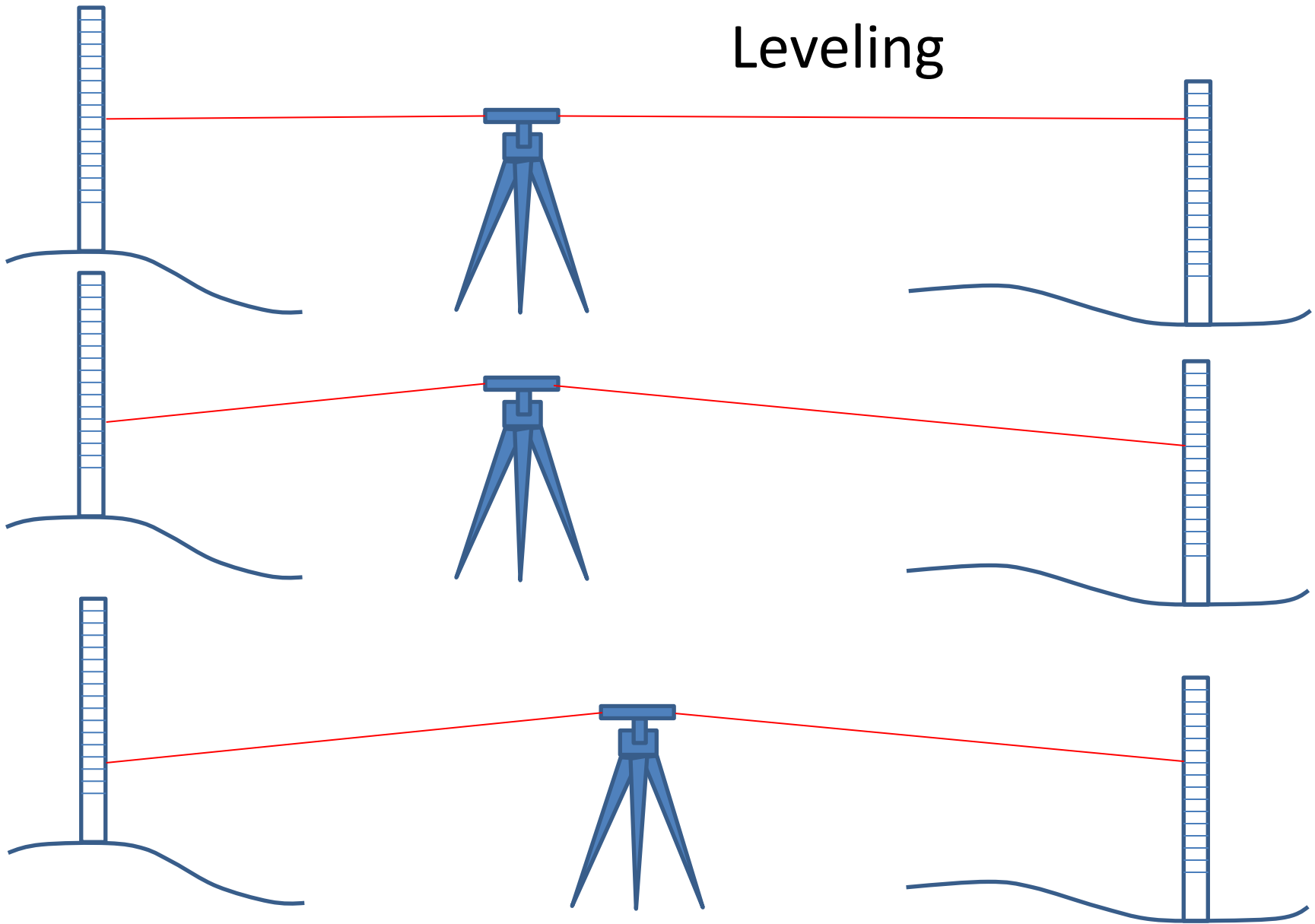
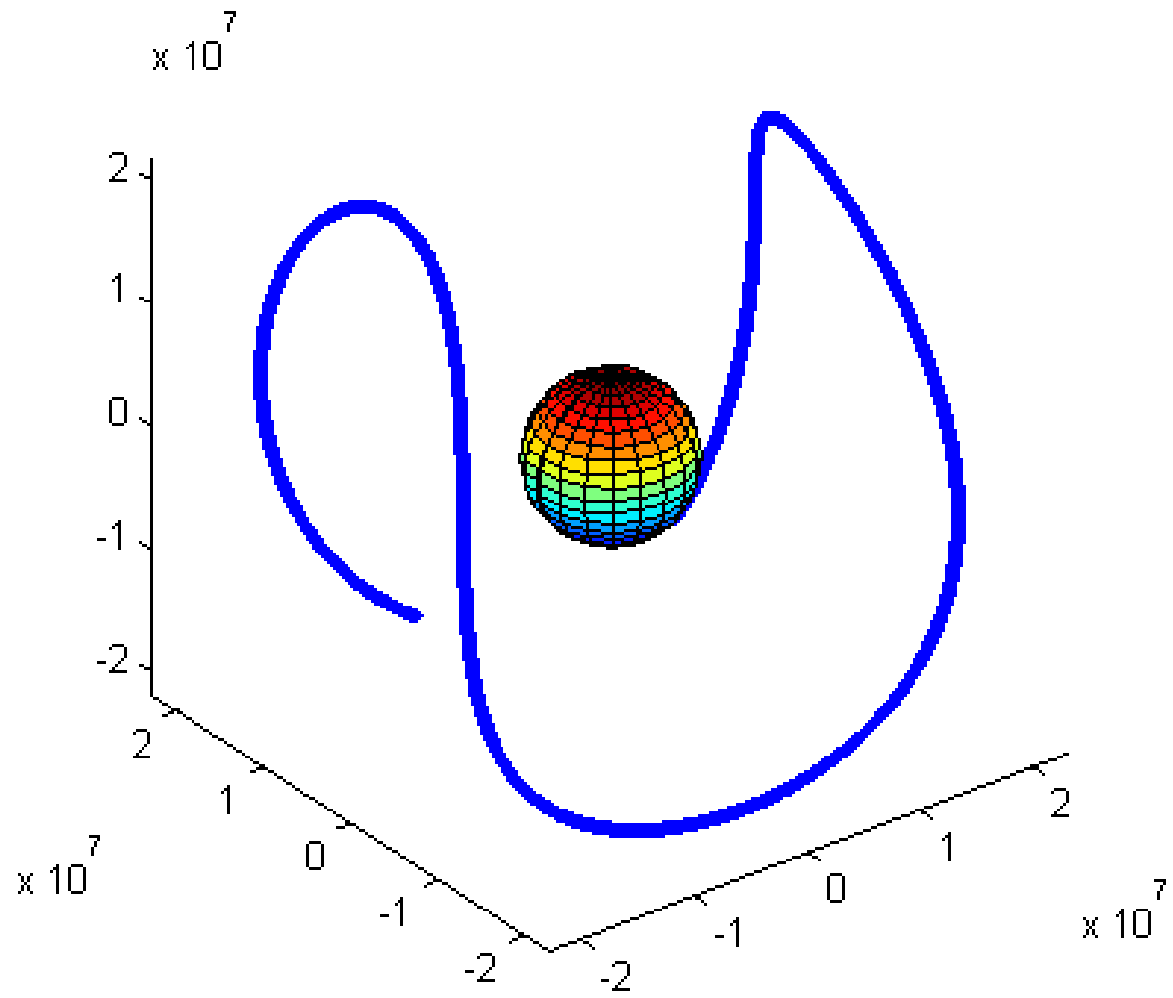


