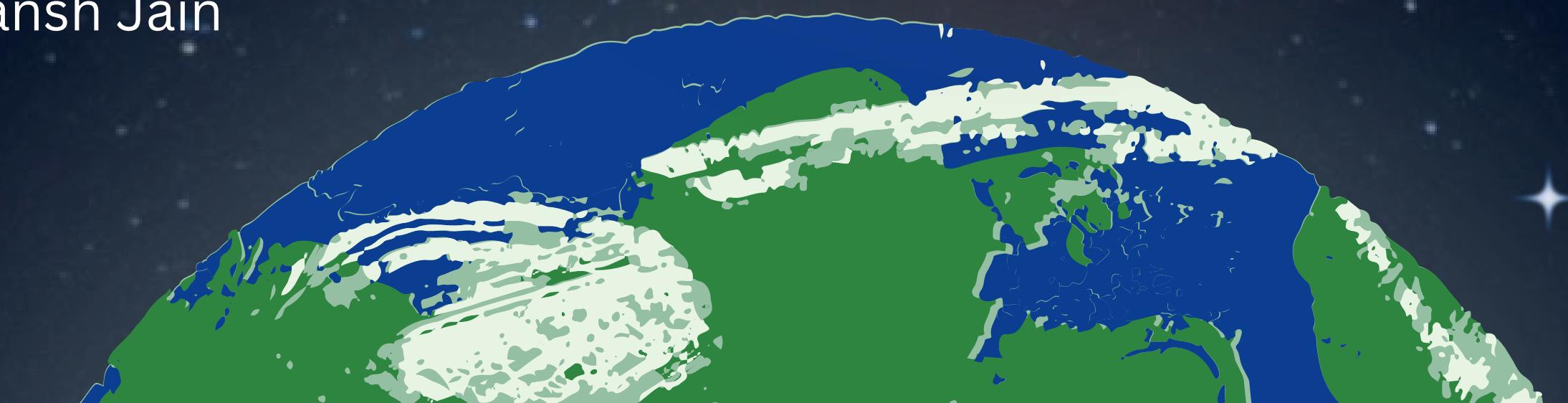
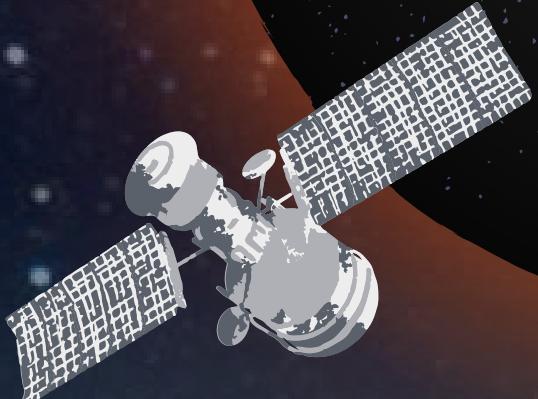


ORBITRONIX HACKATHON

Presented to you by: **THE BIG BANG GANG**

Team members: Wang Chao, Li WenBiao,
Divyansh Jain, Varya Chugh, Vansh Jain



In this session, we will discuss...



The thinking process



Modelling and Optimising



The results and
interpretation

THE THINKING PROCESS

- MATLAB
- PYTHON
- LIBRARIES
 - numpy
 - matplotlib
 - bayesian-optimisation
 - scikit-learn

Why did we choose these?

ORBIT SIMULATION IN MATLAB



Target:

- 1) Simulate and visualize the given orbit and our customized orbit
- 2) Validating frequency of close approach using a graphical approach

