

QUEEN'S UNIVERSITY BELFAST

ELE8096 WIRELESS SENSOR SYSTEMS

---

## Coursework 2

### Linear Regression

---

*Author:*

Zichi Zhang

Muzixiang Xiao

Jiyu Zou

Yuhang Zhang

Chuao Zheng

Yujie Yang

*Student Number:*

40299571

40344034

40344452

40319754

40336028

40348355

*Supervisor:*

Dr. E. Garcia-Palacios

*Module Number:*

ELE8096

February 2, 2022

Team member roles:

Zichi Zhang

Muzixiang Xiao

Jiyu Zou

Yuhang Zhang

Chuaao Zheng

Yujie Yang

## **Abstract**

# 1 Introduction

[1].

## 2 basic statistics

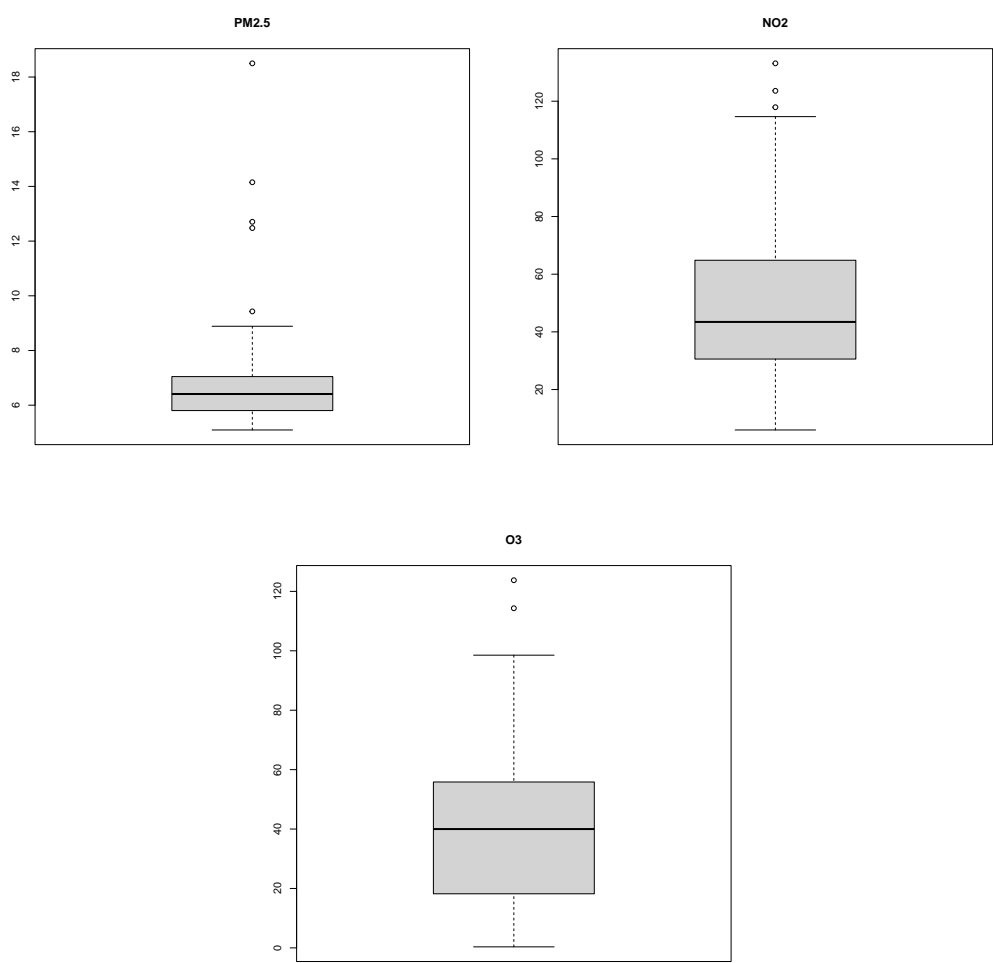
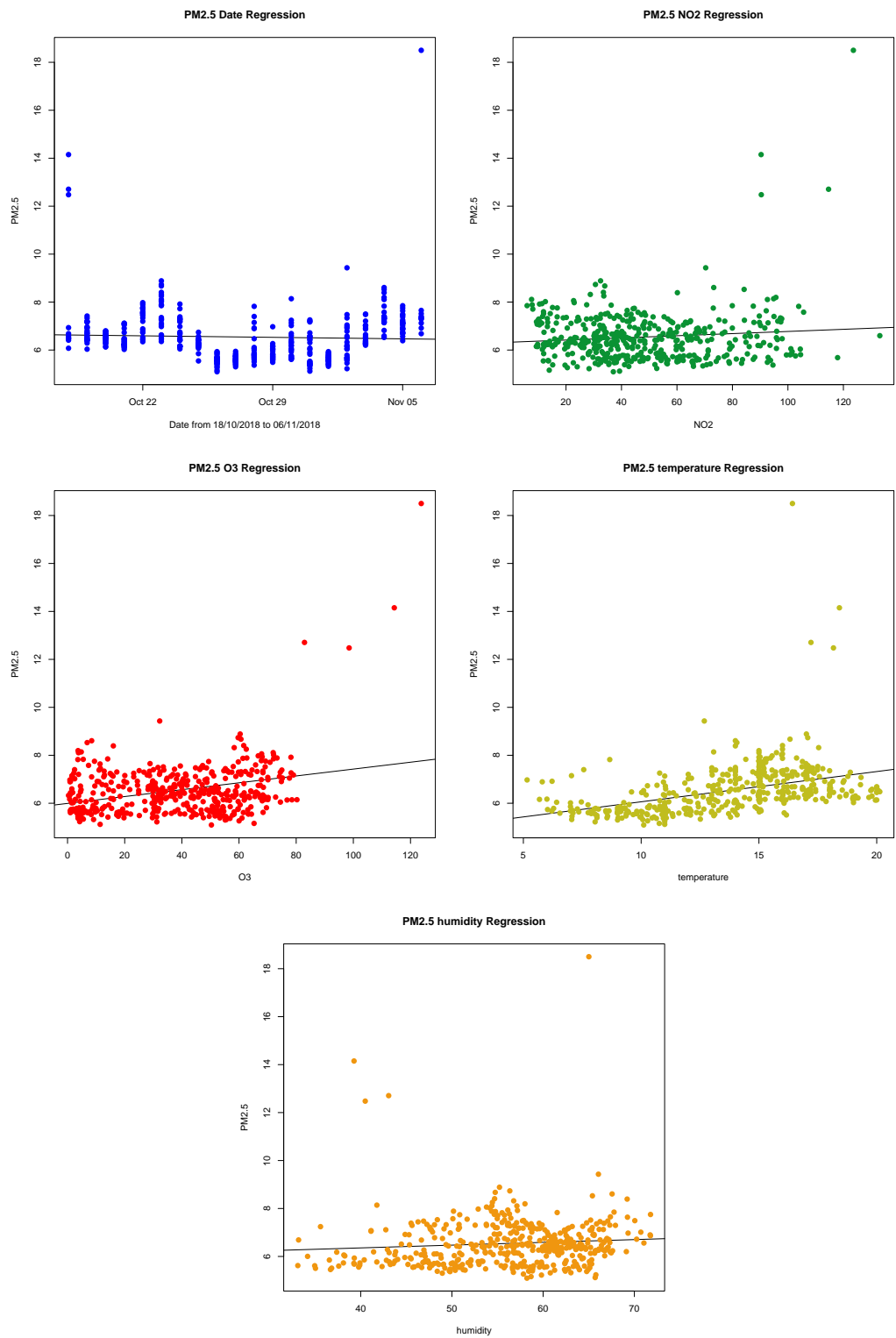


