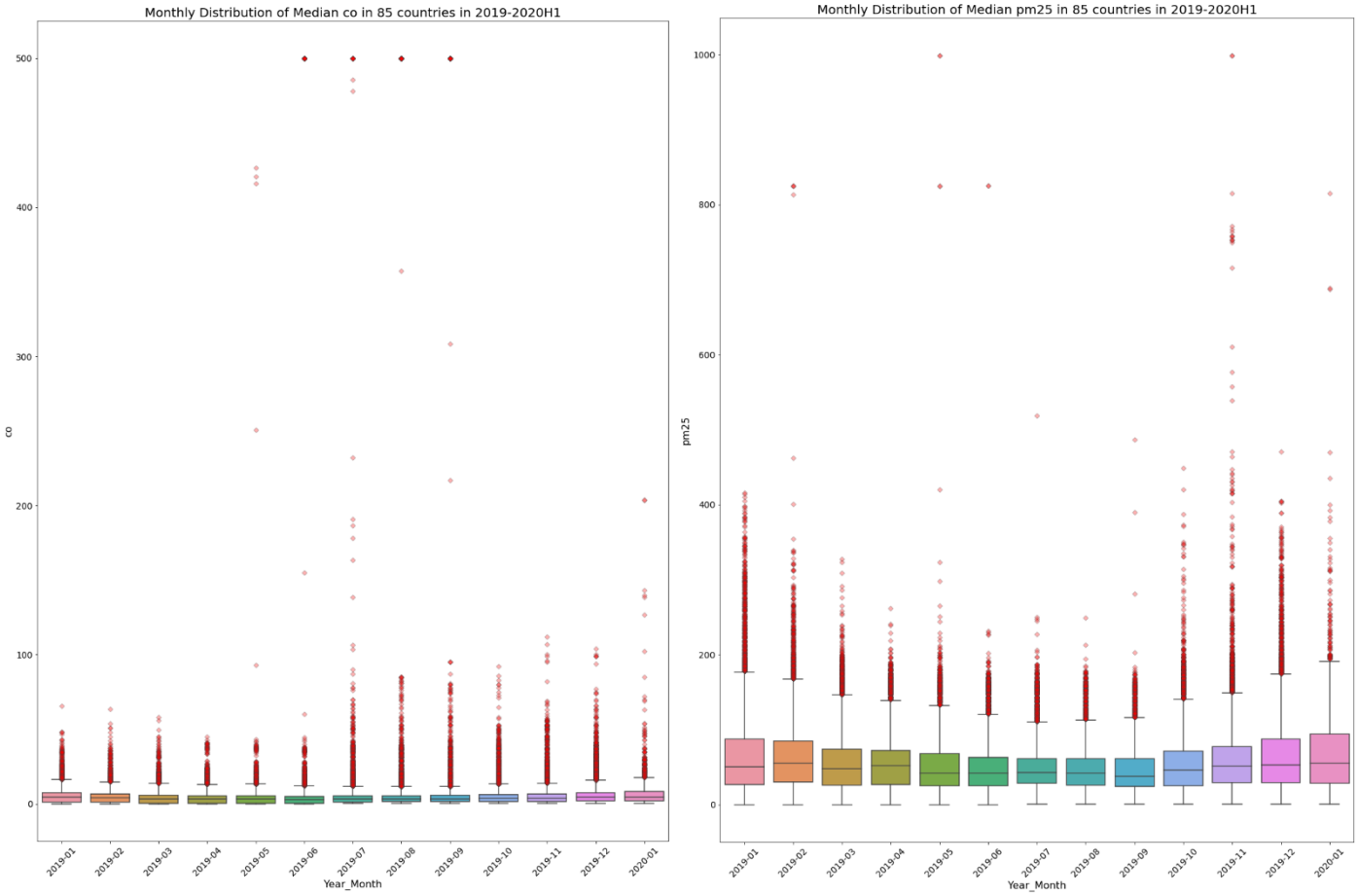
Summary of Major Findings

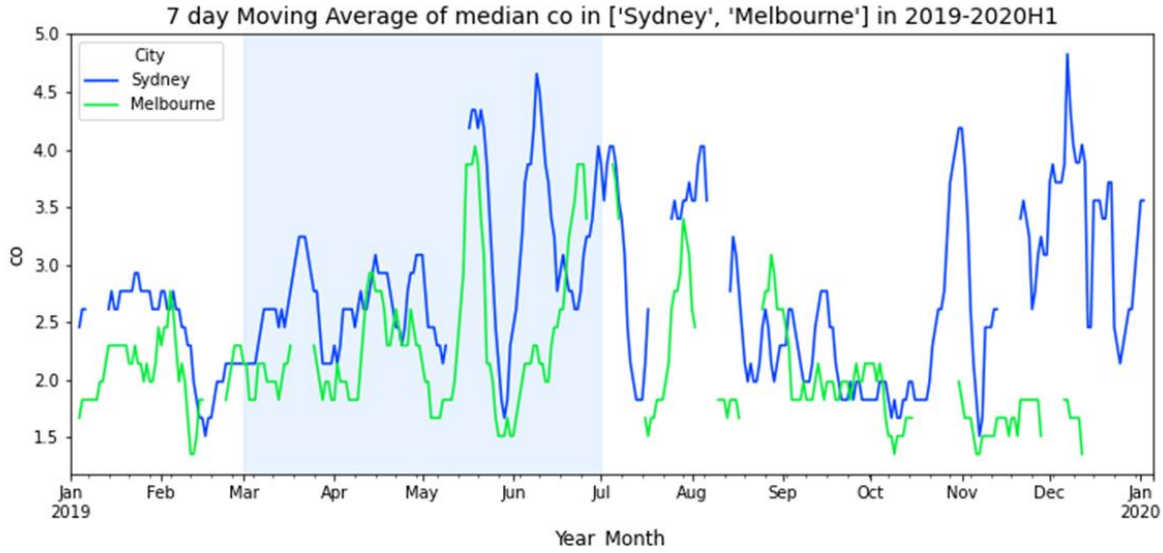
1. **How do the changes in Australia's air quality during the pandemic compare to the changes globally in the same time period?**

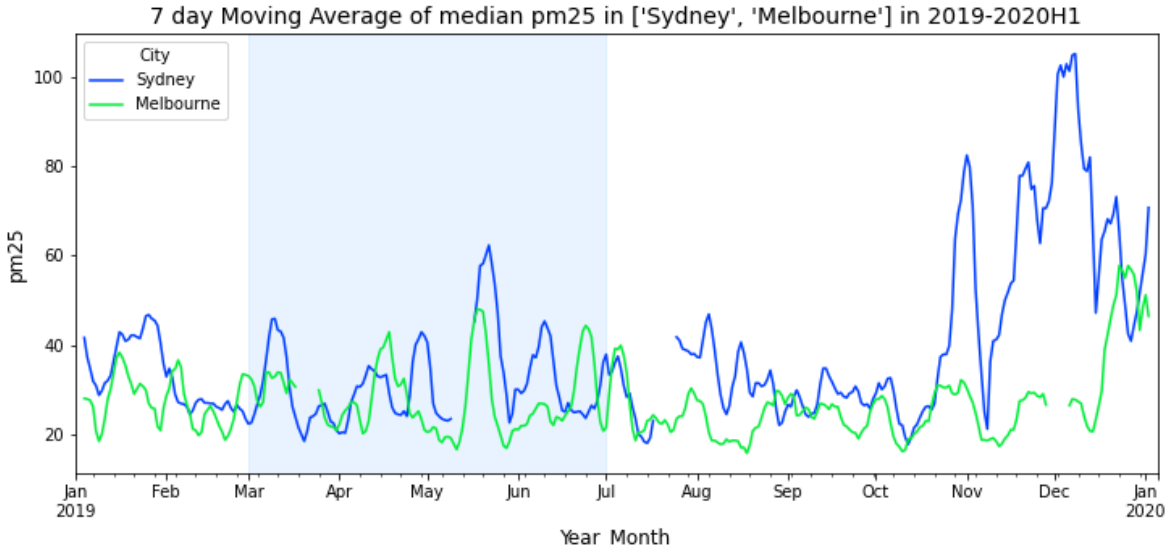


As we can see from the above boxplots, there are quite a few extreme values in the median measurements of the 2 major air pollutants, pm2.5 and co. However, due to our time constraint and knowledge limitation regarding the air pollutants, we will not remove any extreme values. We acknowledge that any should-be-removed outliers would have some impact on our following analysis.

From the overview of the above boxplots, there seems to be a clear upward trend in the air pollutants throughout 2019 to 2020. There are some decreasing trends in the monthly distribution of median pm2.5 from the beginning of 2019 till June 2019. We can also see that July 2019 onwards, the co and pm2.5 levels begin to increase significantly.

