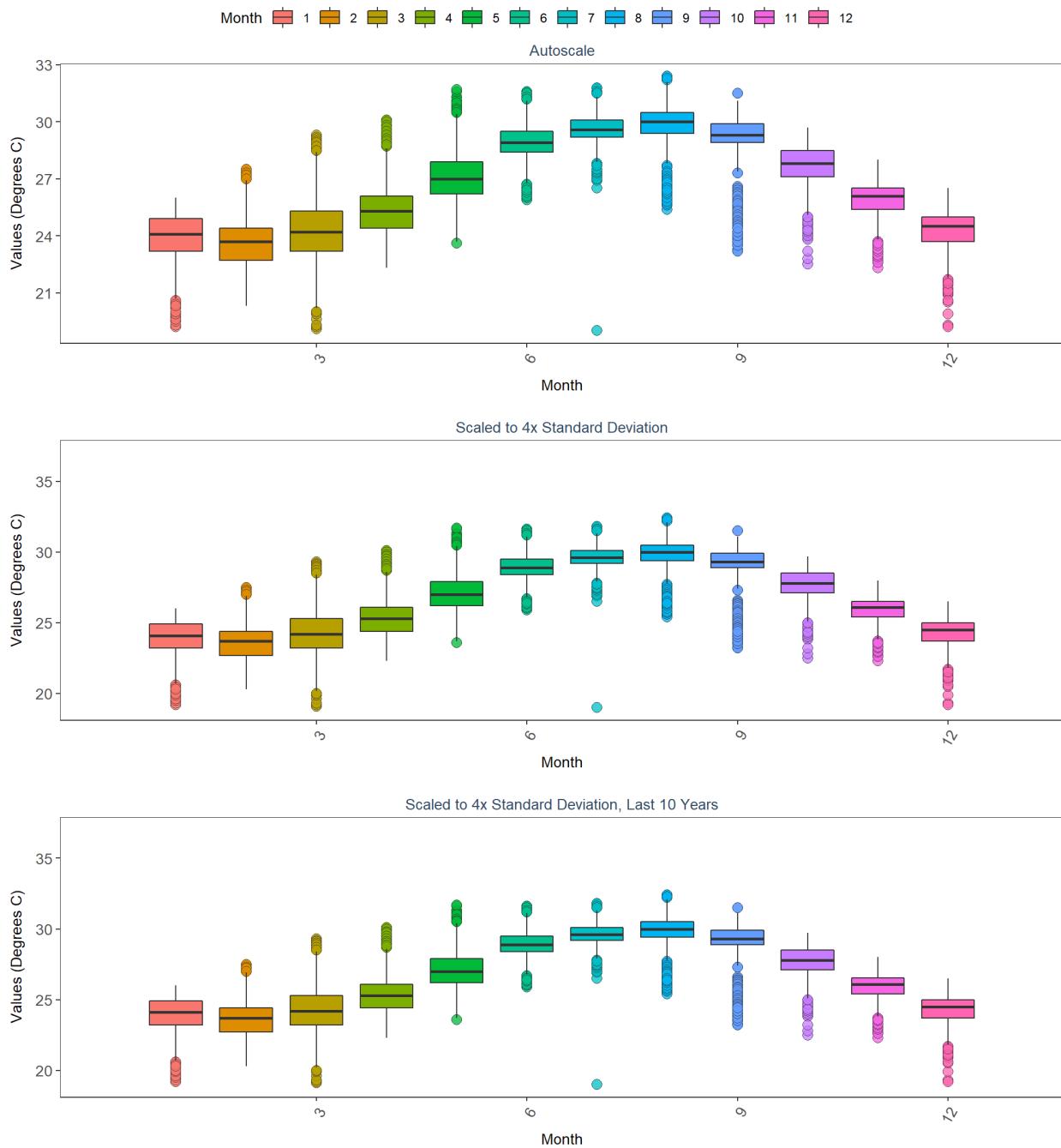
Florida Keys National Marine Sanctuary  
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 By Year



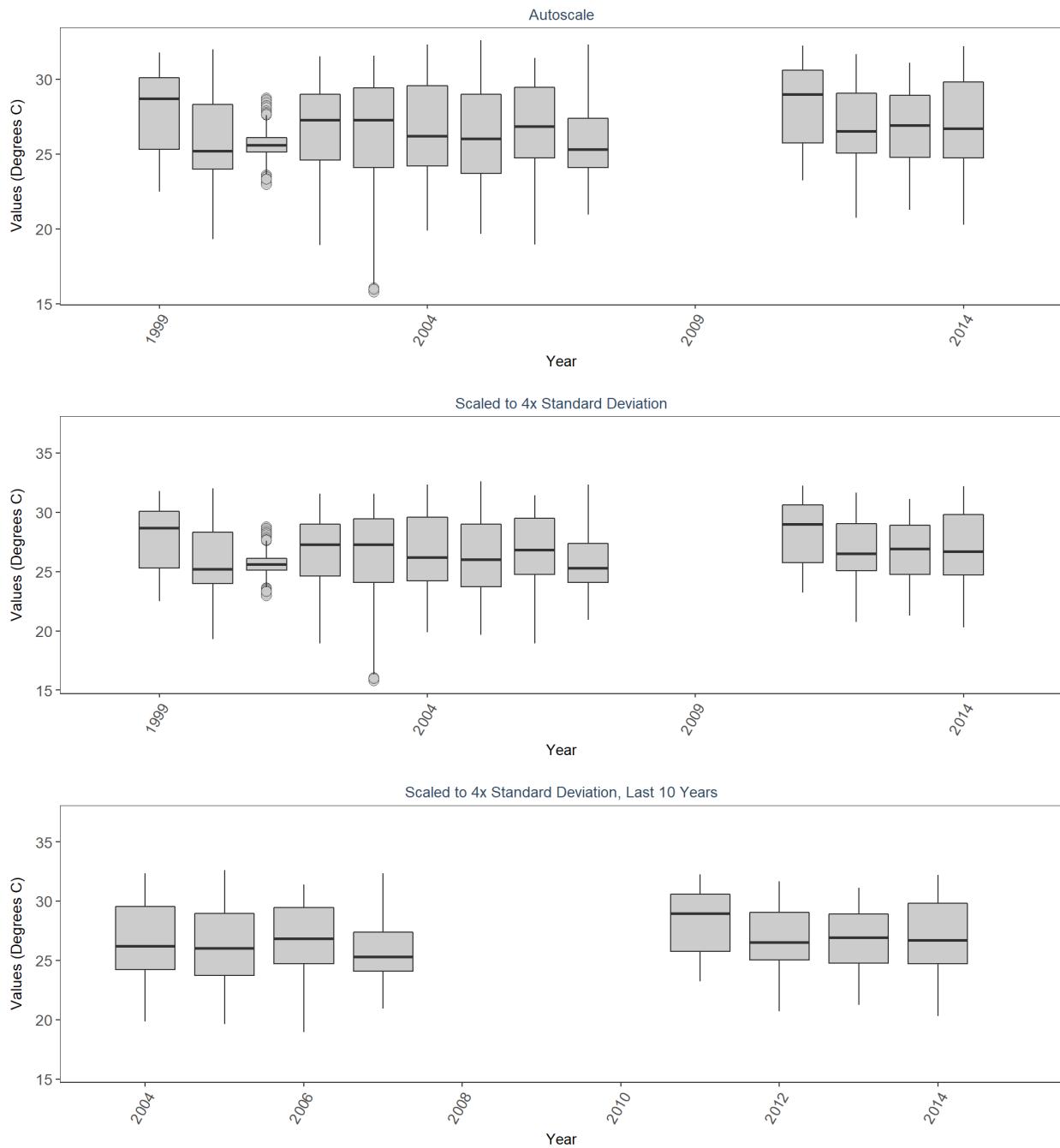
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 FKNMS\_LOOE\_BUOY5  
 By Year & Month



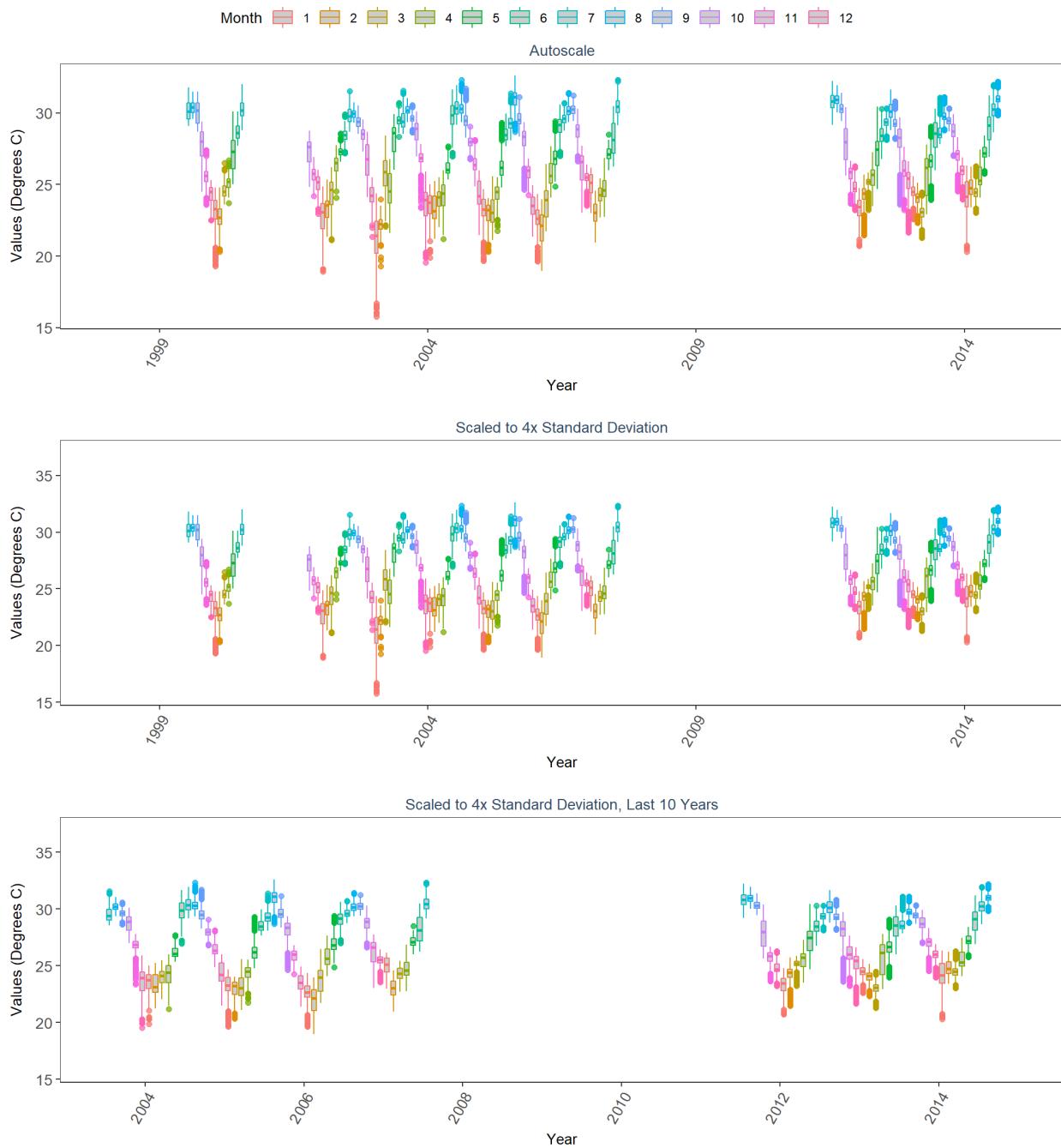
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 By Month



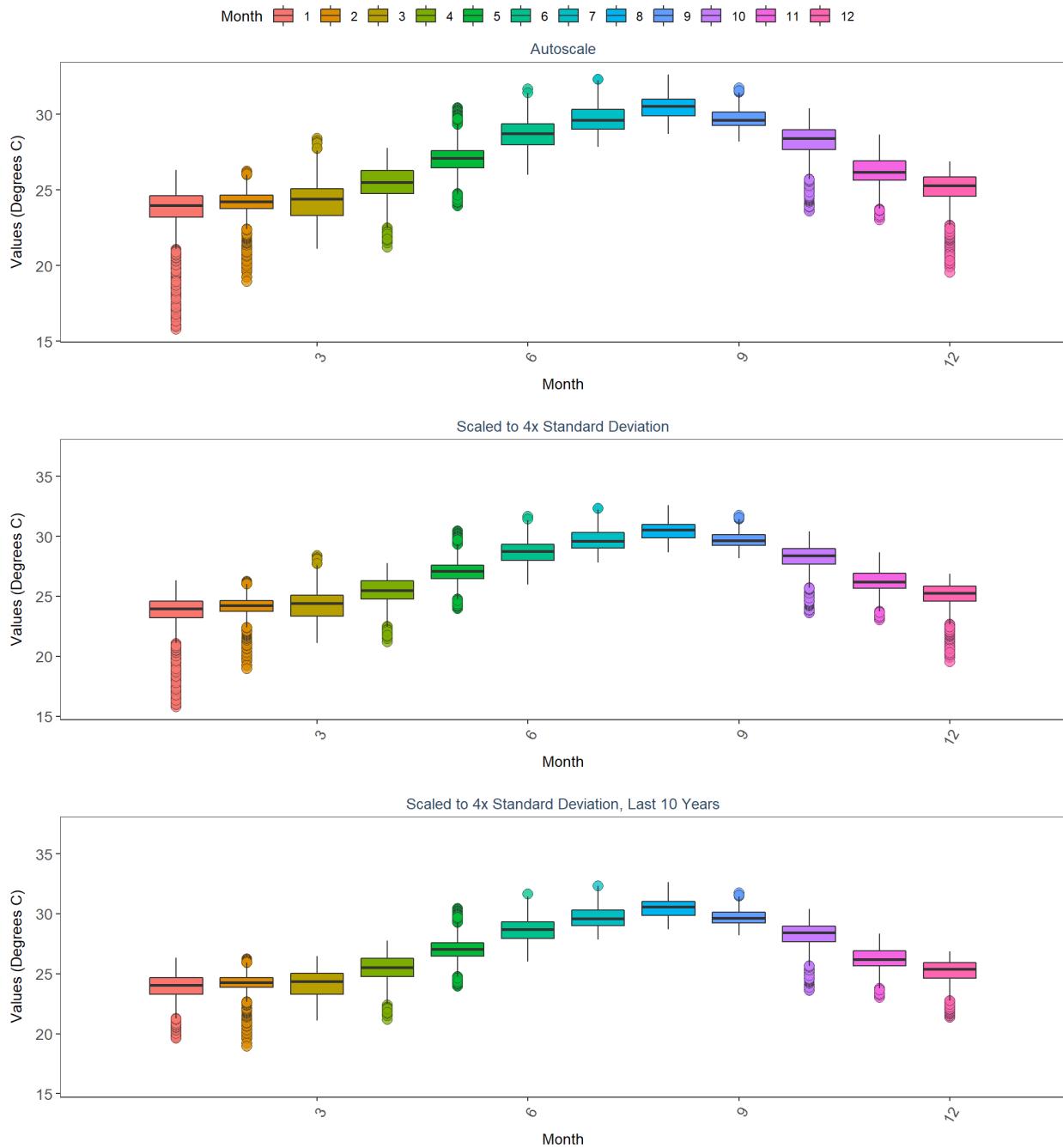
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_LOOE\_ISELIN  
 By Year



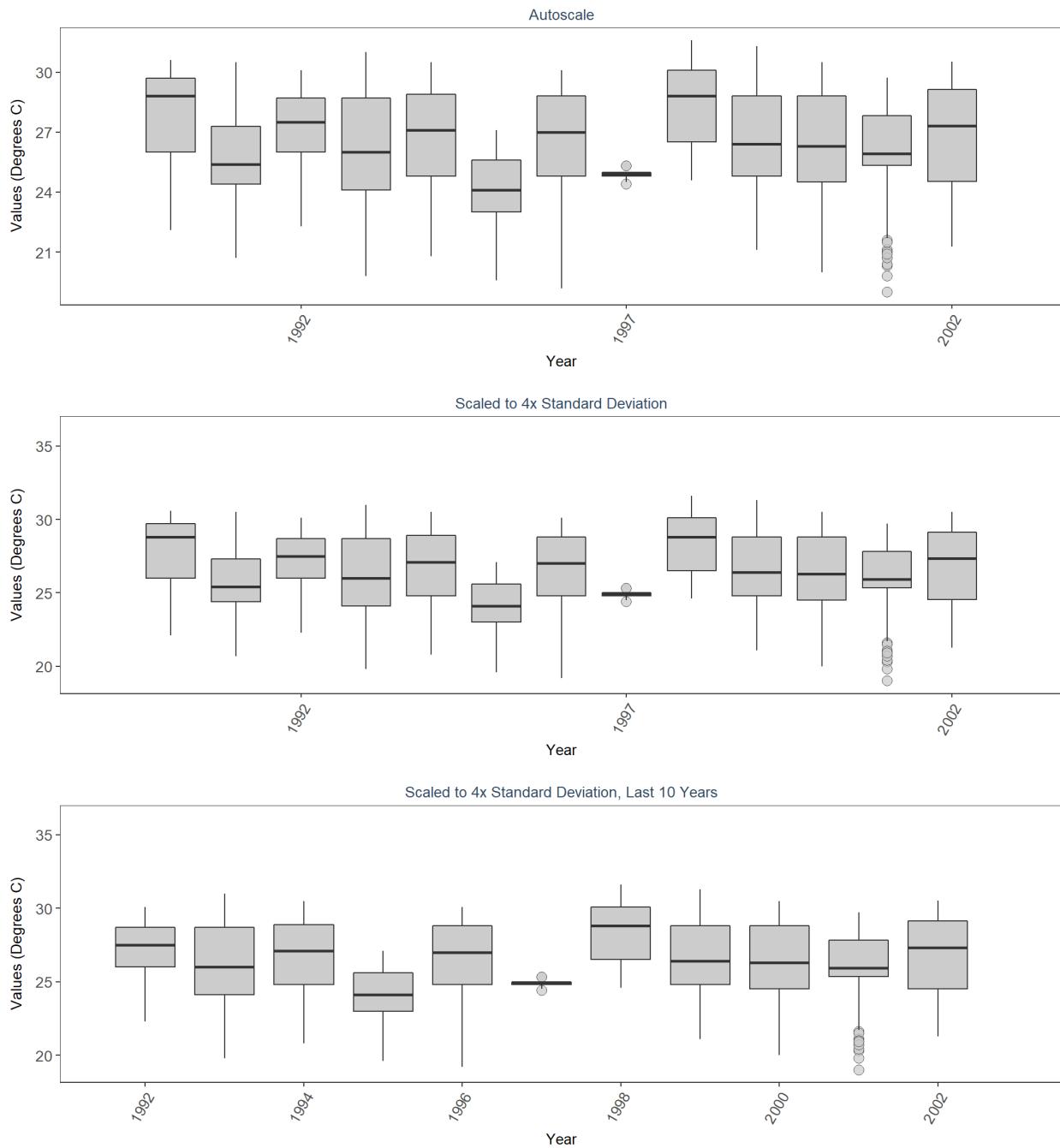
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_LOOE\_ISELIN  
 By Year & Month



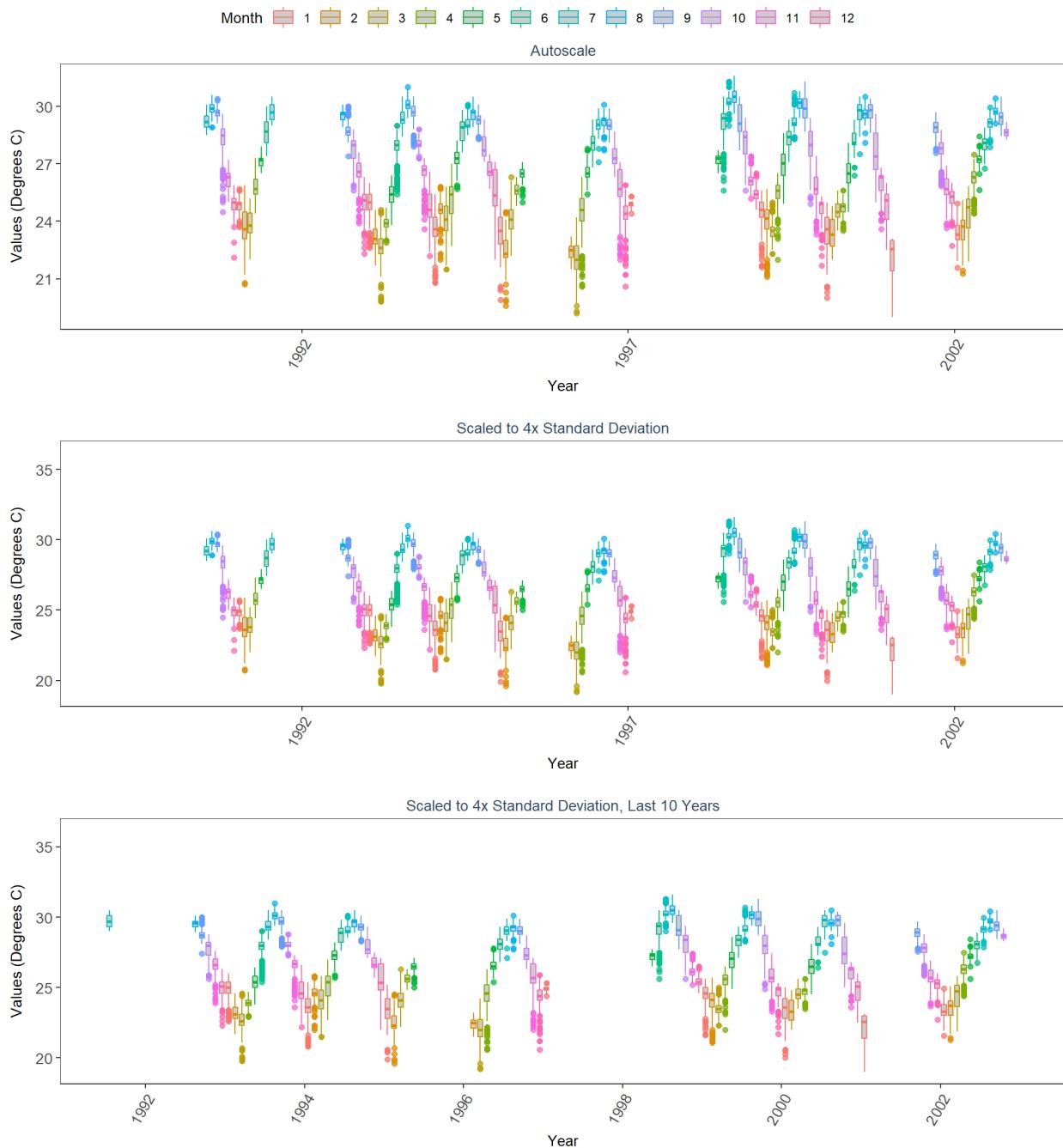
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_LOOE\_ISELIN  
 By Month