Leveling

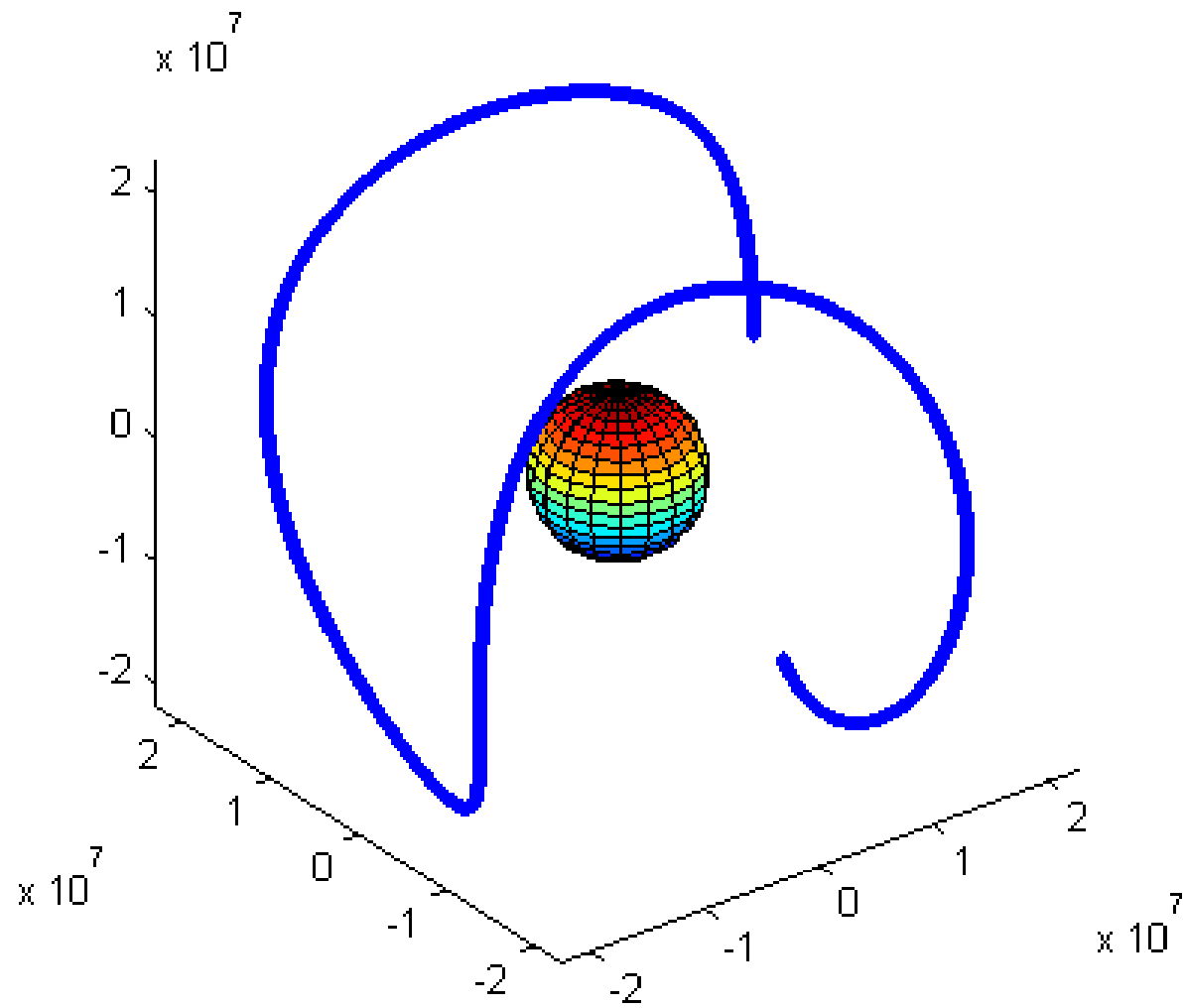


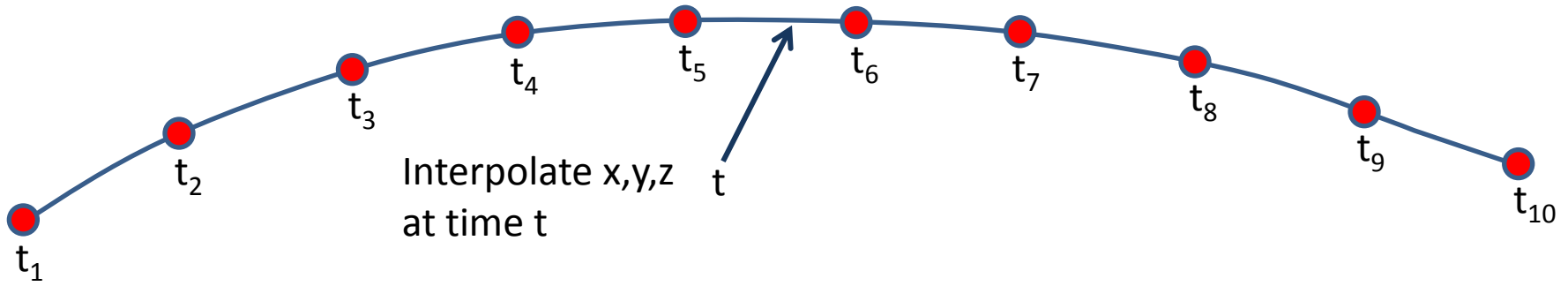
With level line of sight, difference of rod readings = difference of elevation. With non-level line of sight, difference of rod readings does NOT = difference of elevation. HOWEVER, if ranges of backsight & foresight are equal, then you become UNAFFECTED by line of sight error.

GPS "orbit" plot from .sp3 file, each point diff. coord. sys.



another raw plot from .sp3 file, each point own coord. sys.





