LAB-2 Assessment

We have a base and a rover, and have collected GPS default and UTM coordinate date, for our experiment.

First set of data is when the entity was stationary, and the second set of data was when the entity was moving. The data was collected for a total of 10 minutes and 2 minutes respectively. The data was collected with the base being the stationary and the rover being the moving object in both the cases of normal and UTM coordinate data. First let's talk about the outputs of different sets of data and then we can do a comparison followed by a conclusion.

OUTPUTS

Case 1: Rover is moving (clustered data points, without UTM)

ORI= 42.338474787°N 71.089023929°W -26.8650m
AVE=E:-0.0000m N:-0.0000m U: 0.0000m
STD=E: 1.4813m N: 3.6396m U: 5.4485m
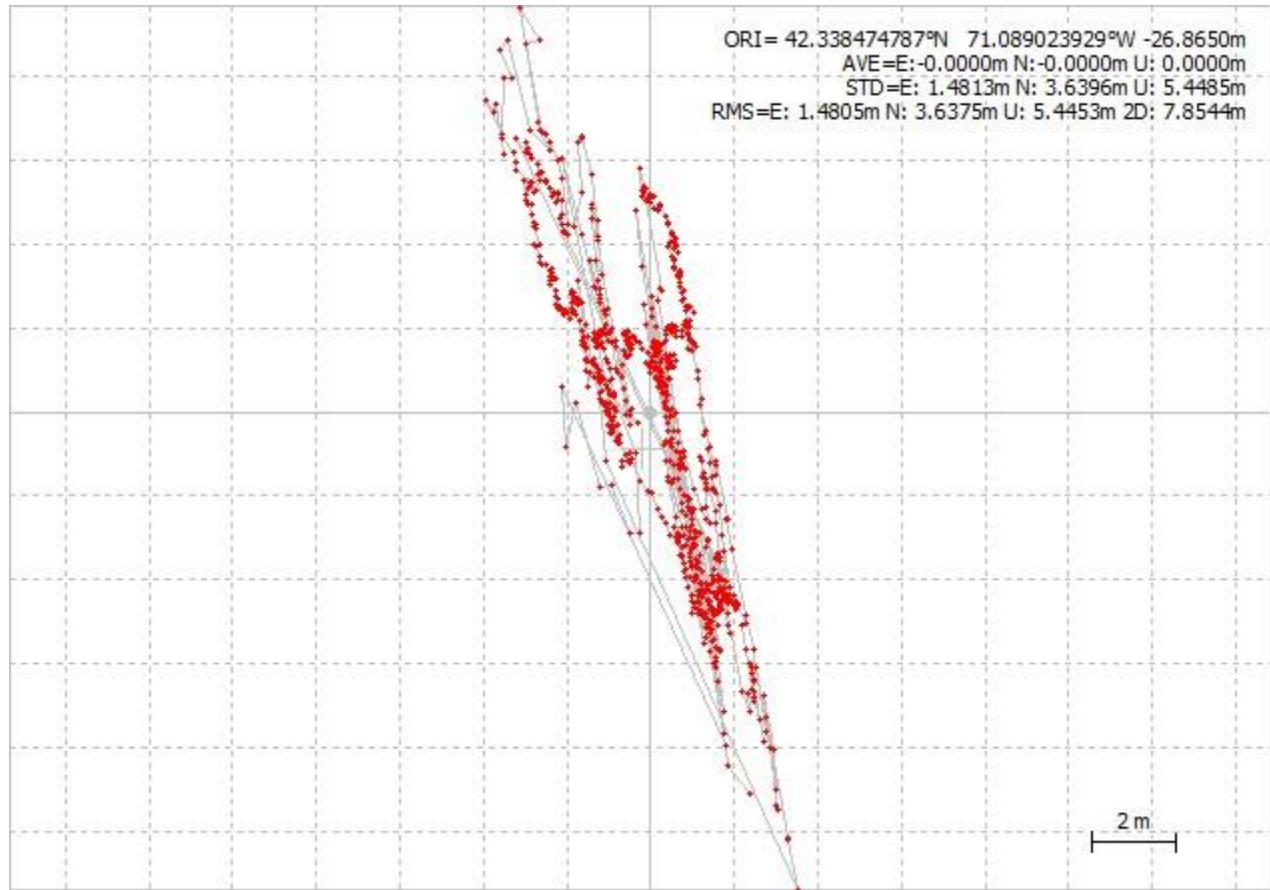RMS=E: 1.4805m N: 3.6375m U: 5.4453m 2D: 7.8544m

2 m

Fig 1: Clustered Data points when stationary

In the first plot, we have plotted the data points of the rover, when it was moving. We can notice that the standard deviation and variance are much lower than that of a default GPS, when we take out the data from GPS RTK Emlid Reach.

