CE6435 Assignment #2

Problem I: Analysis of GNSS code pseudorange and carrier phase measurements and their combinations. Check the effect of cycle slips, ionospheric delay, multipath, receiver noise. Rinex observation file used for the analysis: ABMF00GLP_R_20200200000_01D_30S_MO.rnx

1. How many types of measurements are included in the observation file for each of the GPS, GLONASS, GALIEO and BeiDou systems? What are they? Select one satellite from each of the systems (e.g., GPS01, Galileo02, GLONASS15), and plot the corresponding pseudorange measurements (you can choose any code type) as a function of time on a same figure. Make sure the all elements in the figure are clearly labeled.

2. Plot phase L1 and code P1 on a same plot for each of the satellite in problem 1. Would you conclude one is more precise than the other? And why?

3. Why can ionosphere-free combinations remove the first-order ionospheric effect? Form code (P_c) and carrier phase (L_c) ionosphere-free combinations for the three satellites.

4. The code multipath can be check by plotting the difference of code and carrier ionosphere-free combinations (P_c - L_c). Form the combination for the three satellites. What can you tell from the results?

5. What is geometry-free combination, and what is the physical meaning of this combination? What are the main utilities of the combination? Form the geometry-free combination, e.g., L1-L2, P1-P2 and P1-L1, for the three satellites. Among three combinations (e.g., L1-L2, P1-P2 and P1-L1), which one shows a greater level of noise, and why? How would you explain the variations in these combinations with time? Why do the combinations of L1-L2 and P1-P2 have opposite sign? Plot the combination (L1-L2) and (P2-P1) on the same plot. Does dispersion increase at the beginning and end of arcs? How would you explain the increase if you do see the increase?

6. What is MW combination, and what is it used for? Form the Mw combination for the three satellites.

Problem II: Provide critical reviews to the two reports assigned to you, which are written by class peers. Do they provide a comprehensive description of the GNSS systems, including its segments and signal structure? What are the strengths of the reports? From a reader's perspective, what modifications would you recommend to improve the report with regard to its organization, contents and description? Your reviews will feed back to the authors anonymously.