Adventures in Bayesian Structural Time Series

Part 4: Analyzing SST Data With Regression

Andrew Bates, Josh Gloyd, Tyler Tucker

Outline

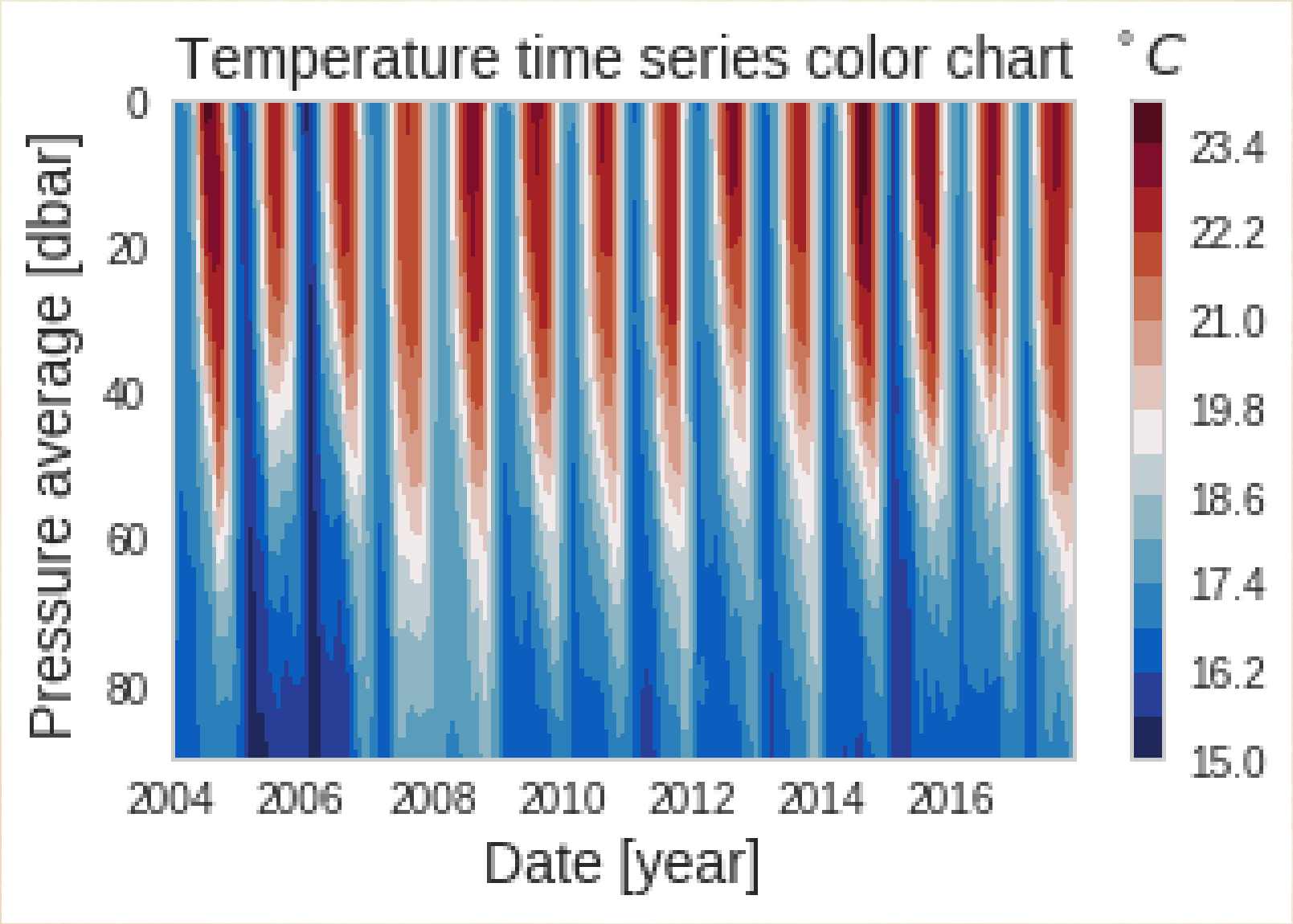
SAN DIEGO STATE UNIVERSITY

- SST data with covariates
- Use `bsts` to
  - Fit structural model with regression
  - Regression posterior
  - Forecast
  - Custom regresson prior