Variance (meters):

0.24

Standard Deviation (meters):

1.4813 in E and 3.36 in N

Mean (meters):

0

RMS (meters):

1.4805

From these three parameters, we can conclude that the mean of the data, standard deviation and variance, are much better than the ones, which we recorded in the previous lab experiment. Here next, we have plotted the probability split of UTM-X vs UTM-Y in comparison, when moving. We can get more information about the data.
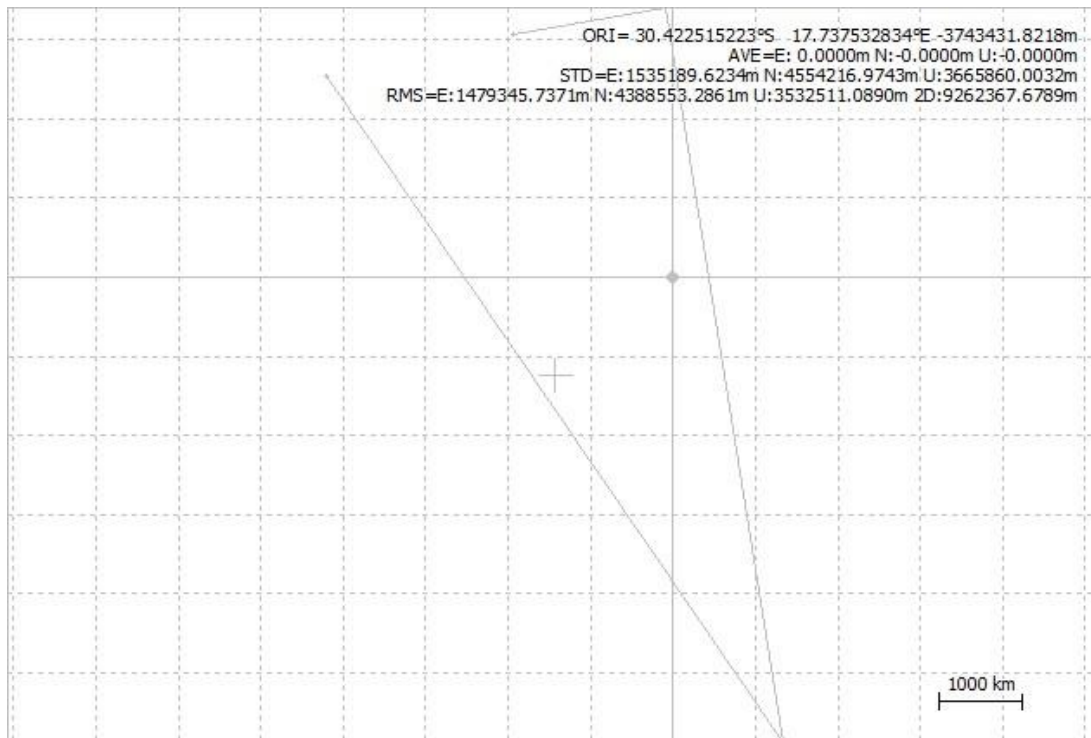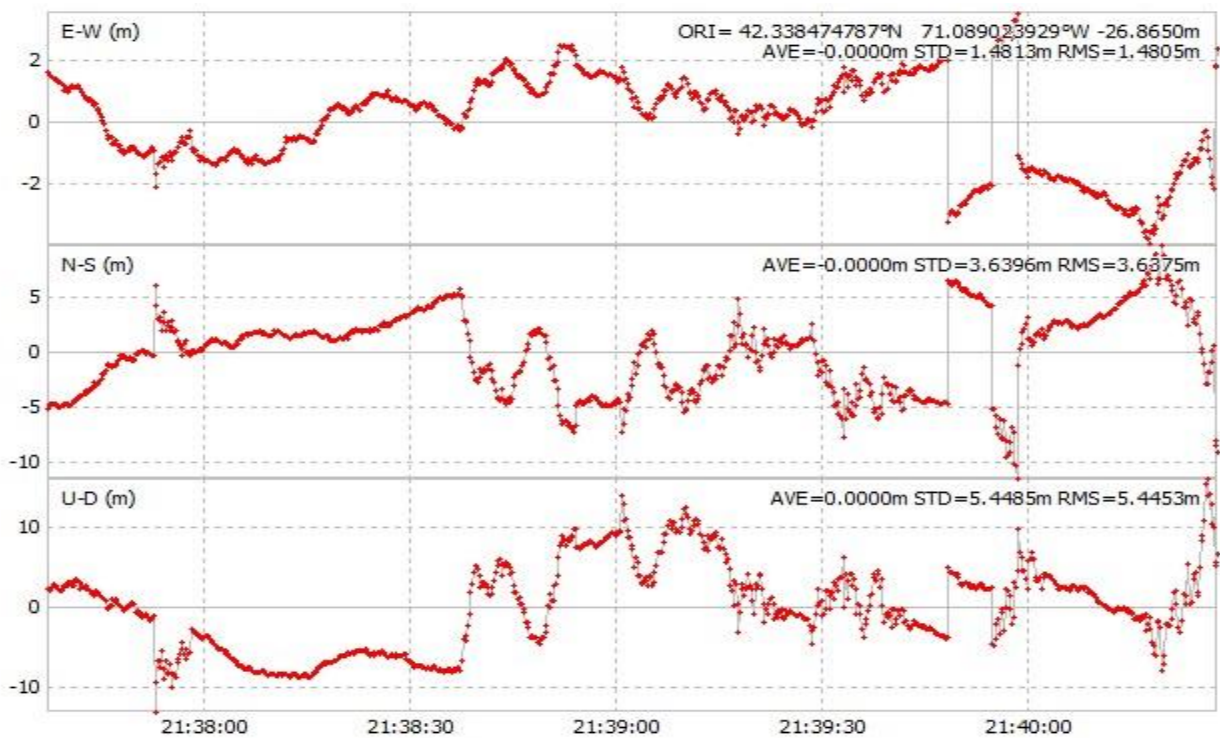