K points: $(t_1, x_1, y_1, z_1), (t_2, x_2, y_2, z_2), \dots, (t_k, x_k, y_k, z_k)$ no two points the same, in this case $k=10$

Interpolate x-coordinate: $L_x(t) = \sum_{i=1}^k x_i l_i(t)$

Interpolate y-coordinate: $L_y(t) = \sum_{i=1}^k y_i l_i(t)$

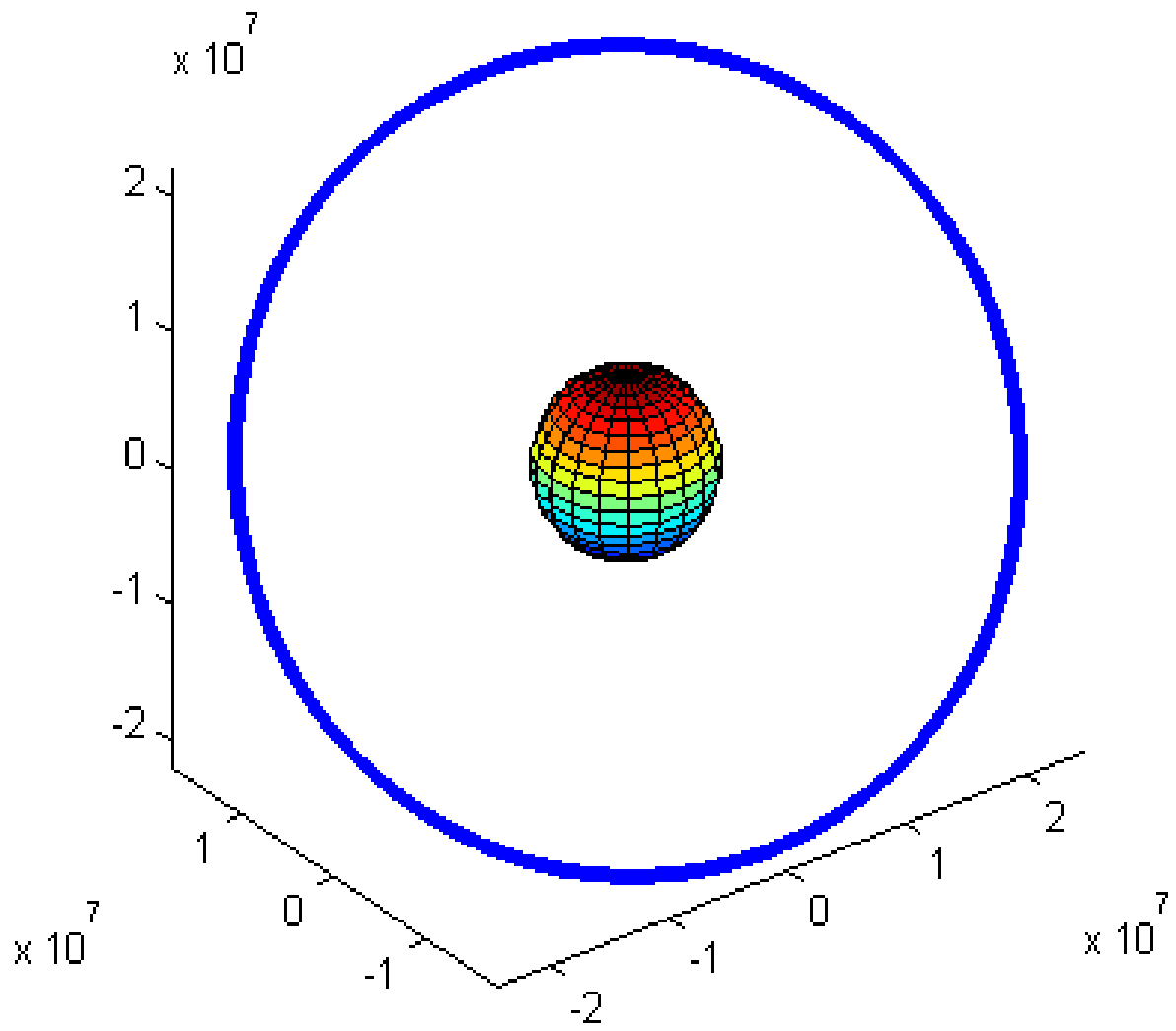
Interpolate z-coordinate: $L_z(t) = \sum_{i=1}^k z_i l_i(t)$

$$l_i(t) = \frac{t - t_1}{t_i - t_1} \times \frac{t - t_2}{t_i - t_2} \times \dots \times \frac{t - t_{i-1}}{t_i - t_{i-1}} \times \frac{t - t_{i+1}}{t_i - t_{i+1}} \times \dots \times \frac{t - t_k}{t_i - t_k}$$

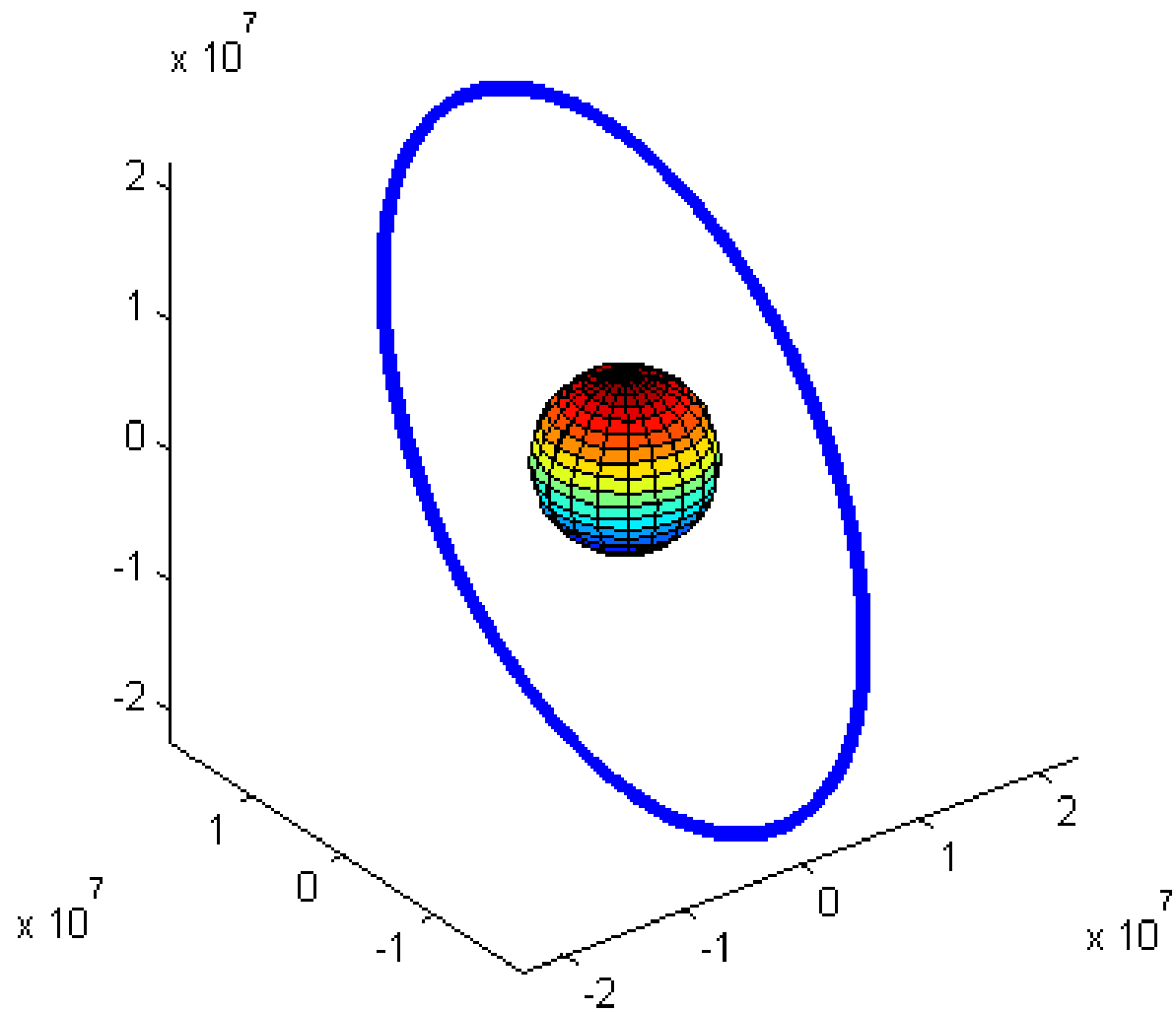
This works for interpolating a .sp3 (orbit) file from 15 minute interval down to interval of observation 1s, 5s, 10s, 30s. Known as Lagrange Interpolation. With 10 points, interpolated positions should be accurate to 1mm. Move the support points so the point you are interpolating is in the middle interval, as shown above.