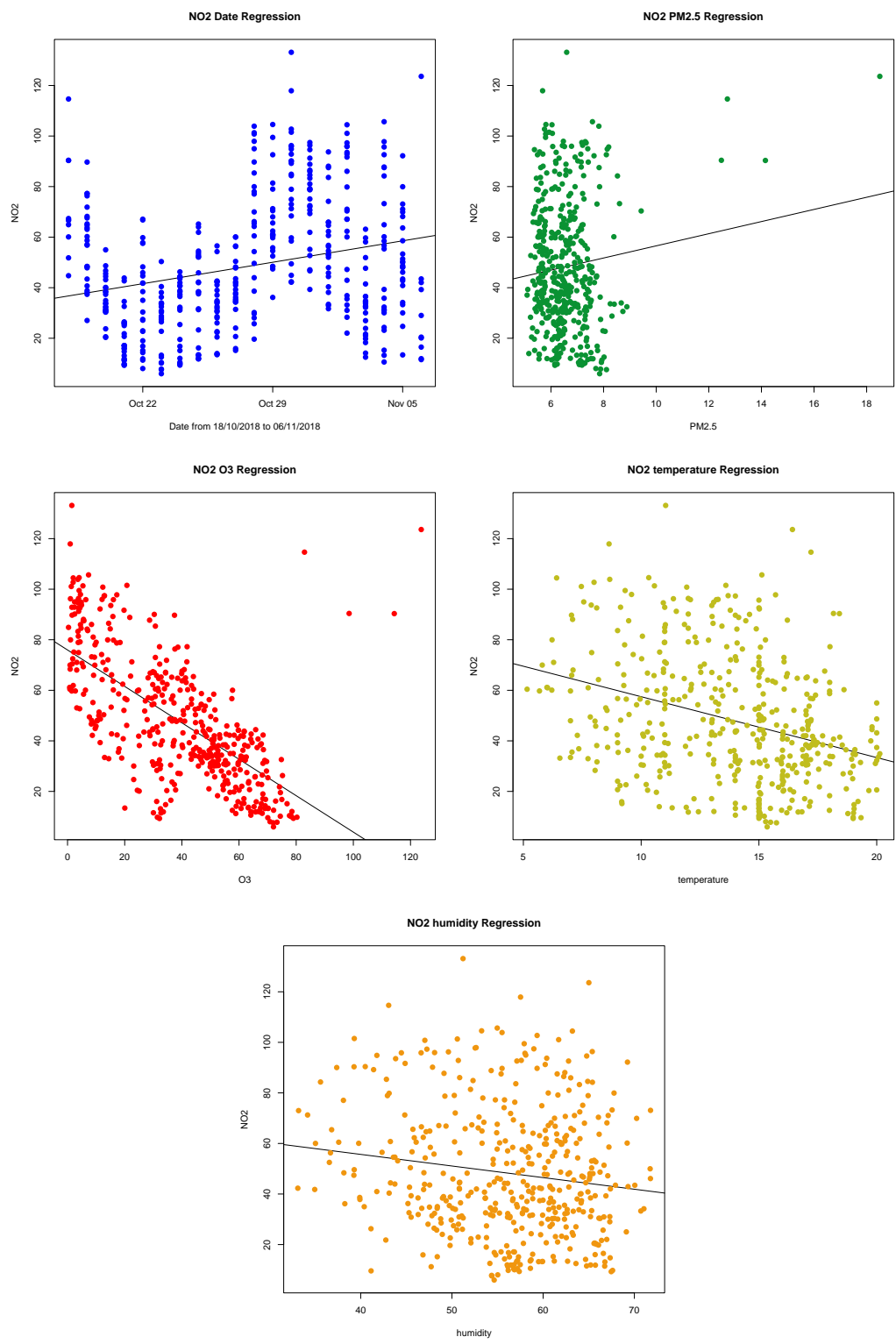
Figure 1: PM2.5 box

# 3 more advanced statistics

