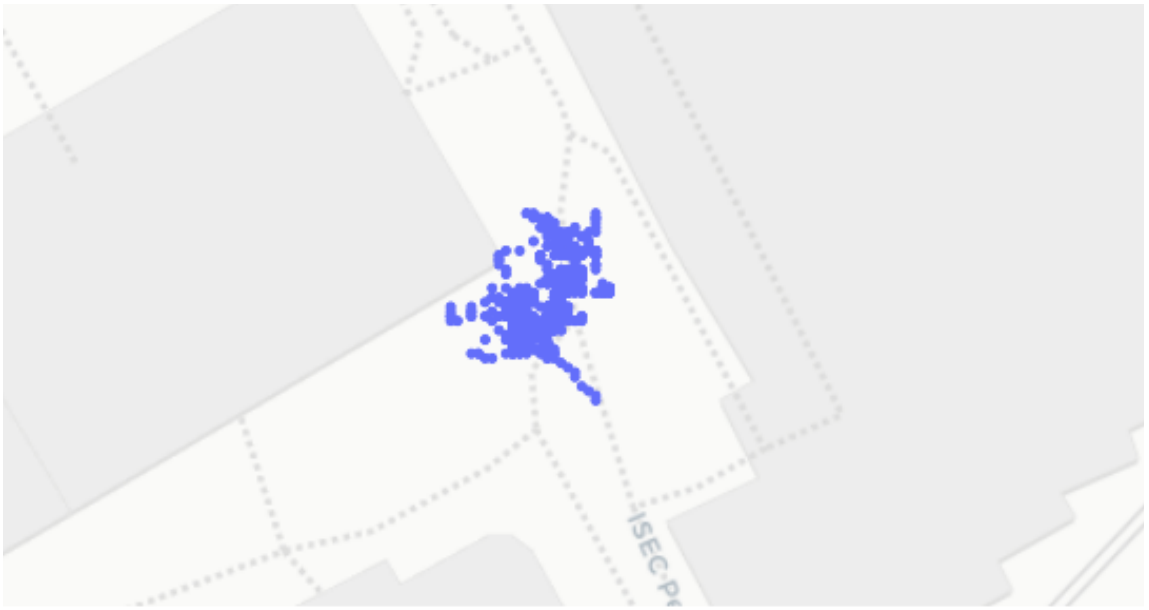
Analysis

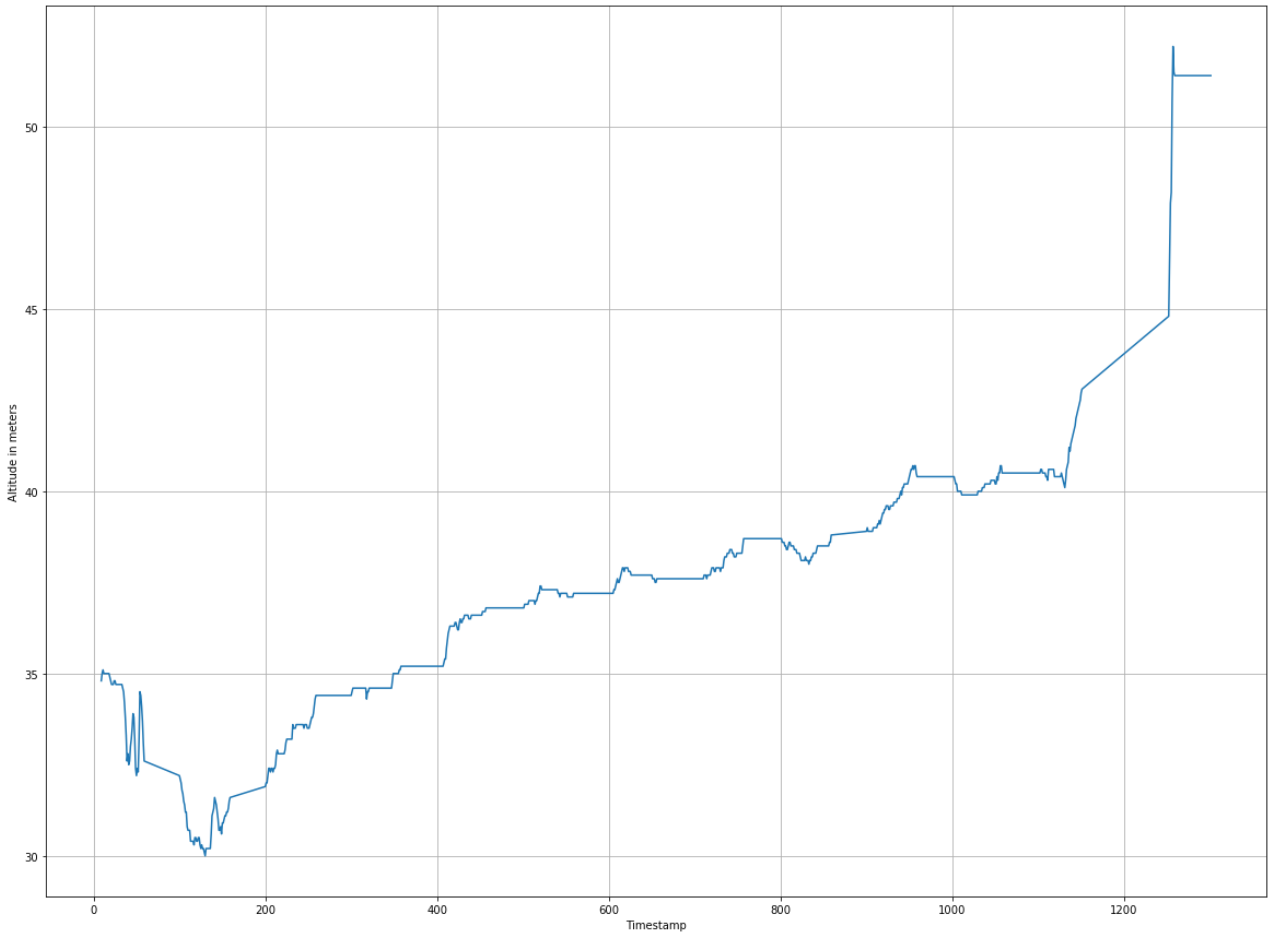
Stationary data

Position: Outside Snell Library
Plot:



Analysis on Latitude and Longitude
As it can be seen from the graph there have been quite a lot of discrepancies in the accuracy of the data. The data sure might look precise but aren't very accurate.
Standard deviation on latitude- 2.890473443627476e-05
Standard deviation on longitude-3.1576648039980324e-05
The deviation on longitude is slightly higher comparatively but overall it's okay to use this device if you don't want 100% accurate information.
This could be because of multipath as signals might have bounced off from nearby buildings. In my case I was sitting right outside of the library