Lagrange Interpolation

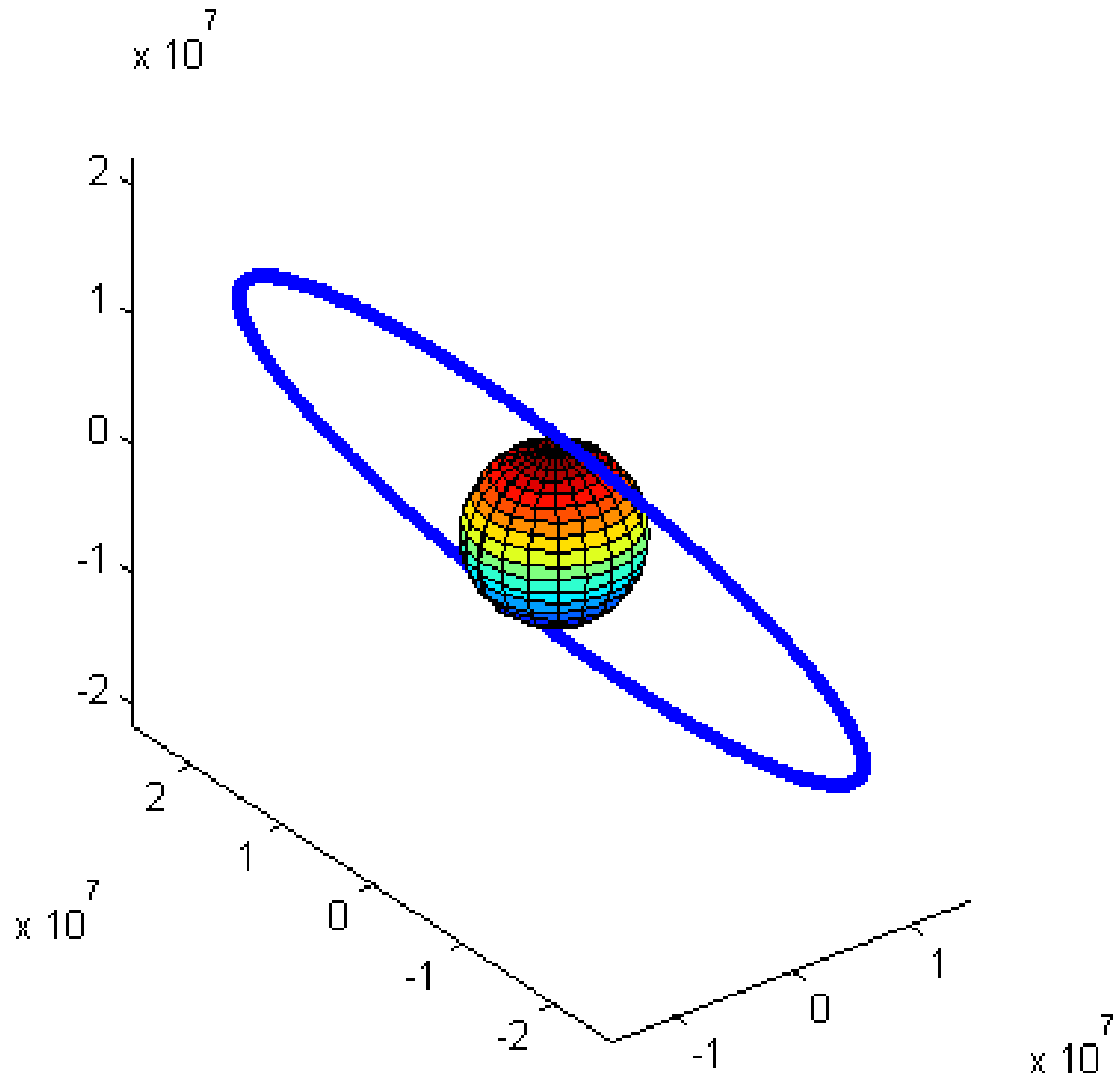
orbit from interpolated .sp3 s07 plane A



