Question 1

Julian Jacklin

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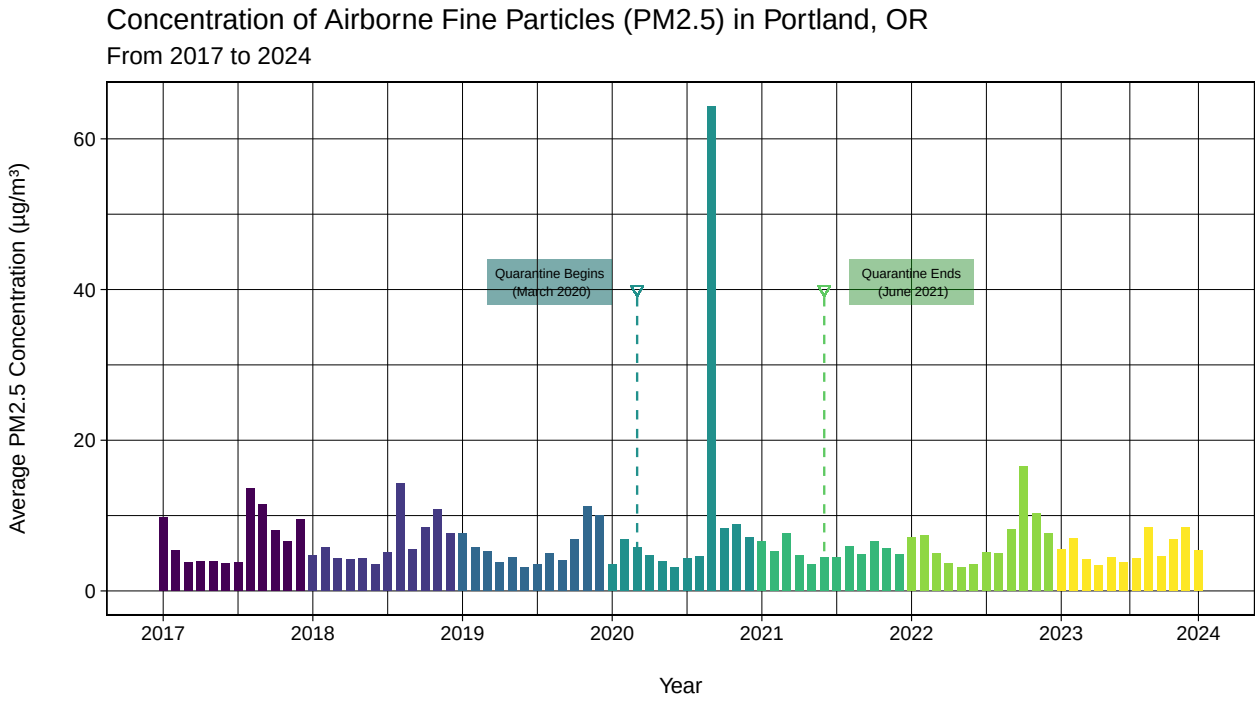
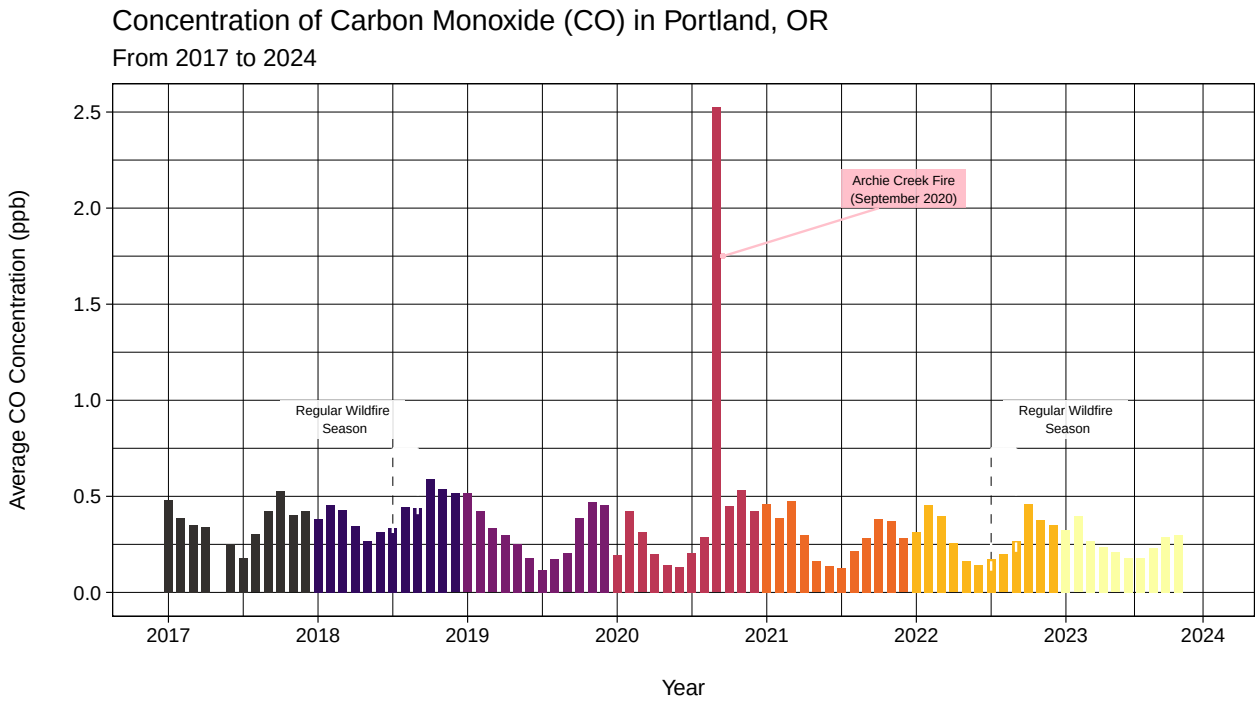



```
# KIANA's FIRST GRAPH
ggplot(avgAll, aes(x = month, y = avg_co, fill = year)) +
  geom_col(width = .7, show.legend = FALSE) +
  scale_fill_manual(values = c("#33302E", "#320a5e", "#781c6d", "#bc3754", "#ed6925", "#fbb61a", "#fcffa
 scale_x_continuous(breaks = c(1, 13, 25, 37, 49,61,73, 84),
                    labels = c("1" = "2017", "13" = "2018", "25" = "2019", "37" = "2020", "49" = "2021"

  theme_linedraw() +

  labs(title = "Concentration of Carbon Monoxide (CO) in Portland, OR",
       subtitle = "From 2017 to 2024",
       x = "Year",
       y = "Average CO Concentration (ppb)") +

  guides(color = "none") +
  theme(axis.title.y = element_text(size = 10, margin = margin(r = 20)),
        axis.title.x = element_text(size = 10, margin = margin(t = 15))) +

  annotate("segment", x = 19, xend = 19, y = .75, yend = 0.3, color = "white", linewidth = .5, linetype
  annotate("segment", x = 21, xend = 21, y = .75, yend = 0.4, color = "white", linewidth = .5, linetype
```

```
  annotate("segment", x = 19, xend = 21, y = .75, yend = 0.75, color = "white", linewidth = .5) +