Next, we focused on two major cities in Australia to visualise their air quality change from 2019 to 2020. We chose Melbourne and Sydney as they are the two most populous cities in Australia, to visualise how the 2 major air pollutants have changed from 2019 to now.

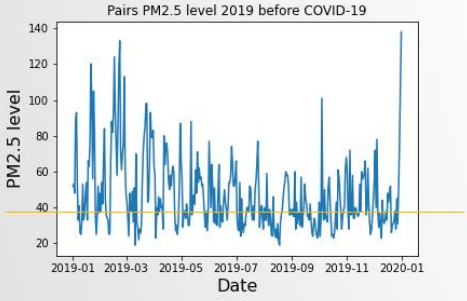


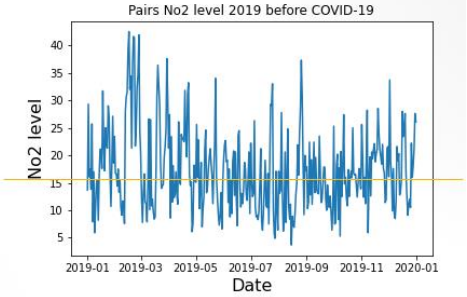


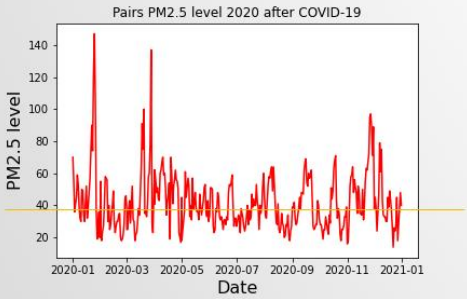
As we can see For Melbourne and Sydney there is a major spike in co levels in between May and July as well as between November 2019 and Jan 2020, which correlates with a similar spike in the monthly distribution of median co and pm.2.5 globally in the bow plots on the first page. The spike in particulate matter pm2.5 around the end of 2019 would be explained by a series of massive bushfires raging New South Wales and Victoria during this time.

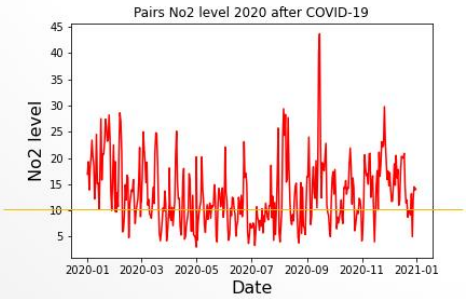
2. Select 5 cities to compare, which city has the greatest air quality variation between 2019 and 2020?