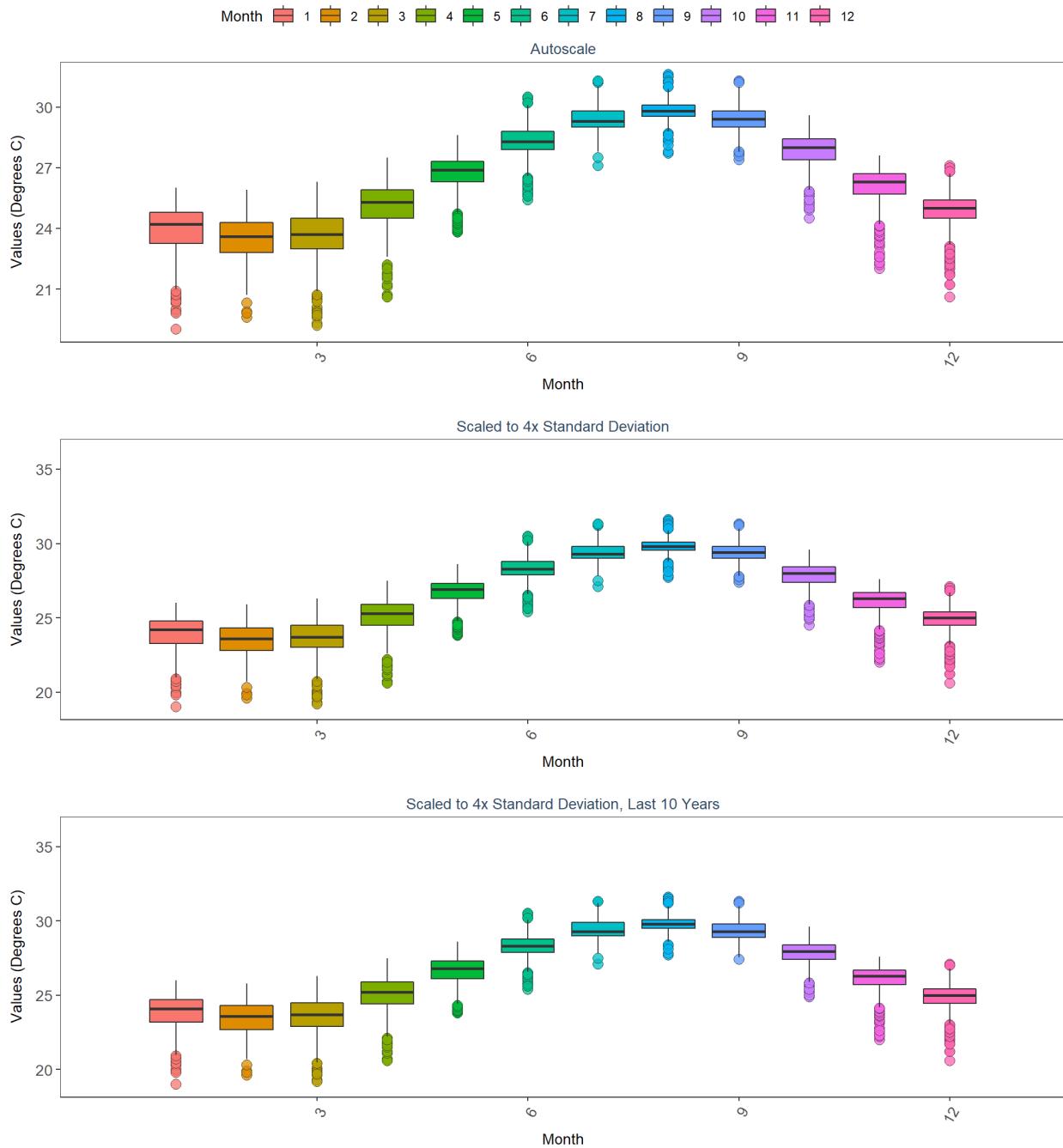
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_MOLASSES  
 By Year



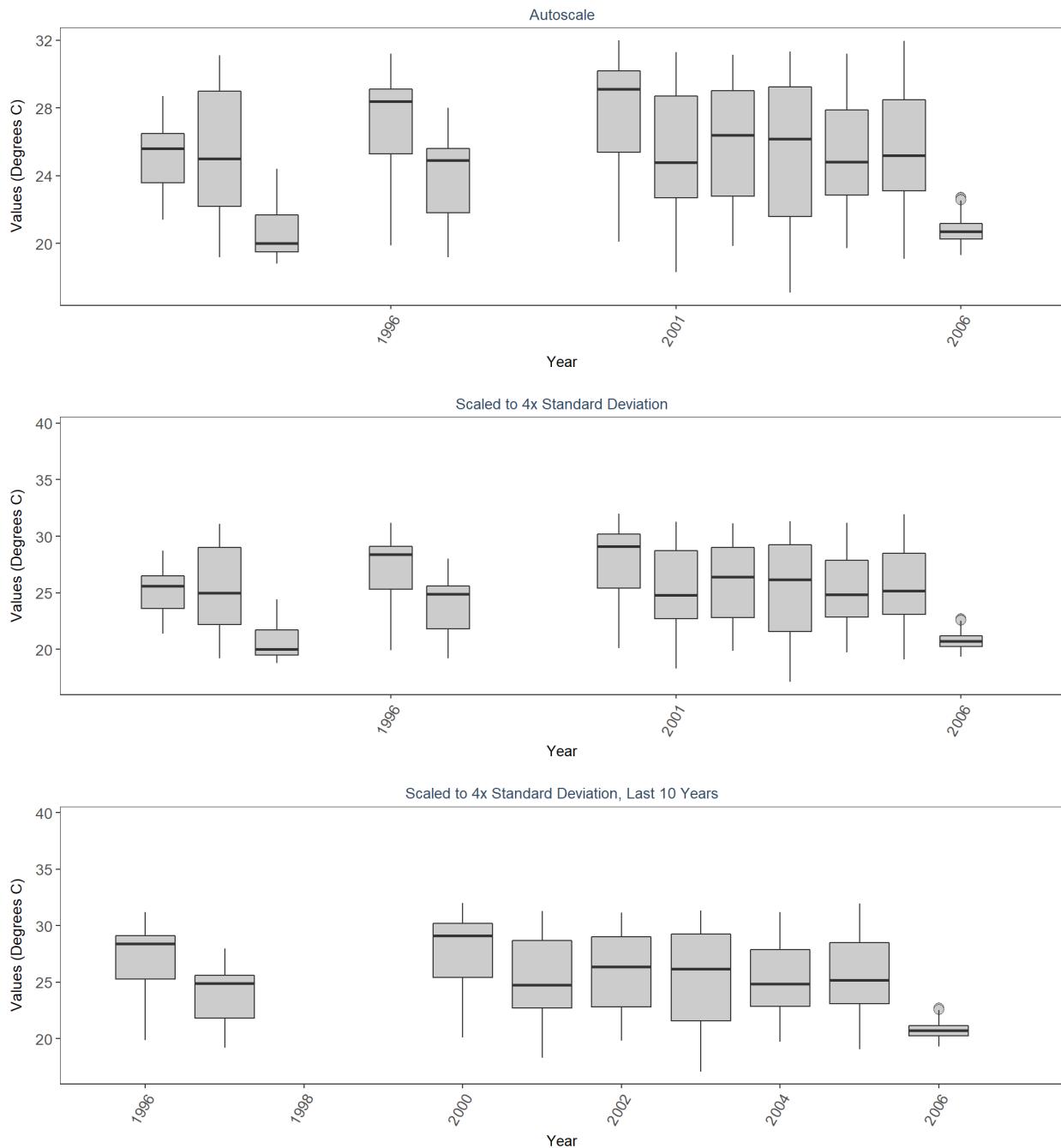
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_MOLASSES  
 By Year & Month



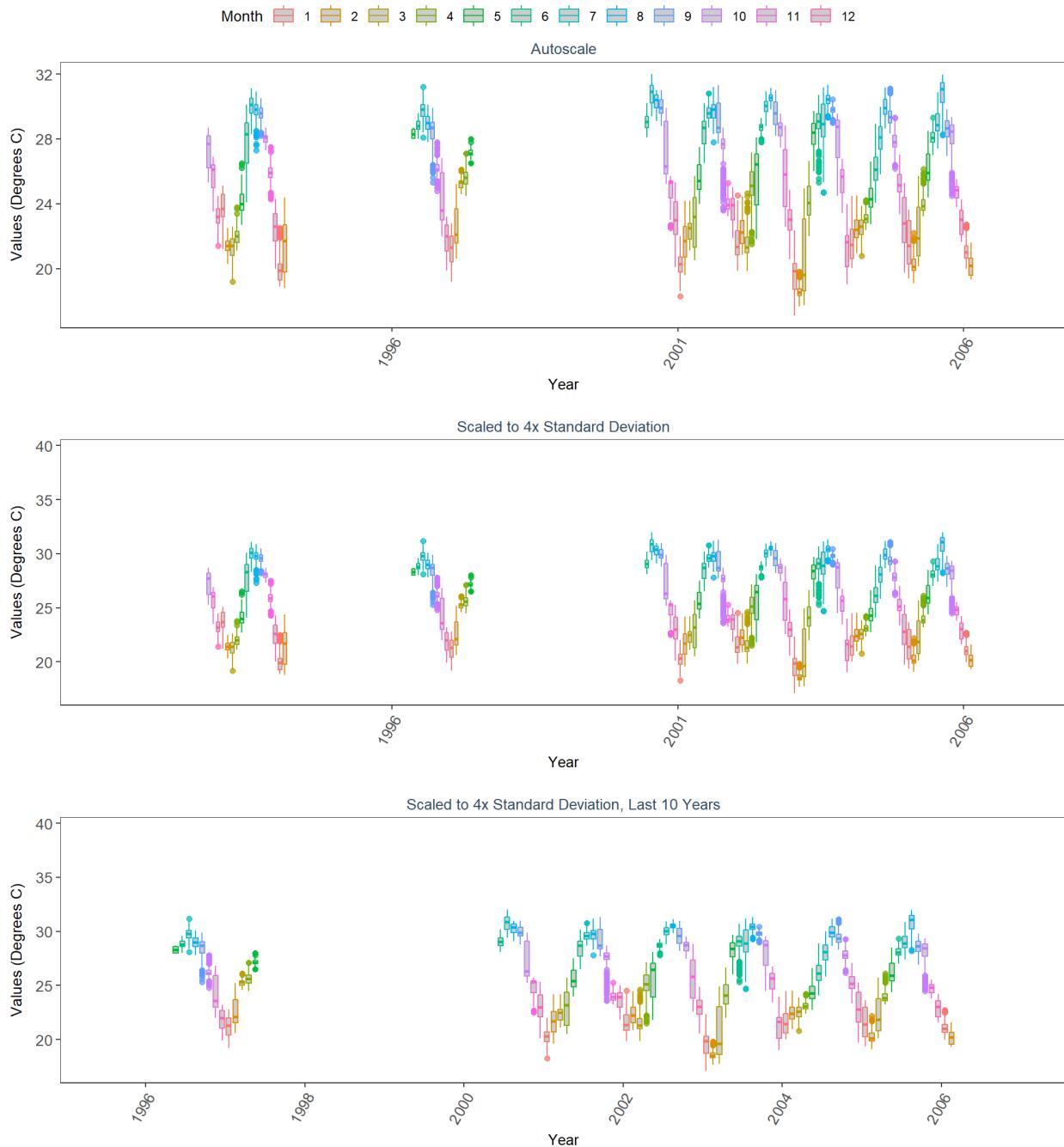
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 FKNMS\_MOLASSES  
 By Month



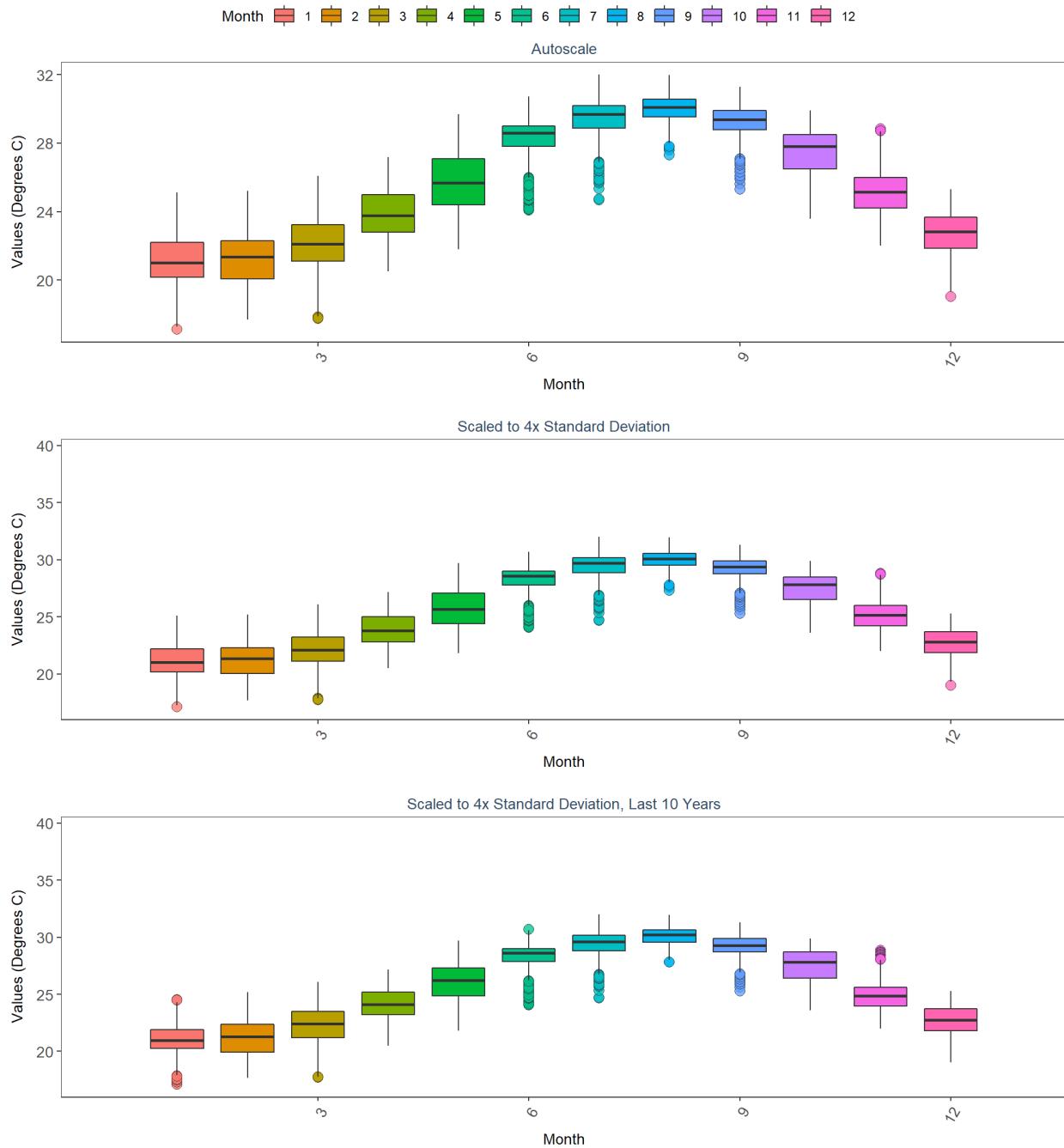
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 FKNMS\_NEWSGROUND  
 By Year



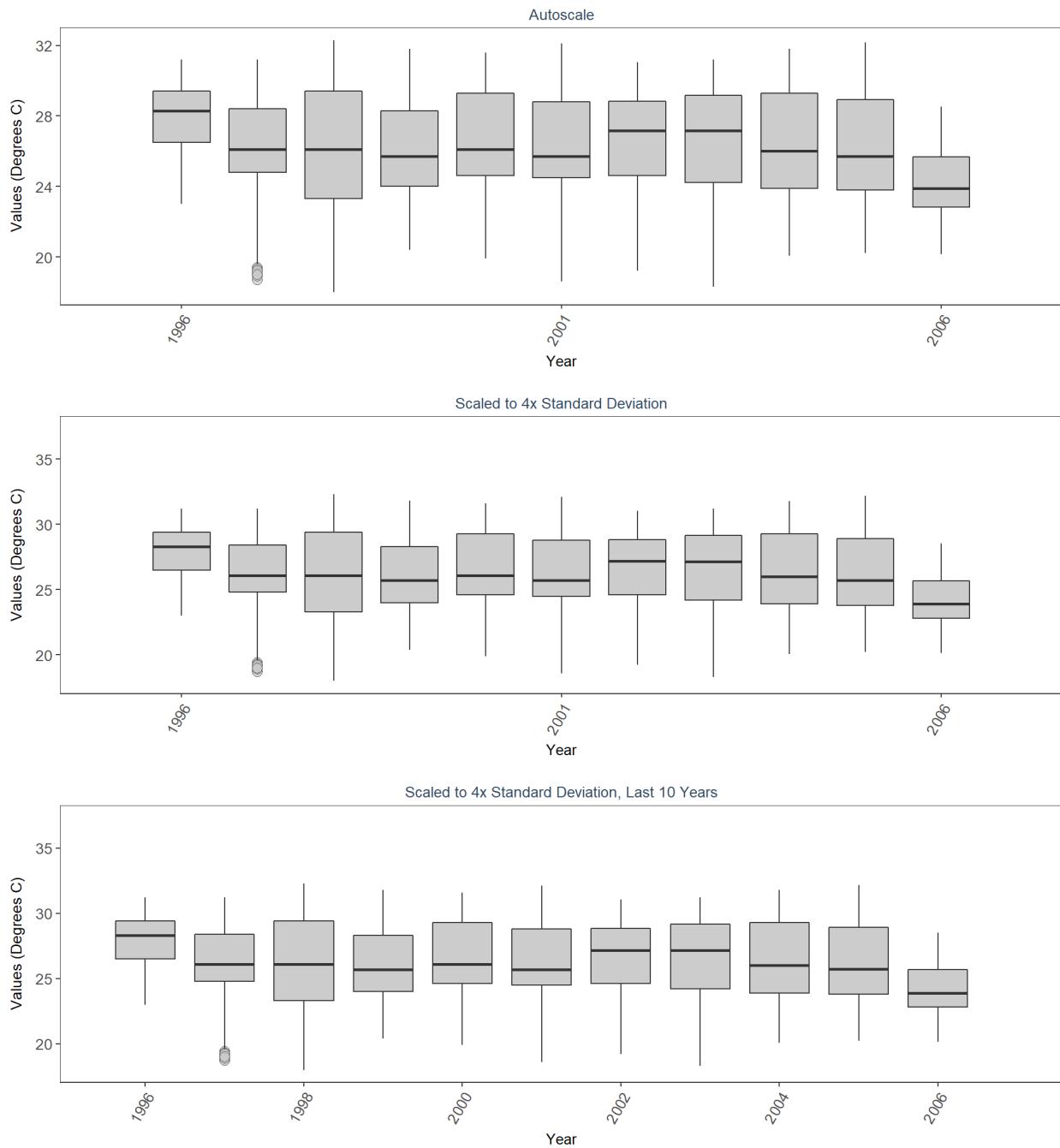
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 FKNMS\_NEWSGROUND  
 By Year & Month



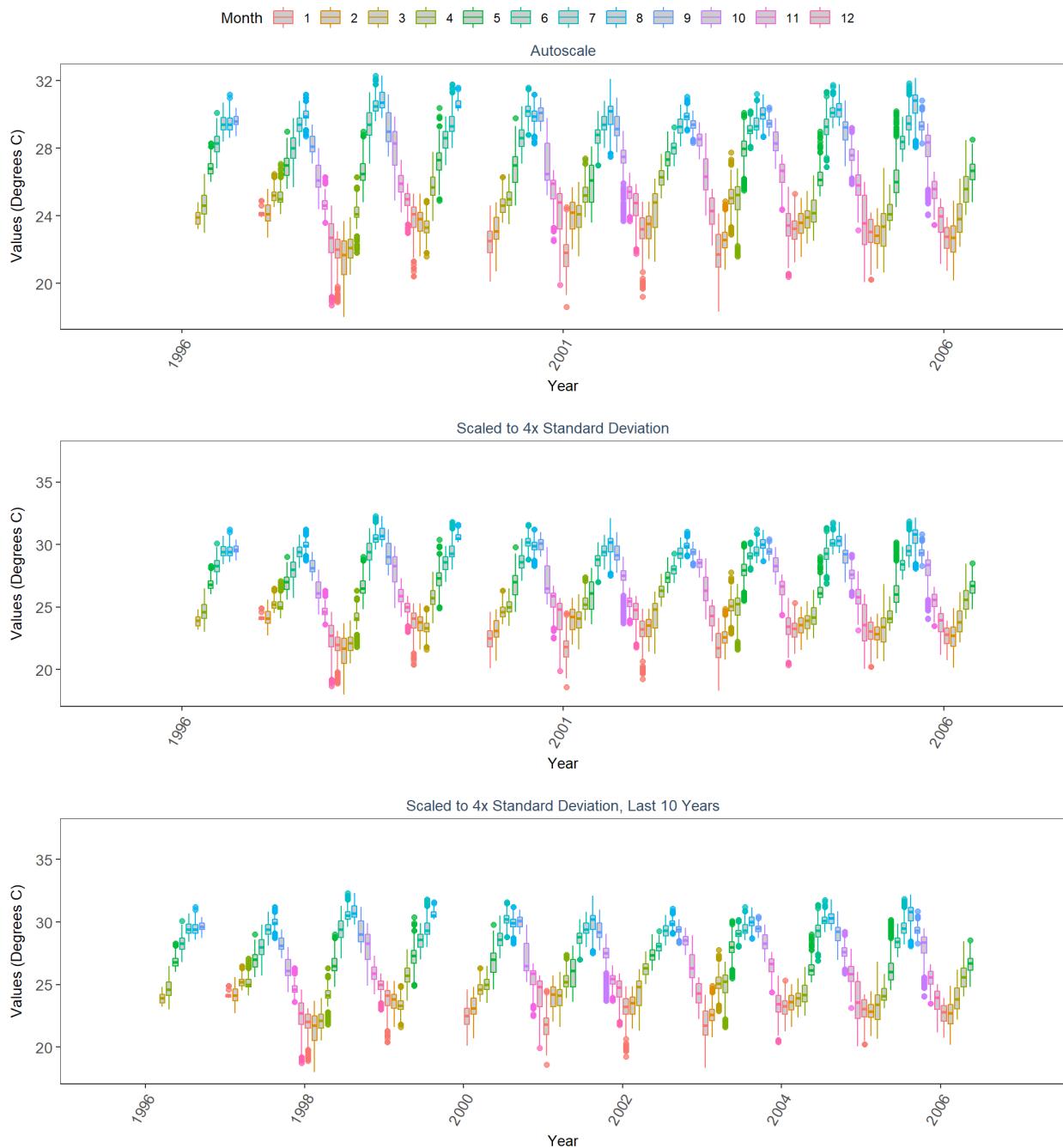
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_NEWSGROUND  
 By Month