  geom_rect(aes(xmin = 10, xmax = 20, ymin = .8, ymax = 1 ), fill = "white", alpha = 0.05) +
  annotate("text", x = 15, y = .9, label = "Regular Wildfire\n Season", size = 2) +
  geom_point(aes(x = 20,y = .775), show.legend = FALSE, color = "white", shape = 6, size = .5) +

  annotate("segment", x = 67, xend = 67, y = .75, yend = 0.1, color = "white", linewidth = .5, linetype
  annotate("segment", x = 69, xend = 69, y = .75, yend = 0.2, color = "white", linewidth = .5, linetype
  annotate("segment", x = 67, xend = 69, y = .75, yend = 0.75, color = "white", linewidth = .5) +
  geom_rect(aes(xmin = 68, xmax = 78, ymin = .8, ymax = 1 ), fill = "white", alpha = 0.05) +
  annotate("text", x = 73, y = .9, label = "Regular Wildfire\n Season", size = 2) +
  geom_point(aes(x = 68,y = .775), show.legend = FALSE, color = "white", shape = 6, size=.5) +

  annotate("segment", x = 45.5, xend = 58, y = 1.75, yend = 2, color = "pink", linewidth = .5) +
  geom_rect(aes(xmin = 55, xmax = 65, ymin = 2, ymax = 2.2), fill = "pink", alpha = 0.05) +
  annotate("text", x = 60, y = 2.1, label = "Archie Creek Fire\n(September 2020)", size = 2) +
  geom_point(aes(x = 45.5, y = 1.75), show.legend = FALSE, color = "pink", size = .5)
```

```
## Warning: Removed 3 rows containing missing values (`position_stack()`).
```