PARIS

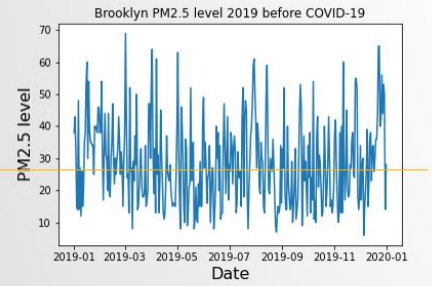


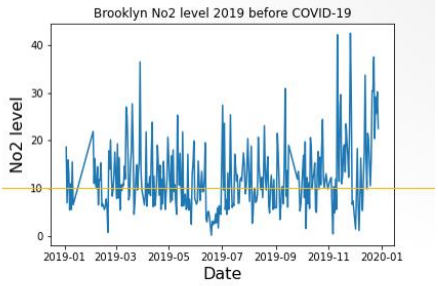


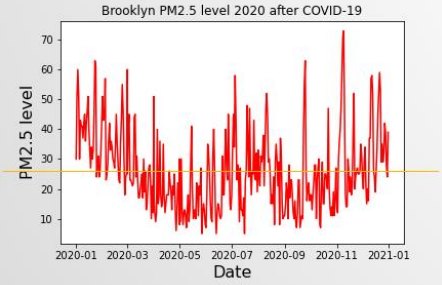


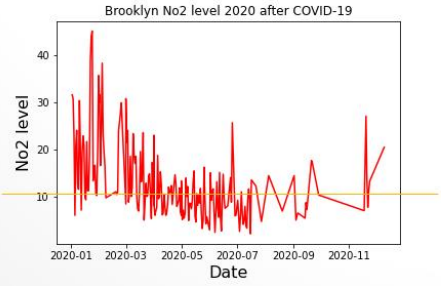


BROOKLYN

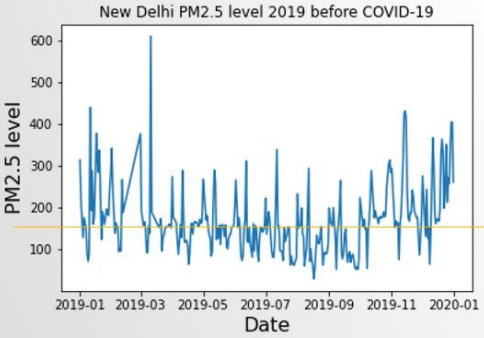


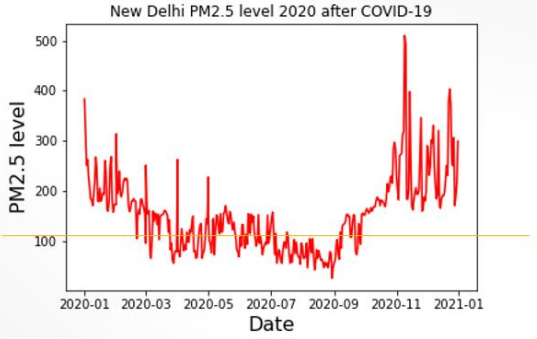




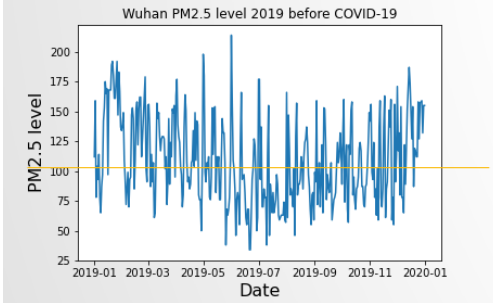


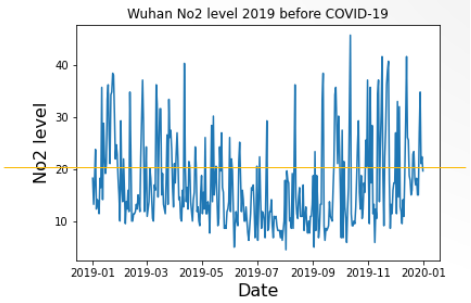
NEW DELHI

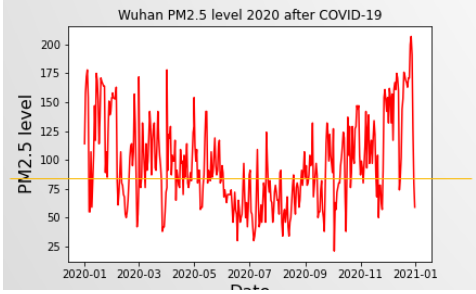


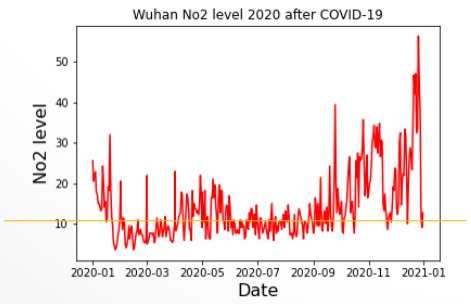


WUHAN

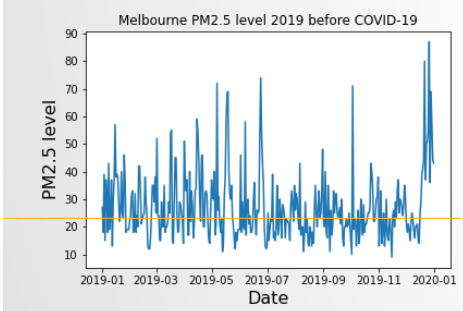


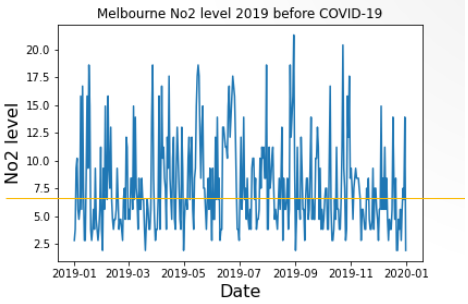


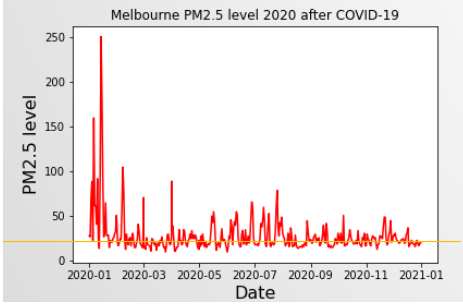


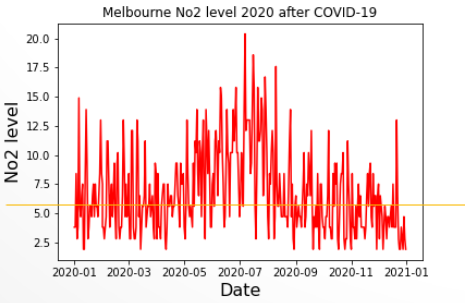


MELBOURNE









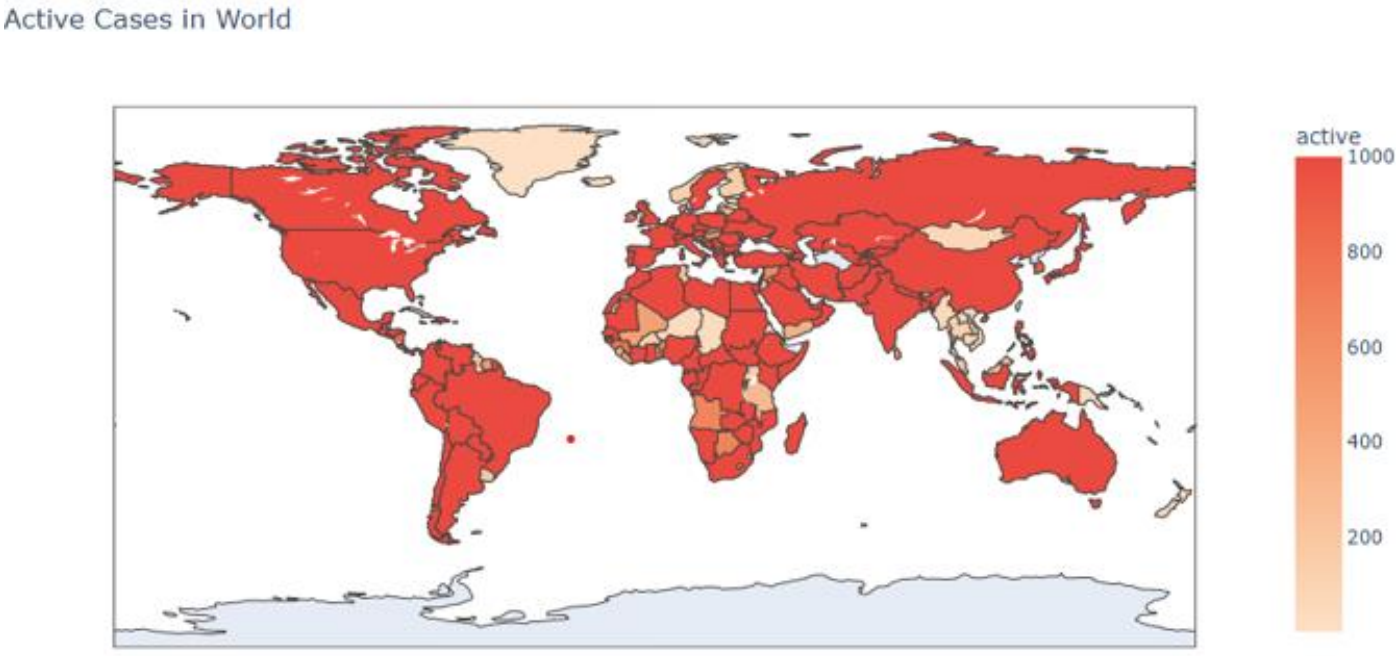
Cities	PM2.5 2019 Before Covid	PM2.5 2020 After Covid	No2 2019 Before Covid	No2 2020 After Covid
New Delhi	155	151	-	-
Paris	40	38	16.4	12
Wuhan	105.5	89	14.7	11.5
Melbourne	24	23	6.5	5.6
Brooklyn	27	24	10.9	10.4

<u>COVID-19 Impact on the 5 major cities</u>

- Covid generally improve the air quality for all cities
- Higher impact on reducing in No2 level than PM2.5, especially for more developed cities.
- Data on air purification can tell a 'true' lockdown!
- Cities from developing countries have large variation during Covid period

3. Are the changes in the number of Covid-19 active cases correlated to the changes observed in Australia's air quality in 2020?

Total COVID-19 cases per 100 people



Daily Reports of COVID cases grouped by country - Research Dates 01/2019 – 07/2020