Tree Nob RCS Reproduction

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Package Installation

Ensure required packages are installed, including a specific archived version of `dplR` due to recent changes.

```
# if (! requireNamespace("remotes", quietly = TRUE)) {
#   install.packages("remotes")
# }
#
# # Install Tree Nob RCS code from GitHub
# remotes::install_github("DaveEdge1/RCS")
#
# # Install specific version of dplR
# packageurl <- "https://cran.r-project.org/src/contrib/Archive/dplR/dplR_1.7.1.tar.gz"
# install.packages(packageurl, repos = NULL, type = "source")
```

Load Required Libraries

```
library(RCS)
```

```
## Attempting to automatically detect format.
## Detected a csv file.
```

```
library(dplR)
library(ggplot2)
```

Load Tree Ring Data

Read in the published version of the data, included with the `RCS` package.

```
TN_rwl <- read.rwl(fname = system.file("extdata", "TreeNobAllLumped10-7.csv", package = "RCS"))
```

```
## Attempting to automatically detect format.
## Detected a csv file.
```

```
TN_po <- read.csv(system.file("extdata", "TN_POLumped_Oct_7_2020.csv", package = "RCS"))
```
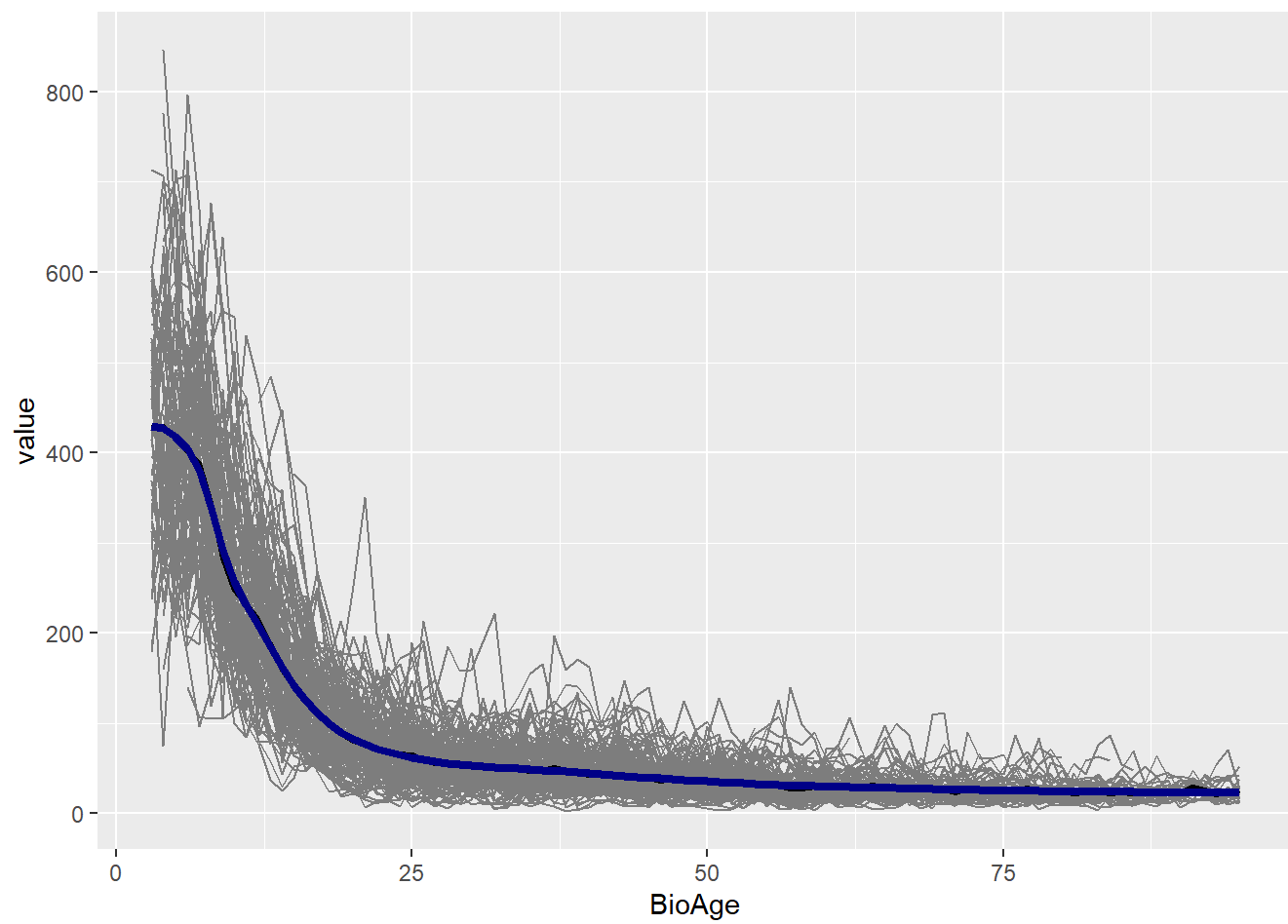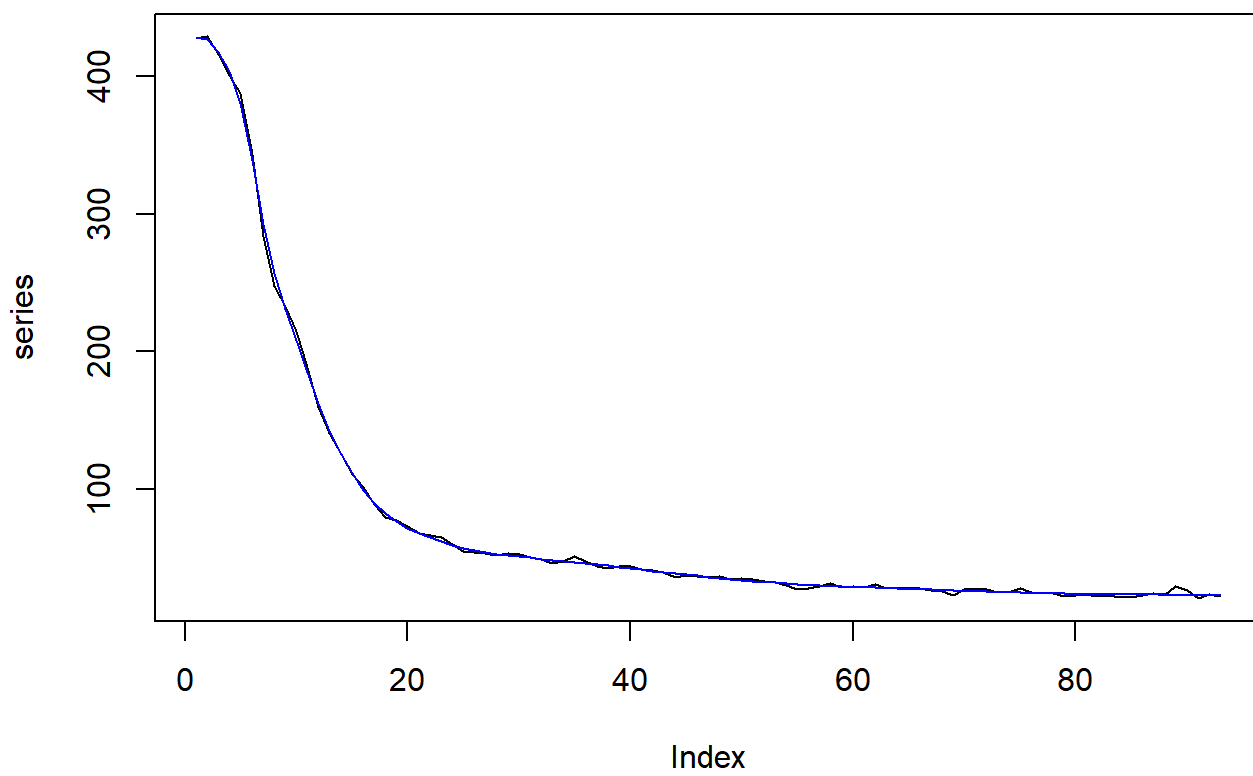
Combine Measurement Series