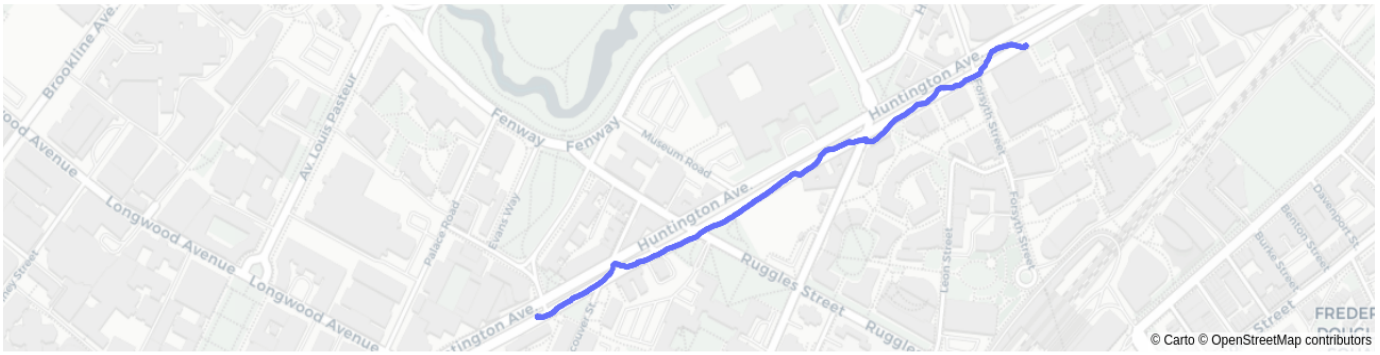
Analysis on Altitude:
The measurements on altitude were completely erratic.
Standard deviation: 3.30524772019414
This is an especially high number and we can conclude that this GPS puck can't perform altitude measurements properly. The errors might be because of selective availability or again signal multipath or the general build of the GPS. One should not use this device for altitude measurement. Though at some point it gives an almost similar value(around 38 m) but it then keeps increasing again. Over time the value has increased which might be cause of the device's internal build
Mean squared error:



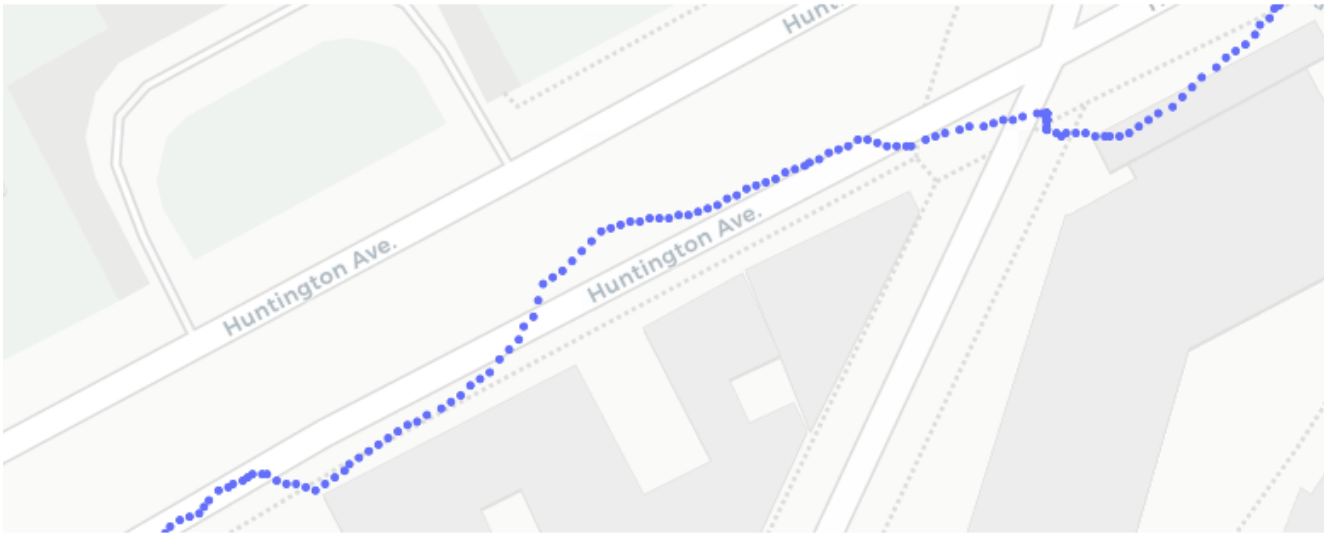
Walking data

Path: Northeastern to Longwood Ave along Huntington Ave

Plot



Zooming out on this graph makes it almost look like a straight line but as we zoom in we can see the discrepancies.



Analysis on Latitude and Longitude:

Even though I walked in a straight line I have had errors in measurement which makes it look like I walked all over the road, it might be possible cause of multipath as I was surrounded by buildings on both sides of the road.