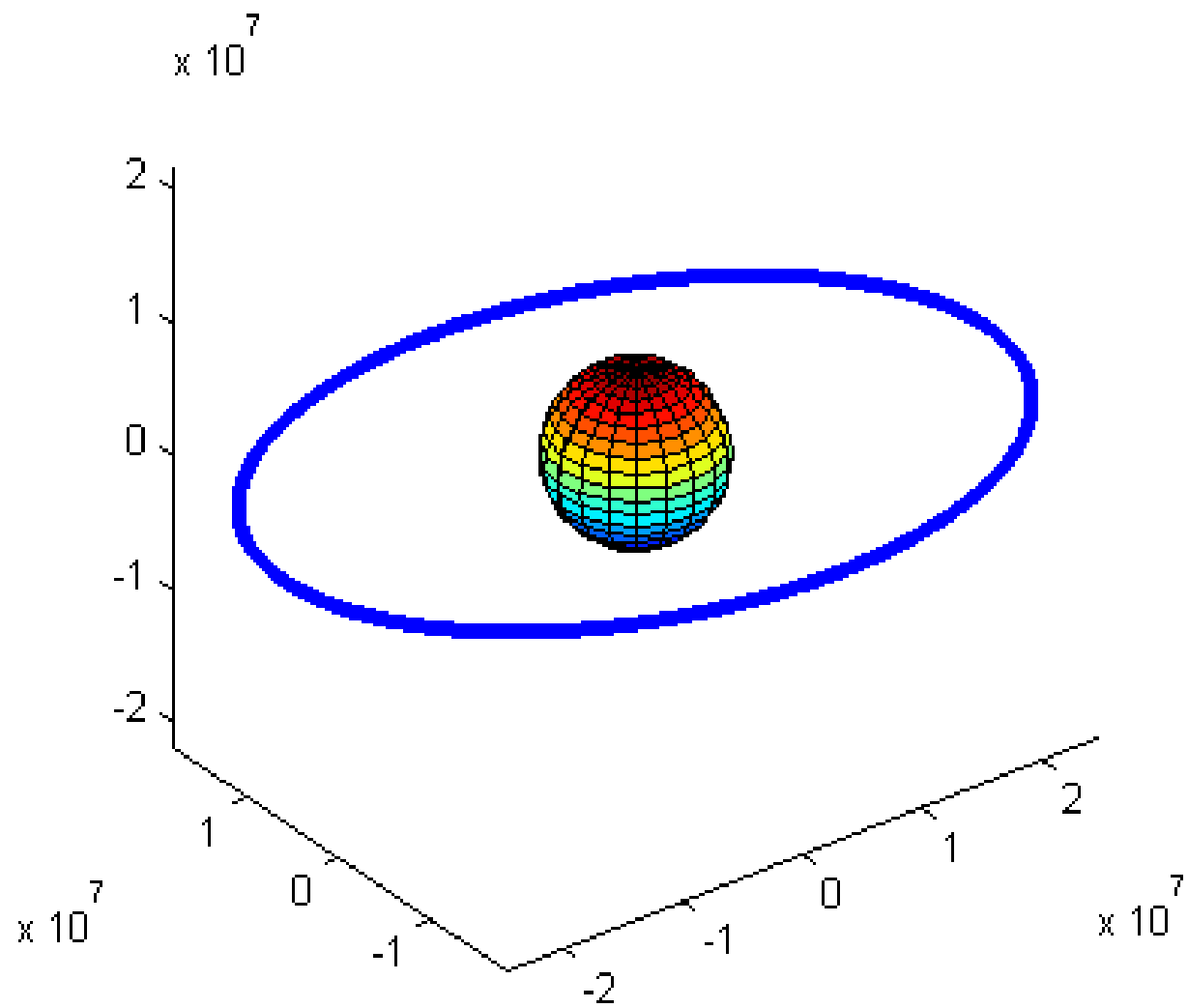
orbit from interpolated .sp3 s12 plane B



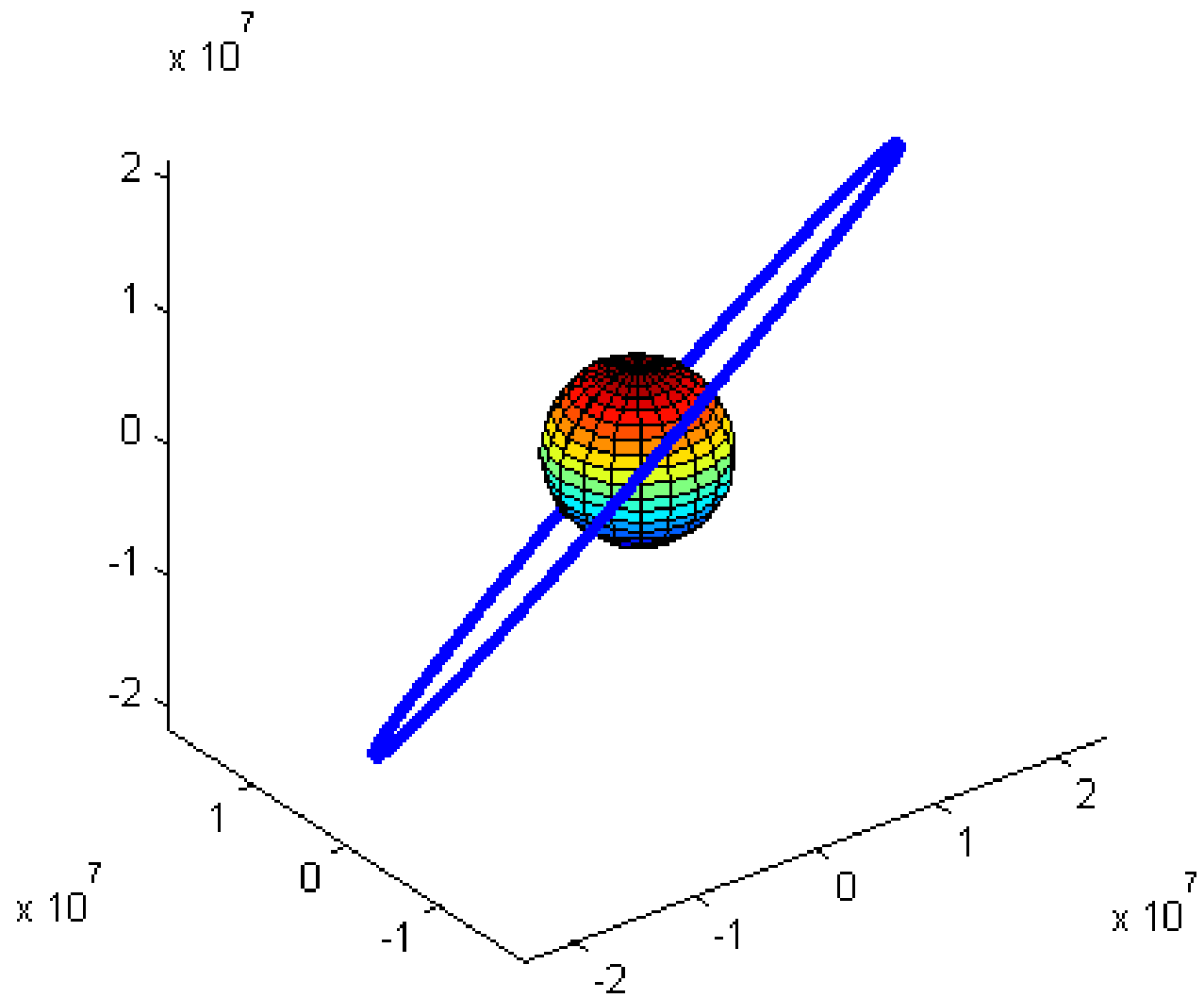
orbit from interpolated .sp3 s17 plane C



