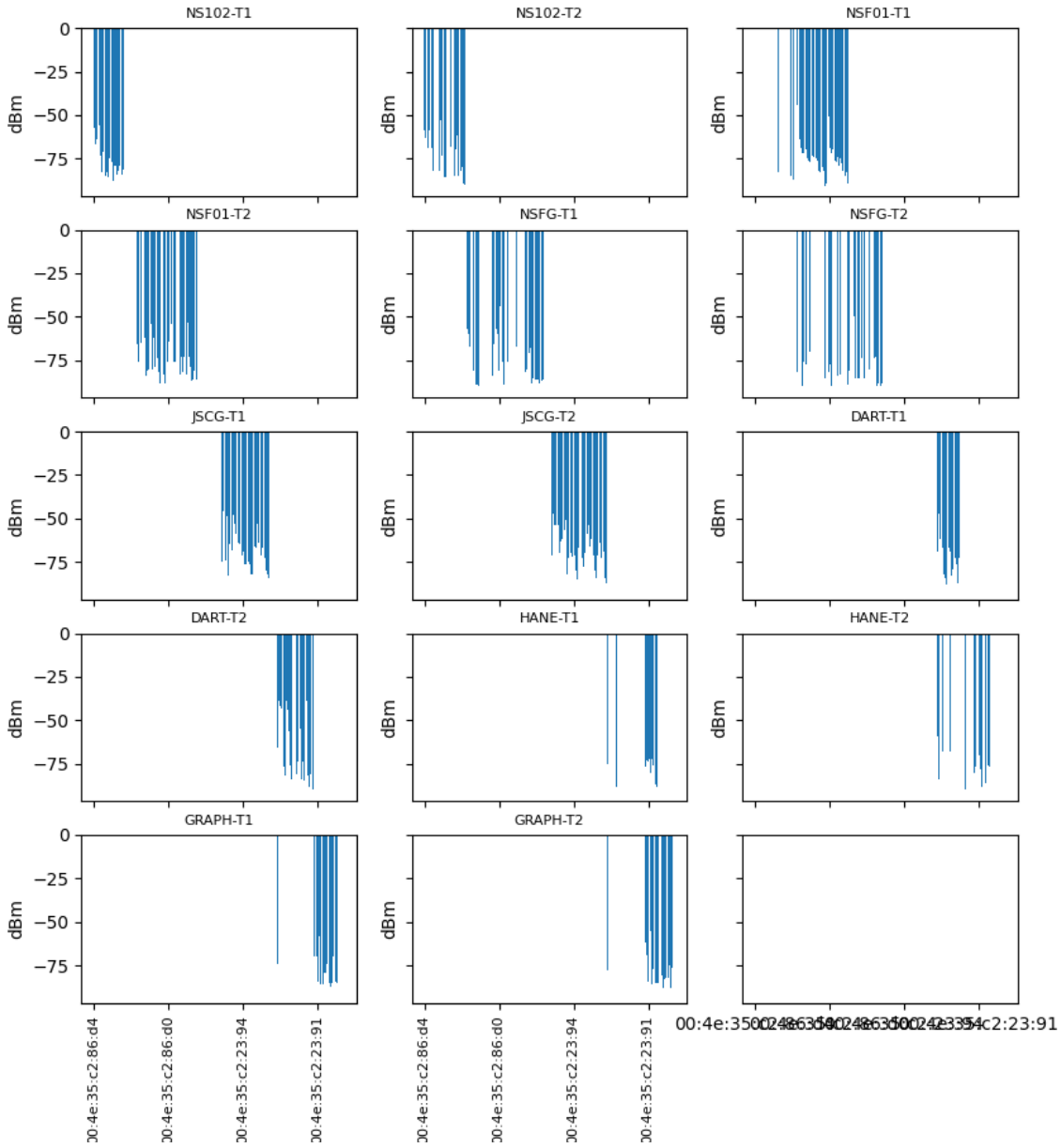
A4 Report

1.



