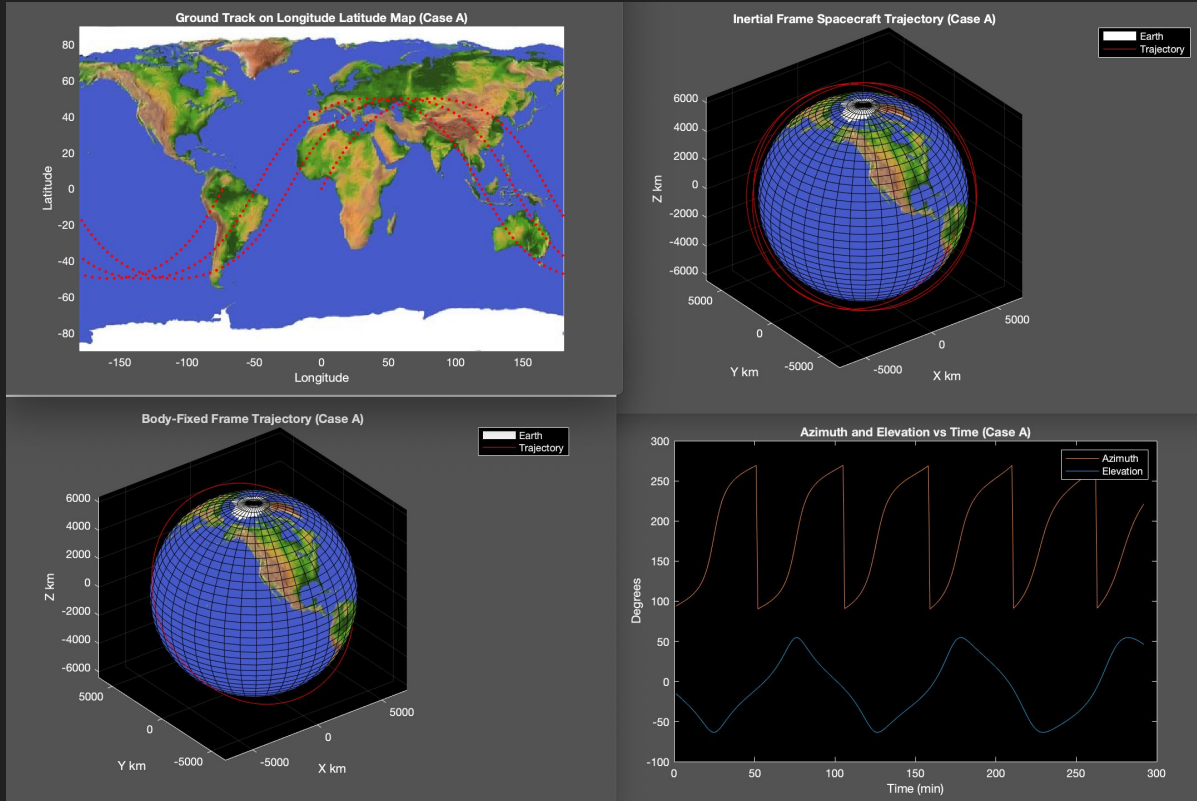


Extra Credit Project: Ground Track Tool

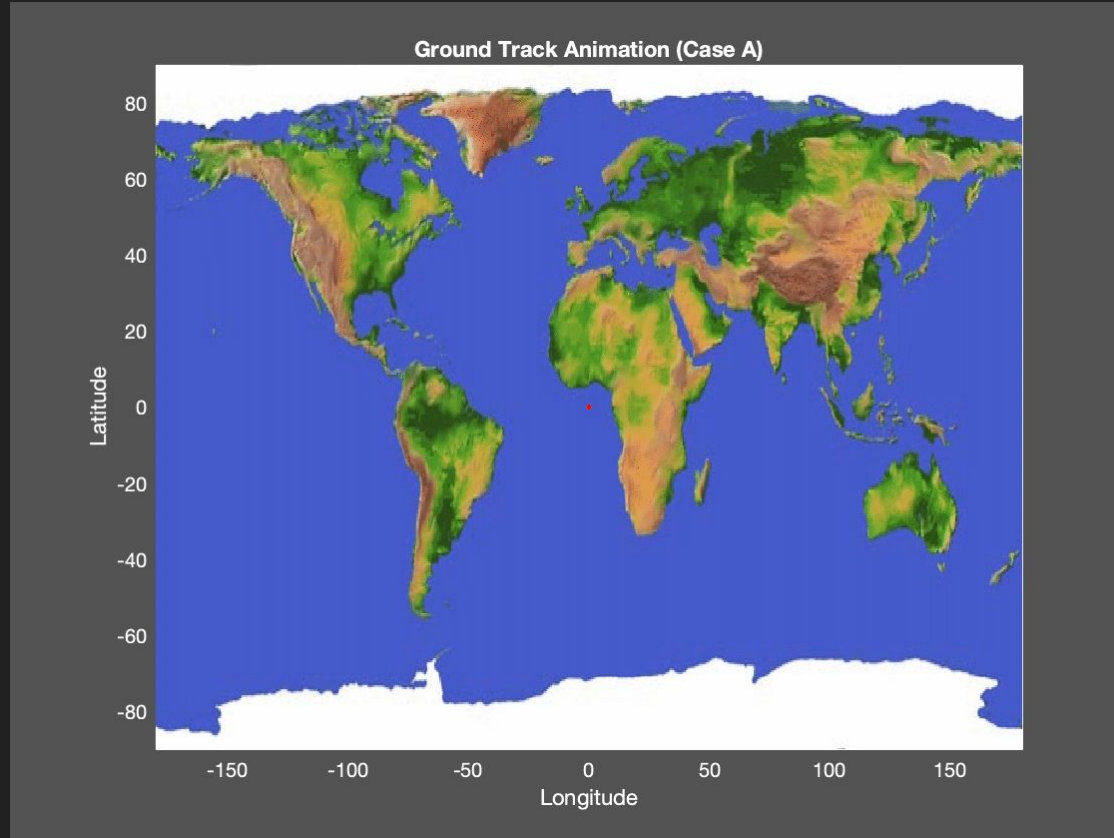
Aston McDonald

Case A: Tool Outputs



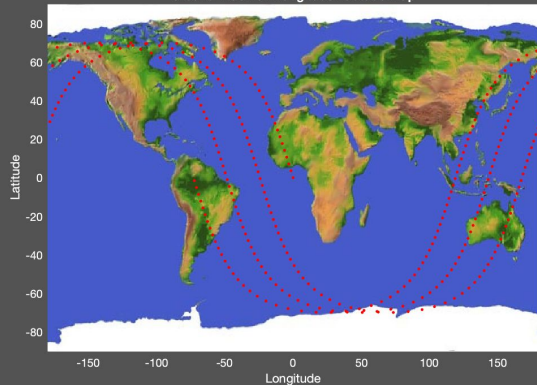
Case A acts as the initial conditions, the other cases will be examined based off the changes they exhibit