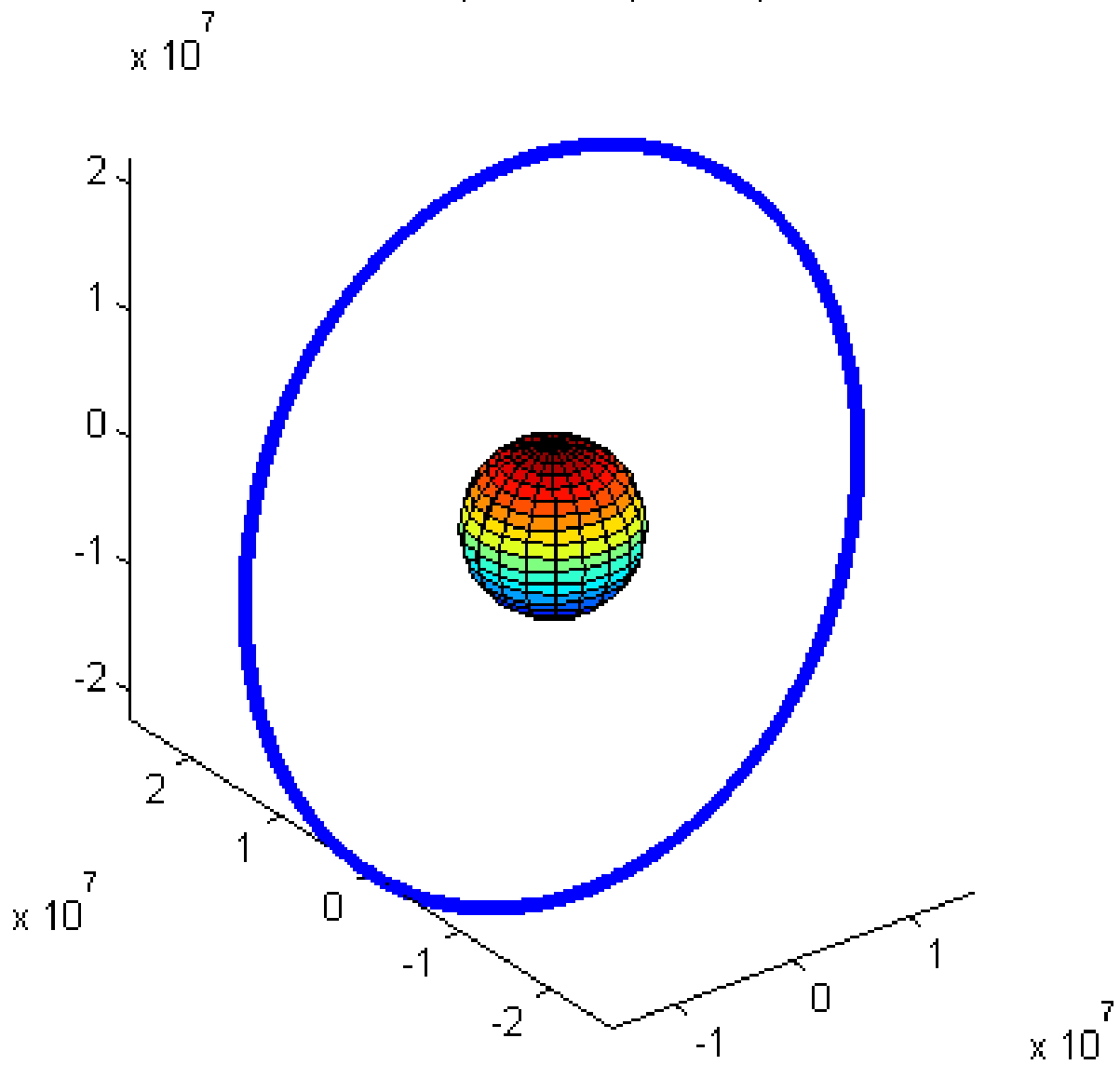
orbit from interpolated .sp3 s01 plane D



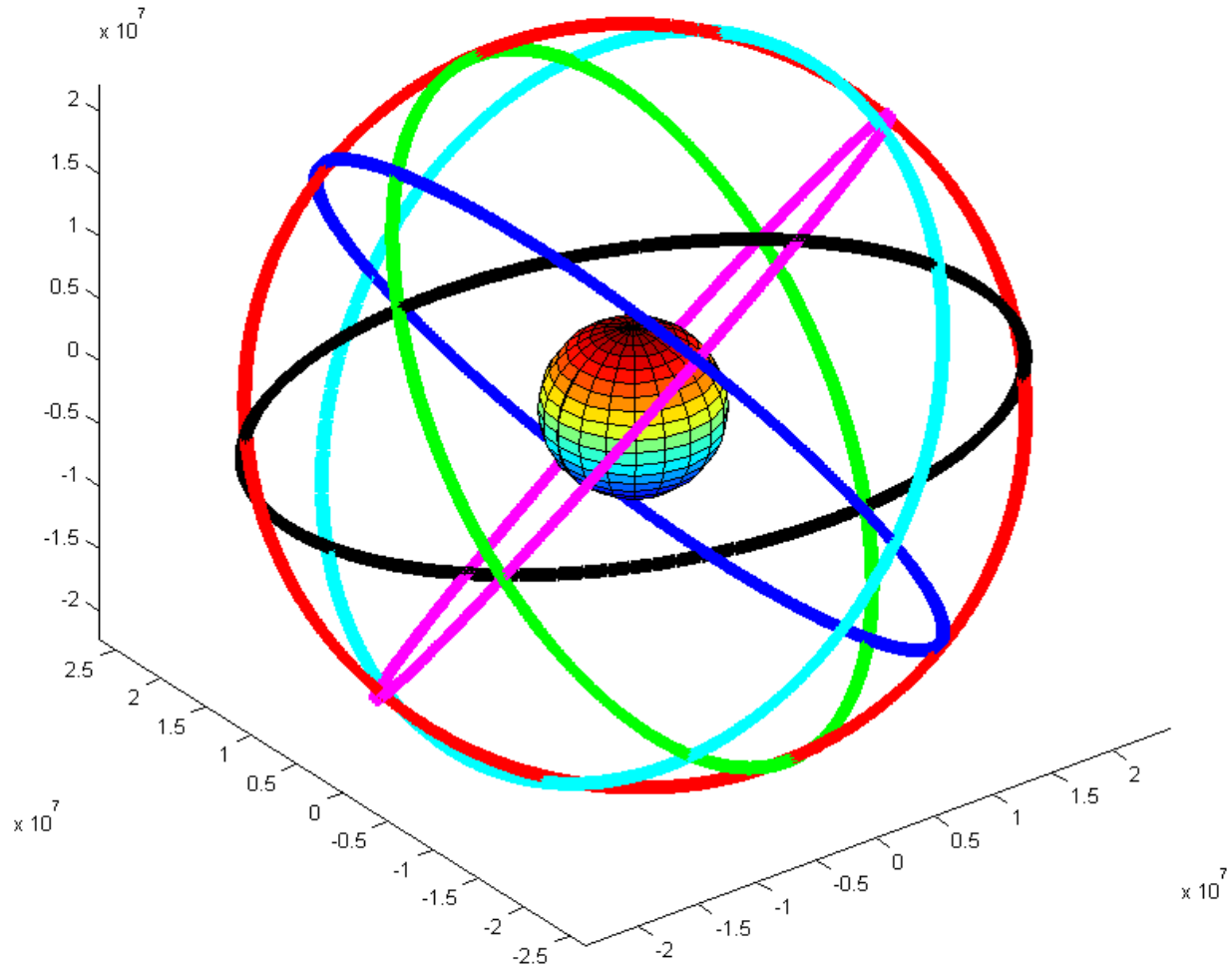
orbit from interpolated .sp3 s05 plane E