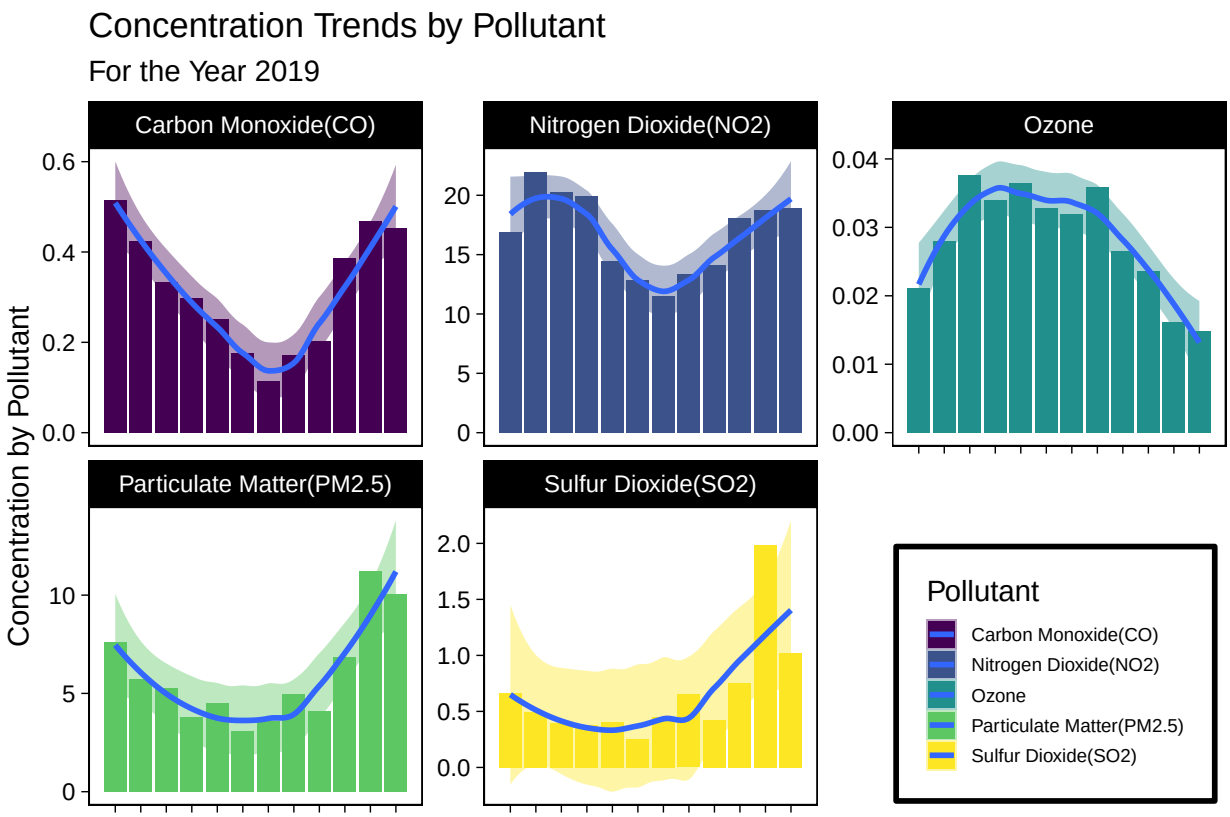



```
ggplot(avgAll2019_melted , aes(x = monthbyyear, y = value, fill = variable)) +
  geom_col() +
  facet_wrap(variable ~ ., scales = "free_y") +
  geom_smooth()+
  scale_x_continuous(breaks = c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12),
                     labels = c("1" = "Jan", "2" = "Feb", "3" = "Mar", "4" = "Apr", "5" = "May", "6" =
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size=5)) +

  scale_fill_viridis_d() +

  theme_linedraw() +
  theme(panel.grid = element_blank()) +
  labs(x = "",
```

```
       title = "Concentration Trends by Pollutant",
       fill = "Pollutant",
       subtitle = "For the Year 2019",
       y = "Concentration by Pollutant") +

  # REMOVES X-LABELS
  theme(axis.text.x = element_blank(),

        # CHANGE MY LEGEND BORDER COLOR AND LINE THICKNESS
        legend.box.background = element_rect(color = "black", size = 1),
        legend.box.margin = margin(6, 6, 6, 6),

        # CHANGE THE POSITION OF THE LEGEND
        legend.position = c(.85, .2),
        legend.text = element_text(color = "black", size = 7),  # Legend text color and size
        legend.title = element_text(color = "black"),           # Legend title color
        legend.key.size = unit(0.4, "cm")
        )
```

```
## Warning: The `size` argument of `element_rect()` is deprecated as of ggplot2 3.4.0.
## i Please use the `linewidth` argument instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

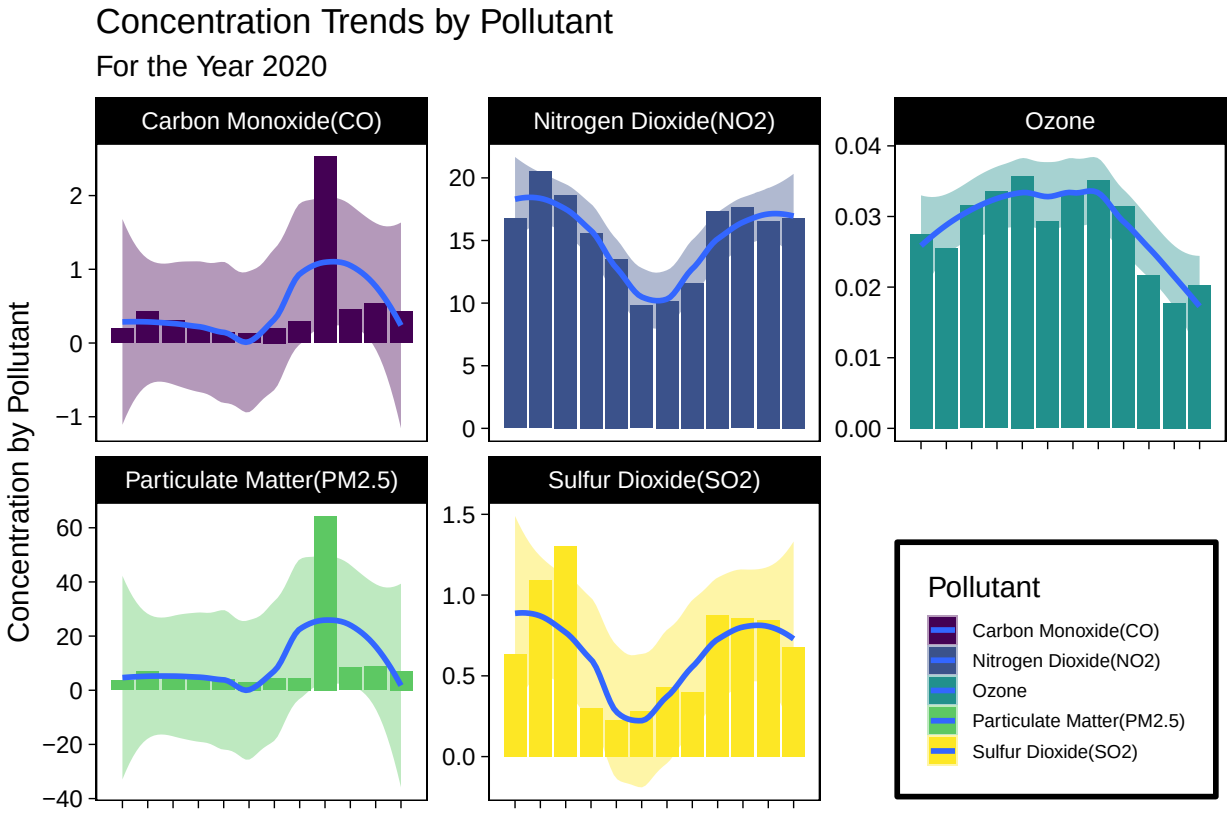