Ground Track Animation for Case A

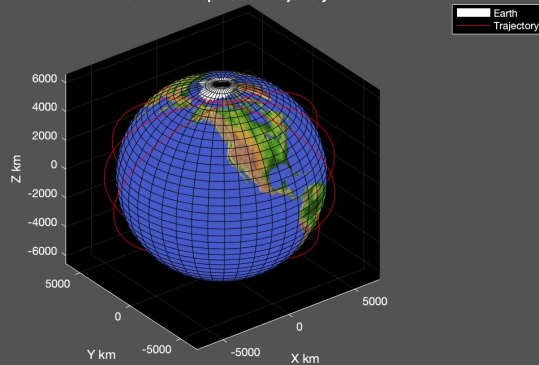


Case B: Tool Outputs

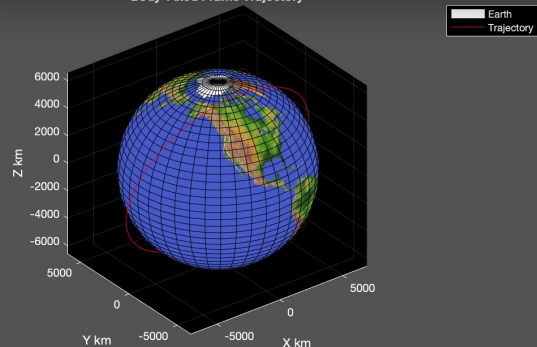
Ground Track on Longitude Latitude Map



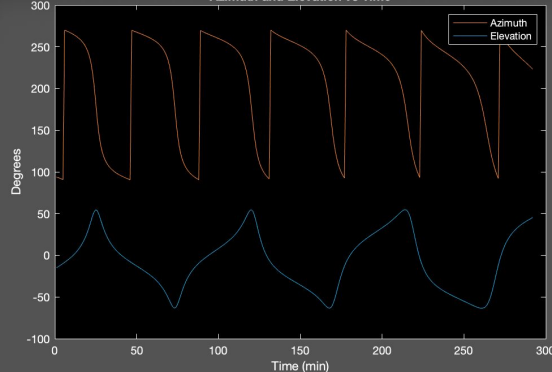
Inertial Frame Spacecraft Trajectory