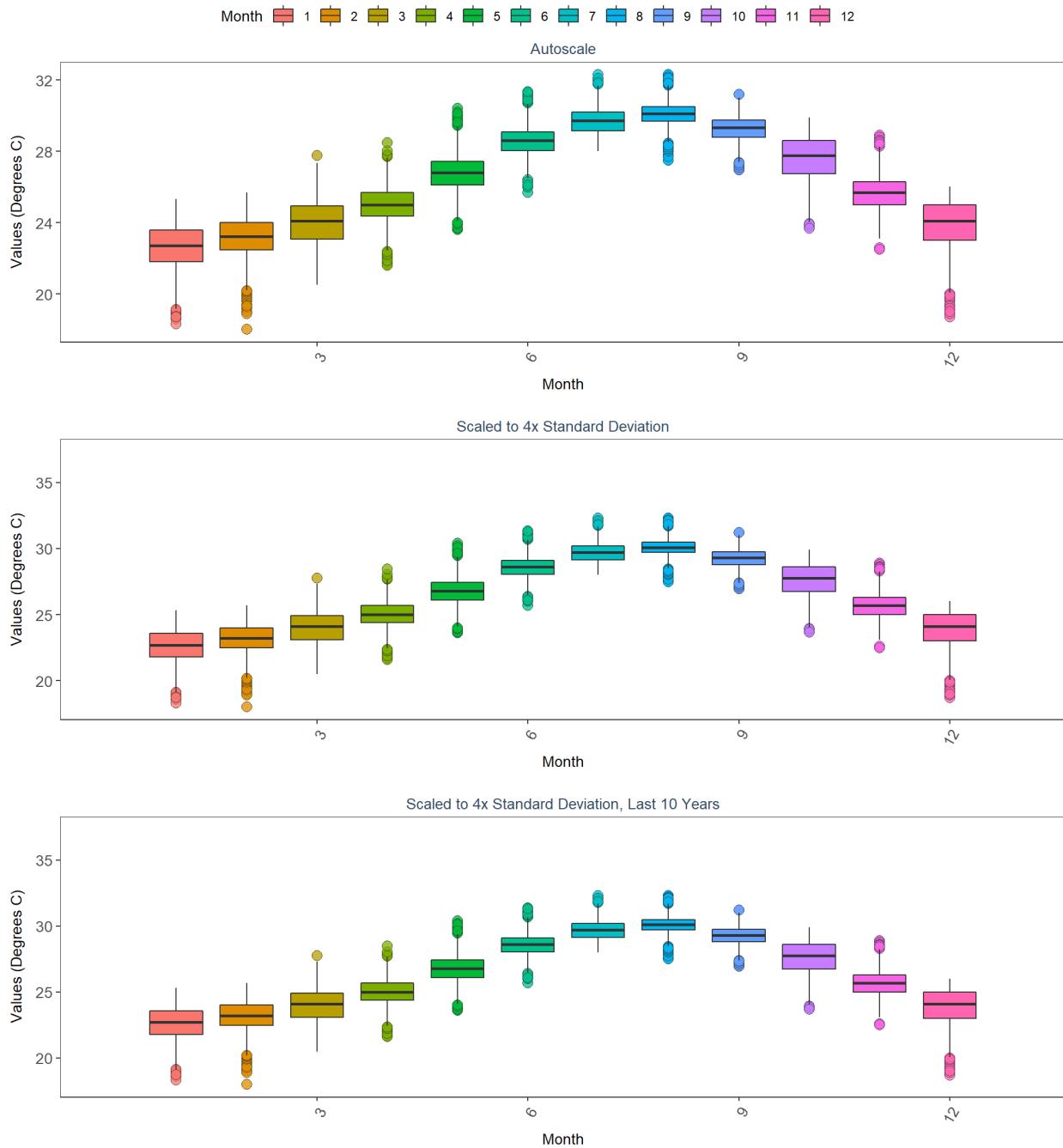
Florida Keys National Marine Sanctuary  
989  
Continuous Bottom Temperature Measurements along the Florida Reef Tract  
FKNMS\_PILLAR  
By Year



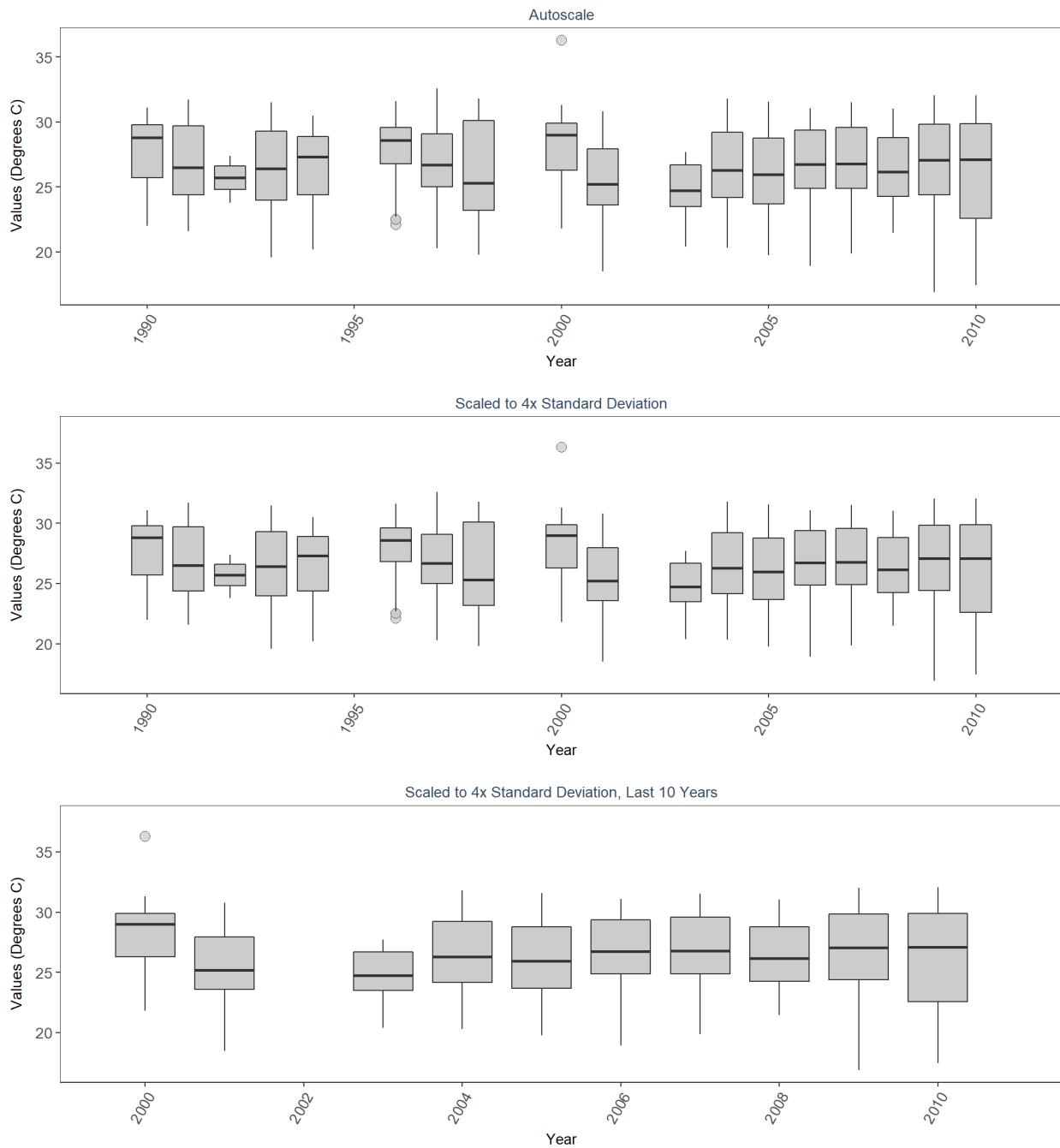
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
**FKNMS\_PILLAR**  
 By Year & Month



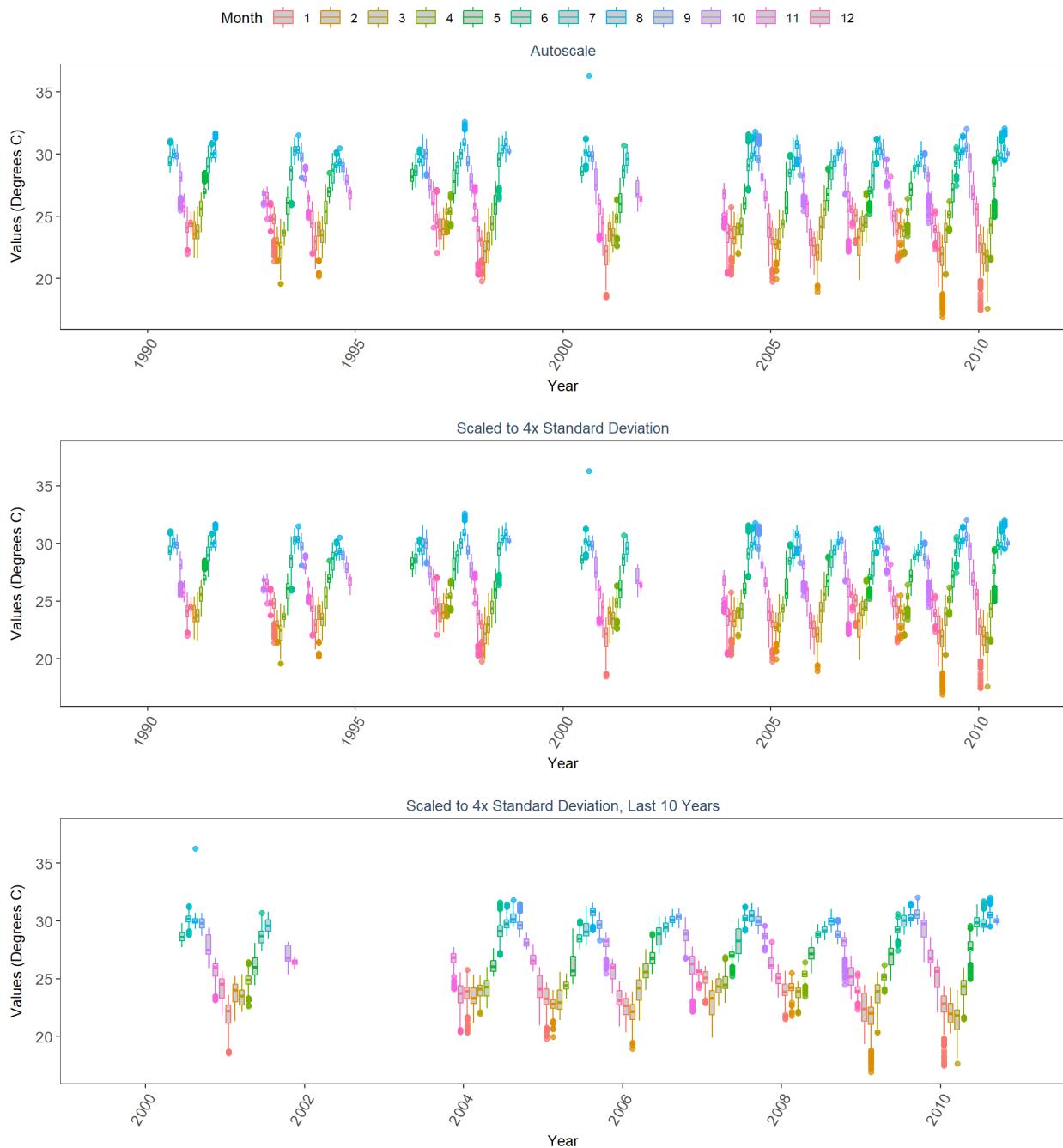
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_PILLAR  
 By Month



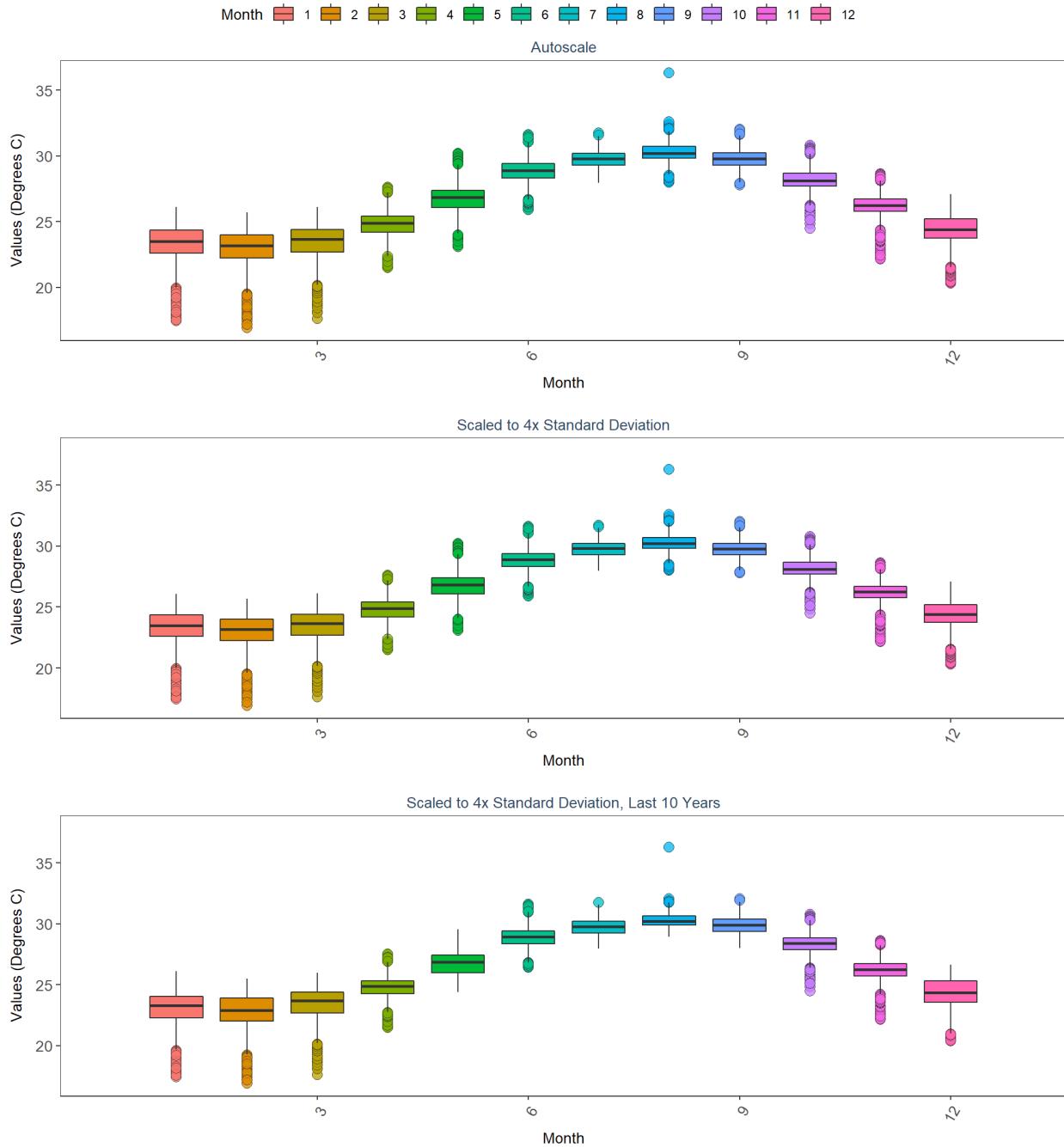
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SAND\_KEY  
 By Year



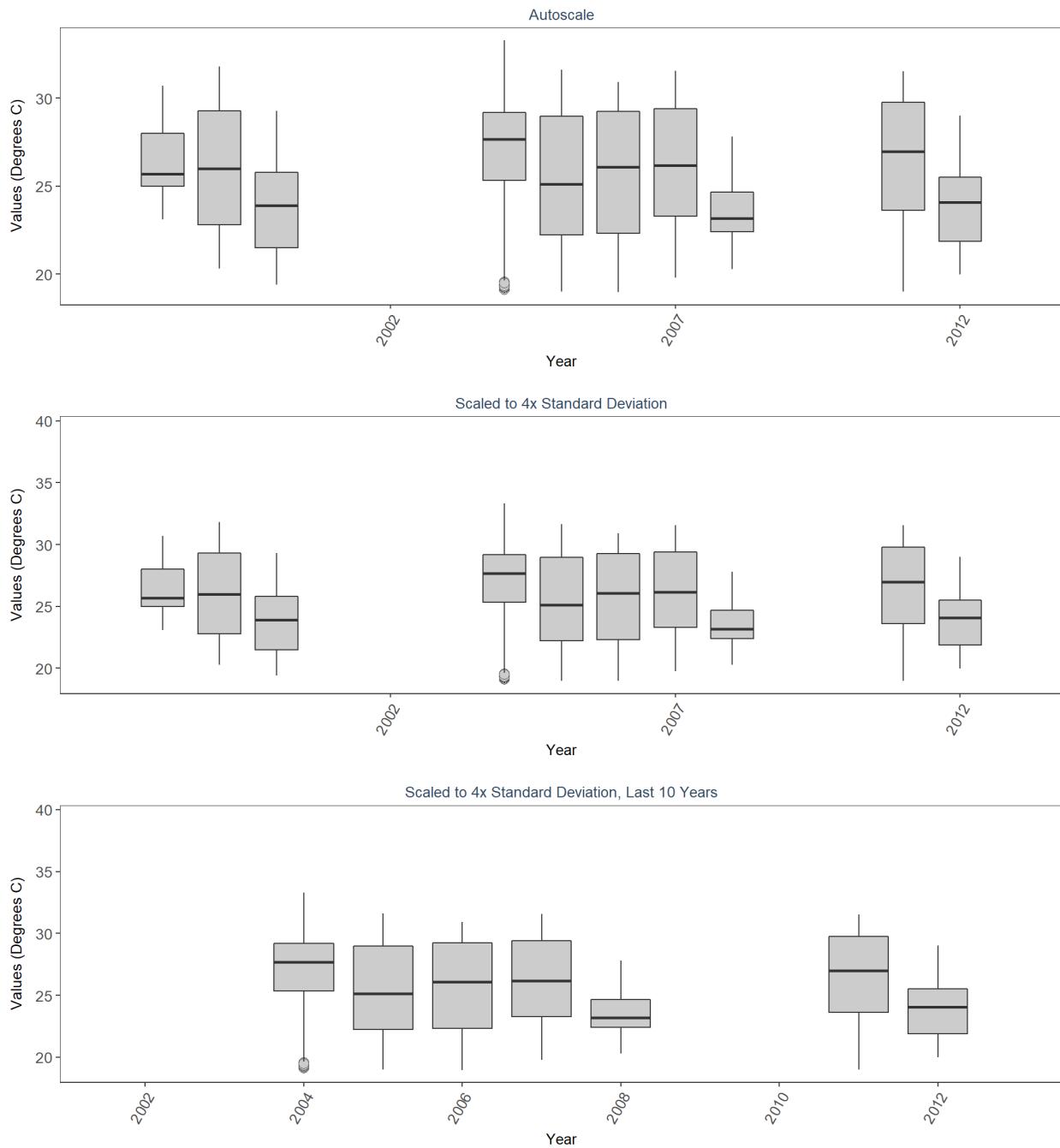
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SAND\_KEY  
 By Year & Month



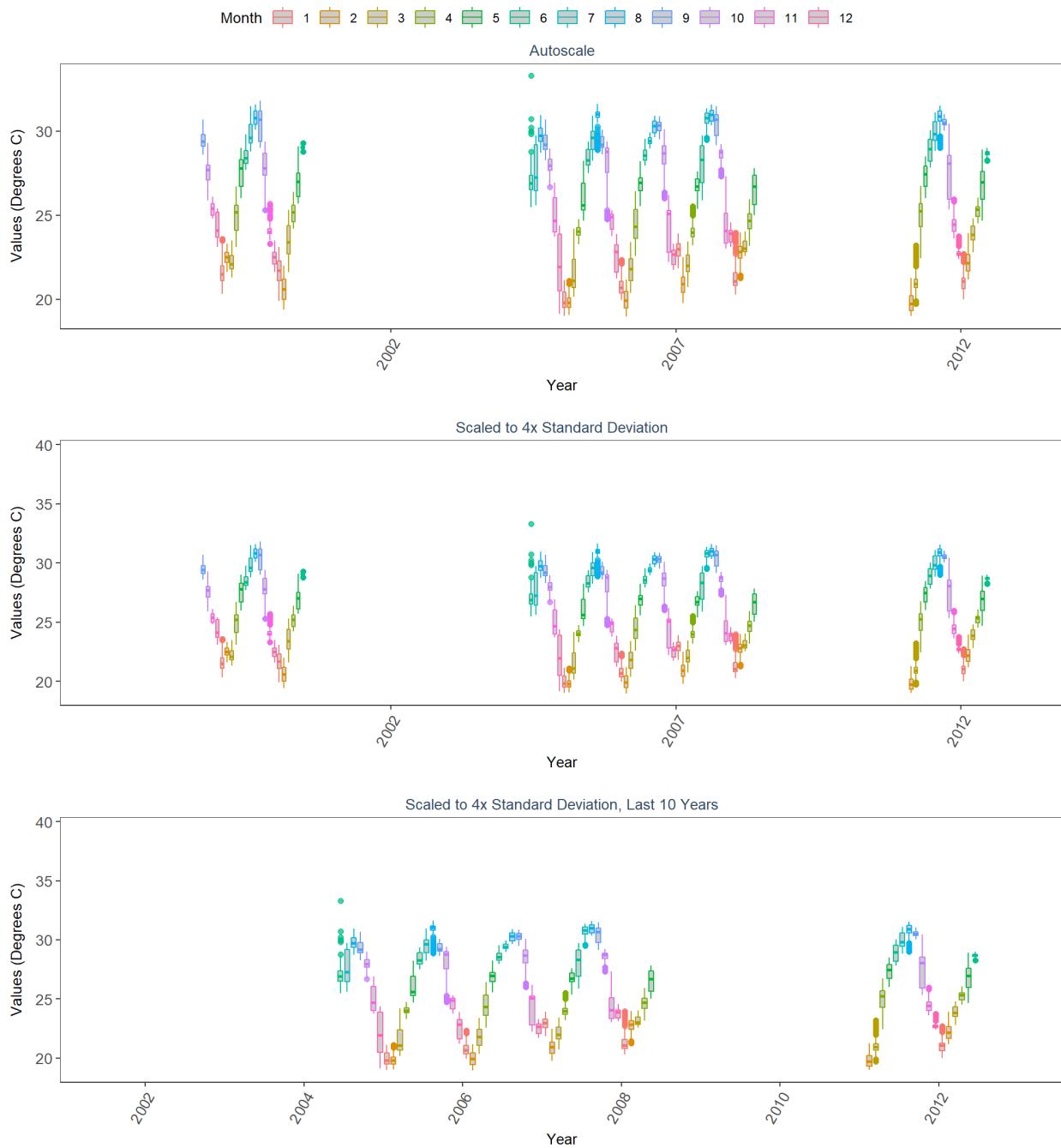
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SAND\_KEY  
 By Month



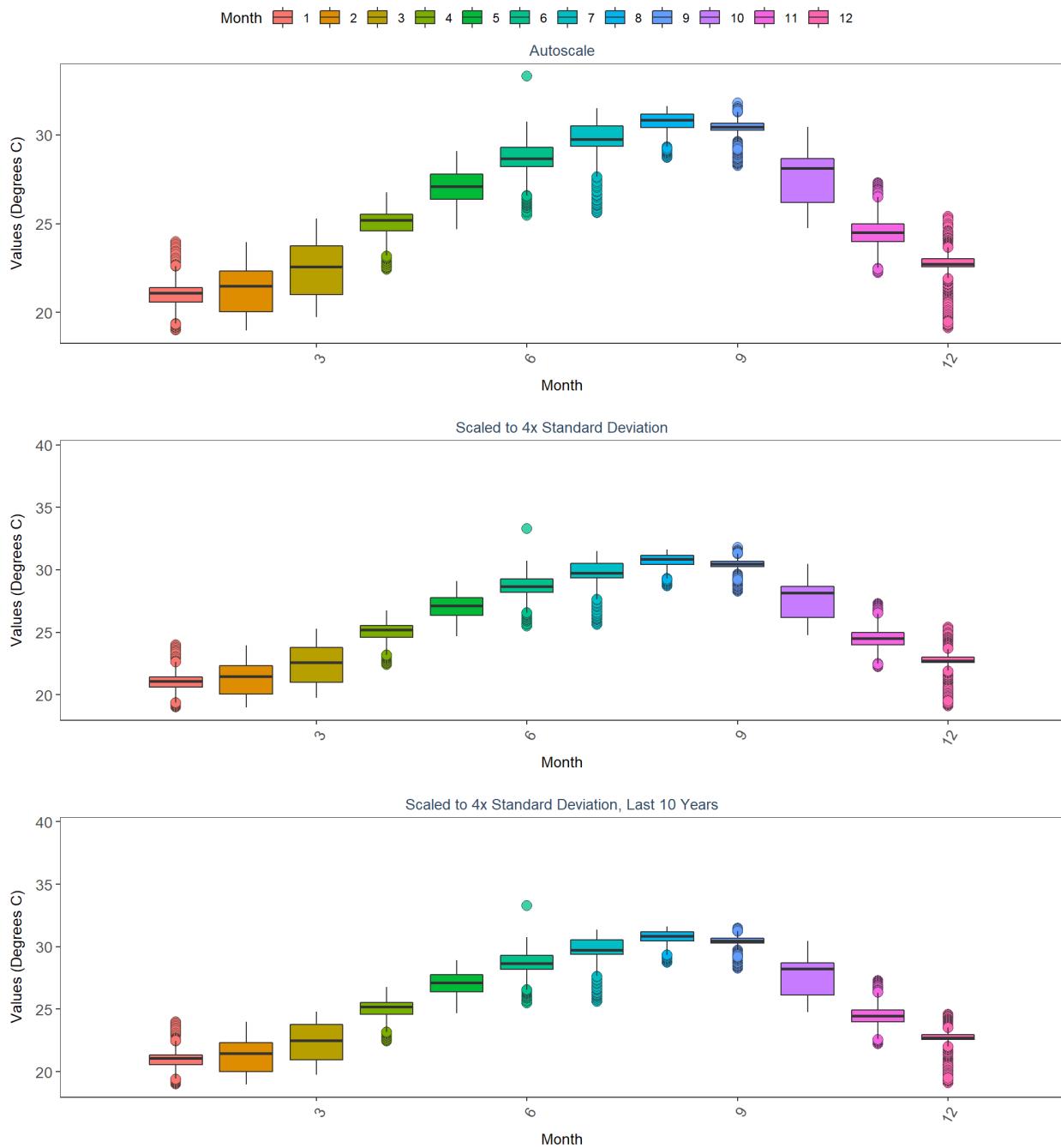
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Continuous Bottom Temperature Measurements along the Florida Reef Tract  
FKNMS\_SMITH\_SHL  
By Year