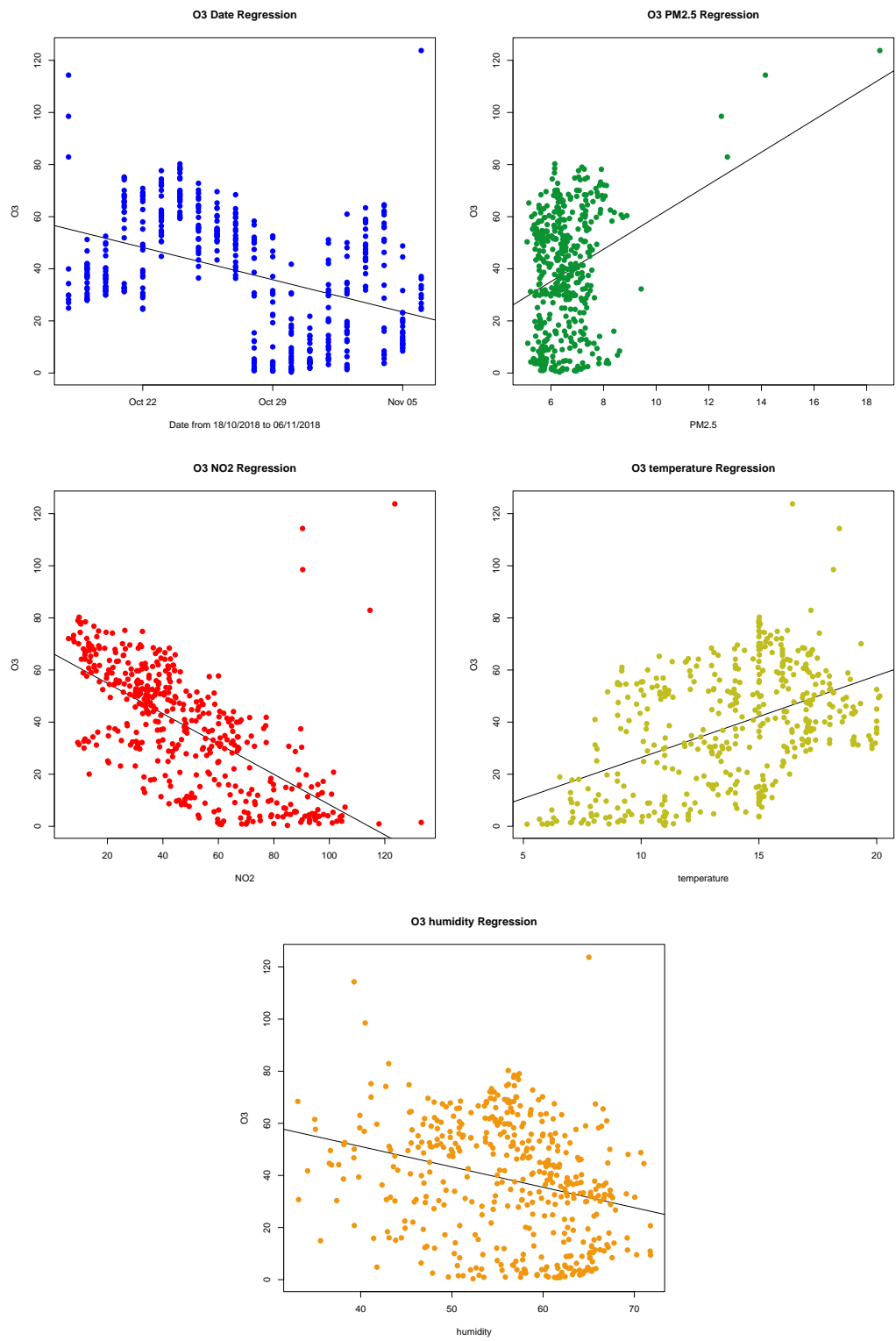
## 3.1 PM2.5



# 3.2 NO2

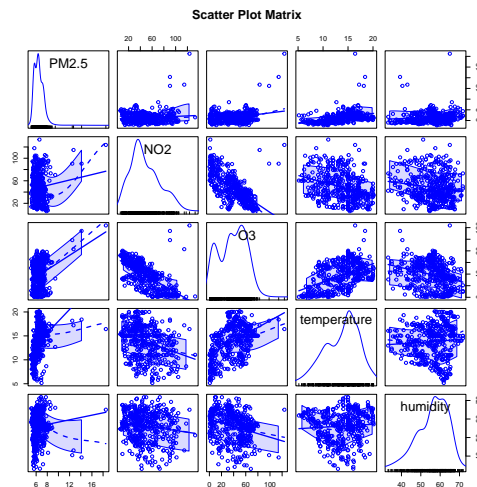