Combine series to produce one measurement per sample.

```
TNoneCore <- combCores(TN_rwl, TN_po)
TNrwl <- TNoneCore$rwl
TNpo <- TNoneCore$PO
```
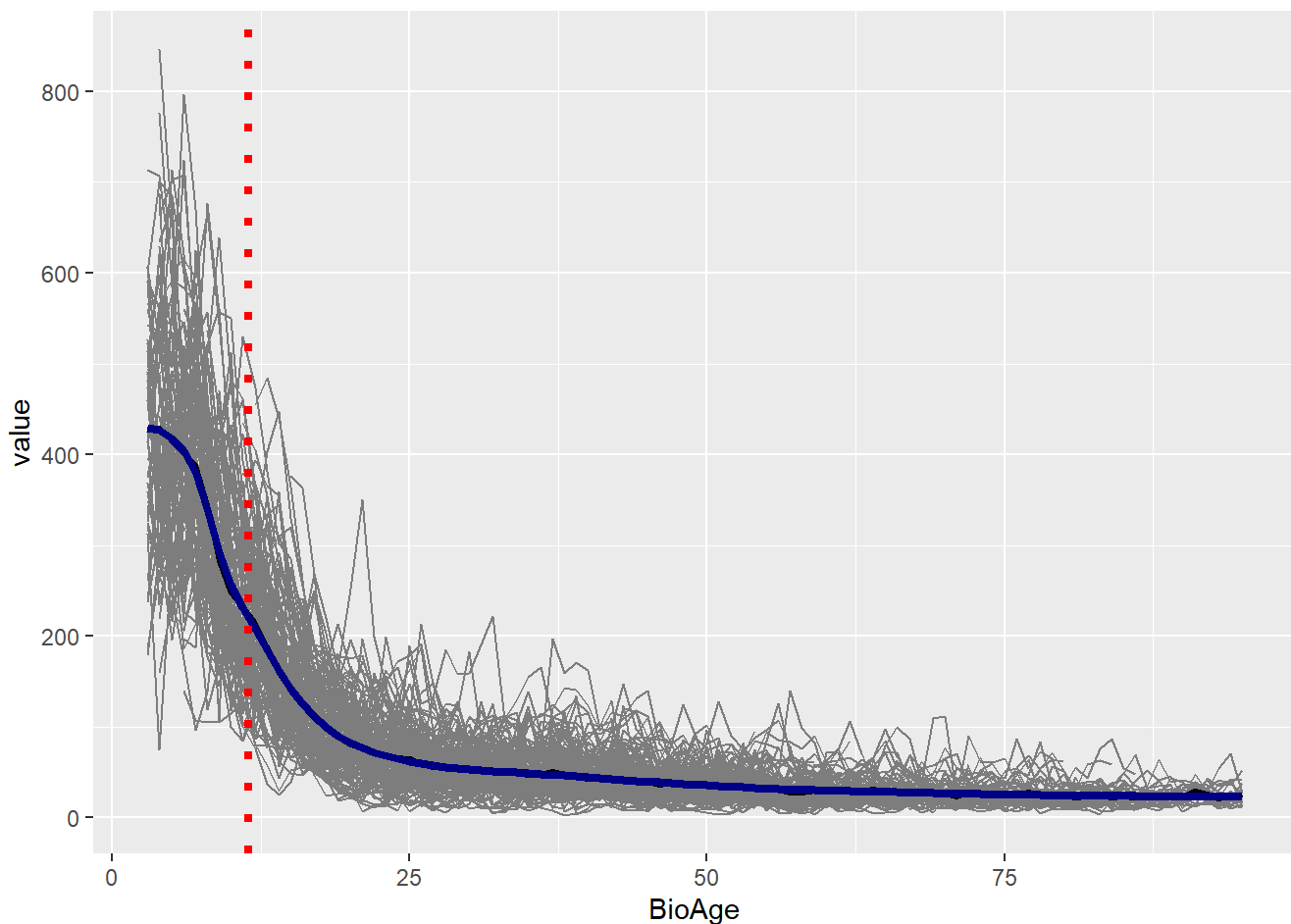
Build Regional Curve