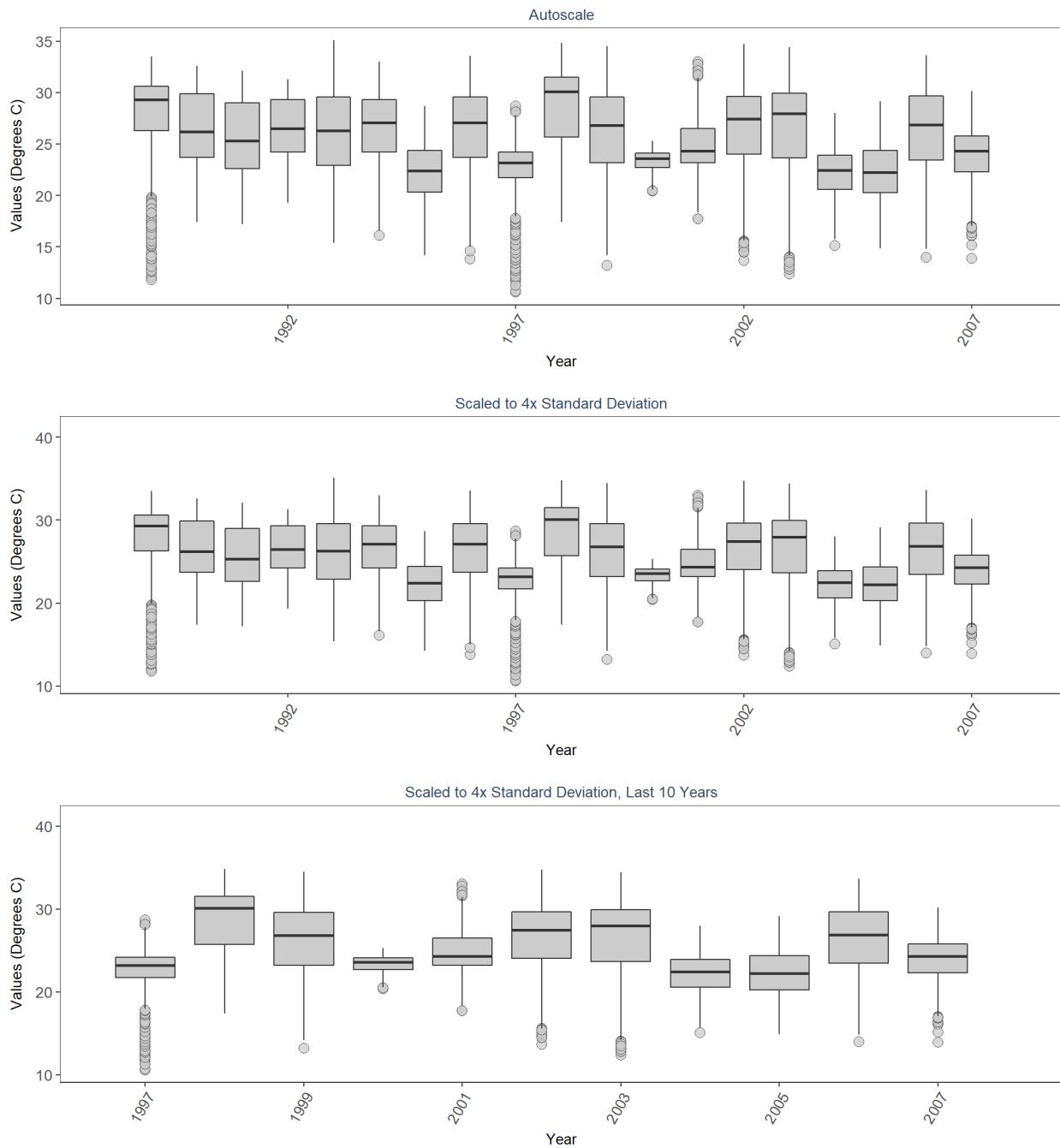
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 FKNMS\_SMITH\_SHL  
 By Year & Month



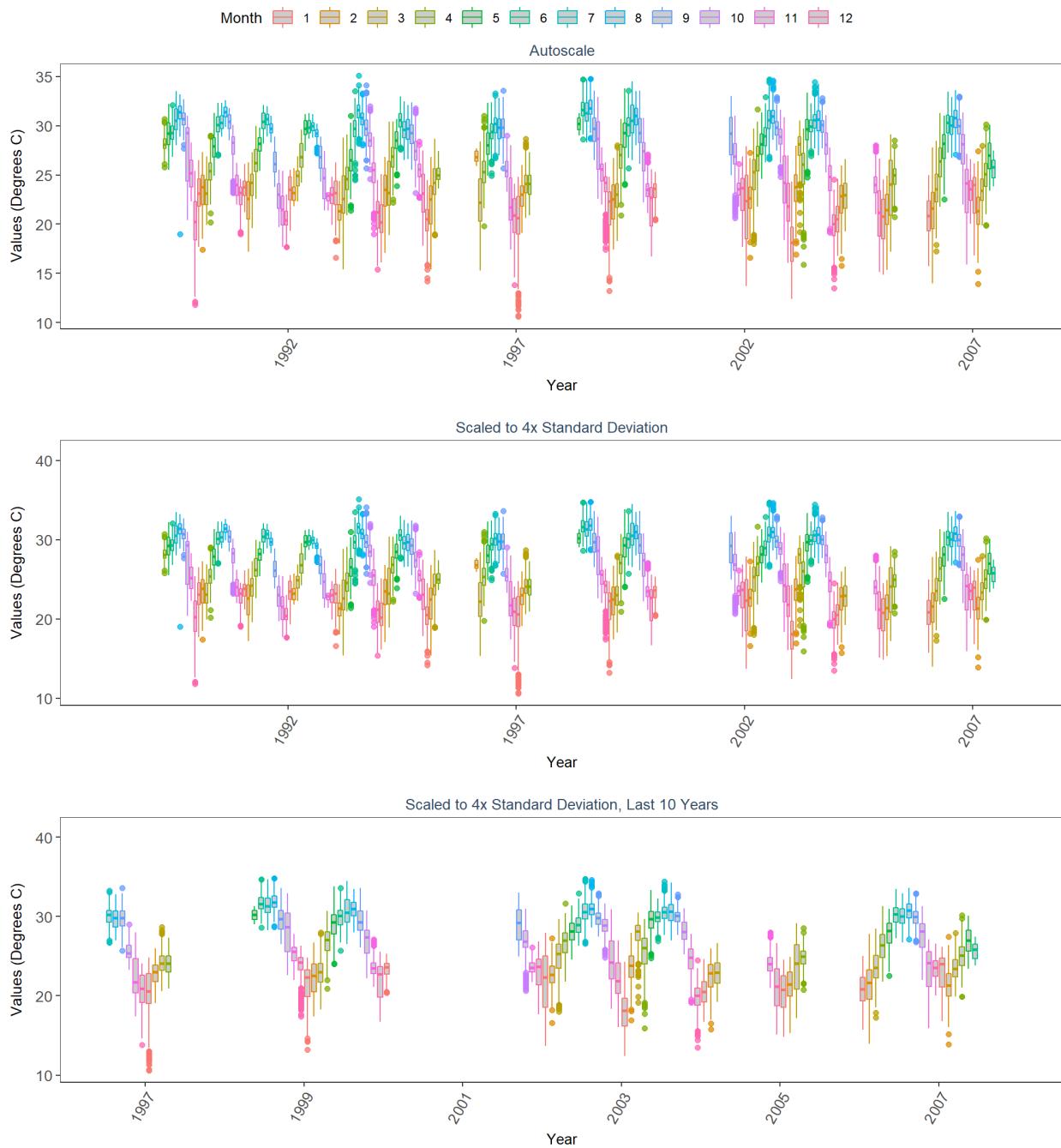
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 FKNMS\_SMITH\_SHL  
 By Month



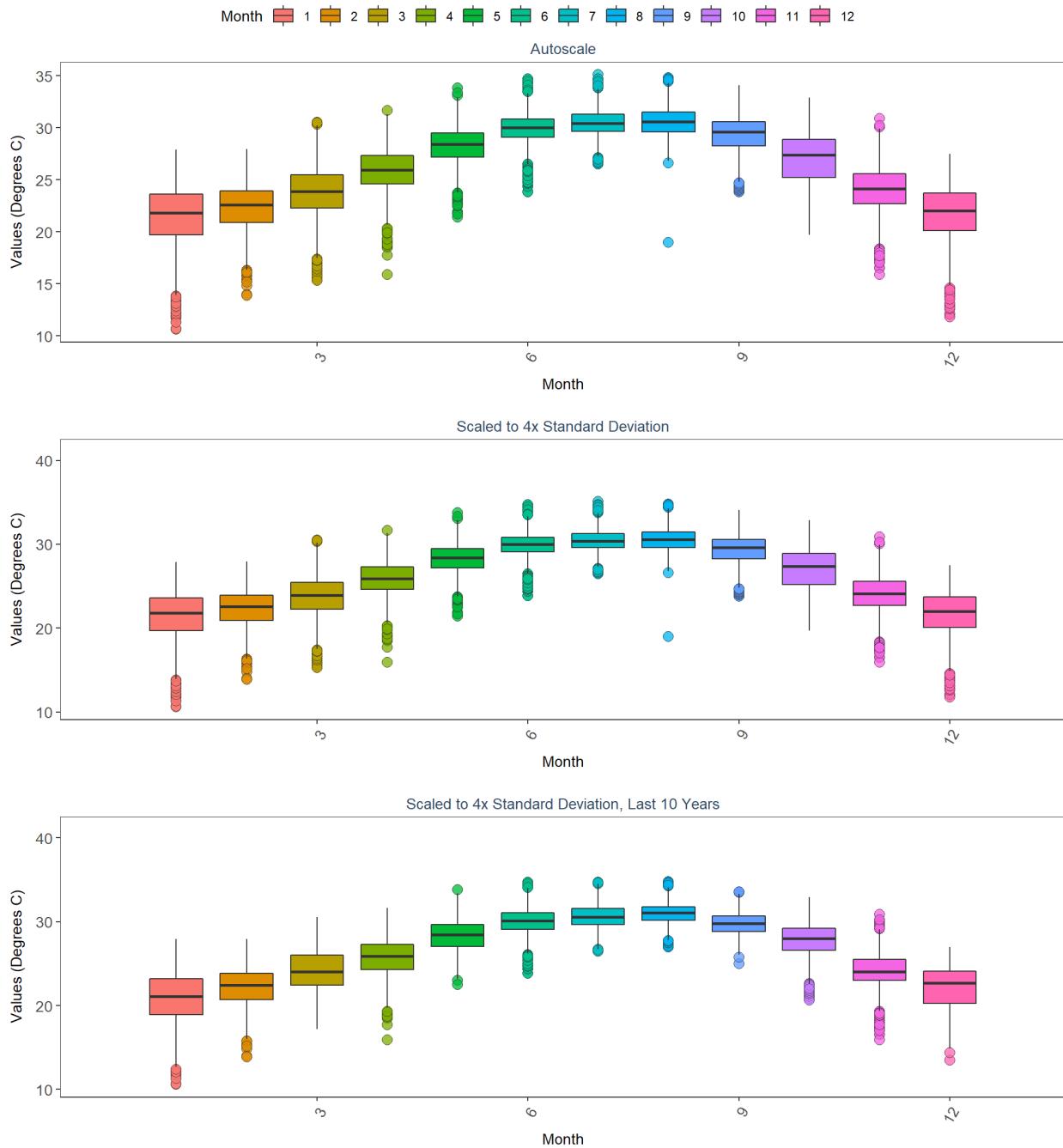
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SNAKE\_CRK  
 By Year



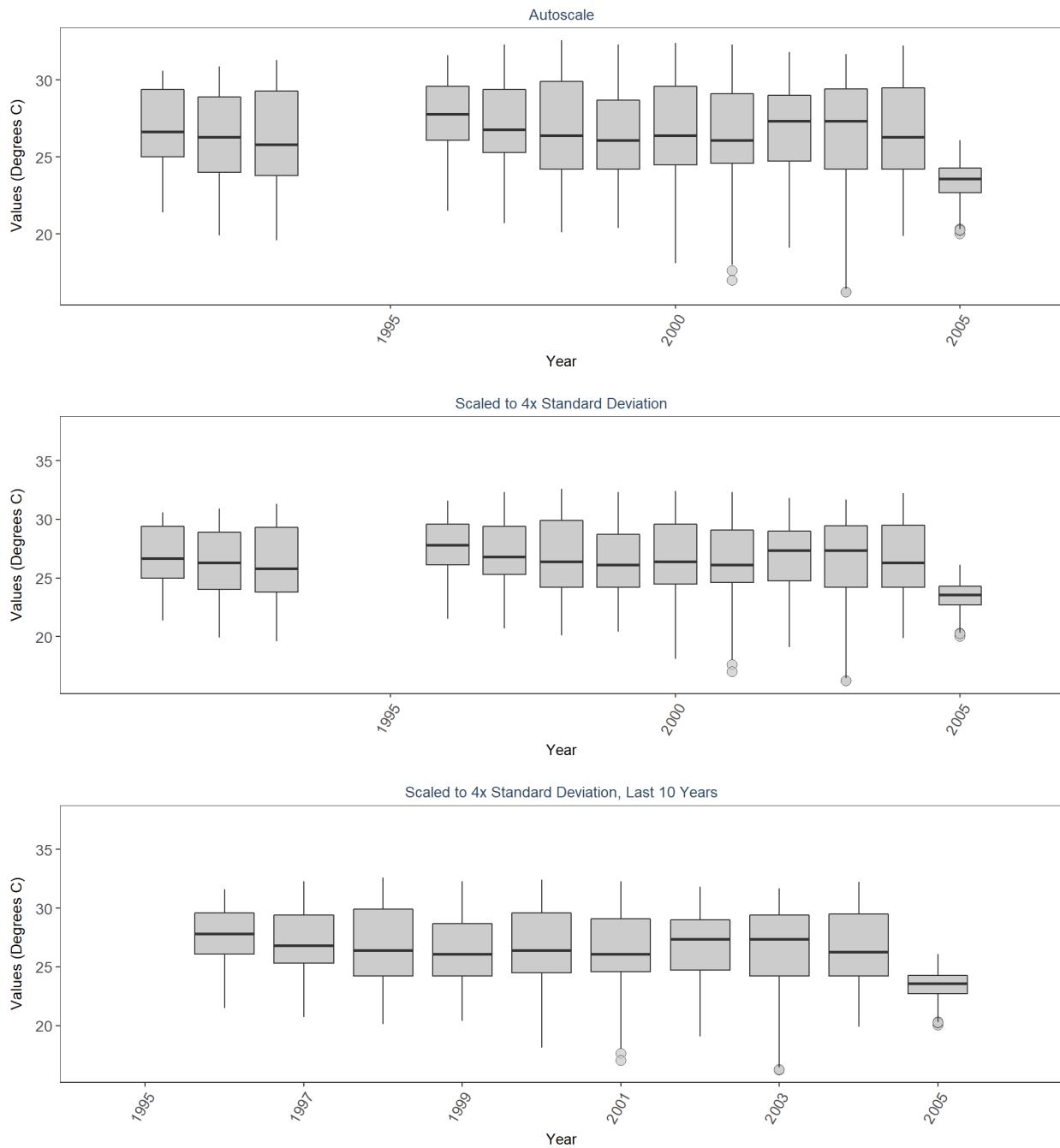
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
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 By Year & Month



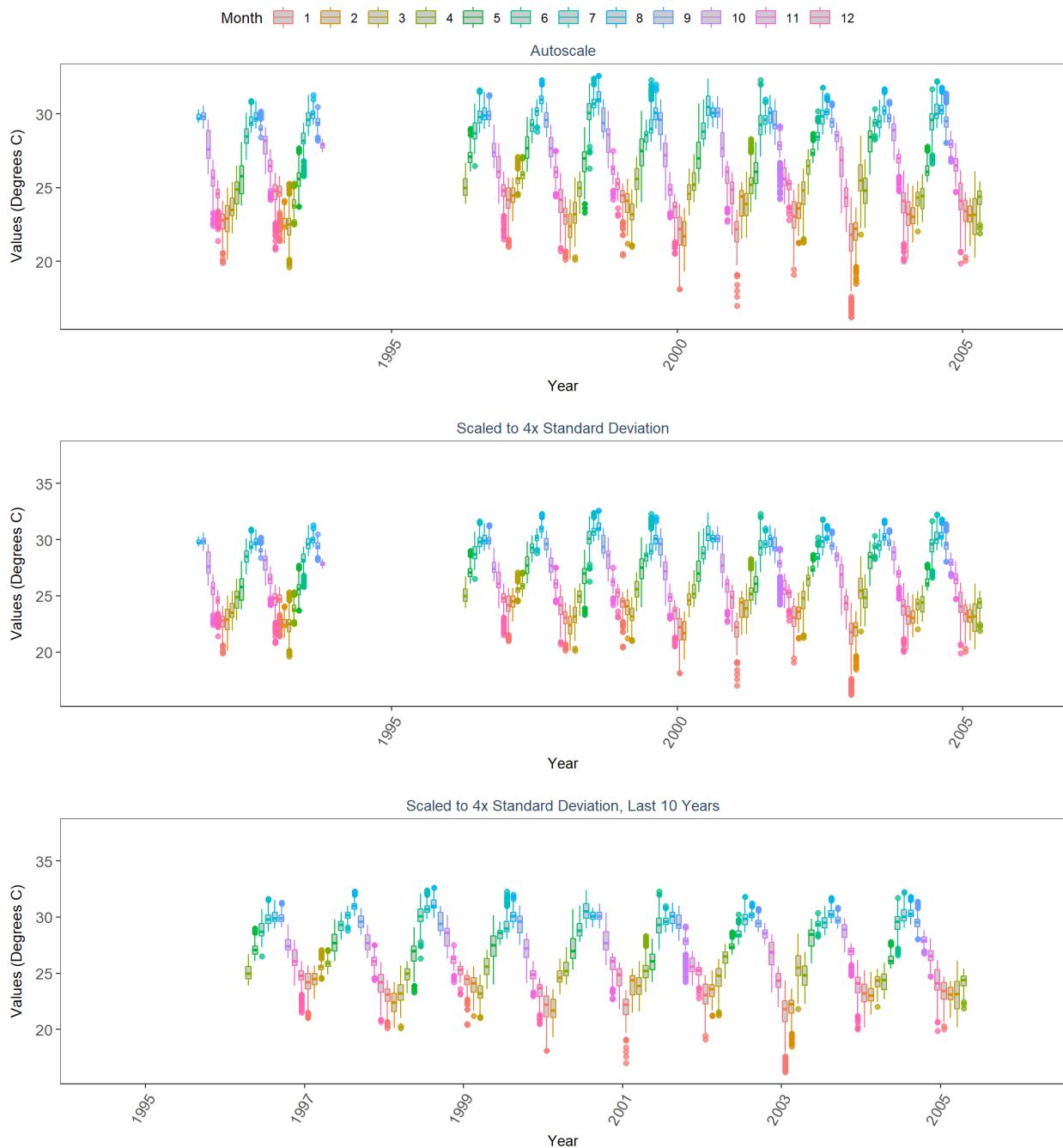
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SNAKE\_CRK  
 By Month



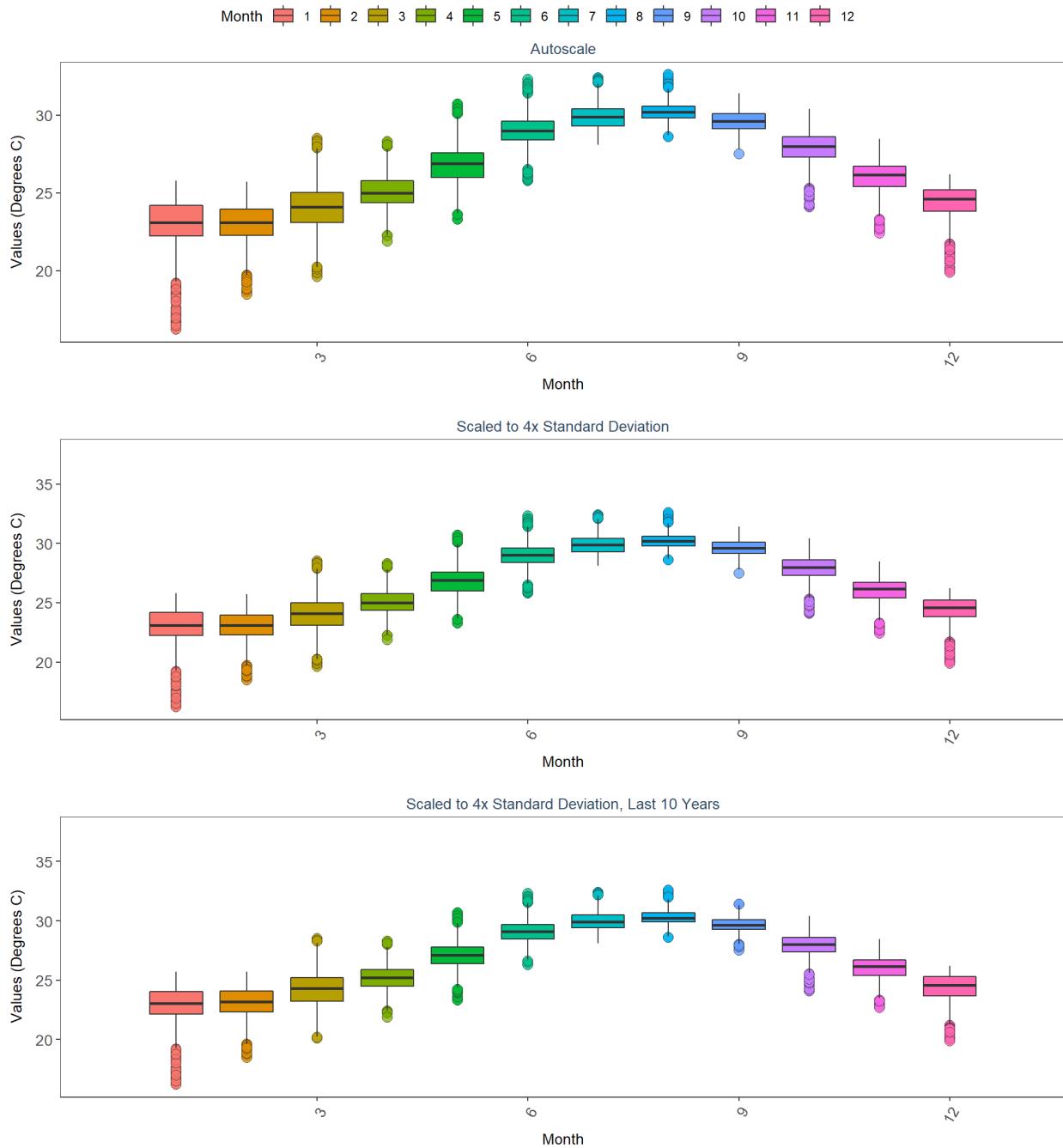
Florida Keys National Marine Sanctuary  
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SOMBRERO  
 By Year