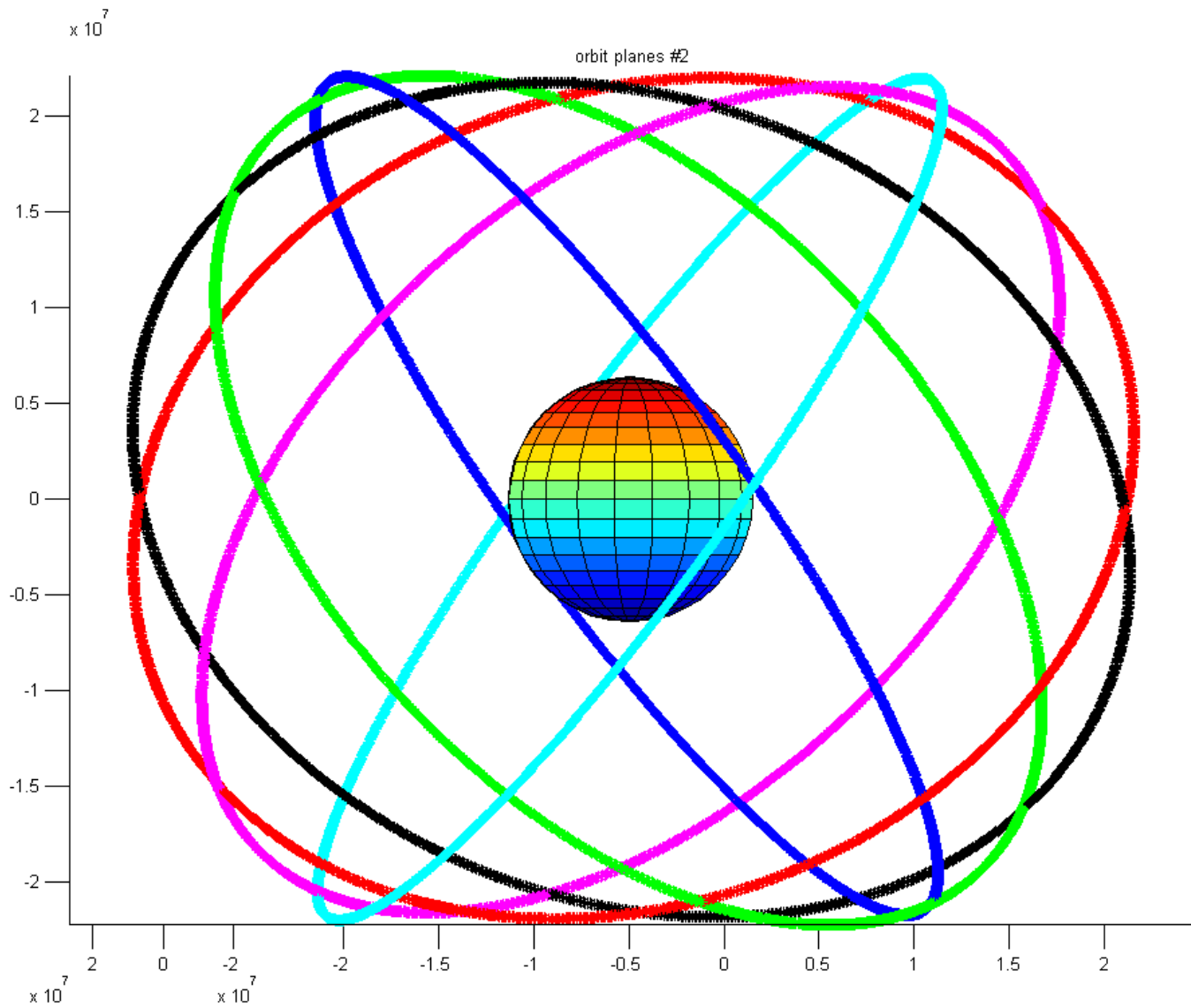


orbit from interpolated .sp3 s09 plane F

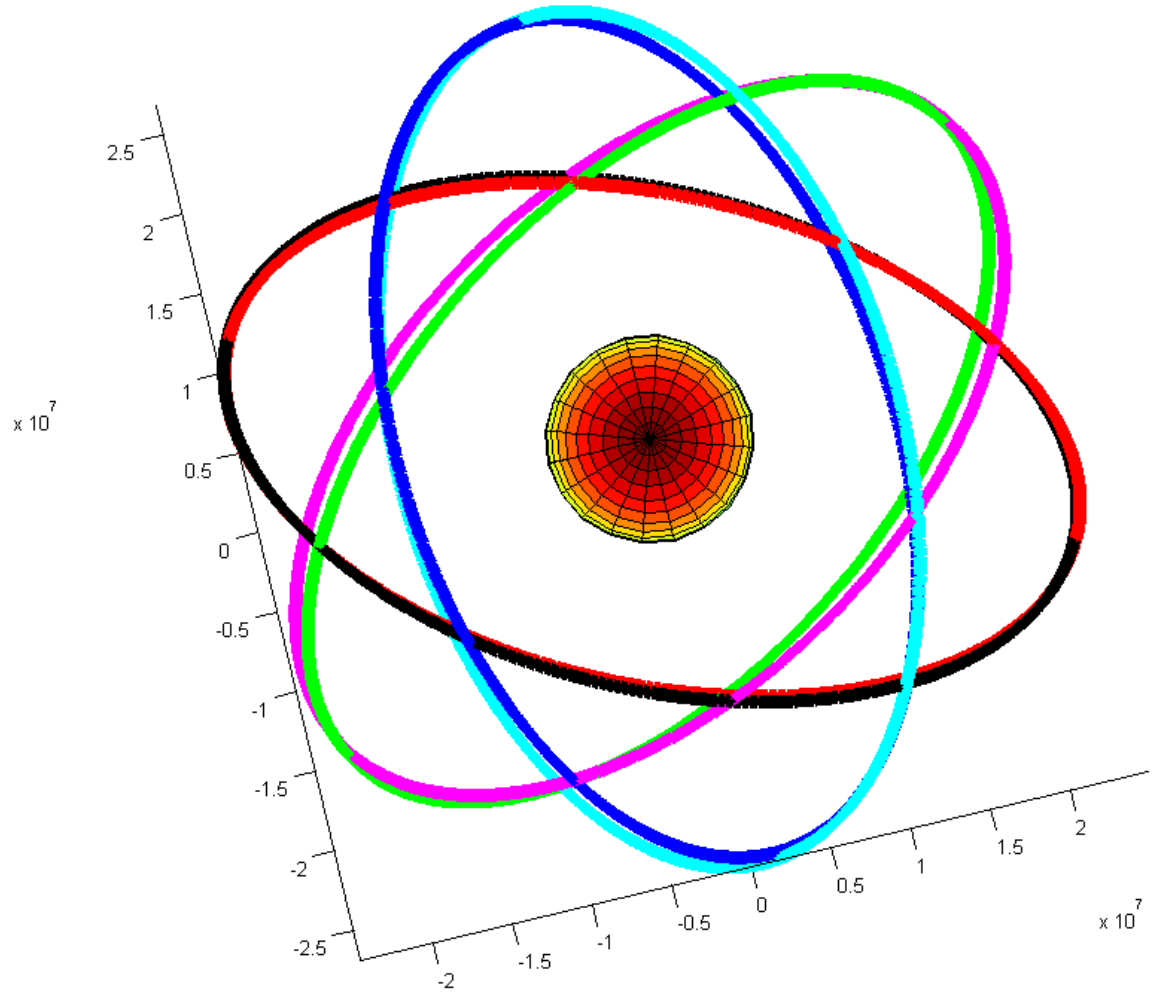