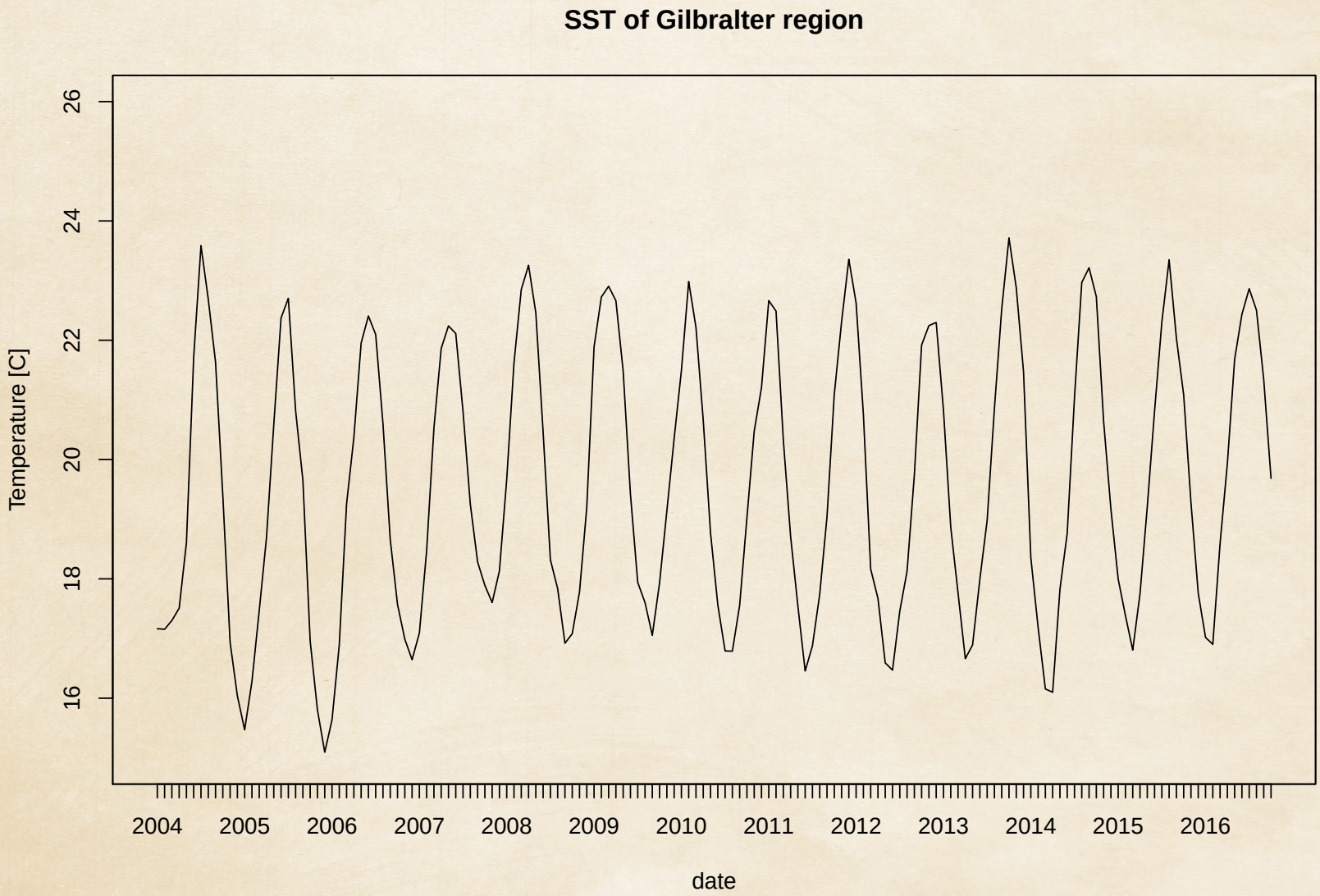
SST Data

- Sea Surface Temperature near Gibraltar
- Aggregated monthly
- January 2004 to November 2017
- Covariates: depth at 10, 20, . . . , 90 meters

SST Data


Temperature time series color chart
°C
Pressure average [dbar]
0
20
40
60
80
2004
2006
2008
2010
2012
2014
2016
Date [year]
23.4
22.2
21.0
19.8
18.6
17.4
16.2
15.0

SST Data


SST of Gilbralter region
Temperature [C]
16
18
20
22
24
26
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
date

Setup


```
library(readr)
library(bsts)

gib <- read_csv("data/gilbralter_time_series_r.csv",
                col_types = cols(startDate = col_skip(),
                                 timeIdx = col_skip()))
names(gib) <- c('SST', '10', '20', '30', '40',
                '50', '60', '70', '80', '90')
gib <- zooreg(gibraltar, start = c(2004, 1, 1),
              end = c(2017, 11, 29),
              frequency = 12)
plot(gib$SST, main='SST of Gilbralter region',
     xlab='date',
     ylab='Temperature [C]',
     ylim=c(15, 26))
```