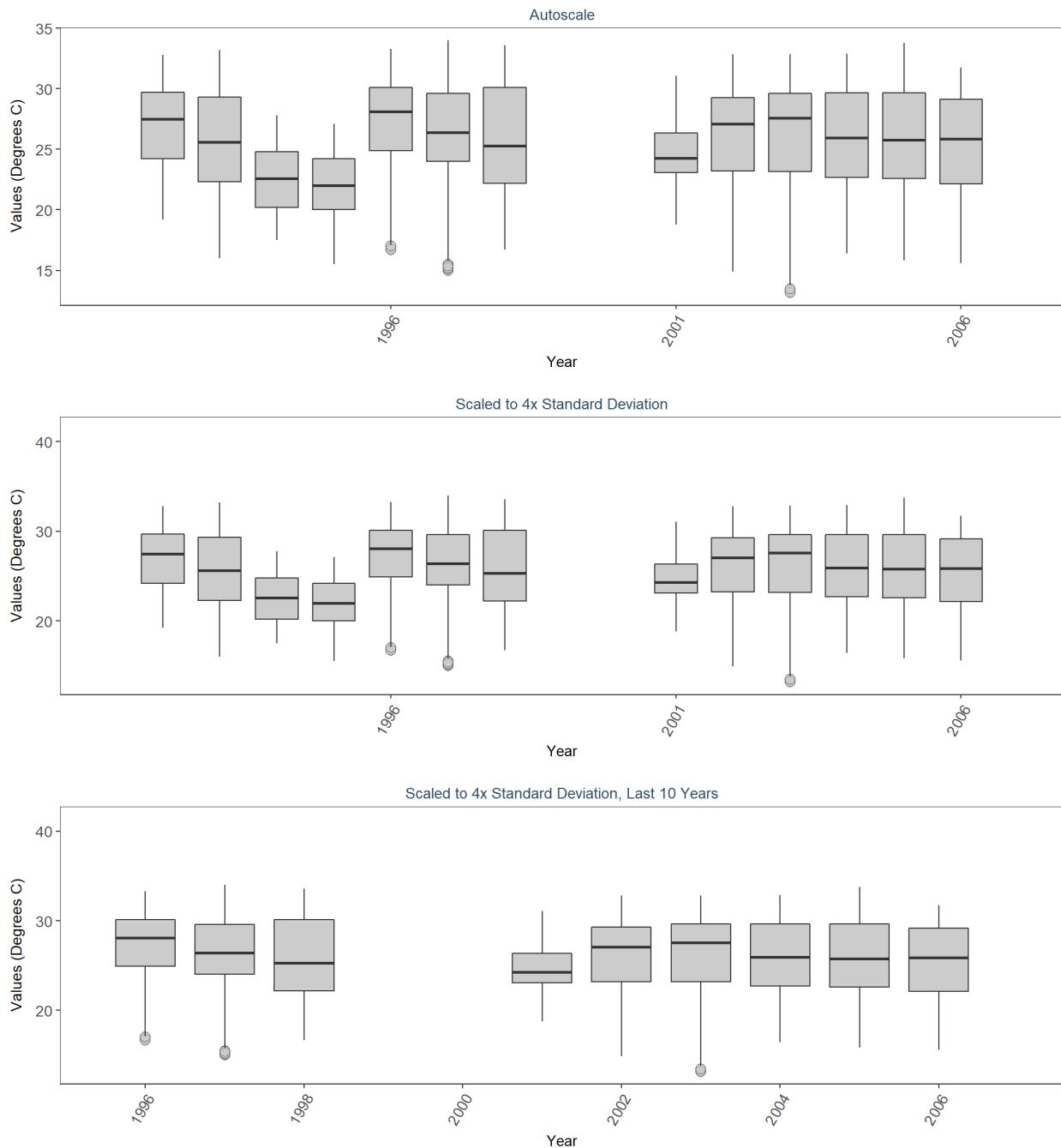
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SOMBRERO  
 By Year & Month



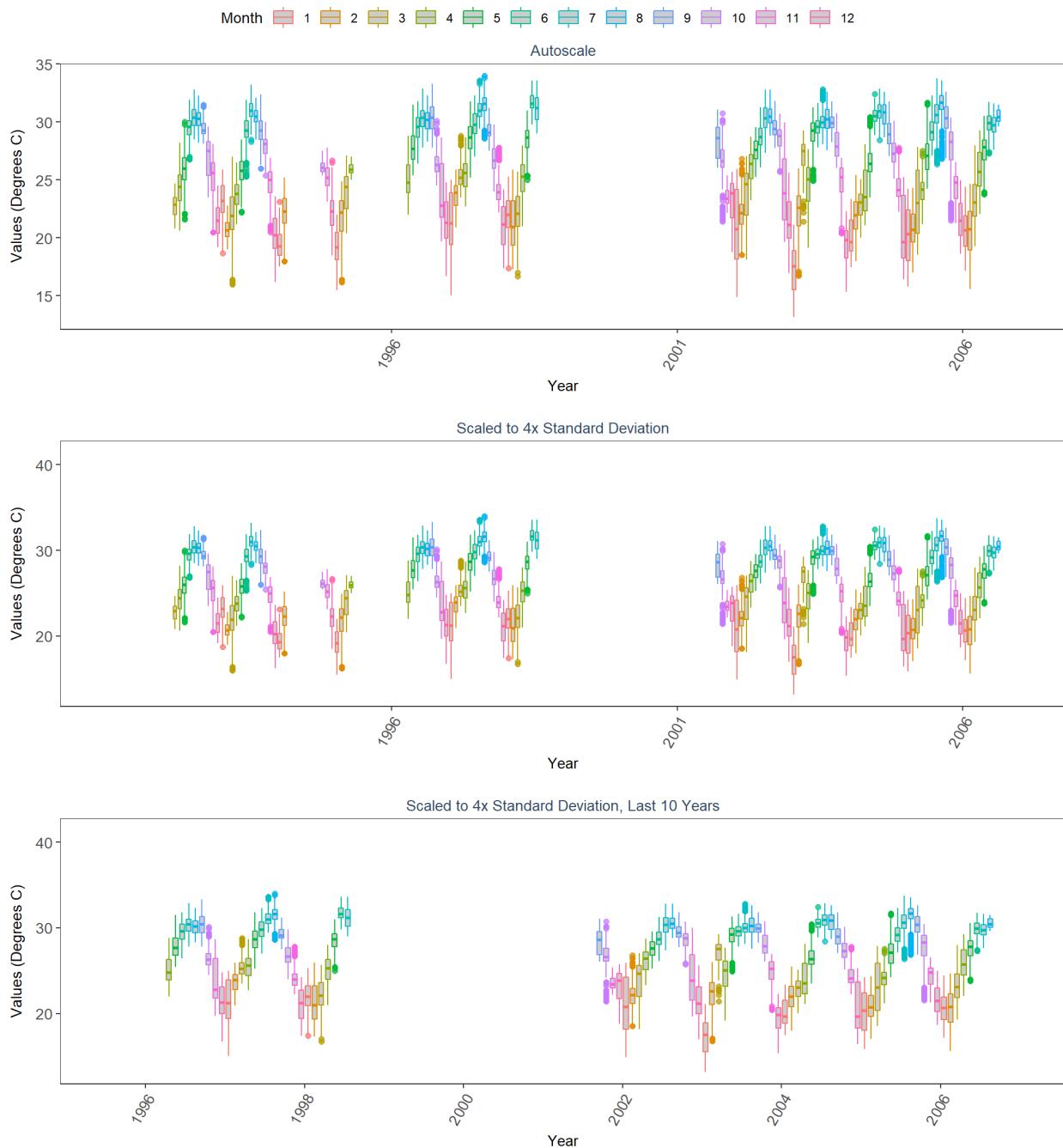
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SOMBRERO  
 By Month



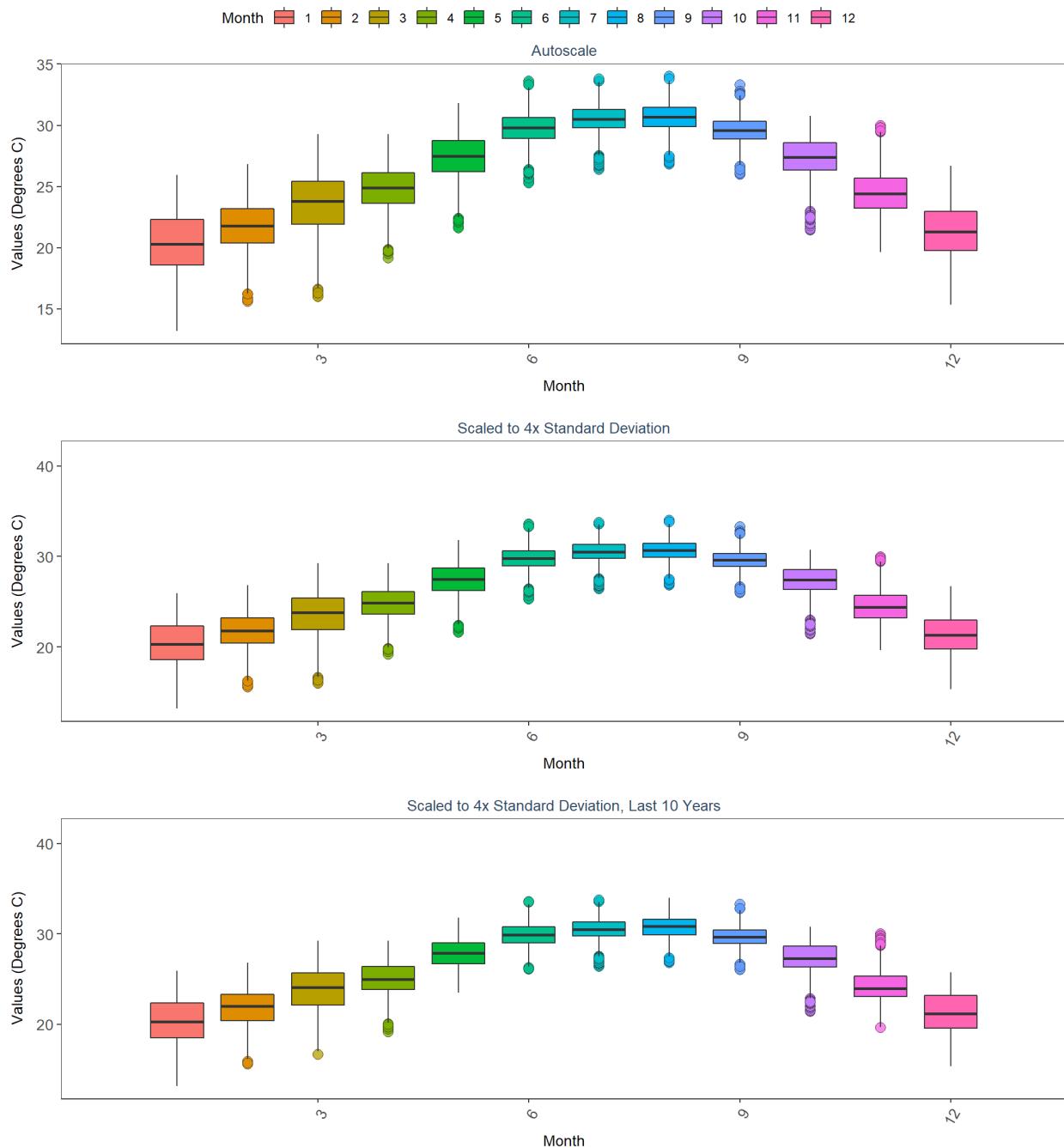
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_SPRIGGER  
 By Year



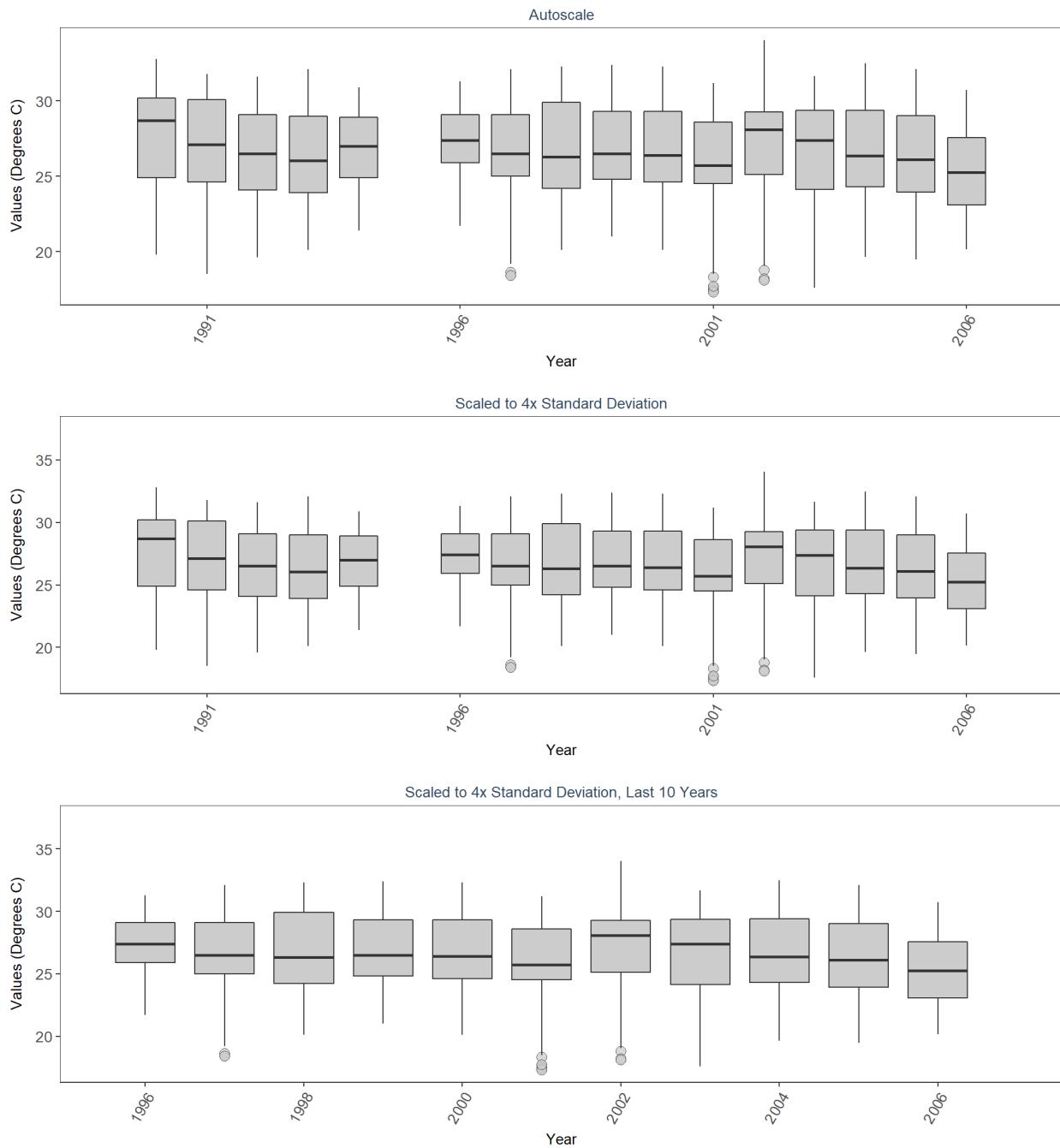
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 FKNMS\_SPRIGGER  
 By Year & Month



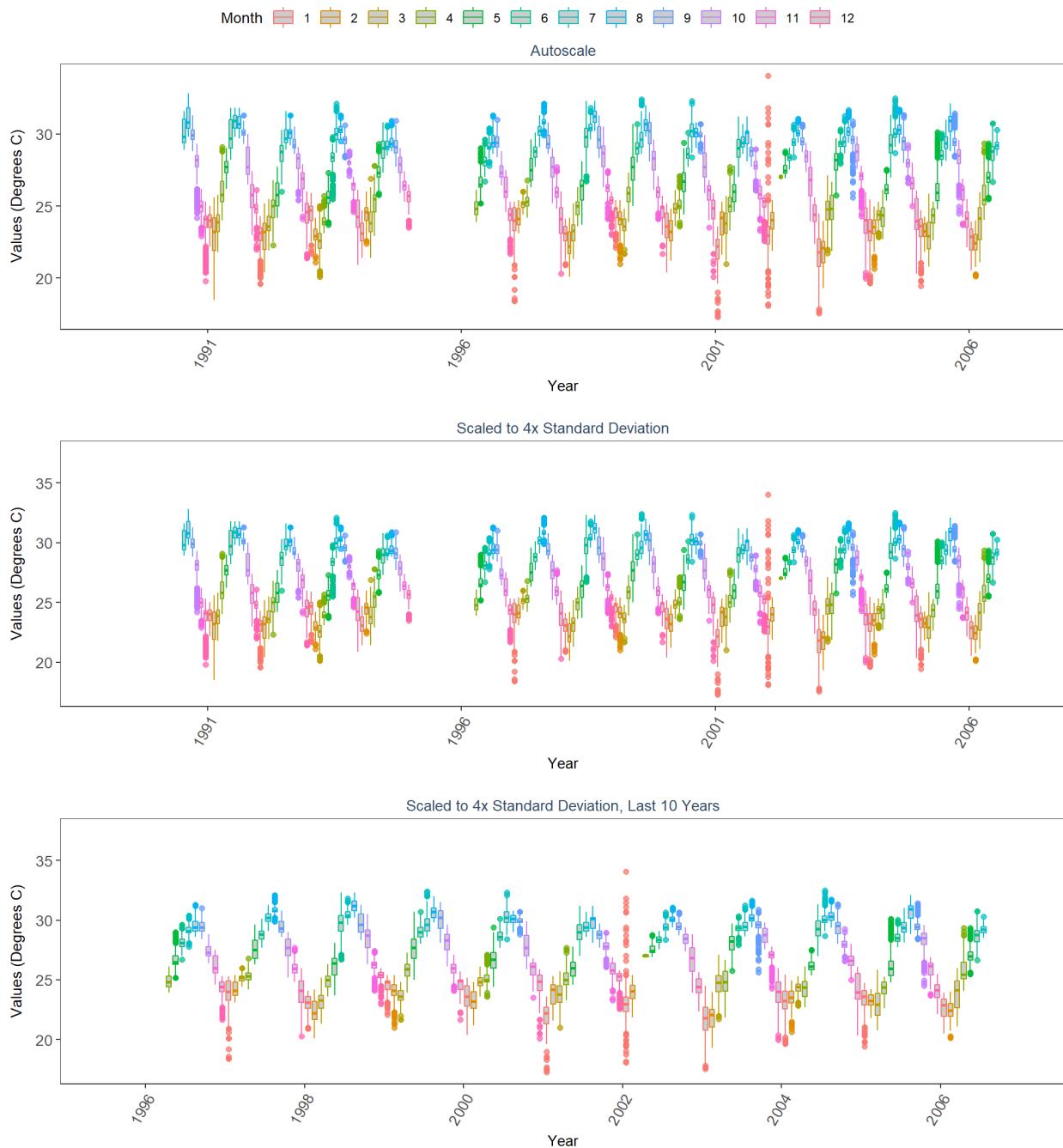
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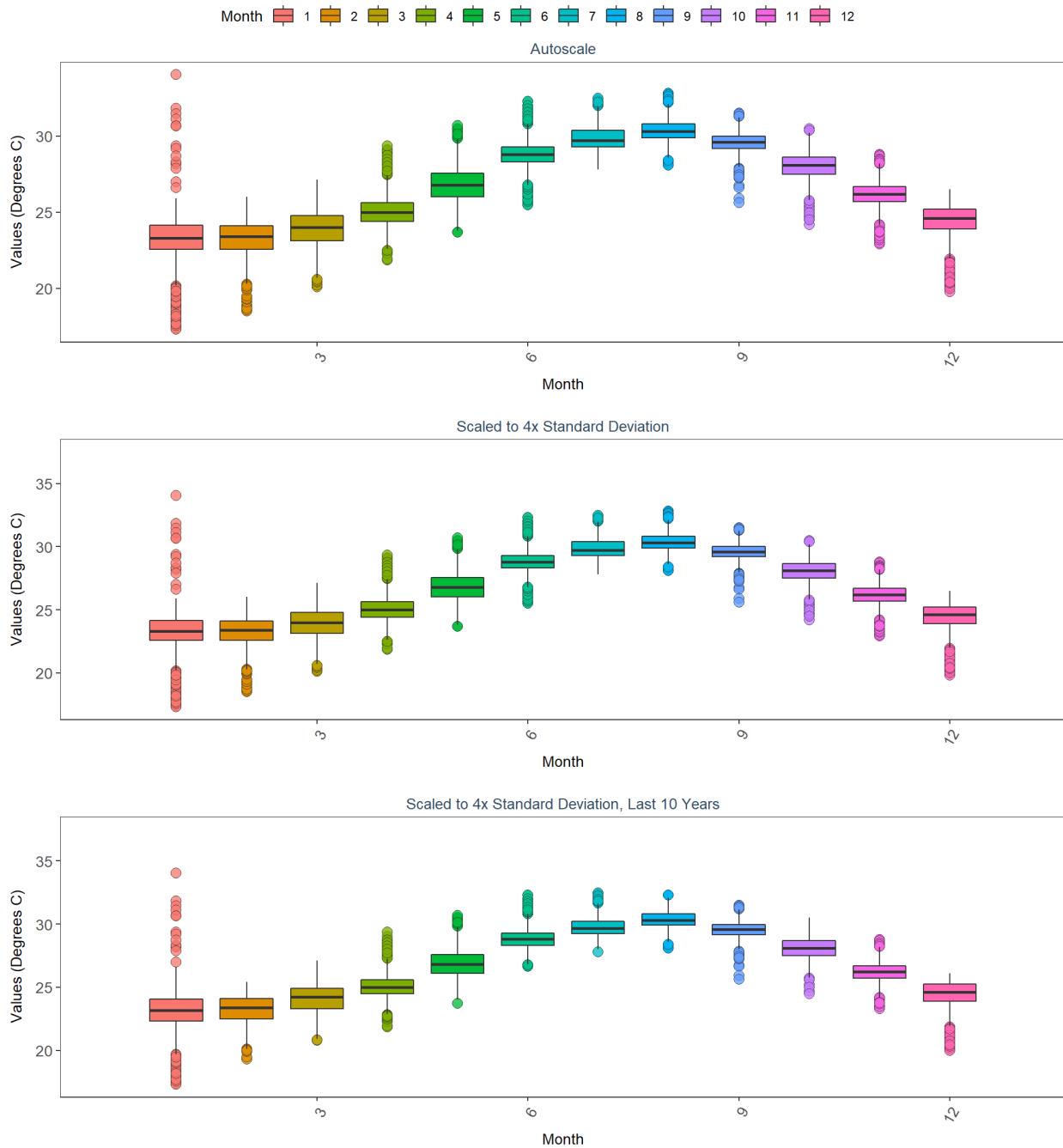
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 FKNMS\_TENN\_REF  
 By Year



