1) In test_HPOP, we define global variables: const (astronomical and mathematical constants), AuxParam (struct that represents model parameters and time for orbit propagator), eopdata (Earth orientation parameters), swdata (space weather data for nrlmsise00 model), SOLdata (solar storm indices for JB2006 & JB2008 models), DTCdata (geomagnetic storm indices for JB2008 model) APdata (Ap data for JB2006 model), PC (planetary coefficients for JPL ephemerides computation).

2) Download Earth orientation parameters from the following link, remove the header and texts like eop19620101.txt, and then rename it (if it is out of date).

https://celestrak.org/SpaceData/EOP-All.txt

3) Download space weather data from the following link, remove the header and texts like sw19571001.txt, and then rename it (if it is out of date).

https://celestrak.org/SpaceData/SW-All.txt

Cut 45 days prediction of space weather data from the downloaded file and paste it into sw_predicted.txt.

4) If you want to use the JB2008 or JB2006 model, update SOLFSMY.txt, DTCFILE.txt, and SOLRESAP.txt from the following link (if they are out of date):

http://sol.spacenvironment.net/jb2008/indices.html

5) Now, we read the initial state vector and model parameters from InitialState.txt. Then we transform the initial state vector from ECEF coordinate system to ECI. After that, we call Ephemeris.m to start integration. In Ephemeris.m, Accel.m is called for computation of the state vector's derivative.

6) In Accel.m, we call IERS.m to interpolate Earth orientation parameters. Then the matrix E is computed for ICRS to ITRS transformation. After that, JPL_Eph_DE440.m is called for the calculation of planetary positions. Afterward, accelerations of perturbing forces are computed.

7) Now, Ephemeris.m successfully finishes calculations, and satellite state vectors in the ECI coordinate system are printed in SatelliteStates.txt. Finally, ECEF state vectors of the satellite (Eph_ecef) are computed, and their difference with the precise orbit (True_Eph) is calculated and plotted.

Note that the precise orbit of the Envisat is produced by observations and its acccuracy is at the centimeter level.