Body-Fixed Frame Trajectory

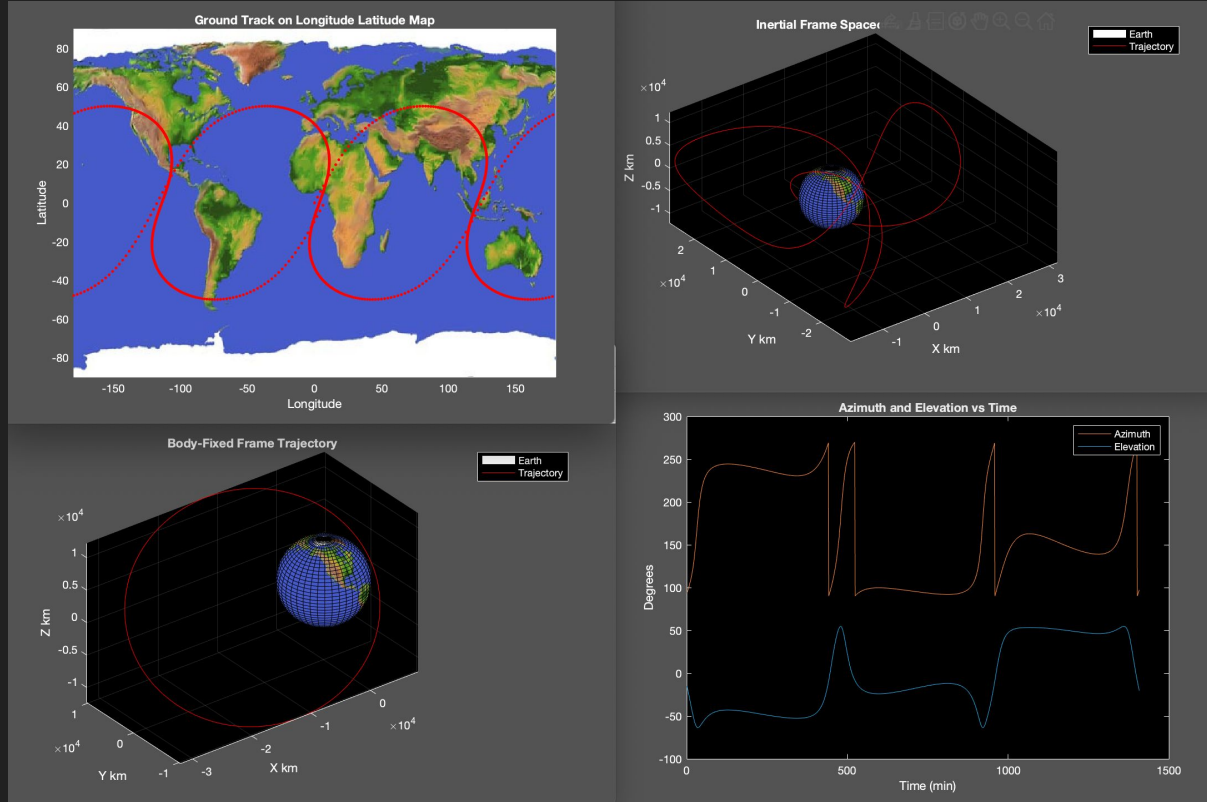


Azimuth and Elevation vs Time



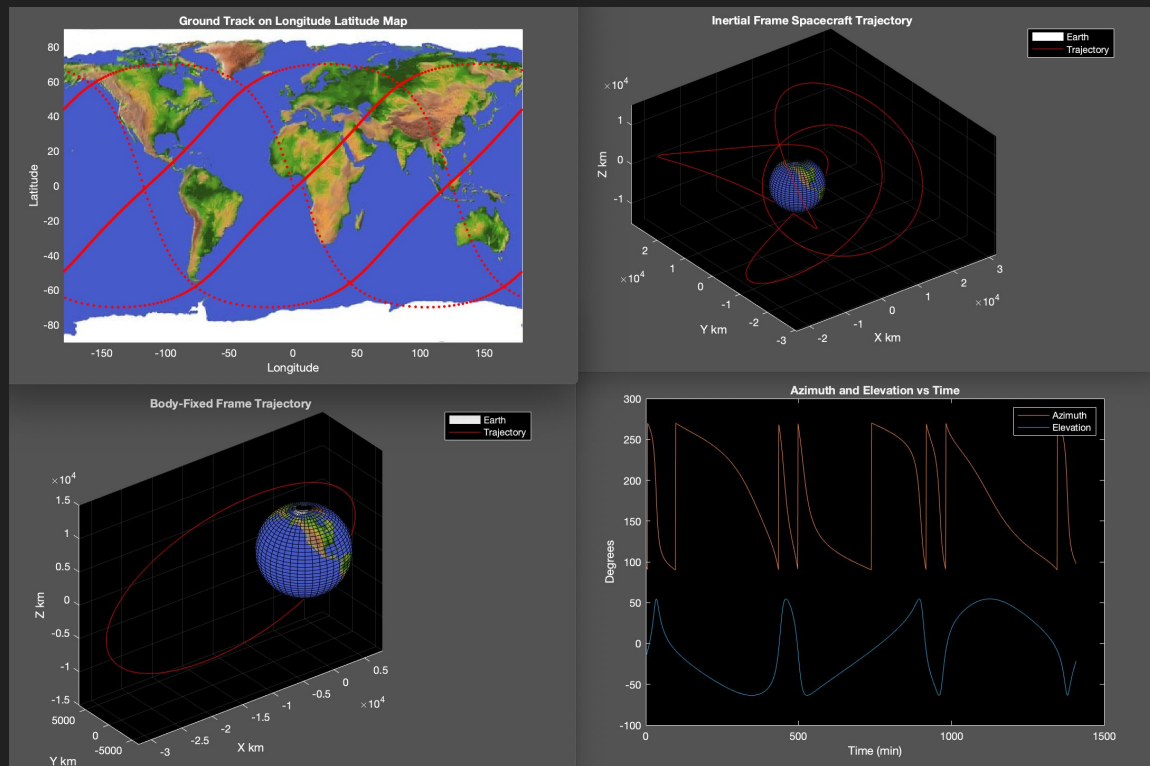
The increased inclination produced a retrograde orbit. The orbit is also closer to the poles.