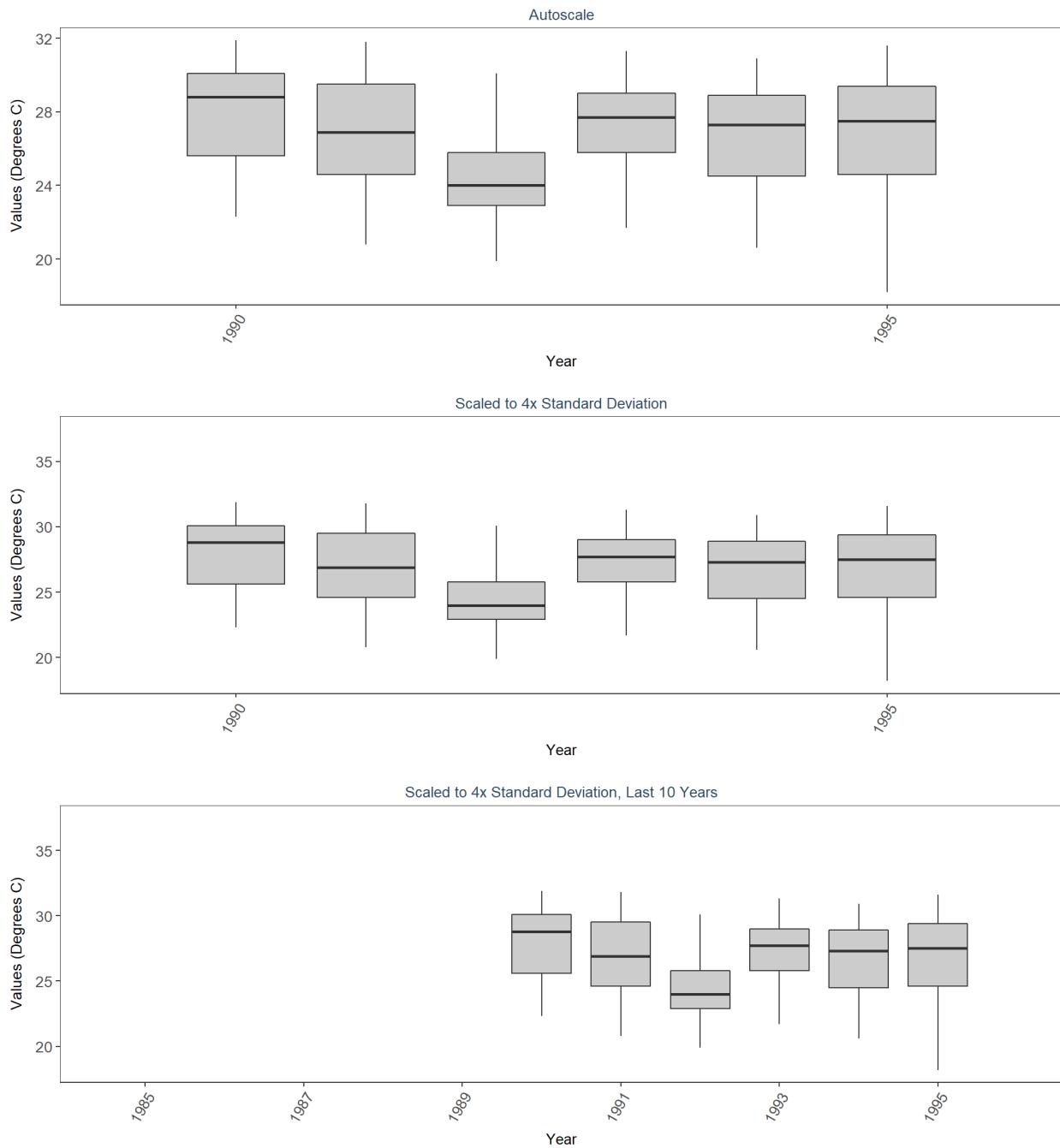
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 By Year & Month



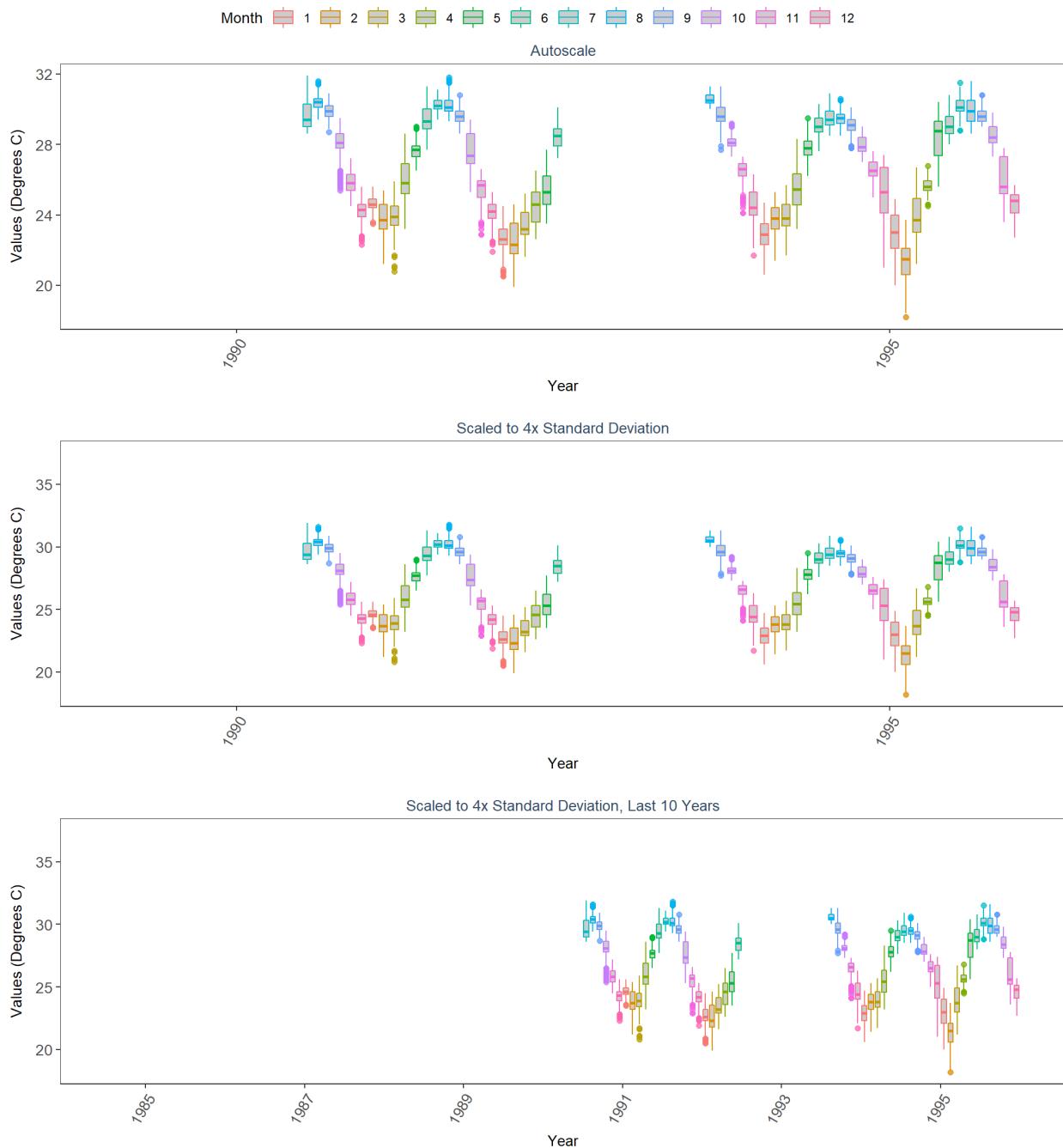
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 By Month



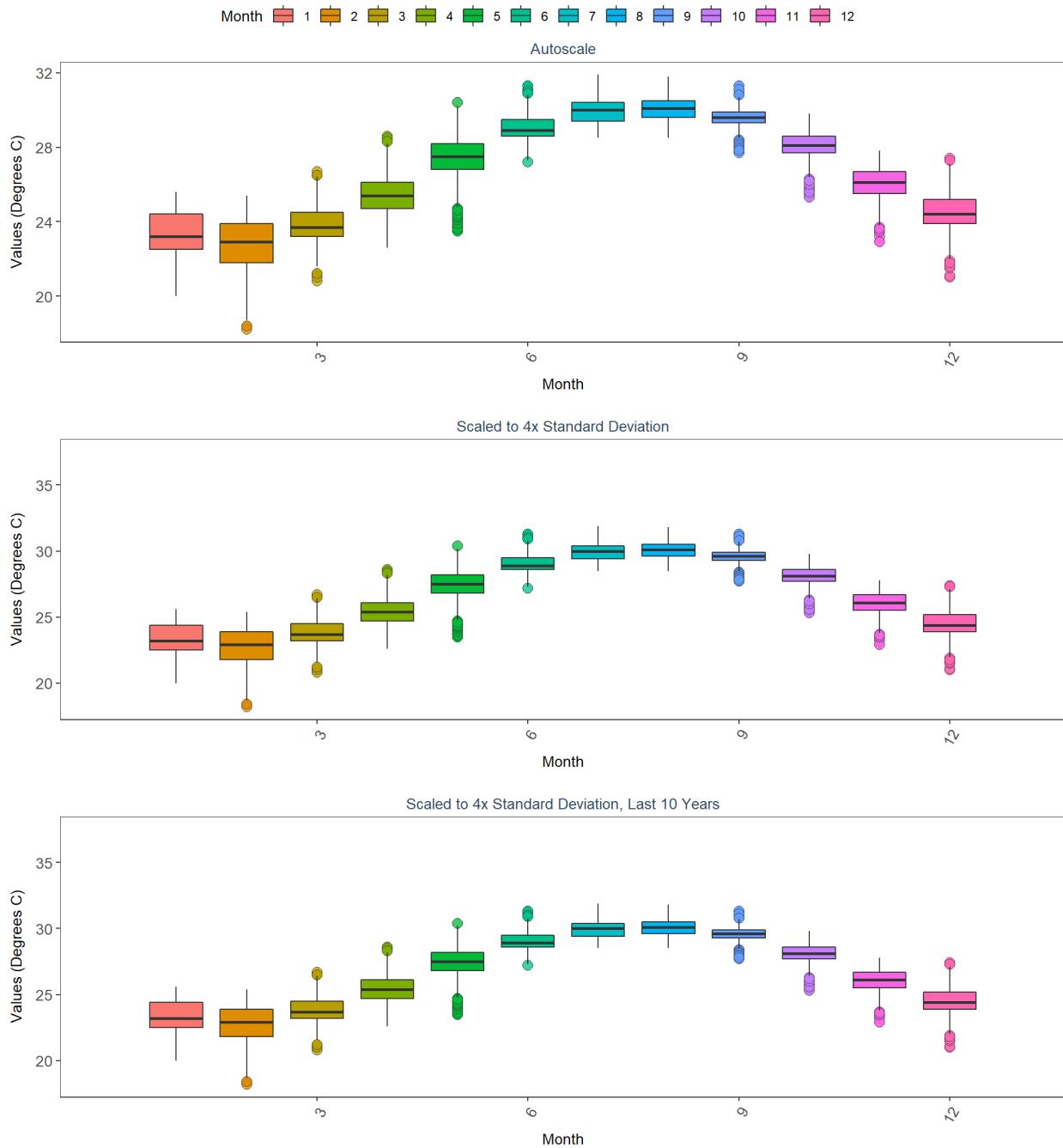
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_W\_SAMBO  
 By Year



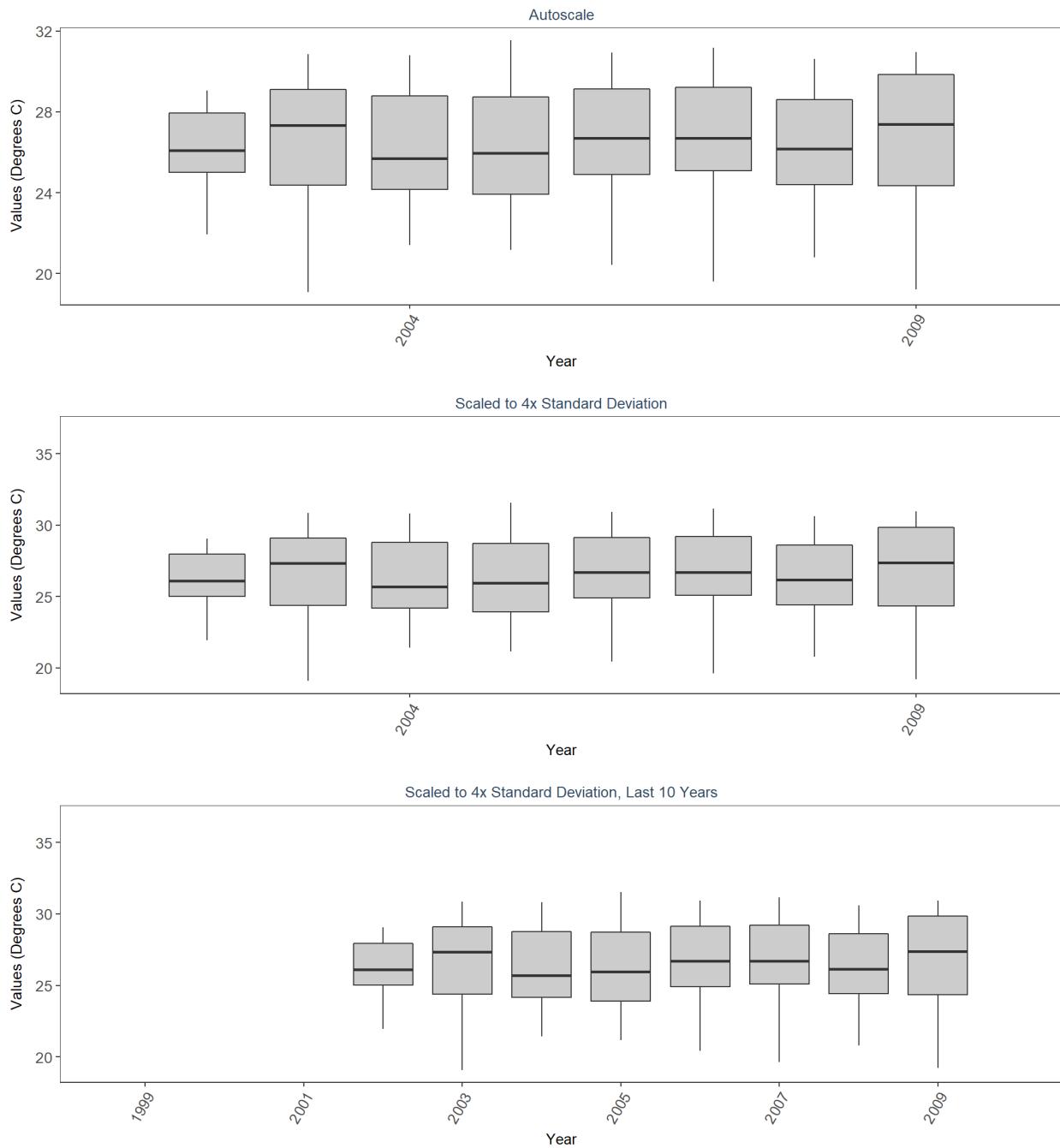
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_W\_SAMBO  
 By Year & Month



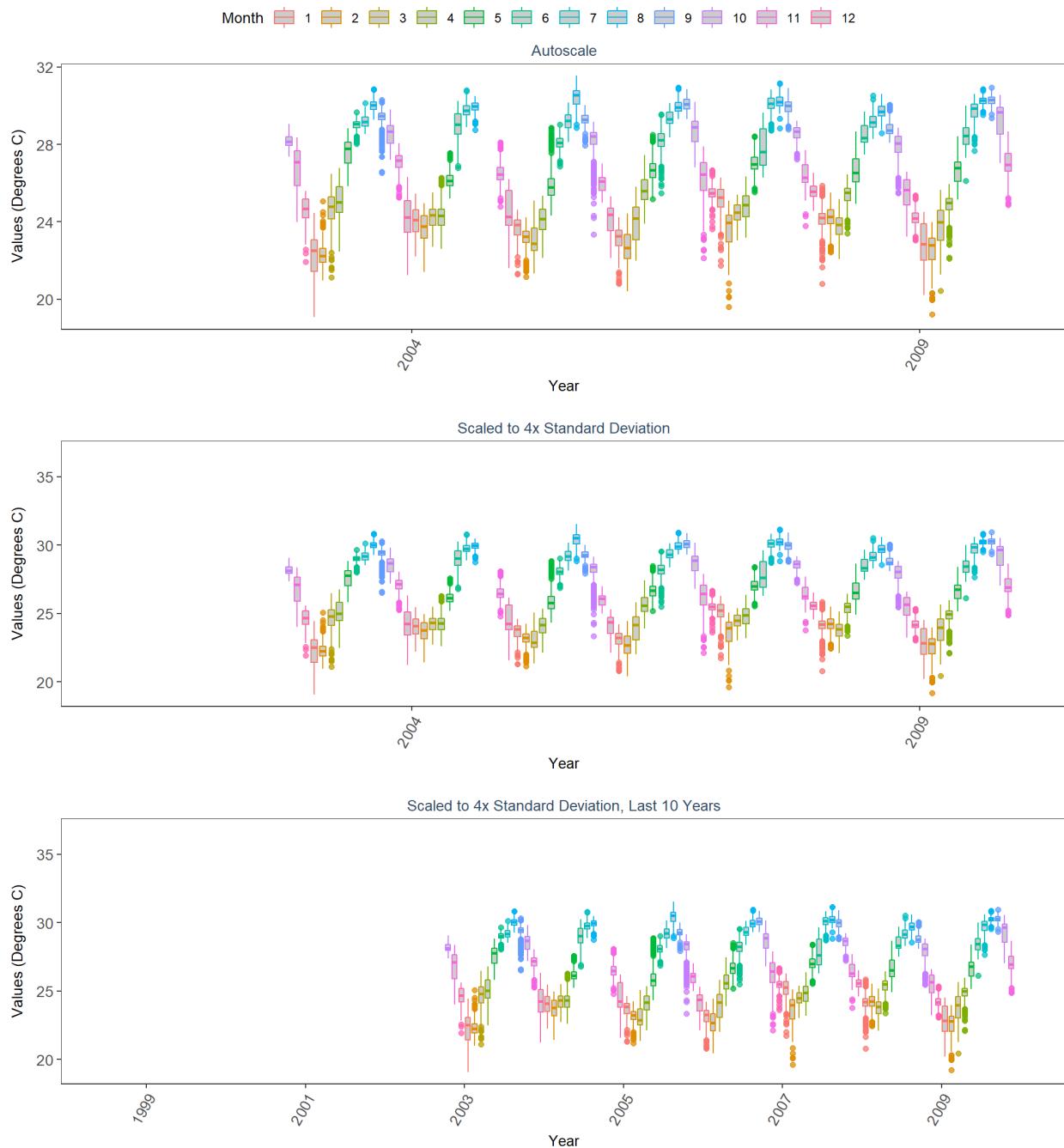
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 FKNMS\_W\_SAMBO  
 By Month



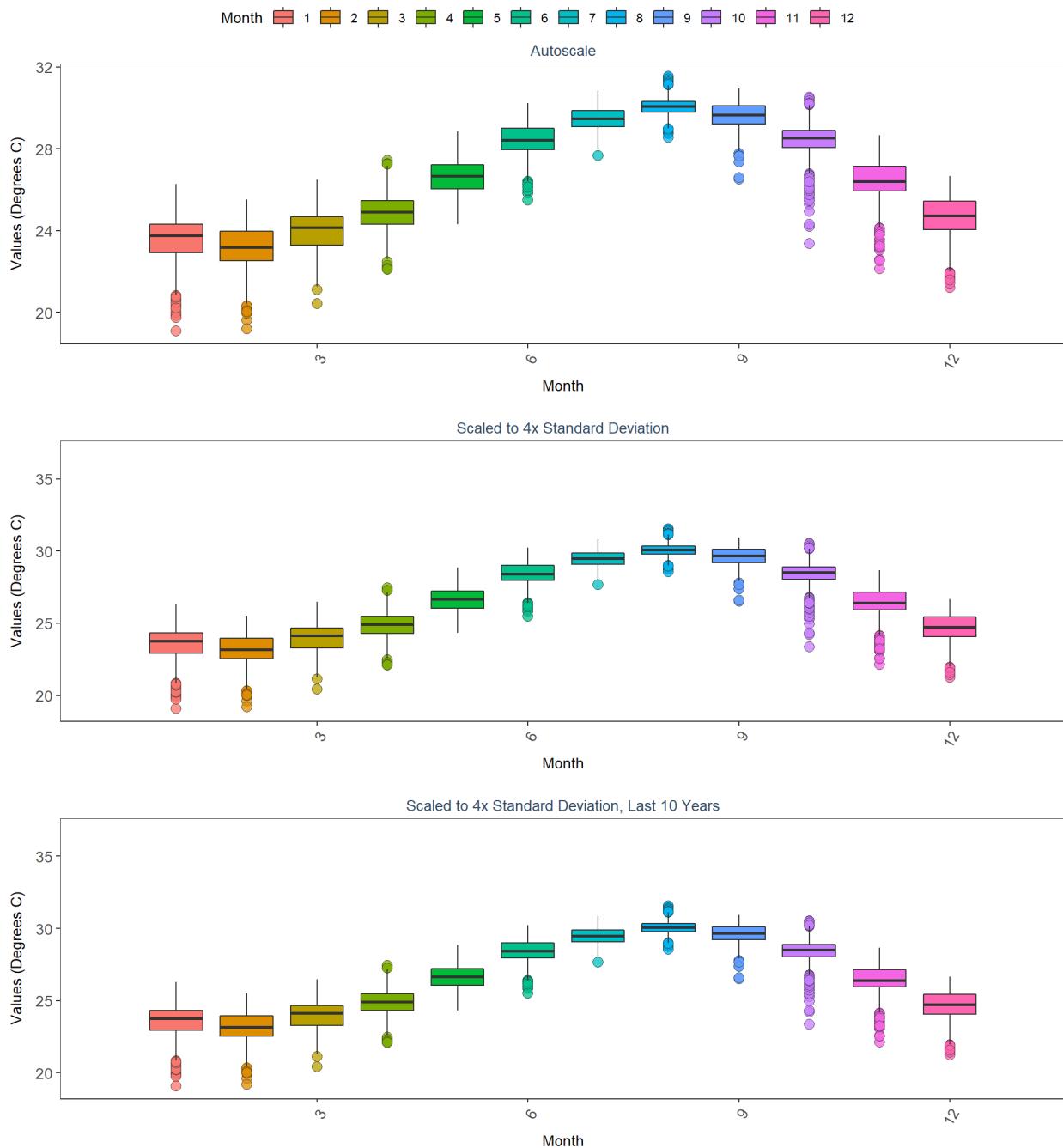
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Continuous Bottom Temperature Measurements along the Florida Reef Tract  
FKNMS\_WELLWOOD  
By Year