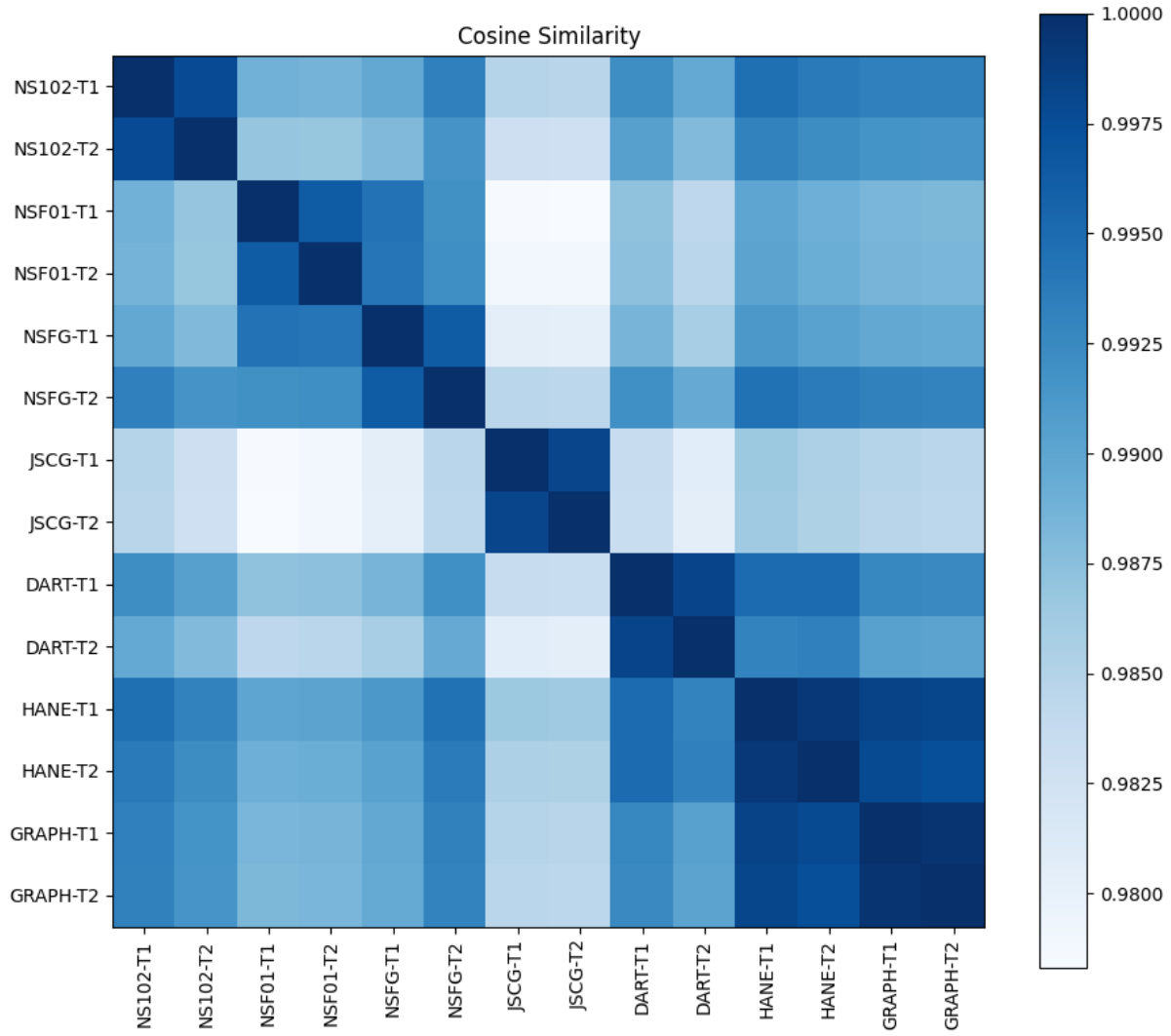

In the graphs above, we can see that across the various trials in the same location, there are vast similarities. This is because of them being in the same locations with in a few centimetres and at the same time within a few seconds of each other.
Across the different locations, we can see how the frequencies shift from lower in the New Sci building near the electronics lab and gradually get higher till the graphics lab in the Sci building. In-between the 2 we can see how new frequencies are picked up while others drop. Also we can see the strength of frequencies vary in a similar manner.
Where many close lines almost forming blocks represent stronger signals while further apart lines are weaker.

2.
Code to generate similary matrix:

```
from sklearn.metrics.pairwise import cosine_similarity

similarity_matrix = cosine_similarity(features, features)
```