```
## `geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```




```
ggplot(avgAll2020_melted, aes(x = monthbyyear, y = value, fill = variable)) +
  geom_col() +
```

```
  facet_wrap(variable ~ ., scales = "free_y") +
  geom_smooth() +
  scale_x_continuous(breaks = c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12),
                     labels = c("1" = "Jan", "2" = "Feb", "3" = "Mar", "4" = "Apr", "5" = "May", "6" =
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size=5)) +

  scale_fill_viridis_d()+

  theme_linedraw()+
  theme(panel.grid = element_blank())+
  labs(x="",
       title = "Concentration Trends by Pollutant",
       fill = "Pollutant",
       subtitle = "For the Year 2020",
       y = "Concentration by Pollutant") +

  # REMOVES X-LABELS
  theme(axis.text.x = element_blank(),

        # CHANGE MY LEGEND BORDER COLOR AND LINE THICKNESS
        legend.box.background = element_rect(color = "black", size = 1),
        legend.box.margin = margin(6, 6, 6, 6),

        # CHANGE THE POSITION OF THE LEGEND
        legend.position = c(.85, .2) ,
        legend.text = element_text(color = "black", size = 7),  # Legend text color and size
        legend.title = element_text(color = "black"),           # Legend title color
        legend.key.size = unit(0.4, "cm")
        )
```