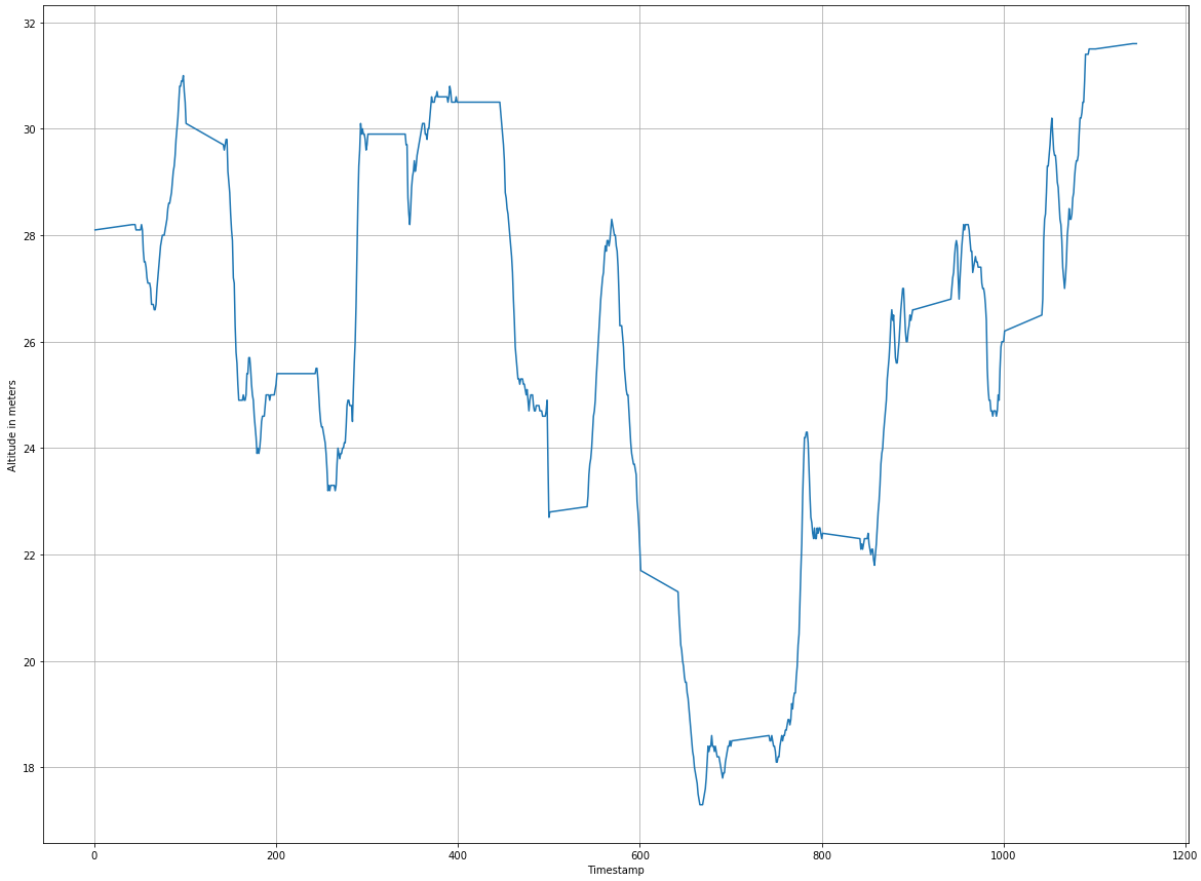
The standard deviations don't make much sense here cause the values are constantly changing but just for the sake of comparison I have mentioned the difference between the latitude and longitude values:-

Standard deviation on latitude: 0.0010201407527964 23=1e-3

Standard deviation on longitude: 0.0025685440135210 13= 2e-3

Again it follows the same pattern where deviation in longitude is more than latitude. Possible multipath and nearby interference might be a reason for this.