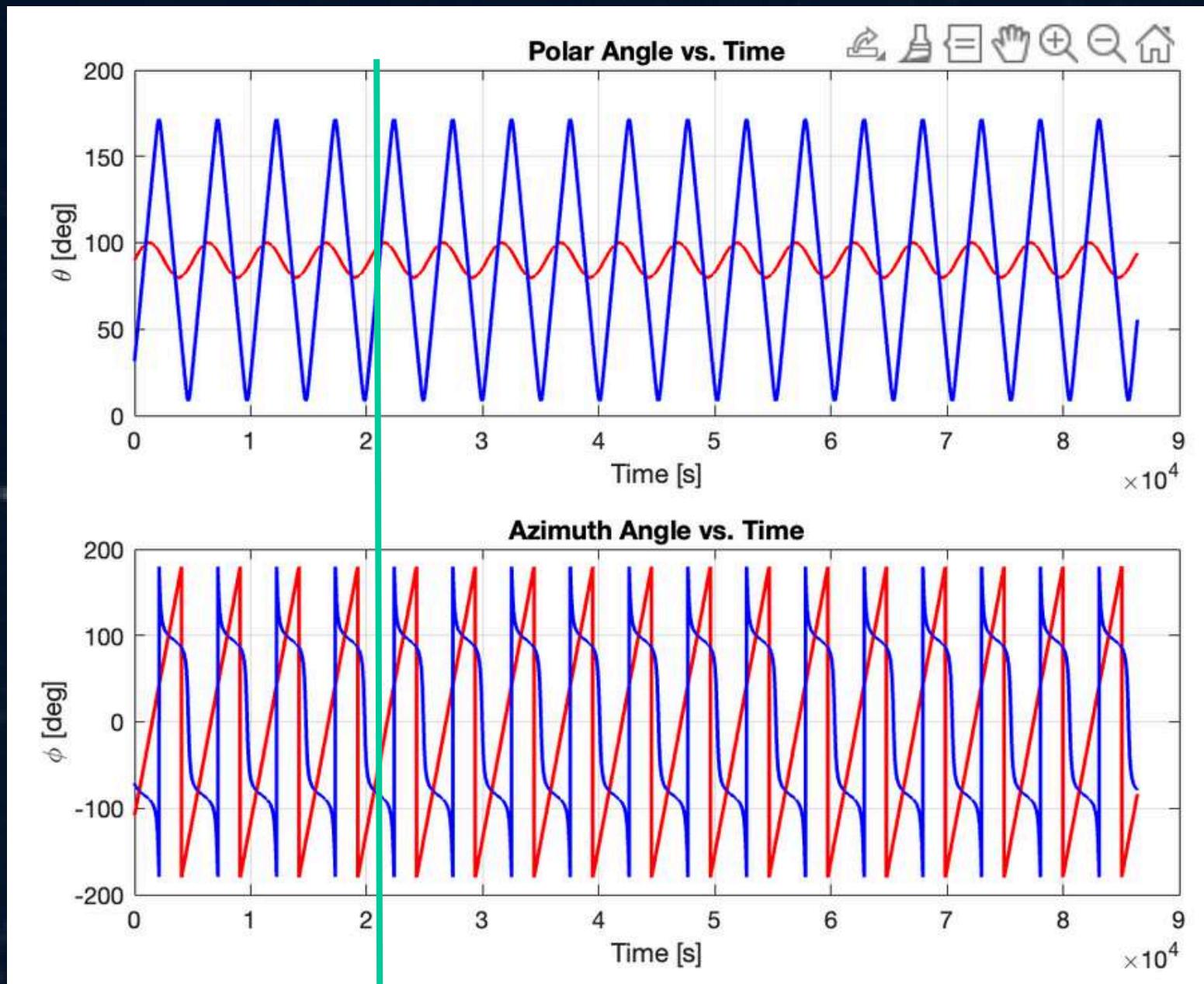
How to achieve:

Conversion from Orbital Parameters to Spherical coordinate
Parameters --> Perifocal --> Equitorial (ECI) --> Spherical