This step constructs a regional curve using robust estimation.

```
TN_RC <- robustRC(rwlFile = TNrwl, poFile = TNpo, truncRC = 20, tvSpline = TRUE, tvRange = c(3,4
0))
```

```
TN_RC$plot +
  geom_vline(xintercept = 11.5, linetype = "dotted", color = "red", size = 1.5)
```
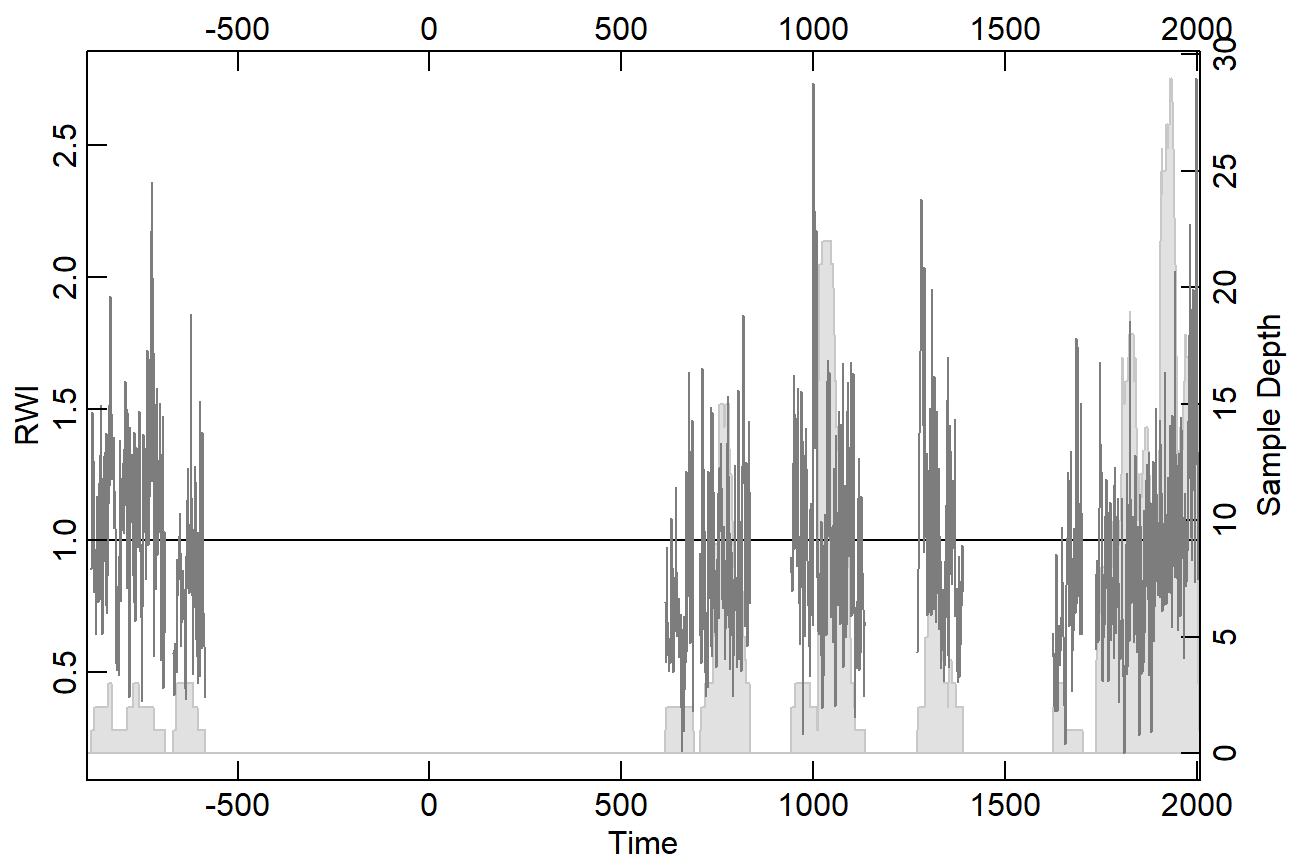

Truncate Growth Increments

Remove growth increments outside a defined age range and update the data.

```
TNtrunc <- ontoTrunc(TNrwl, TNpo, ontoCut = 13)
TNrwl2 <- TNtrunc$rwl
TNpo2 <- TNtrunc$po
```