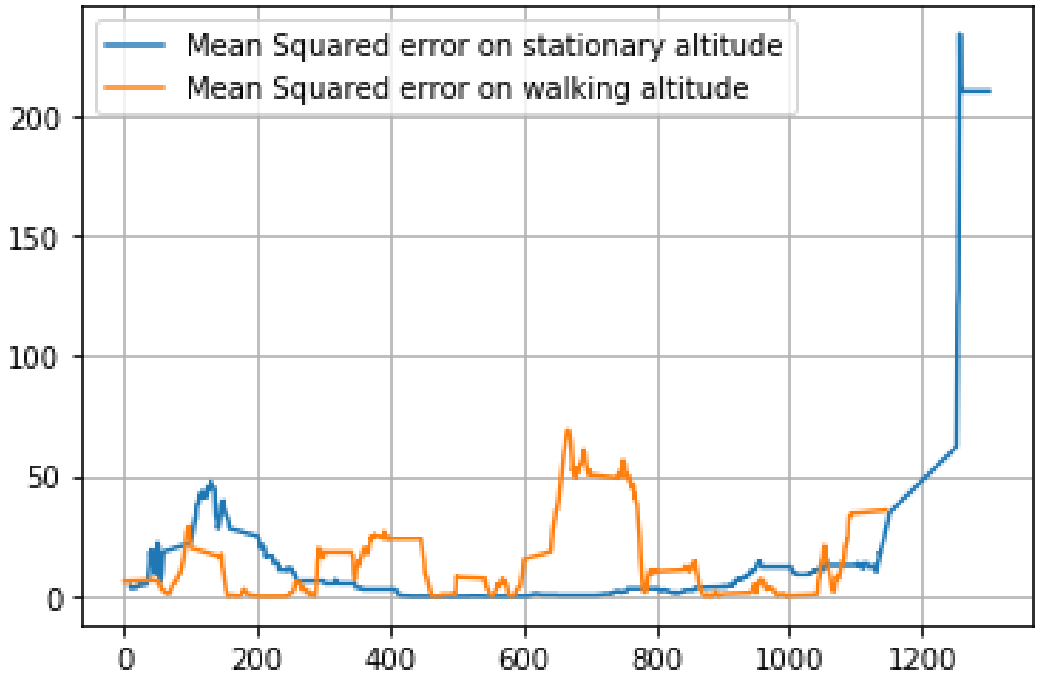
Analysis on Altitude



Standard deviation on altitude: 3.7384518344057818

The values have been changing constantly on the graph which shows how inaccurate the data is, and the deviations for walking and stationary data for altitude is almost comparable. The graph does not follow a particular pattern.

MEAN SQUARED ERRORS ON ALTITUDE:



Total mean squared error on altitude (stationary_data)= 10.909340384566876
Total mean squared error on altitude (walking_data)= 13.955037099976499