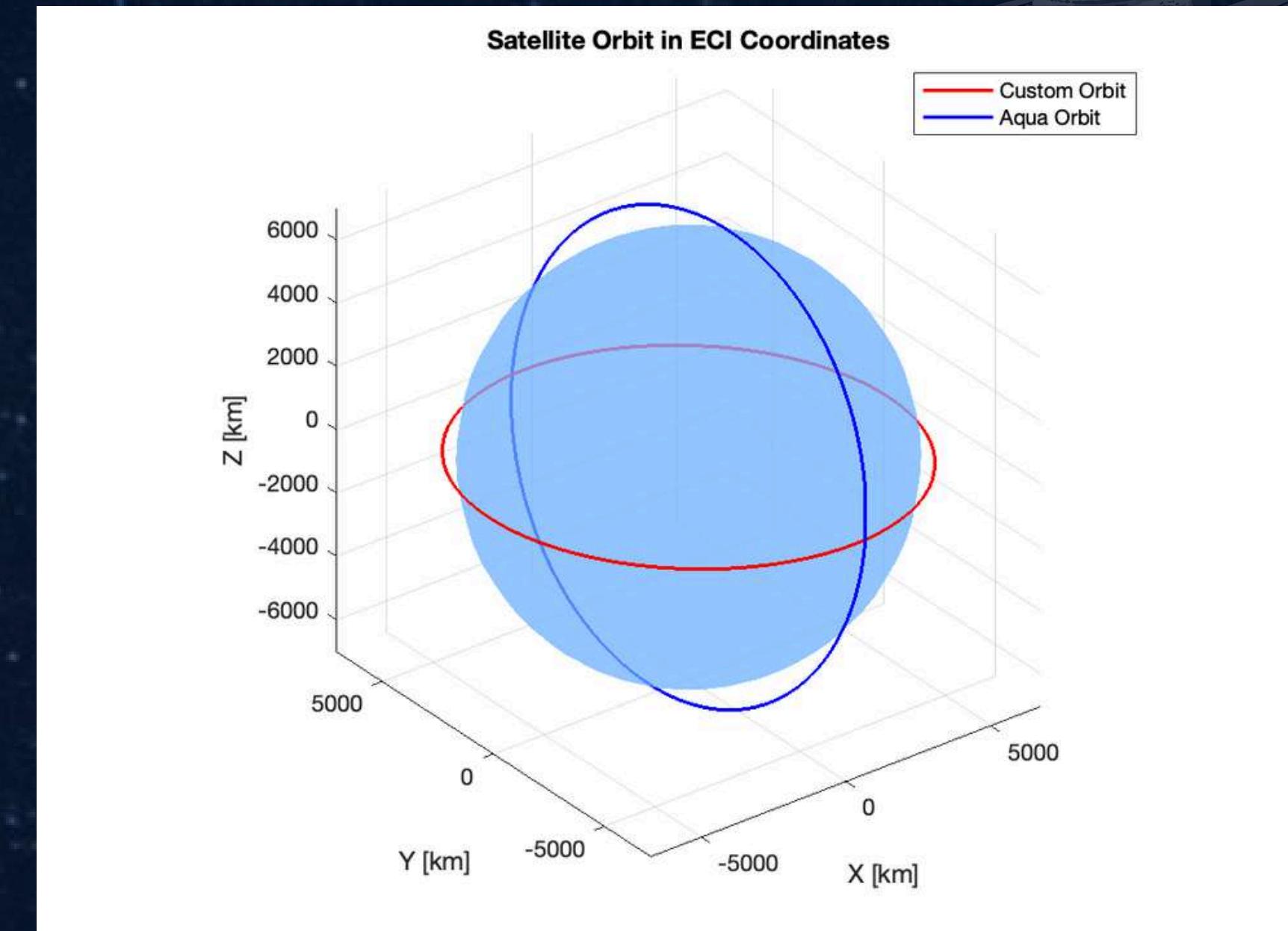
ORBIT SIMULATION IN MATLAB



How to achieve:



Angle-time graphs



3D Illustration

CLOSE APPROACH VALUE OPTIMISATION IN PYTHON

Algorithm:

Constrained Bayesian Optimisation

1. The constraint used is the distance from the satellite to SDSC. The constraint limit was set to 1.
2. The algorithm converged at about 200 iterations. Random exploration was set to be 20 steps.