Case C: Tool Outputs



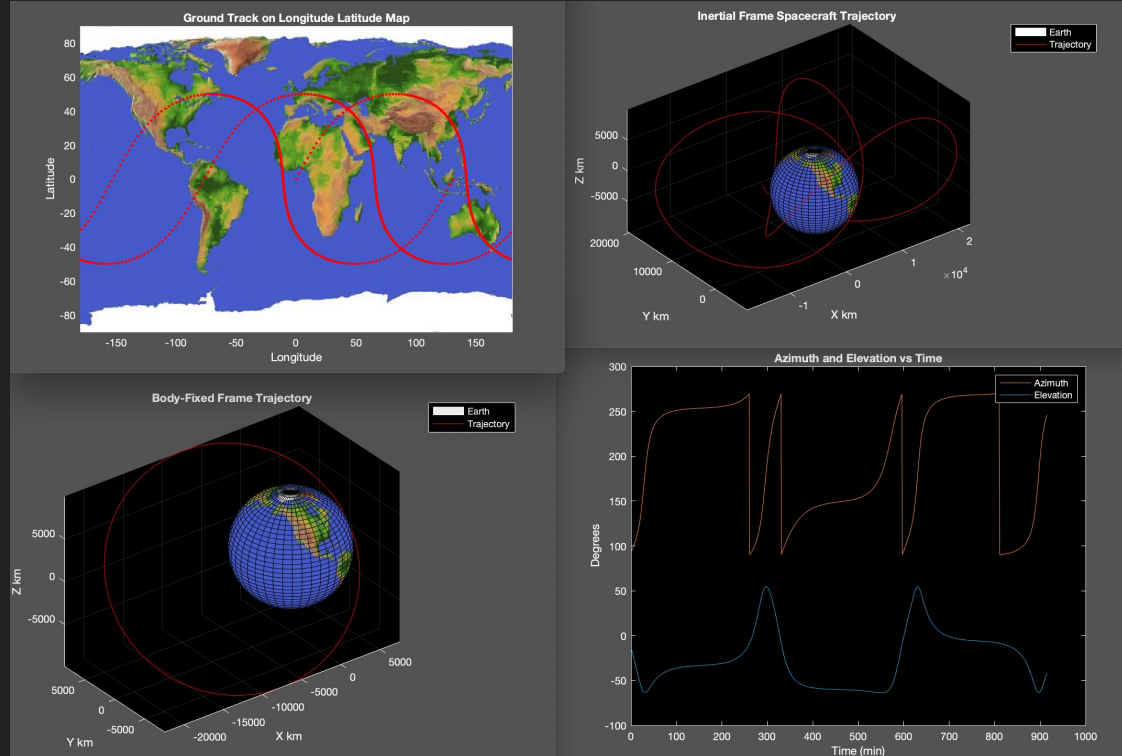
The increased semi-major axis produces a higher period. While the eccentricity boosts the apogee. These cause the orbit's speed relative to the earth to increase near perigee.

Case D: Tool Outputs



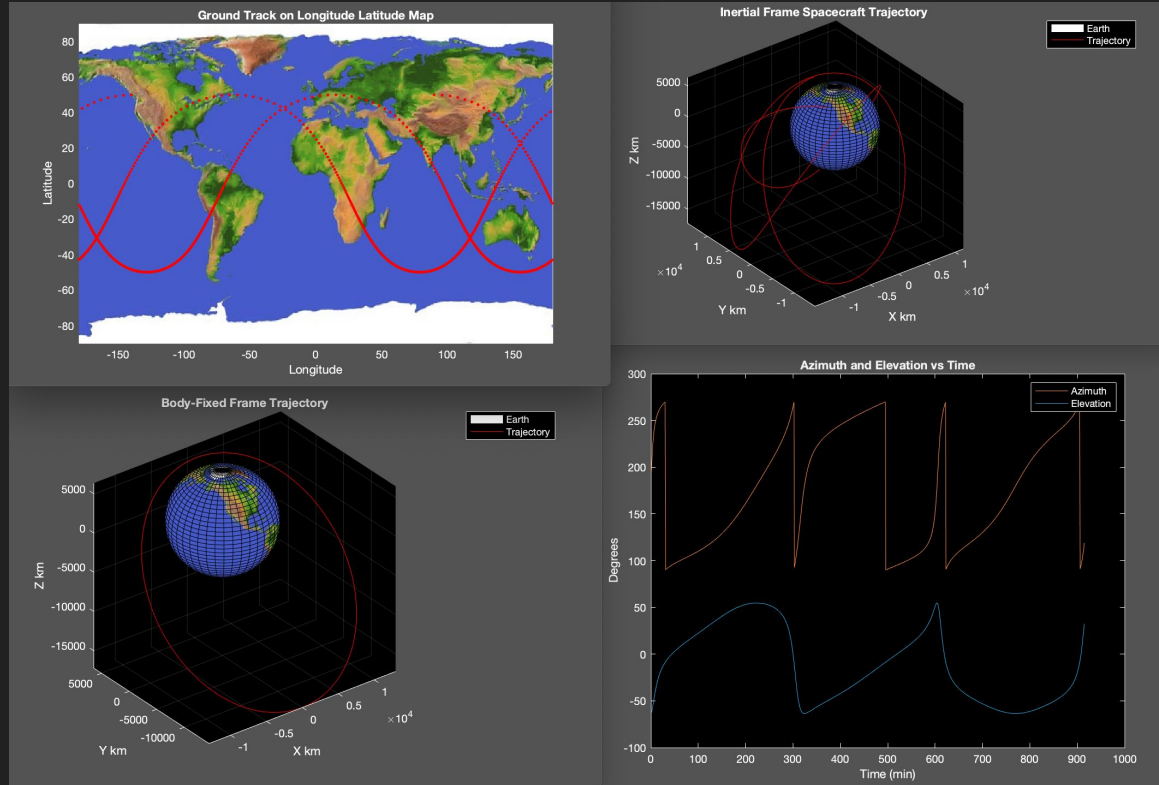
The orbit in case D is almost the exact same as in case C. However the inclination parallels case B causing a retrograde orbit.