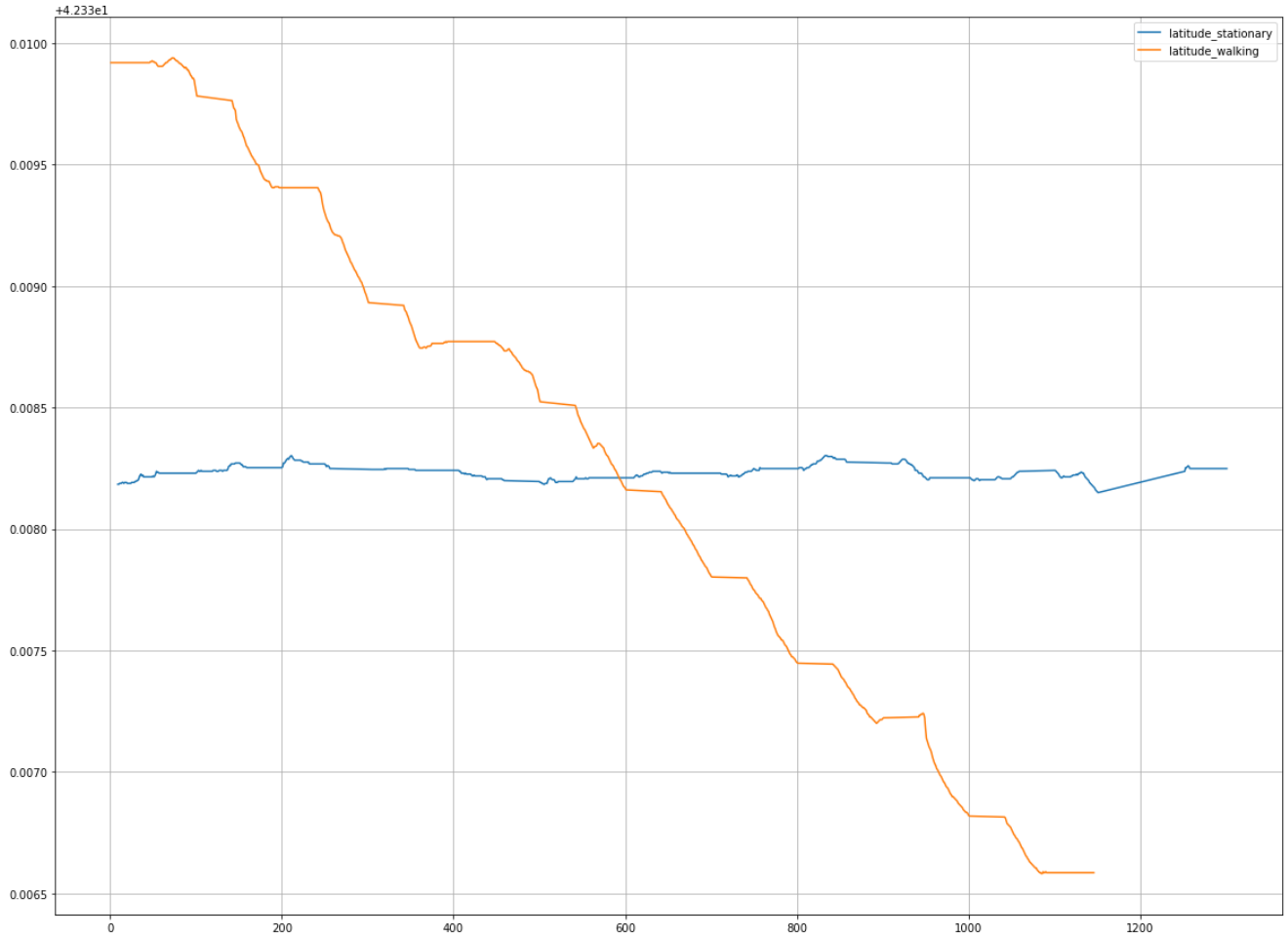
We can see that the mean squared error is almost 0 for the stationary data in the middle whereas there's huge deflections in the end which would make me believe that that was the period in which the GPS had accurate measurements. Whereas, for the walking data there is almost no period of linear data, the value stabilised for some periods but after that went haywire, which makes me conclude that either the device requires some time to become stable or the terrain was erratic.

This might also mean that the device needs to be completely isolated and should be untouched for the recording period cause of the highly sensitive nature of it.

