

Model Use and Explanation

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Read in data

```
climdf<- read.table("data/clim.txt", sep = "",  
                    na.strings = "", stringsAsFactors= F)
```

Computed Yield Anomaly

```
climdf_summary <- climdf %>%  
  filter(year != 1988) %>%  
  group_by(year) %>%  
  summarise(t_min = mean(tmin_c),  
            t_max = mean(tmax_c),  
            precip_mean = sum(precip),  
            yield_anom = yield_model(climdf,  
                                     yearforyield = year,  
                                     crop = "almond")  
)
```

Explore Yield Data

```
climdf_summary
```

```
## # A tibble: 22 x 5  
##   year t_min t_max precip_mean yield_anom  
##   <int> <dbl> <dbl>         <dbl>         <dbl>  
## 1 1989  11.7  22.3         146.         -0.355  
## 2 1990  11.7  22.6         136.           9.29  
## 3 1991  12.1  21.5         493.          68.9  
## 4 1992  13.2  23.1         576.          15.4  
## 5 1993  13.0  23.0         703.          20.2  
## 6 1994  11.9  21.9         411.           2.48  
## 7 1995  13.2  21.4        1169.        1920.  
## 8 1996  12.9  21.3         498.           3.58  
## 9 1997  13.2  22.5         443.          330.  
## 10 1998  11.9  21.2         964.          27.9  
## # ... with 12 more rows
```

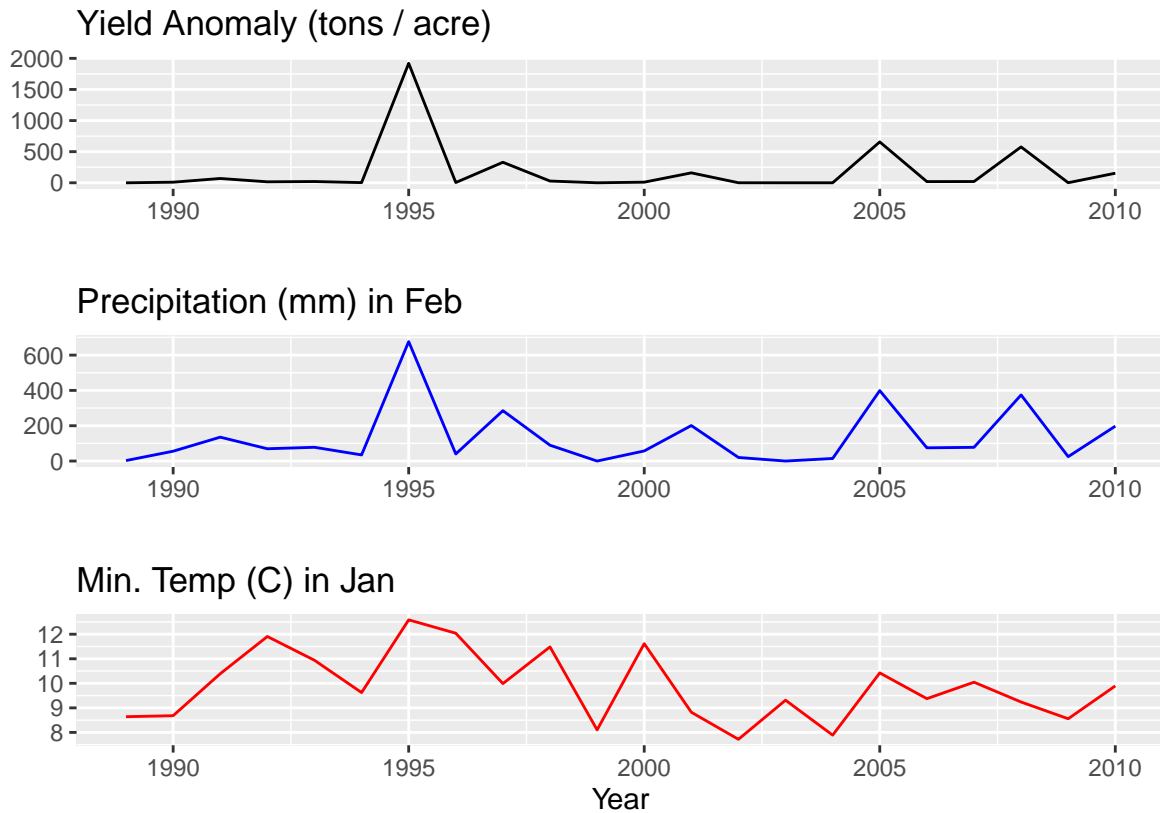
Plot Yield Data

```
climdf_temp <- climdf %>%
  filter(year != 1988,
         month == 2) %>%
  group_by(year, month) %>%
  summarise(t_min = mean(tmin_c),
            t_max = mean(tmax_c))

climdf_precip <- climdf %>%
  filter(year != 1988,
         month == 1) %>%
  group_by(year, month) %>%
  summarise(precip_mean = sum(precip))

plot_yield <- ggplot(climdf_summary) +
  geom_line(aes(x = year,
               y = yield_anom)) +
  labs(x = "",
       y = "",
       title = "Yield Anomaly (tons / acre)")
plot_precip <- ggplot(climdf_precip) +
  geom_line(aes(x = year,
               y = precip_mean),
           col = "blue") +
  labs(x = "",
       y = "",
       title = "Precipitation (mm) in Feb")
plot_temp <- ggplot(climdf_temp) +
  geom_line(aes(x = year,
               y = t_min),
           col = "red") +
  labs(x = "Year",
       y = "",
       title = "Min. Temp (C) in Jan")

plot_yield / plot_precip / plot_temp
```



The annual yield anomaly ranges from -0.355 to 1919.981 tons/acre. Based on the outputs of our model, the annual yield anomaly for almonds is heavily dependent on the total February precipitation in mm. This can be observed in 1995, 2005, and 2008 with spikes in the annual yield anomaly and precipitation, but not in the minimum January temperature in C. In the future we would like to expand our analysis to other crops to how the trends compare.