**Cruise Data Analysis 2**

04/01/23

I have created a .csv file with all the measurements from the cruise (UTC and BST combined and corrected so that everything is in UTC). I have also renamed the columns so that when they indicate the measurements for a particular species, the name is just that of the species in question. The file is just called “raw\_data.csv” and is saved on the hard drive in the raw\_data folder.

NOx zeroes

Import raw data and filter it to remove instances when NOx was being calibrated. Manually remove instances when the zeroes are clearly higher than usual (when the station was “Sailing home” or “Reykjavik and with ids 2 and 12). Also removed zero cycles with high standard deviations (large spread of values, seen in 3 for NO, 15 for NO2 and 25 for both). The table below shows the values used as zeroes for both NO and NO2 at each station. Some of the sailing stations are missing because the only zero cycles they had were problematic. In these cases, the zeroes from the previous station were applied (except for the case of Reykjavik and the first sailing stint, where there was no prior station to use).

The code for all my various zero iterations is in “nox\_zeroes.R”. As I am currently just subtracting a number from the values for NO and NO2, I am just doing this in the “making\_processed\_data.R” code, the nox zeroes code is just a record.

A screenshot of a computer

Description automatically generated with medium confidence

Met data

Contains ship speed and heading, true and rel wind direction and speed (with u and v vectors), air temperature and humidity, latitude and longitude. The processed met data is saved in the processed\_data folder as “met\_data\_processed.csv”. The true wind speed and direction have been determined using the code David wrote for me (“SEANA\_winds\_script.R”).

Most recent form of fully processed data: SEANA\_data.csv

NOx zeroes applied as above, everything averaged to 1 minute, flags for instrumental issues, calibrations and ship emissions applied. For ship stack flag, different labels are used: “ws” when the relative wind speed is below 2.5 ms-1, “wd” when the relative wind direction is between 157.5 and 202.5 degrees (45 degrees around 180), “other ship” when there is a significant spike in CO, NOx and sometimes even in SO2 and lastly “nox spike” when there is a spike in NOx (a spike is considered anything that goes above 0.5 ppb).

Have added an extra flag for CO when it is above 250 ppb (I think the instrument went a bit weird and we have a massive spike, which I don’t think is real, so I have flagged it). I have also flagged NOy when it is less than NOx.