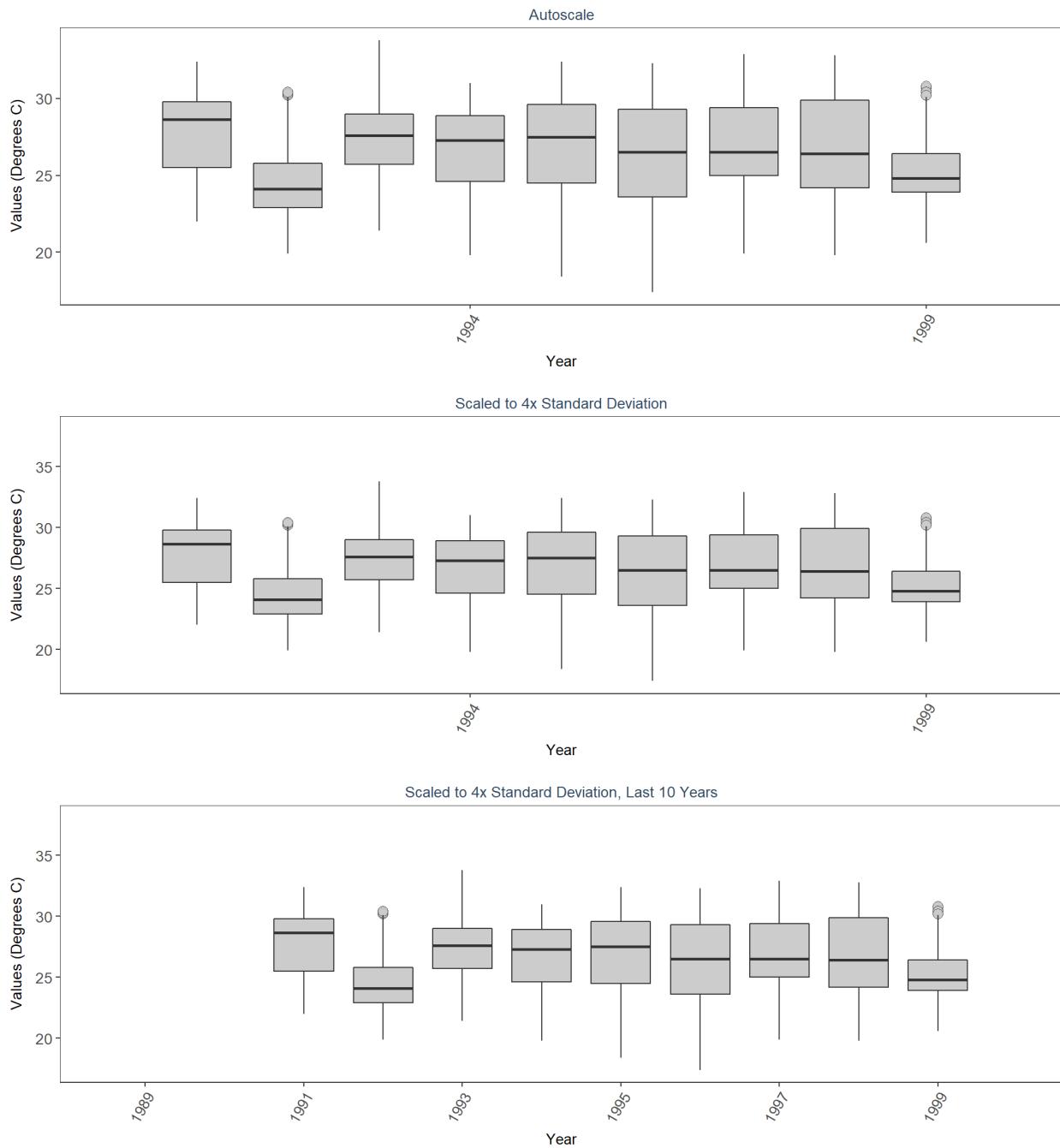
Florida Keys National Marine Sanctuary  
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_WELLWOOD  
 By Year & Month



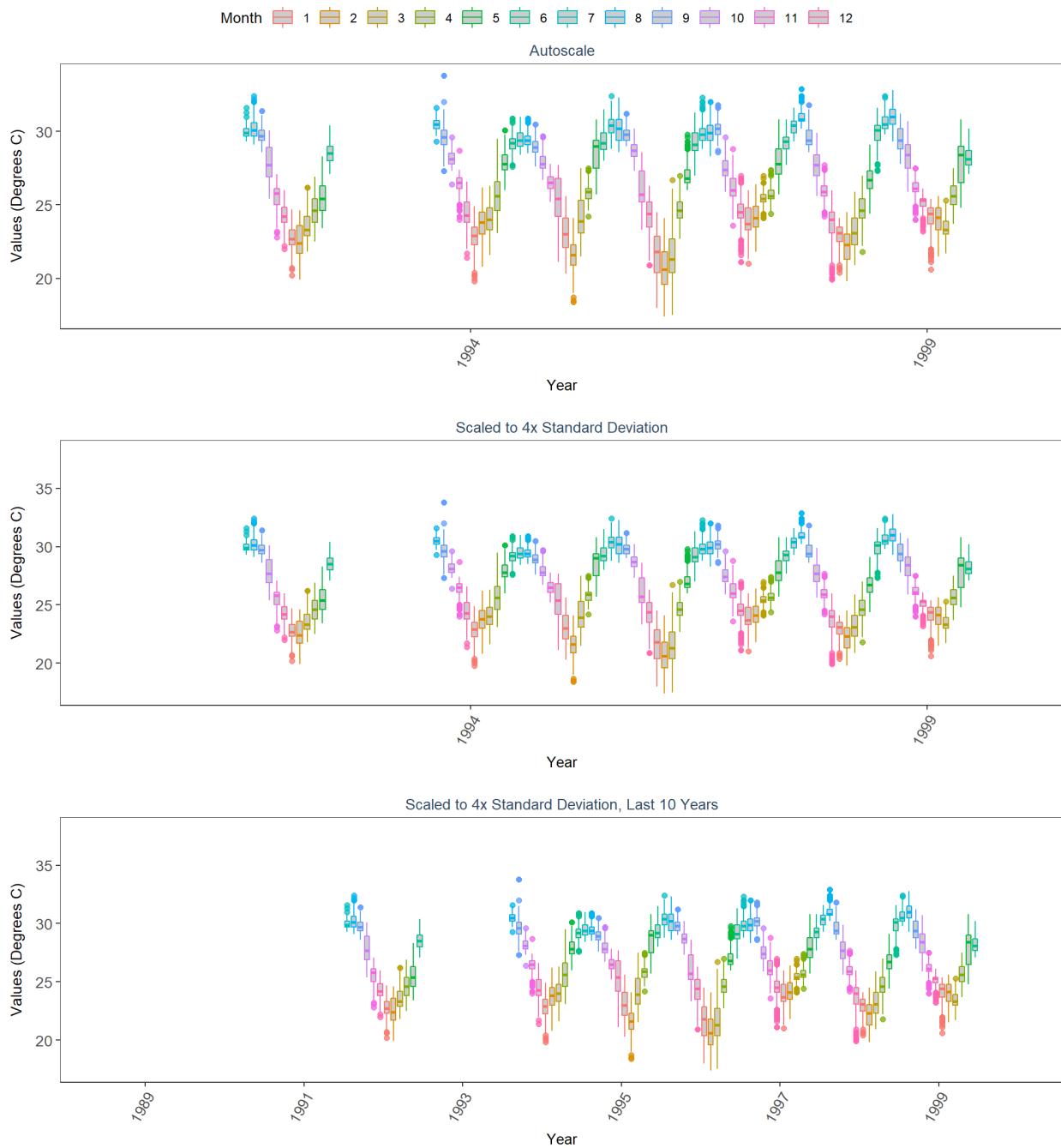
Florida Keys National Marine Sanctuary  
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 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_WELLWOOD  
 By Month



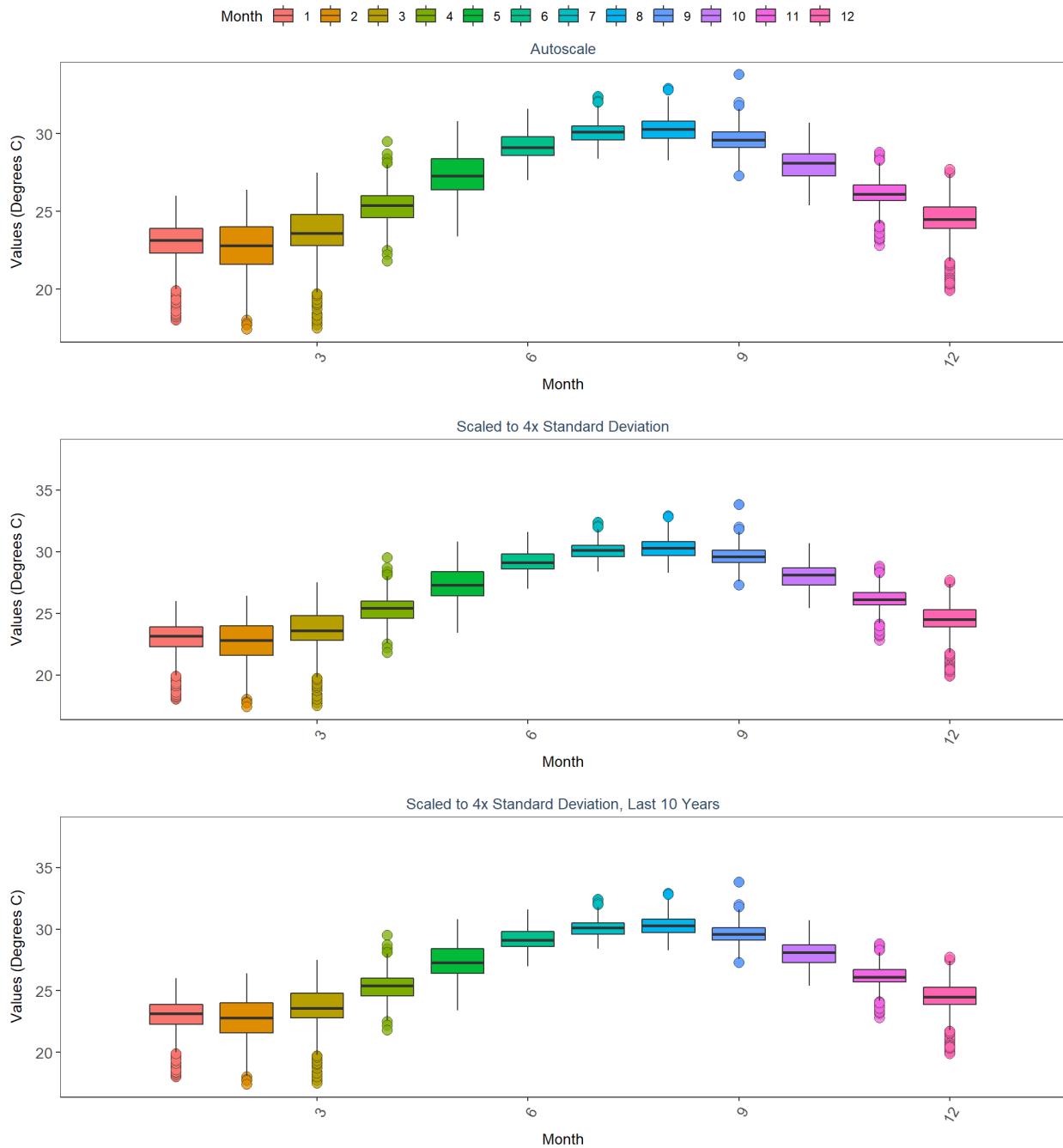
Florida Keys National Marine Sanctuary  
989  
Continuous Bottom Temperature Measurements along the Florida Reef Tract  
FKNMS\_WS\_JACKYL  
By Year



Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_WS\_JACKYL  
 By Year & Month



Florida Keys National Marine Sanctuary  
 989  
 Continuous Bottom Temperature Measurements along the Florida Reef Tract  
 FKNMS\_WS\_JACKYL  
 By Month



#### Appendix IV: Excluded Monitoring Locations

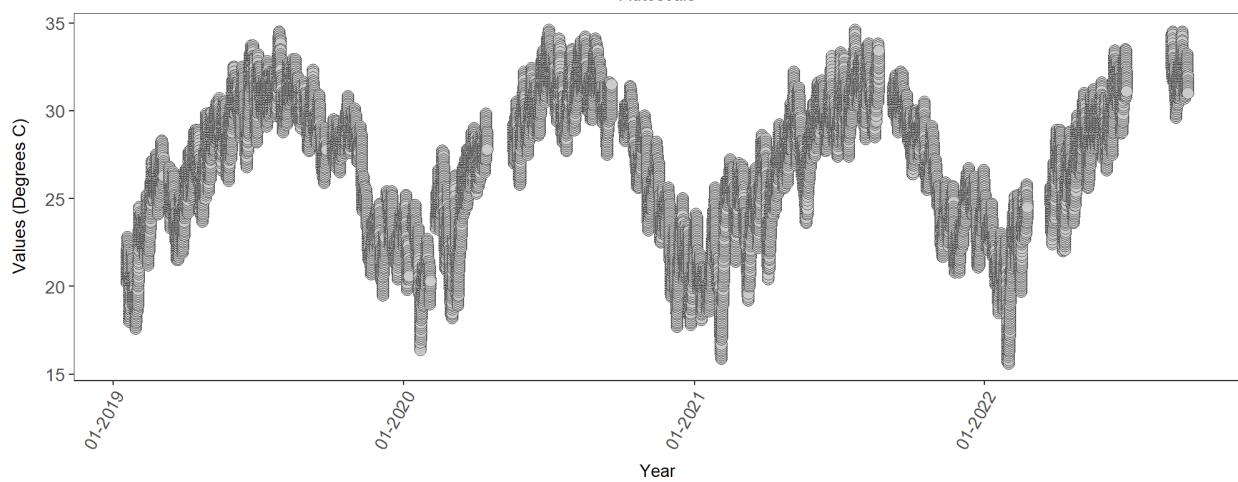
Scatter plots of data values are created for monitoring locations that have fewer than 5 separate years of data entries.

```

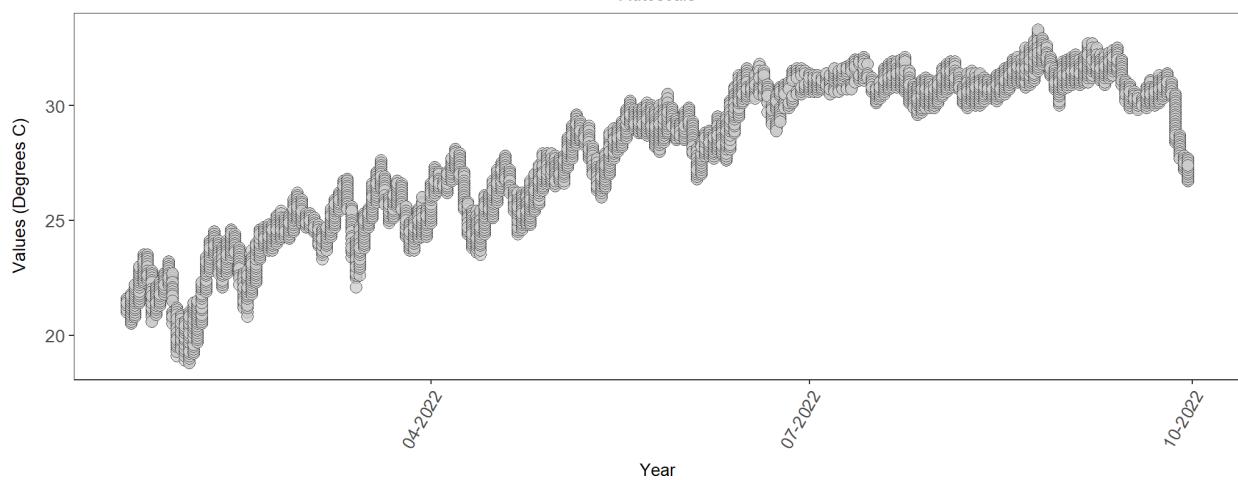
# Get list of monitoring locations that have data, but without sufficient data
Mon_Exclude <- Mon_Summ[Mon_Summ$SufficientData==FALSE & N_Years>0,]
Mon_Exclude <- Mon_Exclude[order(Mon_Exclude$MonitoringID),]
z=nrow(Mon_Exclude)
# Determines whether excluded monitoring locations exist. If they do, begins
# looping through them
if(z==0){
  print("There are no monitoring locations that qualify.")
} else {
  for(i in 1:z){
    # Get managed area name for title
    MA_name <- unique(data$ManagedAreaName[
      data$MonitoringID==Mon_Exclude$MonitoringID[i]])
    # Get program name for title
    Mon_name <- paste0(unique(data$ProgramID[
      data$MonitoringID==Mon_Exclude$MonitoringID[i]]), "\n",
      unique(data$ProgramName[
        data$MonitoringID==Mon_Exclude$MonitoringID[i]]), "\n",
      unique(data$ProgramLocationID[
        data$MonitoringID==Mon_Exclude$MonitoringID[i]])))
    # Create scatter plot with data
    p1<-ggplot(data=data[data$MonitoringID==Mon_Exclude$MonitoringID[i] &
      data$Include==TRUE, ],
      aes(x=SampleDate, y=ResultValue)) +
      geom_point(shape=21, size=3, color="#333333", fill="#cccccc",
      alpha=0.75) +
      labs(title=paste0(MA_name, "\n",
        Mon_name, " (", Mon_Exclude$N_Years[i],
        " Unique Years)"),
        subtitle="Autoscale", x="Year",
        y=paste0("Values (", unit, ")")) +
      plot_theme +
      scale_x_date(labels=date_format("%m-%Y"))
    print(p1)
  }
}

```

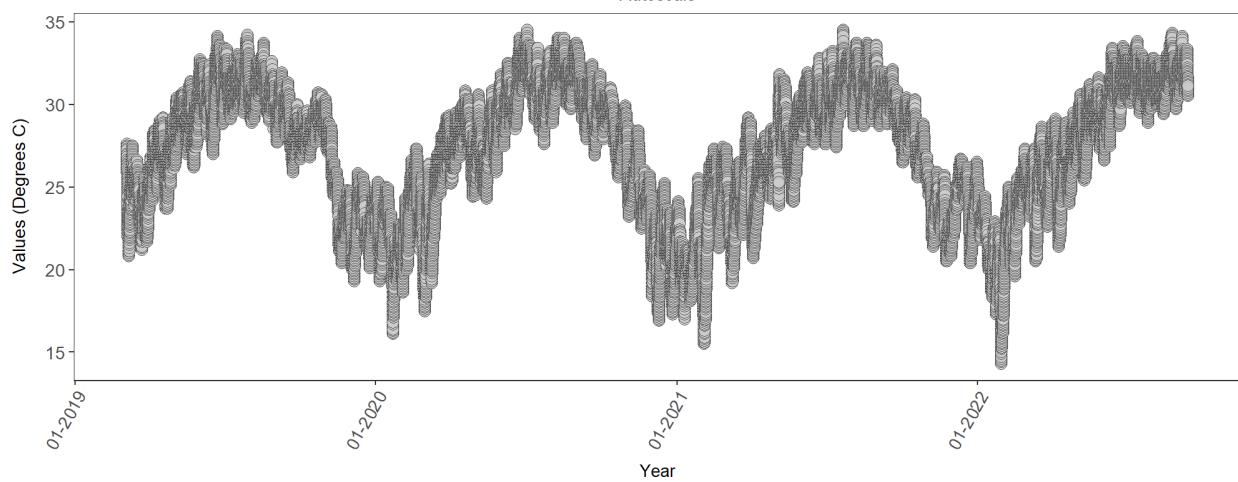
Biscayne Bay Aquatic Preserve  
5077  
Biscayne Bay Aquatic Preserves Continuous Water Quality Monitoring  
BBBB14 (4 Unique Years)  
Autoscale



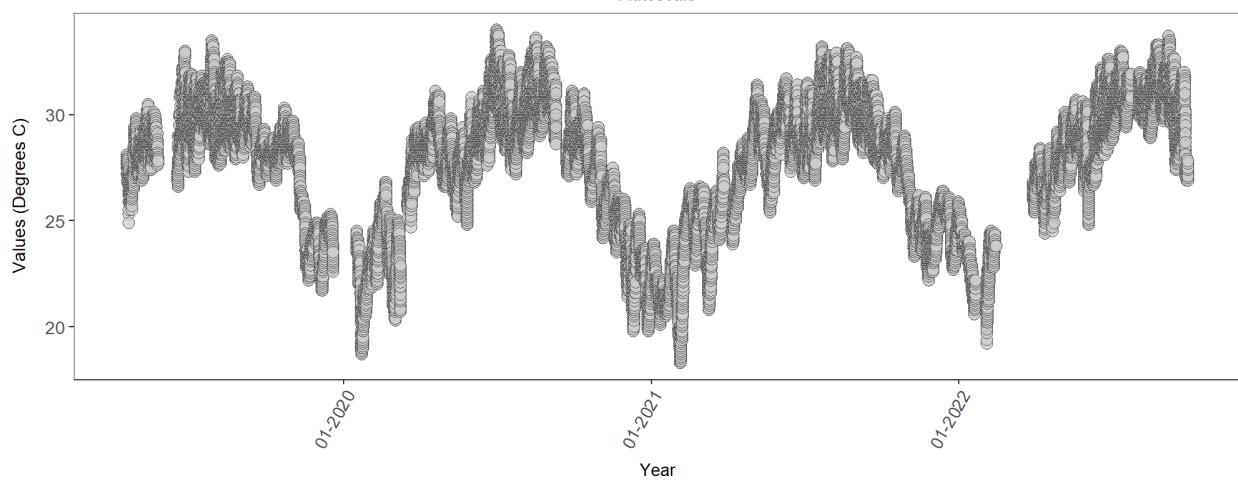
Biscayne Bay Aquatic Preserve  
5077  
Biscayne Bay Aquatic Preserves Continuous Water Quality Monitoring  
BBCWA4 (1 Unique Years)  
Autoscale



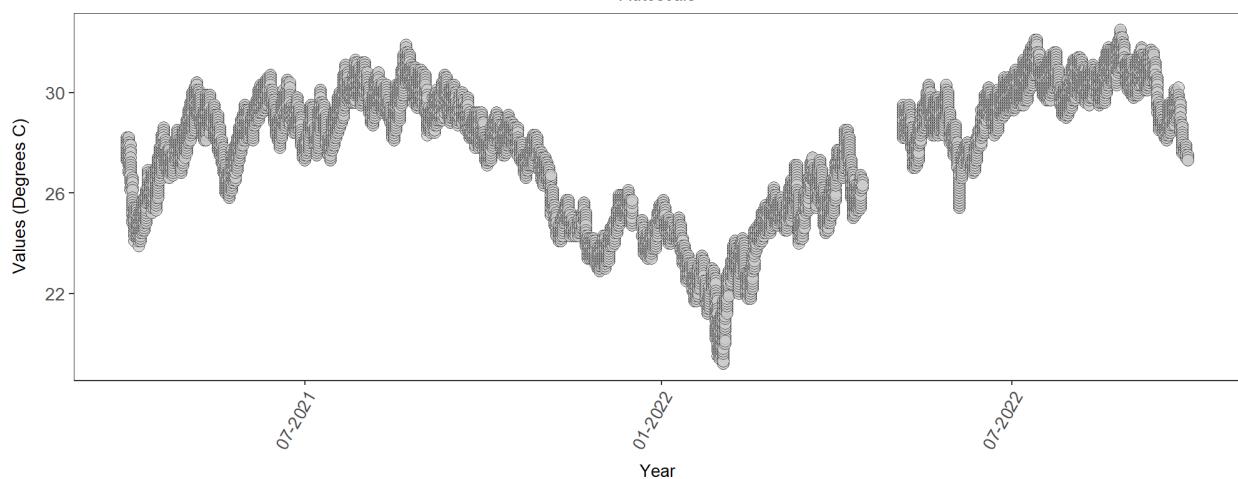
Biscayne Bay Aquatic Preserve  
5077  
Biscayne Bay Aquatic Preserves Continuous Water Quality Monitoring  
BBJT71 (4 Unique Years)  
Autoscale



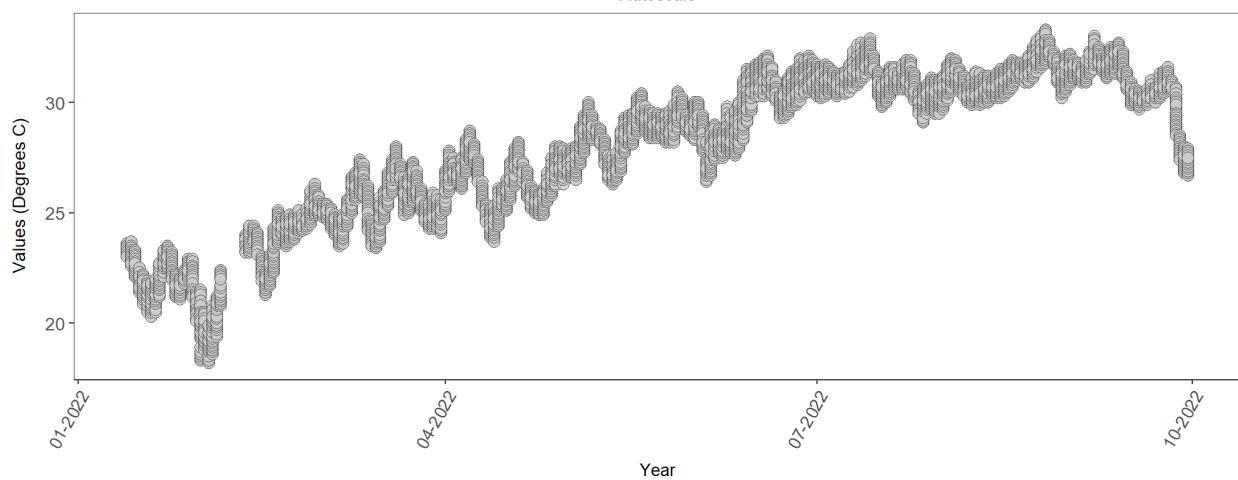
Biscayne Bay Aquatic Preserve  
5077  
Biscayne Bay Aquatic Preserves Continuous Water Quality Monitoring  
BBLR03 (4 Unique Years)  
Autoscale