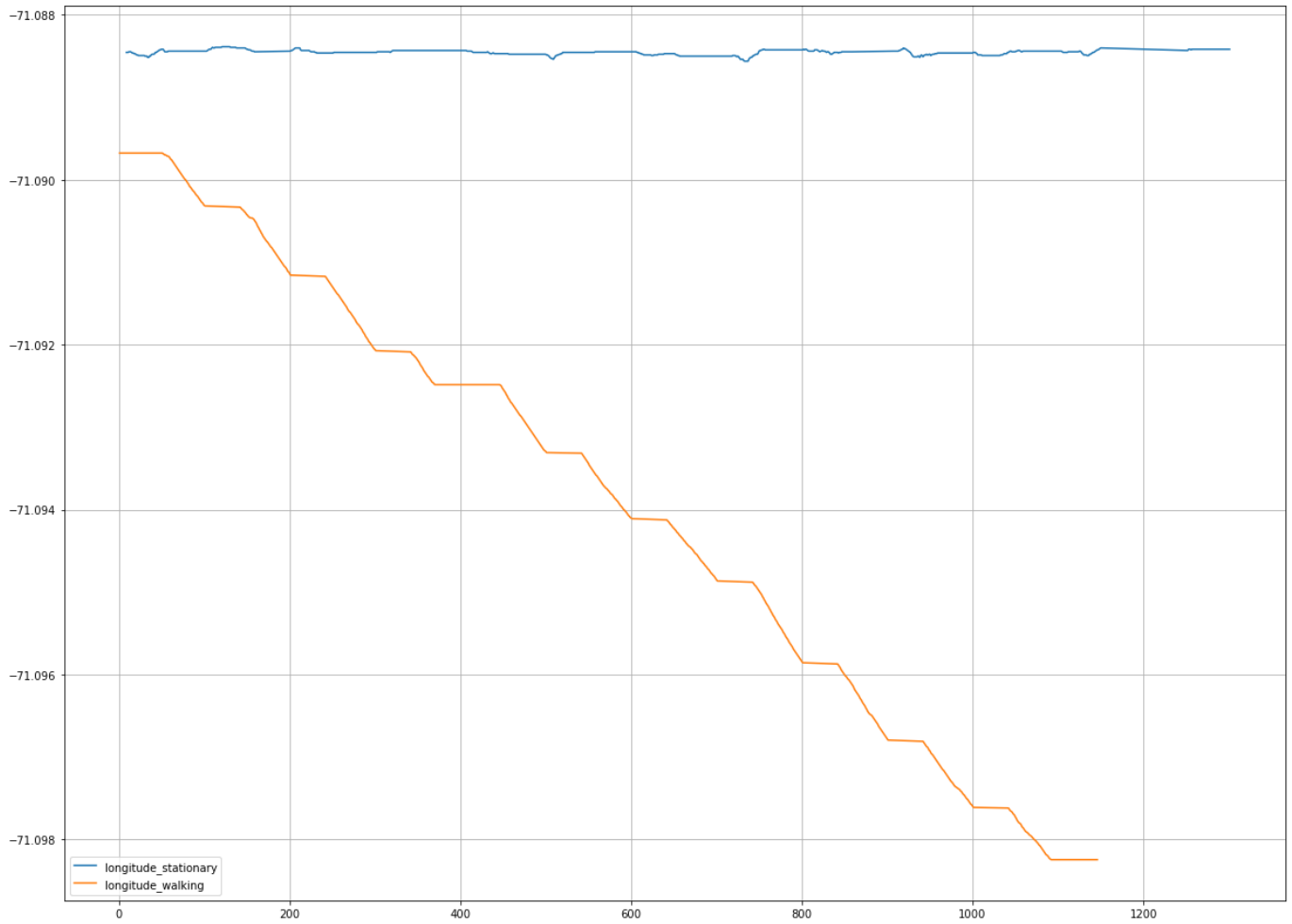
Other MSEs
(Errors in walking data don't mean much because the values change anyway)
Total mean squared error on latitude (stationary_data)= 8.343118864741524e-10
Total mean squared error on longitude (stationary_data)= 9.956862656743848e-10

Comparison plots

Latitude



Longitude



Due to my also erratic nature of walking and possible errors in the GPS as mentioned above the graphs are not completely linear but we can make out that a person was walking due to the changing latitude and longitude.