### 3.3 O3

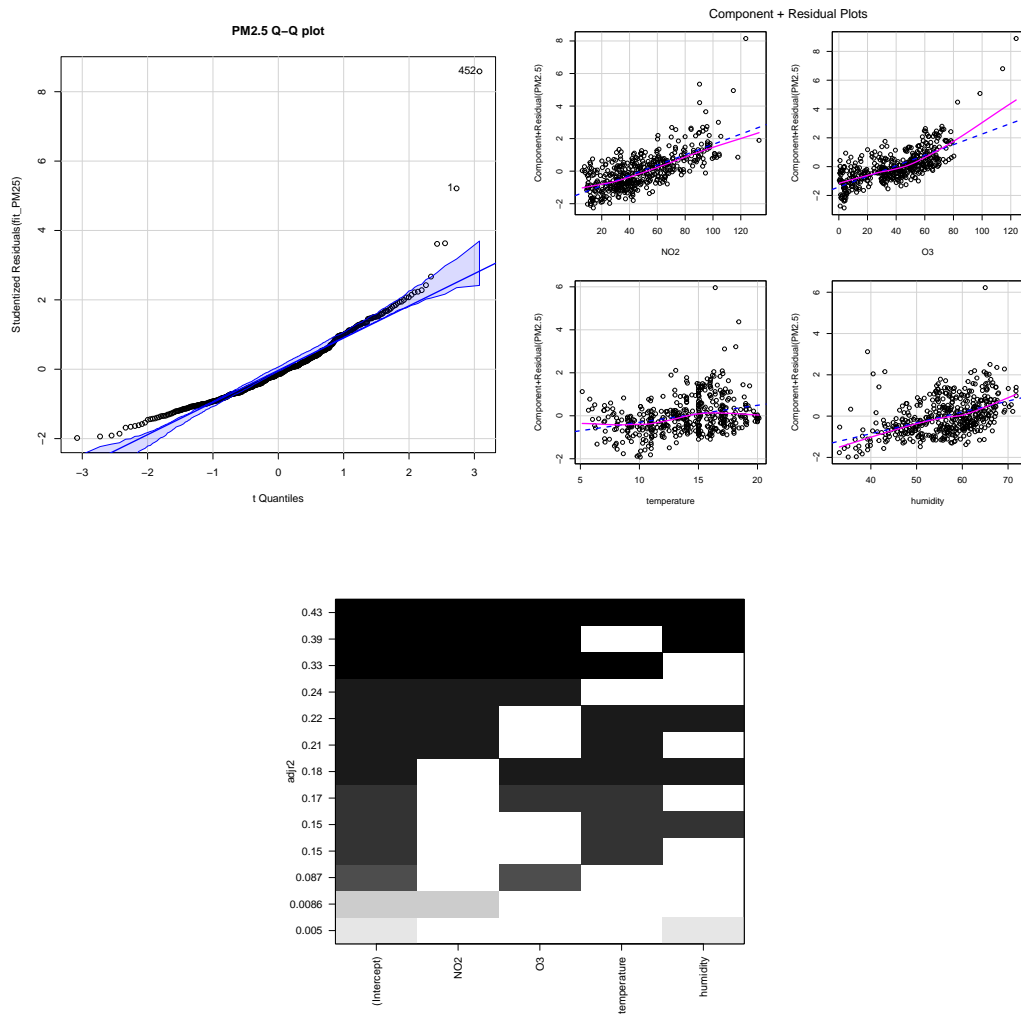




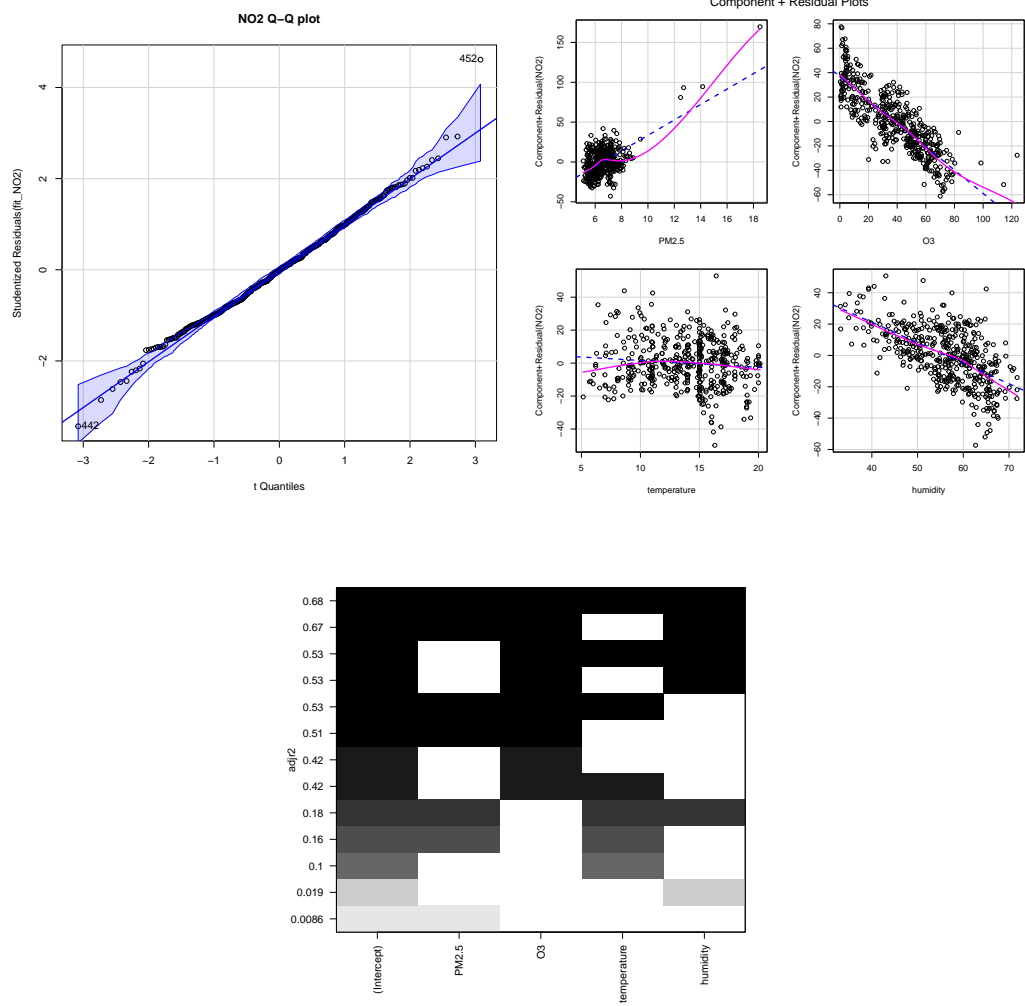
# 4 multi variable regression forecasting models, visualisation of results