Biscayne Bay Aquatic Preserve  
5077  
Biscayne Bay Aquatic Preserves Continuous Water Quality Monitoring  
BBMRDW (2 Unique Years)  
Autoscale



Biscayne Bay Aquatic Preserve  
5077  
Biscayne Bay Aquatic Preserves Continuous Water Quality Monitoring  
BBMRRB (1 Unique Years)  
Autoscale



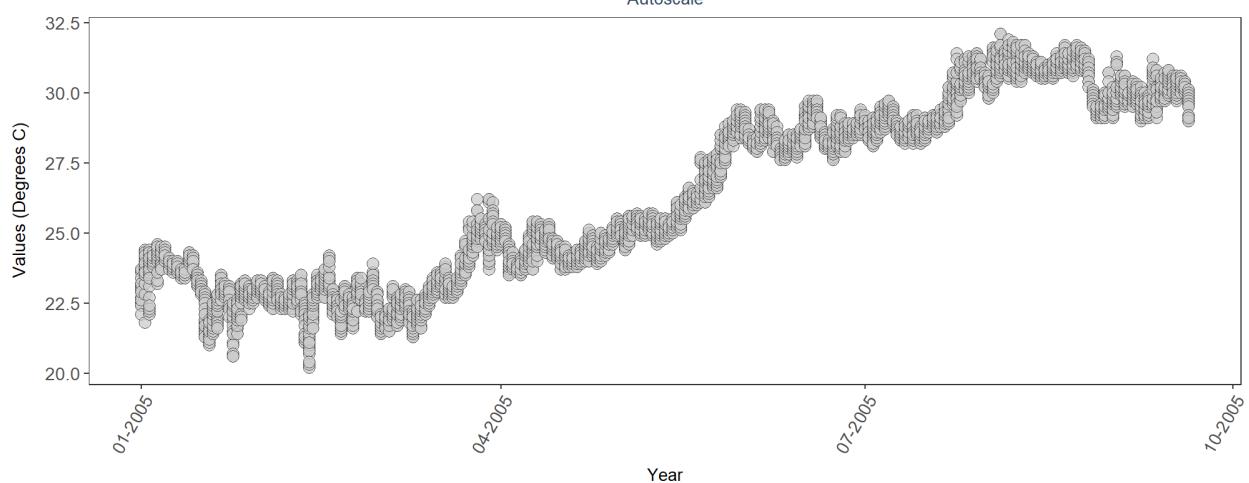
Florida Keys National Marine Sanctuary

5

National Data Buoy Center

SANF1 (1 Unique Years)

Autoscale



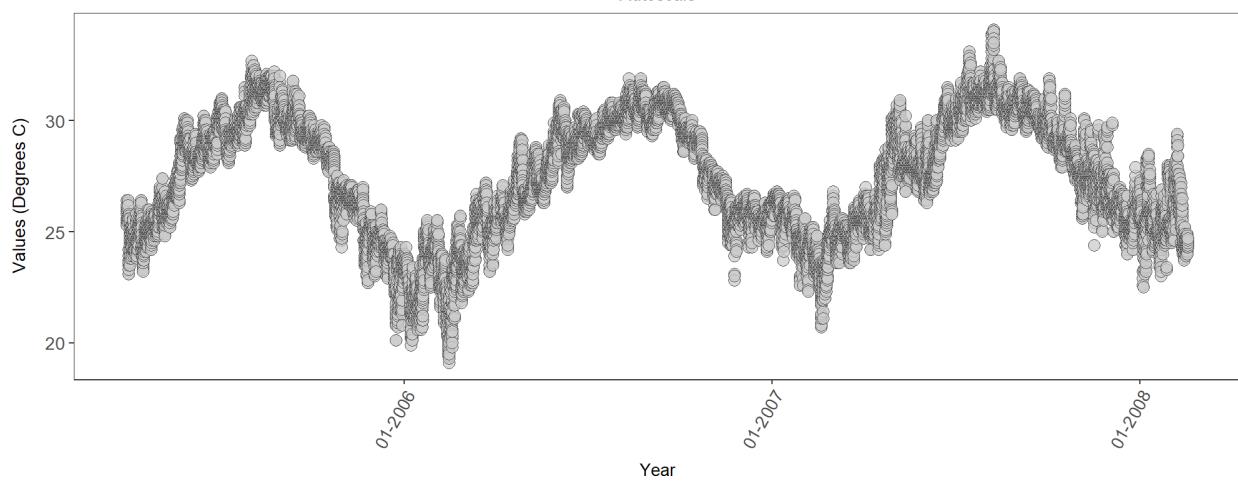
Florida Keys National Marine Sanctuary

5

National Data Buoy Center

SMKF1 (4 Unique Years)

Autoscale

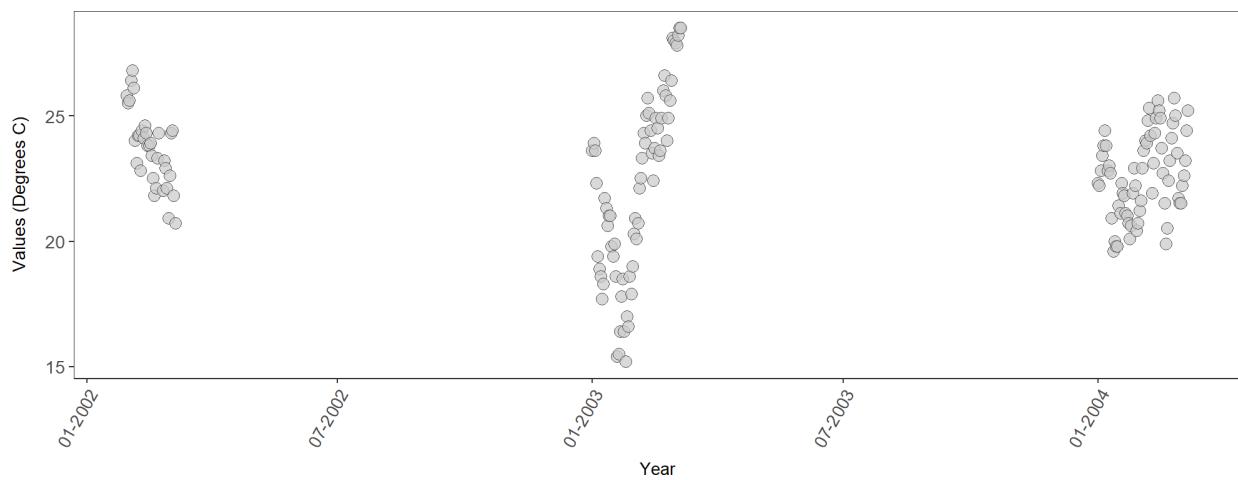


Florida Keys National Marine Sanctuary

7

National Water Information System  
245323080410100 (3 Unique Years)

Autoscale

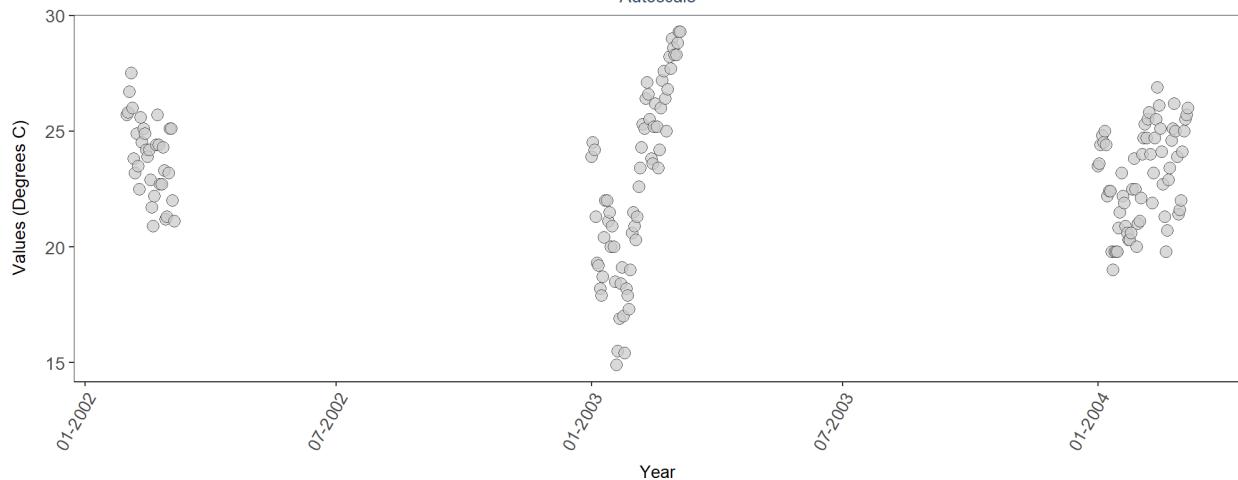


Florida Keys National Marine Sanctuary

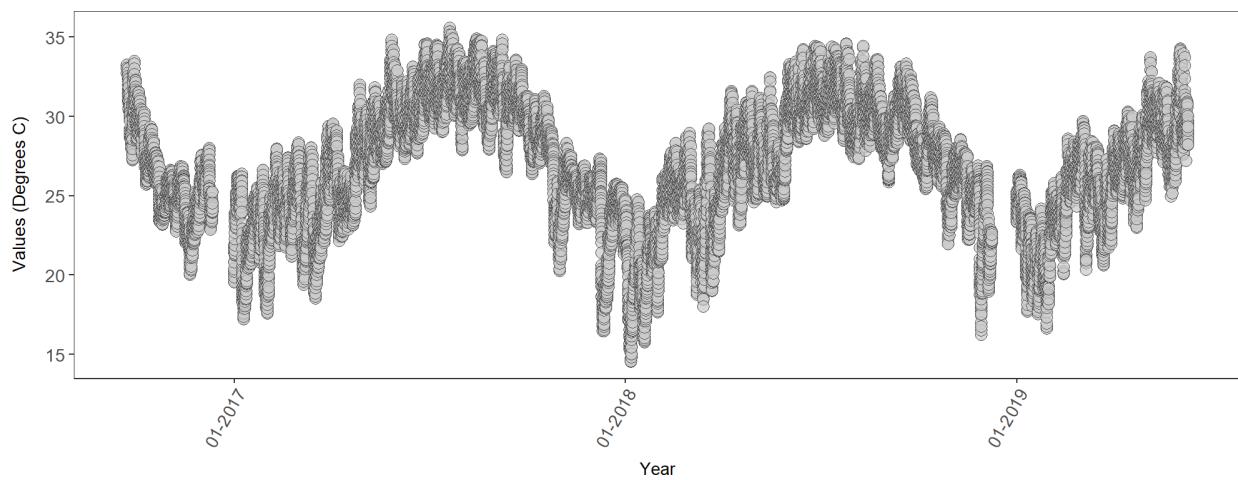
7

National Water Information System  
245622080364200 (3 Unique Years)

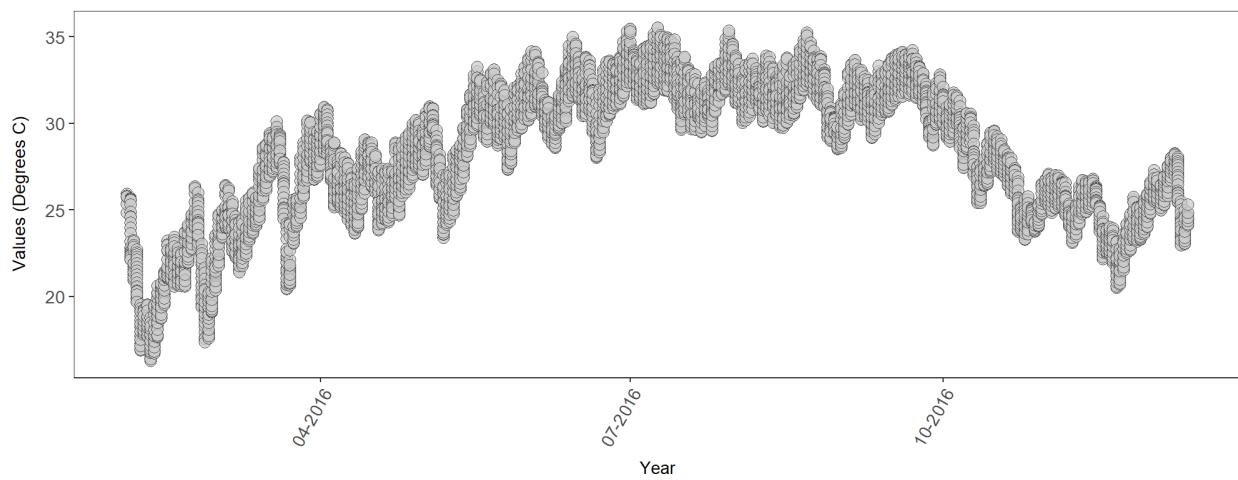
Autoscale



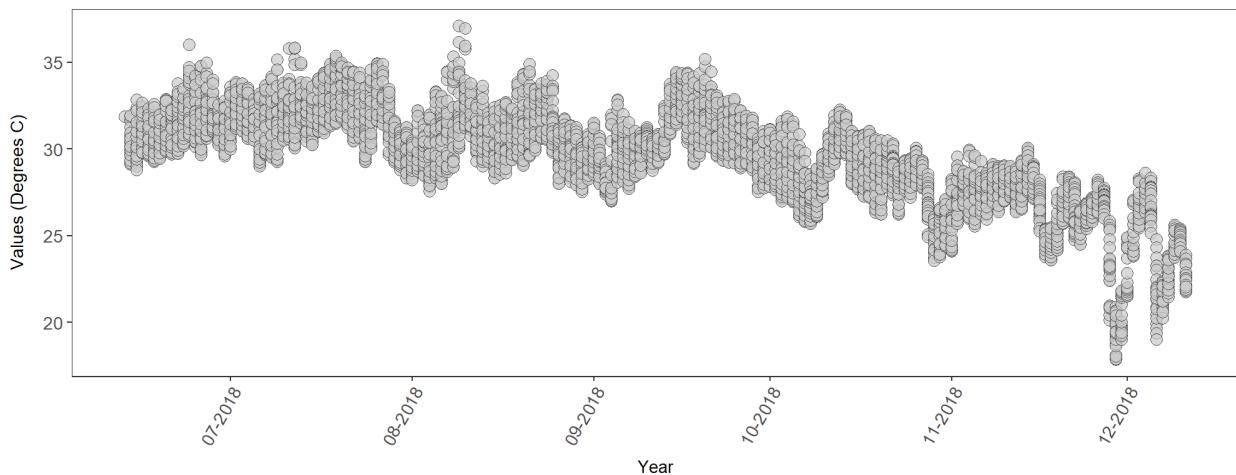
Florida Keys National Marine Sanctuary  
296  
Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
502 (4 Unique Years)  
Autoscale



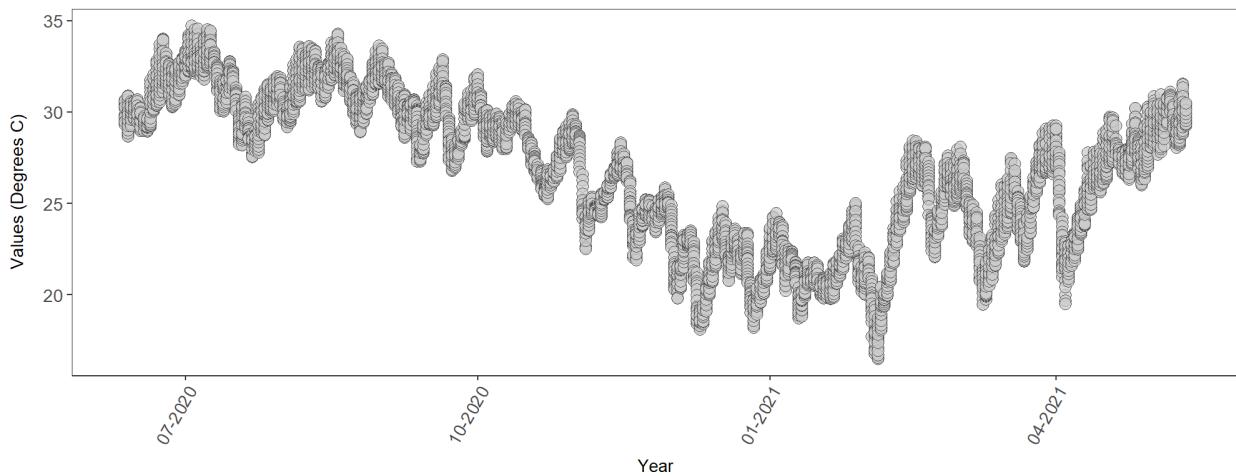
Florida Keys National Marine Sanctuary  
296  
Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
503 (1 Unique Years)  
Autoscale



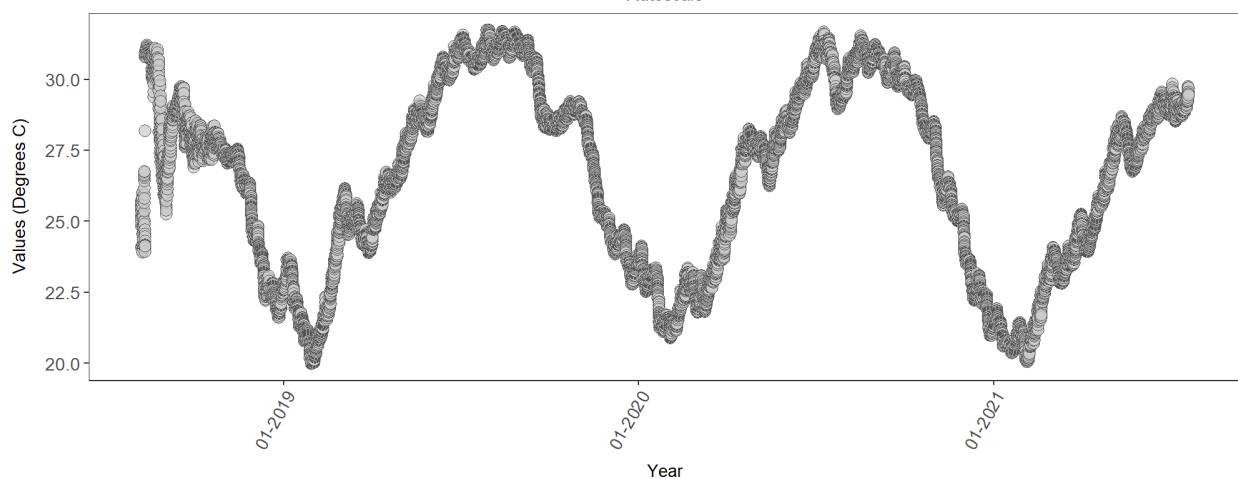
Florida Keys National Marine Sanctuary  
296  
Florida Keys National Marine Sanctuary Seagrass Monitoring Project  
504 (1 Unique Years)  
Autoscale



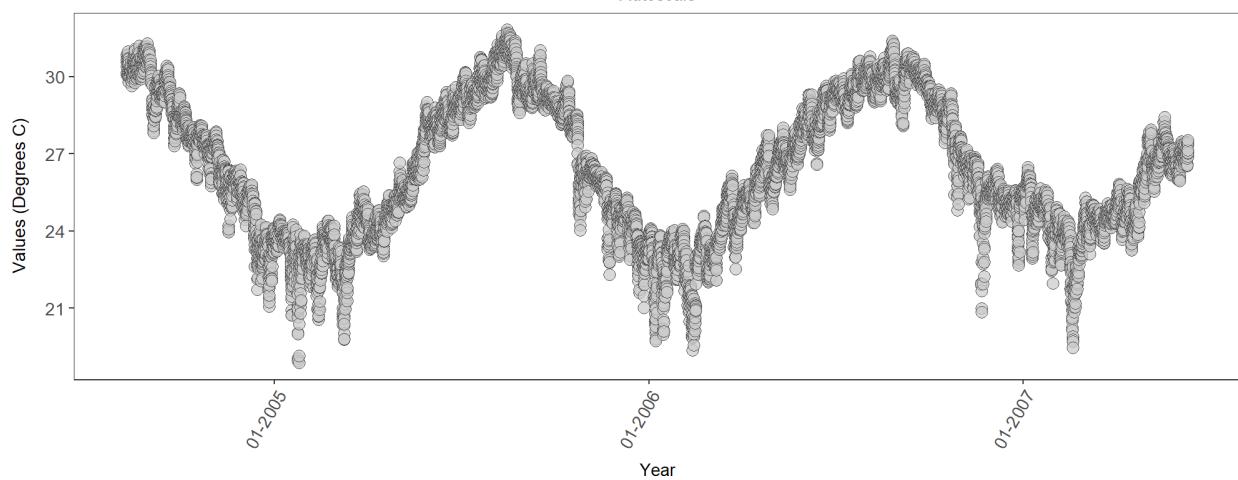
Florida Keys National Marine Sanctuary  
986  
Water Temperature on Coral Reefs in the Florida Keys  
10 (2 Unique Years)  
Autoscale



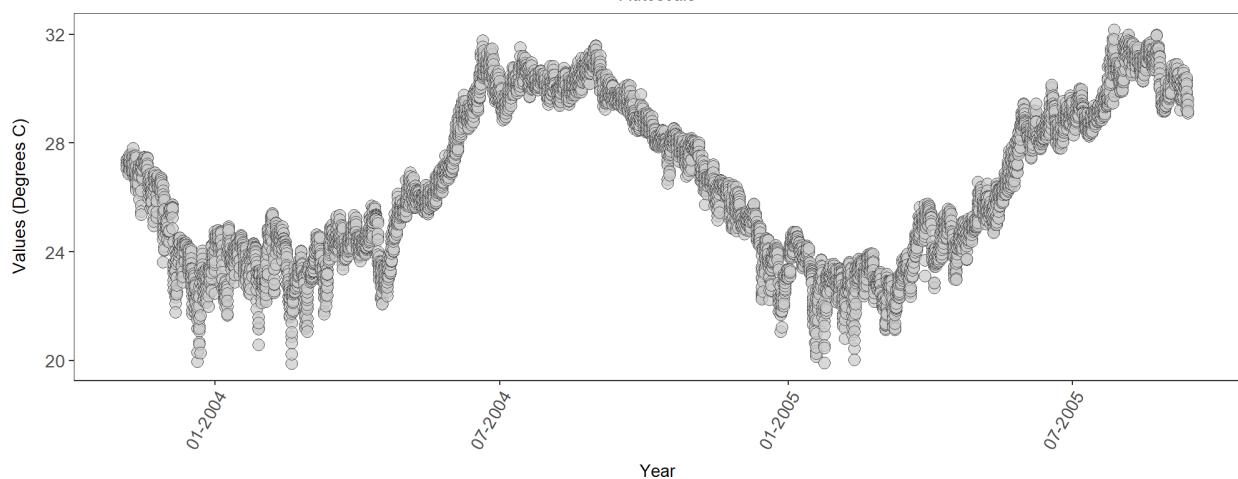
Florida Keys National Marine Sanctuary  
986  
Water Temperature on Coral Reefs in the Florida Keys  
39 (4 Unique Years)  
Autoscale



Florida Keys National Marine Sanctuary  
989  
Continuous Bottom Temperature Measurements along the Florida Reef Tract  
FKNMS\_MAITLAND (4 Unique Years)  
Autoscale



Florida Keys National Marine Sanctuary  
989  
Continuous Bottom Temperature Measurements along the Florida Reef Tract  
FKNMS\_WS\_BUOY16 (3 Unique Years)  
Autoscale



Lignumvitae Key Aquatic Preserve  
7  
National Water Information System  
245323080410100 (3 Unique Years)  
Autoscale