Case E: Tool Outputs



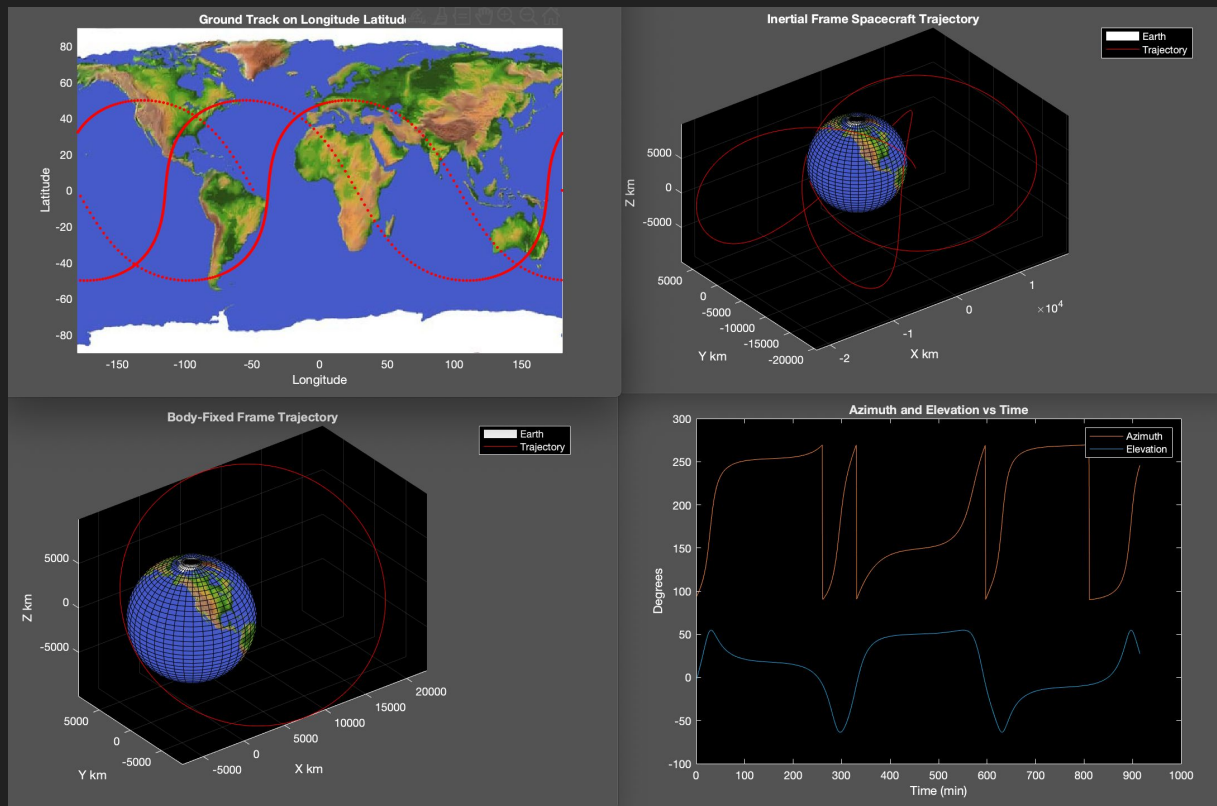
Case E has an increased time period because of the increase in semi-major axis when compared to case A, but decreased in comparison to case C. Additionally it's eccentricity produces an extended apogee with similar effects as Case C.