Fig 2: UTM points moving map
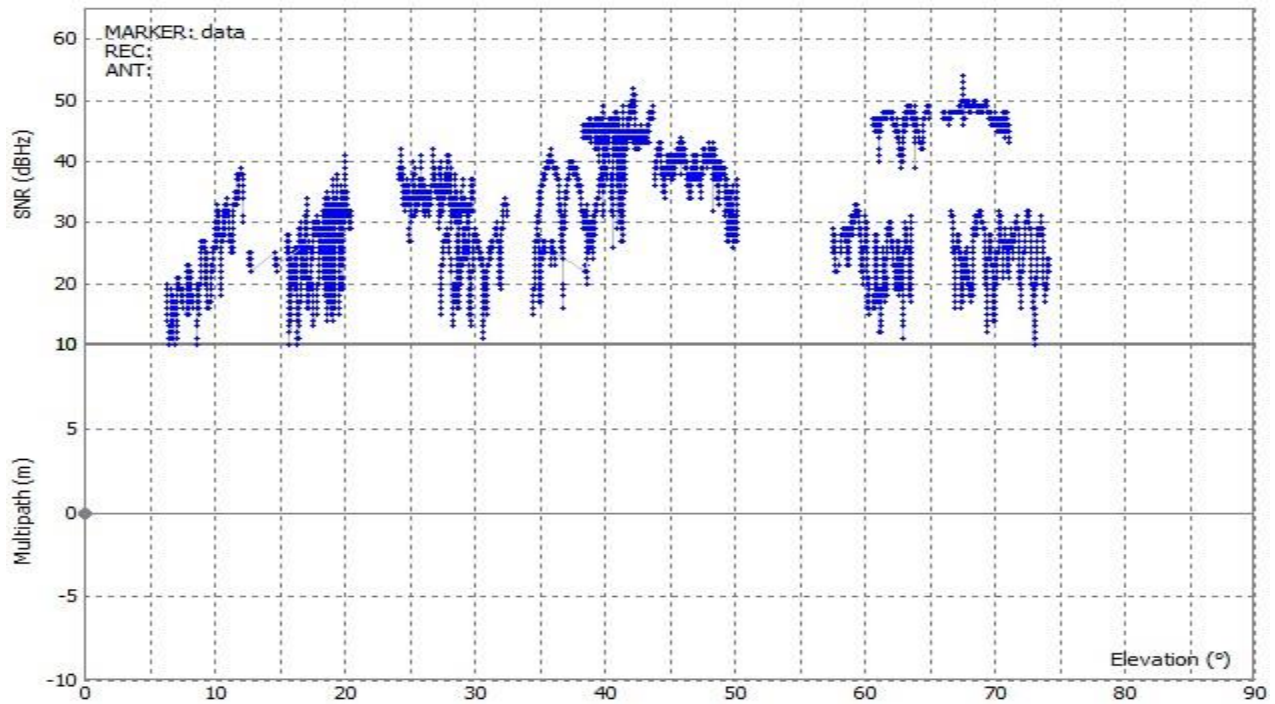

Fig 3: Position graphs of UTM data.