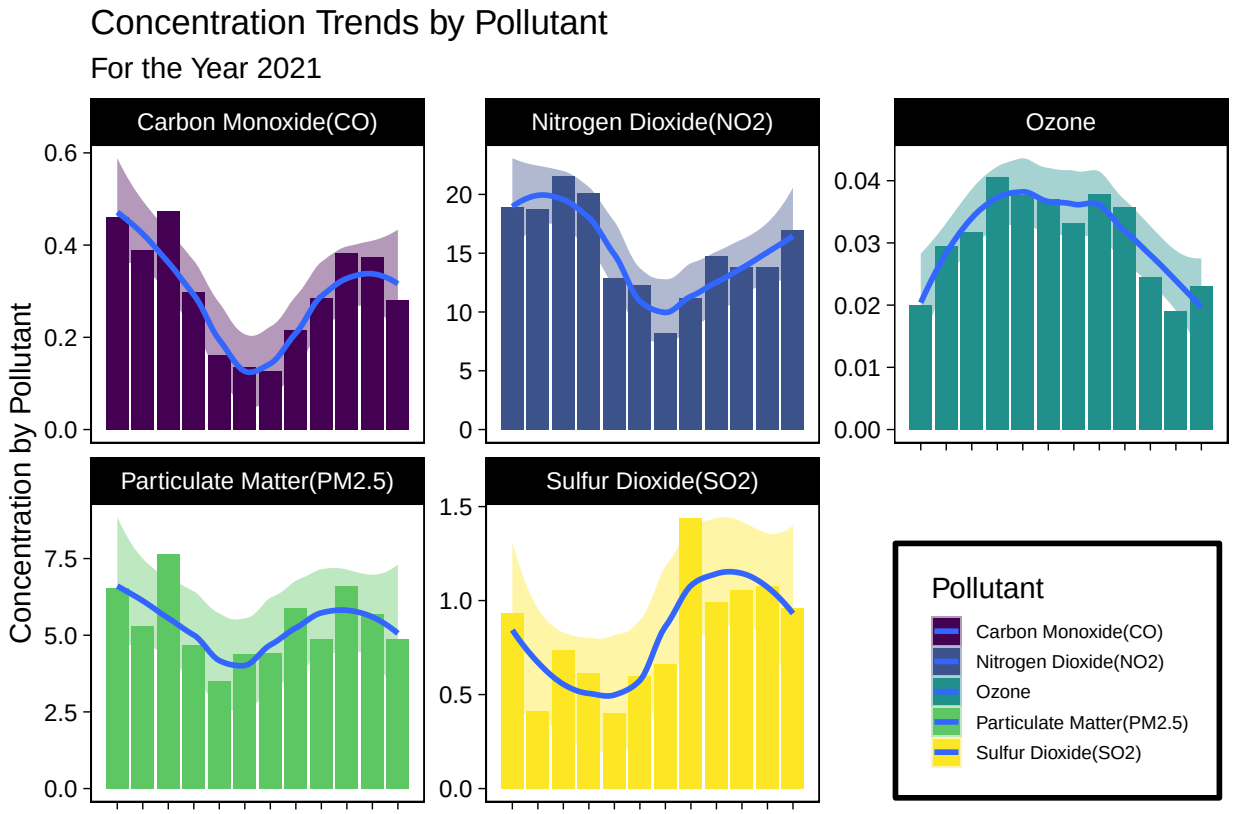
```
## `geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```