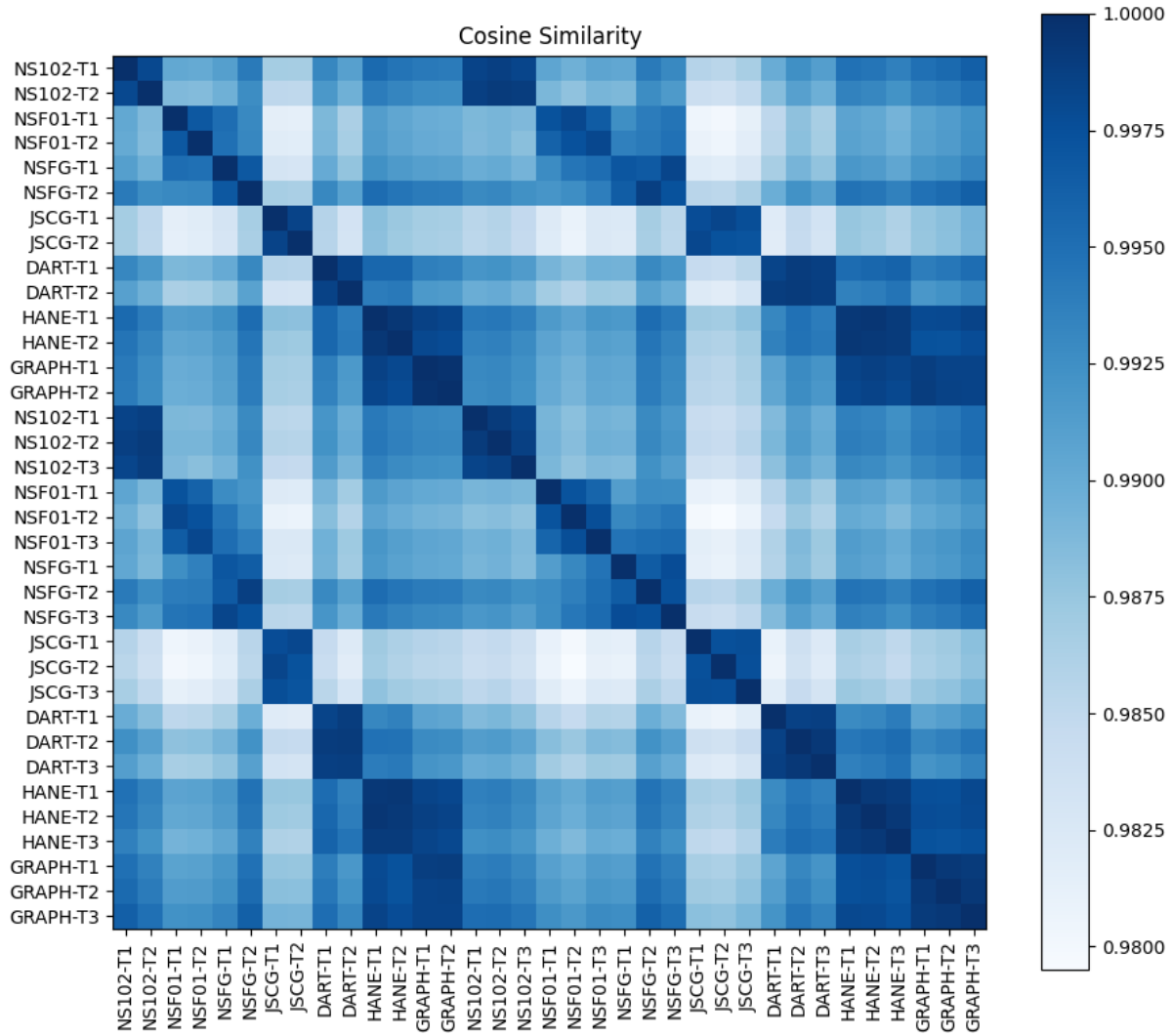
3.




In the above similarity matrix we can see the strong diagonal line across the same readings, this of of course because it is the same data so 100% similar. Aside from this, we can see very similar readings across different trials in the same location. Similarly to the first graph, we can see signals in the same buildings are similar, with the closest being the most similar (Graphics lab and Hane's office).

The least similar is JSCG. This is because it is in its own building however this seems strange since the new and “old” sci buildings are more similar than this despite being further apart from each other.
1 solution to this could be because the majority of the readings are 0. All white space in the first graph is a 0 in the data. This is the reason that all readings extremely close to 1 (completely similar). Therefore it is possible that the JSC has more non 0 readings or just a strong unique band that are not present in the sci buildings. Fewer 0 readings could result in a result that apperas less similar.

4.




This is my data combined with someone elses. Note that I only did 2 trials where he did 3, this is the cause of the rectangular blocks rather than square. The interesting bits of this graph are the upper right and lower left corners, since this is where our data is compared against the other persons.

We can see that there are similar patterns as when 1 persons data is compared against itself however they are slightly less similar. There are number of possible causes for this:

- different positions in the same room - We would not have necessarily stood in exactly the same place in the room or held the phones at the same height. These variances would allow detections of different signals and different strengths of the same signals.
- Different hardware – Our data could have been collected on different phones of the same make or different models entirely. Either way, the aerials in the phones may have been different