Fig 4: SNR in dB for the data points.

As we can see, the SNR levels are always hovering around the 30-50 dB mark. Usually the SNR depends on various factors such as the height of the antenna. Since the height of our given antenna is very low, we might find the SNR levels to be a bit on the higher side. A good SNR for a GPS signal should be around the high 20s or low 30s.
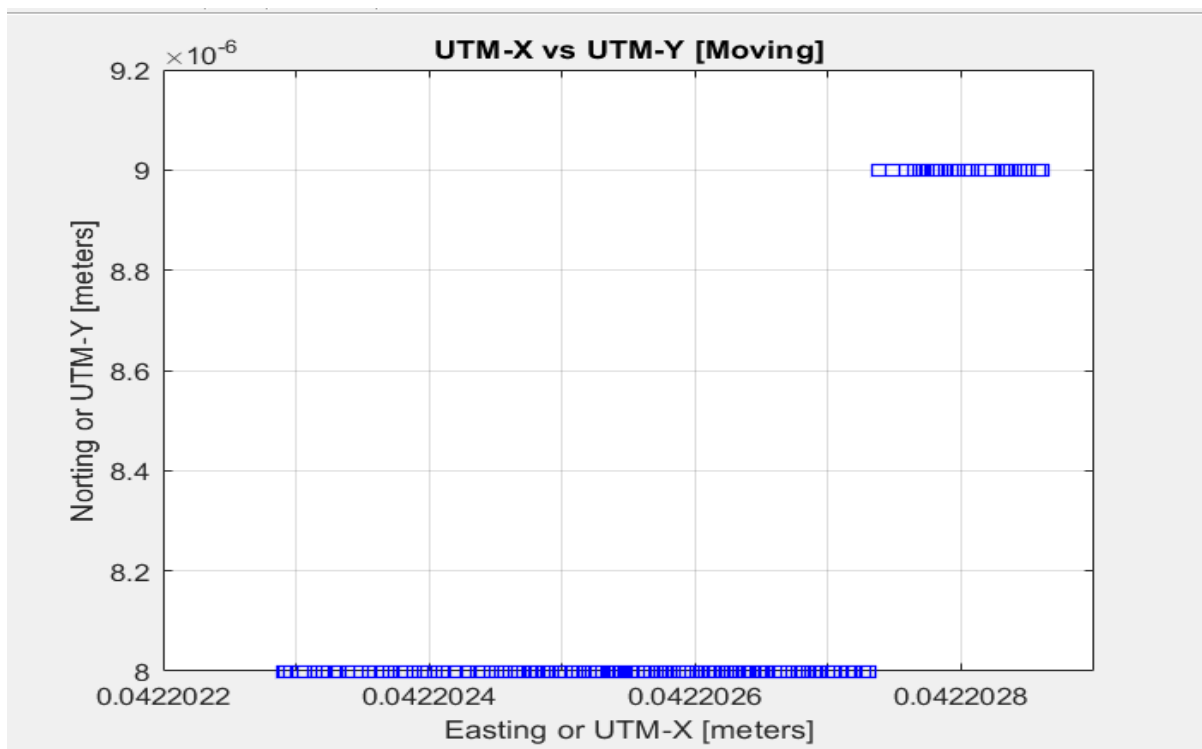

COMPARISION:

Fig 4: UTM-X vs UTM-Y when moving

CONCLUSION AND INFERENCE:

So, as we can see from the graphs, the factors, which affect the performance of any GPS such as variance, standard deviation, RMS and mean are much less when we use the EMlid REACH in Laboratory 2, as compared to when the in Laboratory 1.

To interpret the graphs, we need to know how to read the UTM Data. In UTM format, there are no latitude and longitude, instead there are easting and northing along with the zone name and zone number. So, one unit in UTM will be one meter we move towards east or north.

As we can see from the first two figures, which are the data cluster points and the moving, which give us some insight about the different metrics of the GPS.

The third graph is the position information of the UTM data captured when the rover was moving. Fourth graph talks about the SNR range, at different points of our dataset.

In both the cases, there is no electromagnetic flux involved since the GPS was held away from the laptop.