```
ggplot(avgAll2021_melted , aes(x = monthbyyear, y = value, fill = variable)) +
  geom_col() +
  facet_wrap(variable ~ ., scales = "free_y") +
  geom_smooth() +
  scale_x_continuous(breaks = c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12),
                     labels = c("1" = "Jan", "2" = "Feb", "3" = "Mar", "4" = "Apr", "5" = "May", "6" =
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size=5)) +

  scale_fill_viridis_d() +

  theme_linedraw() +
  theme(panel.grid = element_blank()) +

  labs(x = "",
       title = "Concentration Trends by Pollutant",
       fill = "Pollutant",
       subtitle = "For the Year 2021",
       y = "Concentration by Pollutant") +

  # REMOVES X-LABELS
  theme(axis.text.x = element_blank(),

        # CHANGE MY LEGEND BORDER COLOR AND LINE THICKNESS
        legend.box.background = element_rect(color = "black", size = 1),
        legend.box.margin = margin(6, 6, 6, 8),

        # CHANGE THE POSITION OF THE LEGEND
        legend.position = c(.85, .2),
```

```
        legend.text = element_text(color = "black", size = 7),  # Legend text color and size
        legend.title = element_text(color = "black"),           # Legend title color
        legend.key.size = unit(0.4, "cm")
        )
```

```
## `geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```




```
avgAll %>%
  group_by(year) %>%
  summarize(AVGPM = mean(avg_pm2.5), AVGCO = mean(avg_co, na.rm=T), AVGNO = mean(avg_no2, na.rm=T), AVGS
```

```
## # A tibble: 7 x 5
##   year  AVGPM AVGCO AVGNO AVGSO
##   <chr> <dbl> <dbl> <dbl> <dbl>
## 1 2017   6.95 0.369  19.6 0.803
## 2 2018   6.55 0.421  19.6 0.883
## 3 2019   5.89 0.316  16.7 0.656
## 4 2020  10.5  0.485  15.4 0.661
## 5 2021   5.37 0.299  15.3 0.824
## 6 2022   6.87 0.296  16.2 0.907
## 7 2023   5.53 0.261  15.0 0.737
```