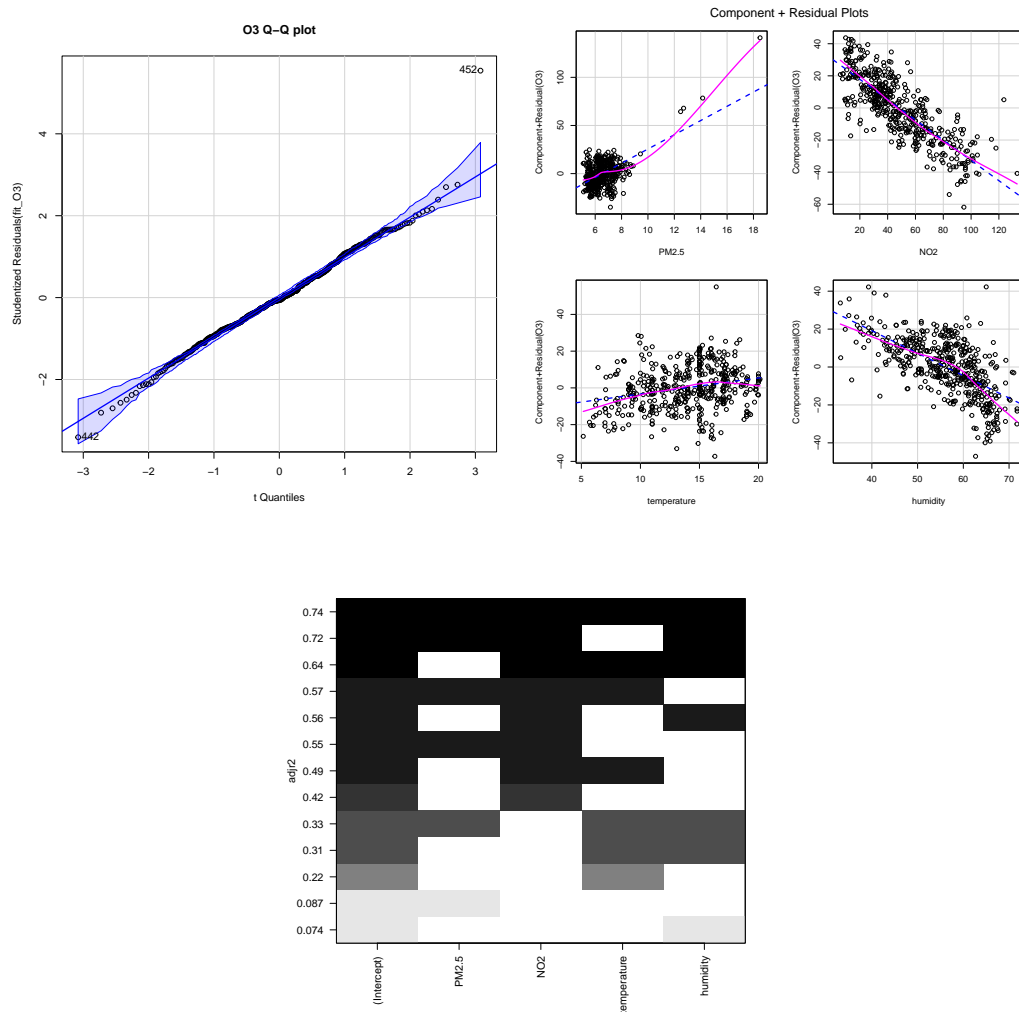
## 4.1 PM2.5



# 4.2 NO2



## 4.3 O3



## 5 model performance and discussion of results

We can use the function "outlierTest" to find the outliers in data. The output is:

```
1 > outlierTest(fit_PM25)
2      rstudent unadjusted p-value Bonferroni p
3 452 8.585952          1.5164e-16   6.8539e-14
4 1   5.212401          2.8566e-07   1.2912e-04
5 > outlierTest(fit_NO2)
6      rstudent unadjusted p-value Bonferroni p
7 452 4.611271          5.2351e-06   0.0023663
8 > outlierTest(fit_O3)
9      rstudent unadjusted p-value Bonferroni p
10 452 5.543088          5.0943e-08   2.3026e-05
```

Then, we delete the outliers and make regression again, the model performance will be better.

## **6 Conclusions**

# References

- [1] U. E. P. Agency, “Basic information about no<sub>2</sub>,” <https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects>, 2021.