Detrend Using Custom RCS

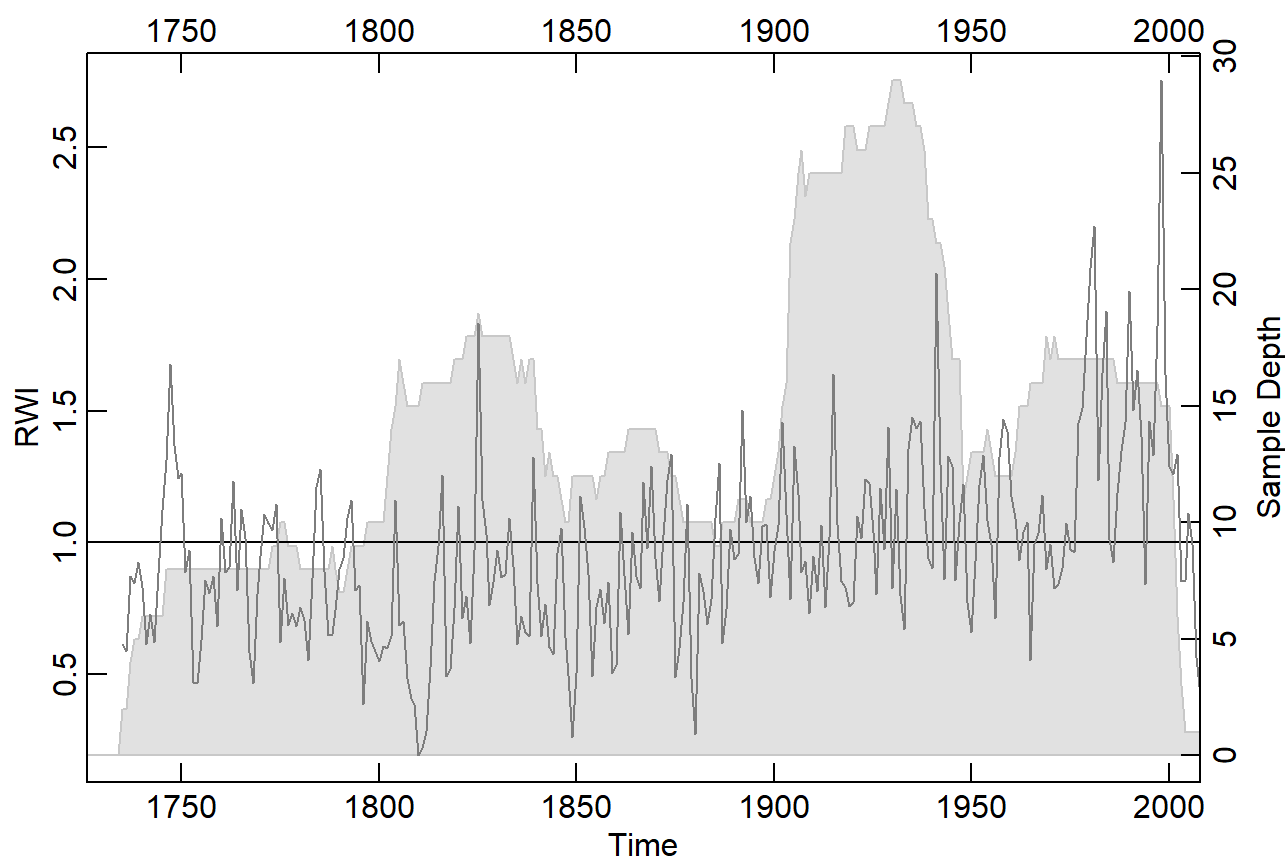Use the custom RCS curve to detrend the series and build the chronology.

```
TN_rcs <- dRCS(TNrwl2, TNpo2, TN_RC)
```

```
## [1] "Year: 2901"
## [1] "dim(rwi): 2901" "dim(rwi): 143"
## [1] "dim(chron): 1" "dim(chron): 2"
```

```
TNchron <- chron(TN_rcs$rwi)

plot(TNchron[as.numeric(rownames(TNchron)) > 1725, ])
```

Compare with NOAA Archived Chronology

Compare newly created chronology with the archived NOAA version.

```
truncatedTNchorn <- TNchron[as.numeric(rownames(TNchron)) > 1734, ]
NOAA <- read.rwl(fname = system.file("extdata", "NOAA_archived_truncated.csv", package = "RCS"))
```

```
## Attempting to automatically detect format.
## Detected a csv file.
```

```
# Correlation
cor(truncatedTNchorn$xxxstd, NOAA$std)
```

```
## [1] 0.9997599
```

```
# Differences
diffs <- abs(truncatedTNchorn$xxxstd - NOAA$std)
max(diffs)
```

```
## [1] 0.05455299
```

```
summary(diffs)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.       Max.
## 0.0002107 0.0070488 0.0127016 0.0147208 0.0210721 0.0545530
```

```
# Greatest positive discrepancy
truncatedTNchorn[which.max(truncatedTNchorn$xxxstd - NOAA$std), ]
```

```
##          xxxstd samp.depth
## 1737 0.8738841          4
```

```
NOAA[which.max(truncatedTNchorn$xxxstd - NOAA$std), ]
```

```
##          std s.depth
## 1737 0.8595822       4
```

```
# Greatest negative discrepancy
truncatedTNchorn[which.min(truncatedTNchorn$xxxstd - NOAA$std), ]
```

```
##        xxxstd samp.depth
## 1998 2.757309         15
```

```
NOAA[which.min(truncatedTNchorn$xxxstd - NOAA$std), ]
```

```
##          std s.depth
## 1998 2.811861      15
```

```
# Sample depth difference
summary(NOAA$s.depth - truncatedTNchorn$samp.depth)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       0       0       0       0       0       0
```