OUR RESULTS AND INTERPRETATION

Maximum number of close approaches: 1024

Inclination: -3.46°

RAAN: 293.89

Orbital Period: 91.88 minutes (LEO)

Argument of Perigee: 218.55

Orbital Height: 374.05 km

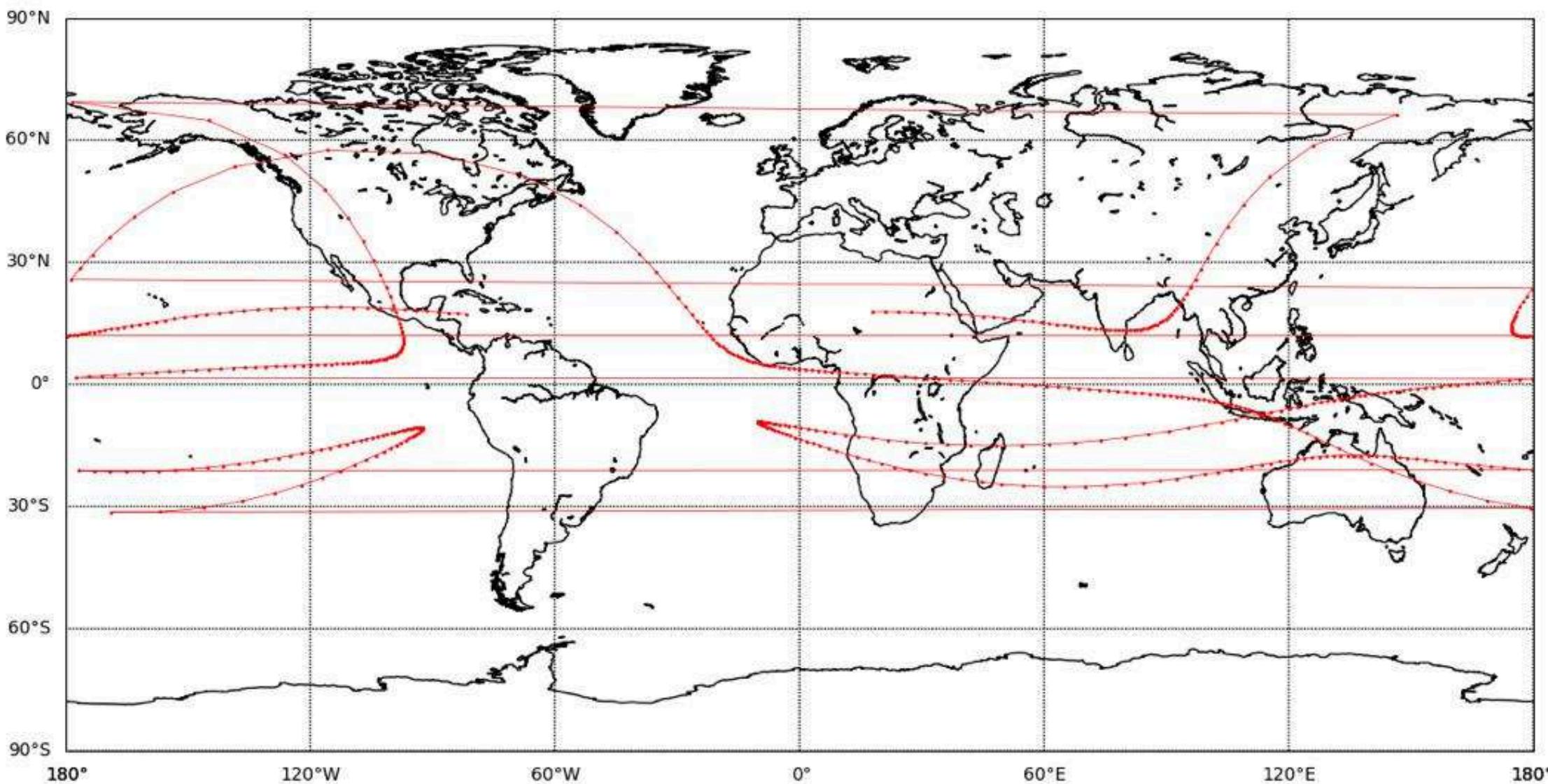
Nearest Coordinates: (13.28 °N, 80.19 °E)

Distance to SDSC: 25.47 km

OUR RESULTS AND INTERPRETATION

(Points measured
every 10 seconds)

Satellite Ground Track



Mission complete!

See you next time!