

Suess Correction Model

Jonathan Dombrosky

A ~1,000-Year ^{13}C Suess Correction Model for the Study of Past Ecosystems

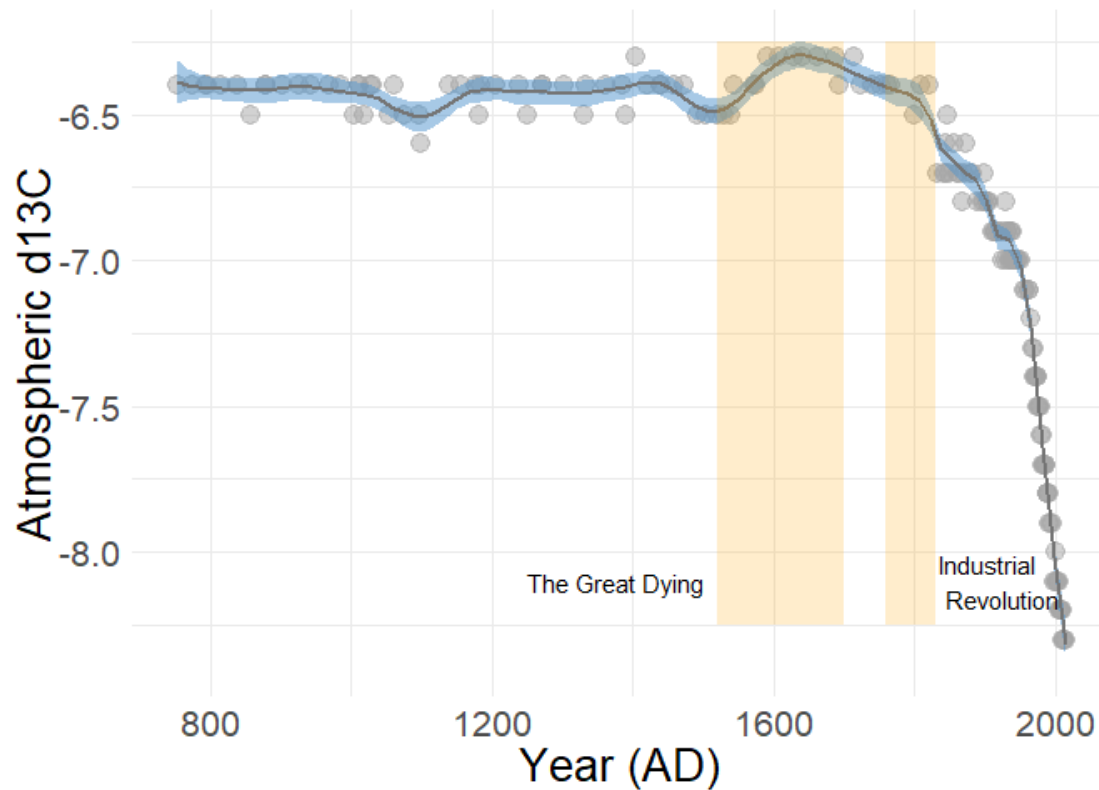
Libraries and Data

```
library(ggplot2)
library(ggthemes)
mydata <- read.table("Supplemental File 1.txt", header=T)
```

Figure of Model

```
theme_set(theme_minimal())
p <- ggplot(data = mydata,
            mapping = aes(x = age_AD,
                          y=d13C_CO2)) +

  labs(x = "Year (AD)",
        y = "Atmospheric d13C")
p + geom_point(color = "gray65", alpha = 0.50, size = 4) + geom_smooth(method
= "loess", span = 0.10, size = 1, color = "gray46", fill = "steelblue3", alph
a = 0.50) +
  theme(text = element_text(size=20)) +
  annotate(geom = "rect", xmin = 1520, xmax = 1700,
           ymin = -8.25, ymax = -6.25, fill = "orange", alpha = 0.2) +
  annotate(geom = "rect", xmin = 1760, xmax = 1830,
           ymin = -8.25, ymax = -6.25, fill = "orange", alpha = 0.2) +
  annotate(geom = "text", x = 1250, y = -8.10,
           label = "The Great Dying", hjust = 0) +
  annotate(geom = "text", x = 1835, y = -8.10,
           label = "Industrial \n Revolution", hjust = 0)
```



Model Function

```
loessmodel <- loess(d13C_CO2 ~ age_AD, mydata, span = 0.10, control = loess.control(surface = "direct"))
```

Dataframe of Model

```
Suess_dataframe <- data.frame(age_AD = 753:2019, pred_d13C = predict(loessmodel, newdata = data.frame(age_AD = 753:2019), se = TRUE))
```

Export Dataframe

```
write.csv(Suess_dataframe, 'Supplemental File 3.csv')
```