Case F: Tool Outputs



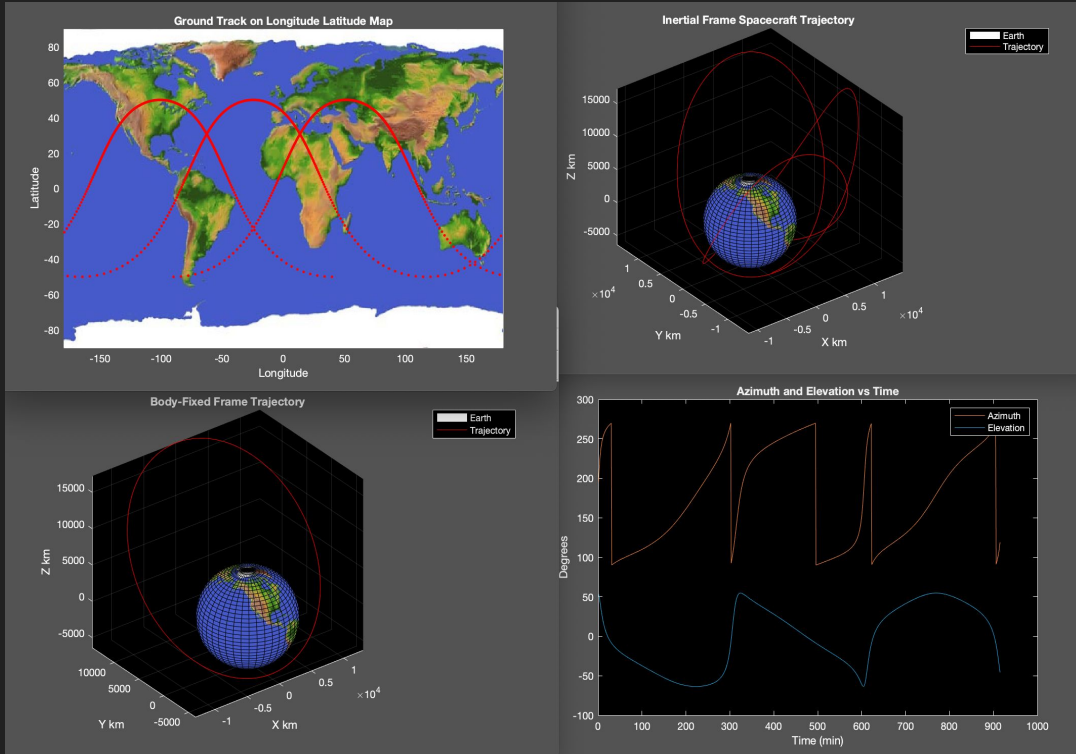
This orbit mirrors case E, but the change in the argument of periapee to 90 degrees. The apogee duration now tracks a much shorter range of longitude. The same can be said for the perigee.

Case G: Tool Outputs



Case G is the same but now the longitude range of both the perigee and apogee parts of the orbit now track an even shorter range of longitude while the increase in latitude range grows steeper.

Case H: Tool Outputs



In case H with the argument of periapee now at 270 degrees, the perigree approach is focused over the northern hemisphere. The apogee is on the southern hemisphere

Repeat Ground Track Results

- A. Repeat period time is $6.0315e+05$ seconds
- B. 111 Spacecraft Revolutions
- C. Semi-major axis is $6.68023e+03$
- D. Shown in Next Slide
- E. A trajectory of this design would be most useful for taking a scan of the entire globe perhaps to produce a map or produce a program much like google earth.
- F. Smallest instrument swath width angle was 61.6942 degrees

Repeated Ground Track Plots