orbit planes A,B,C,D,E,F interpolated from .sp3 file

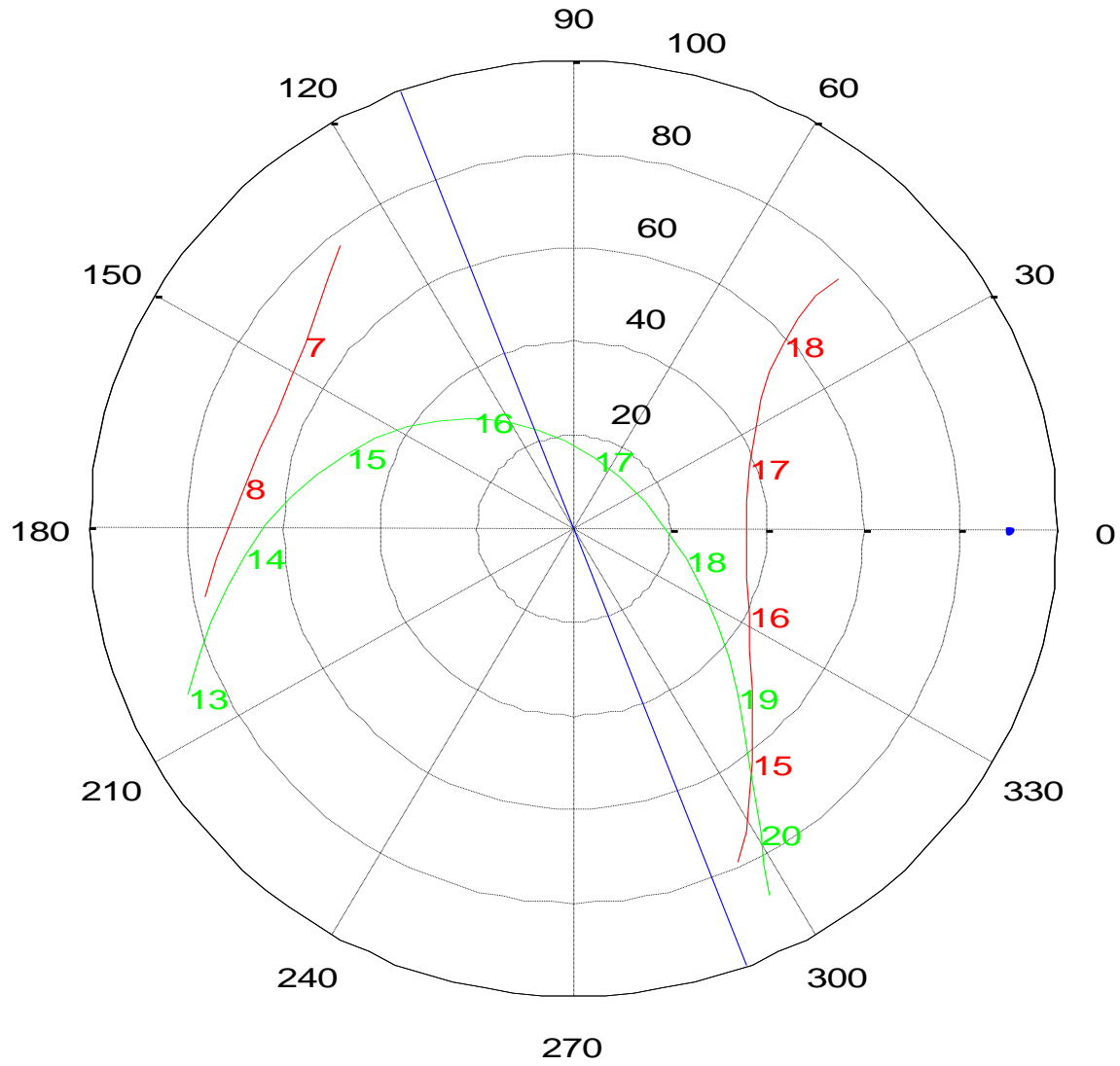


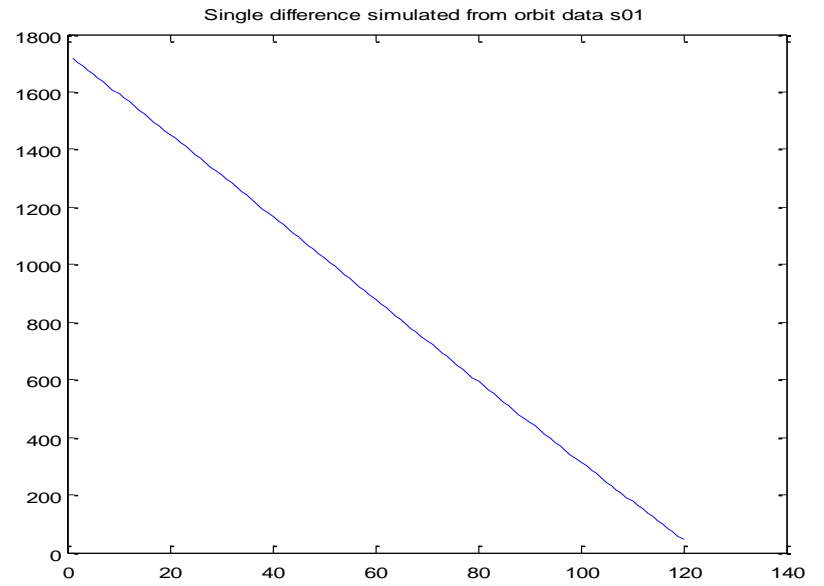
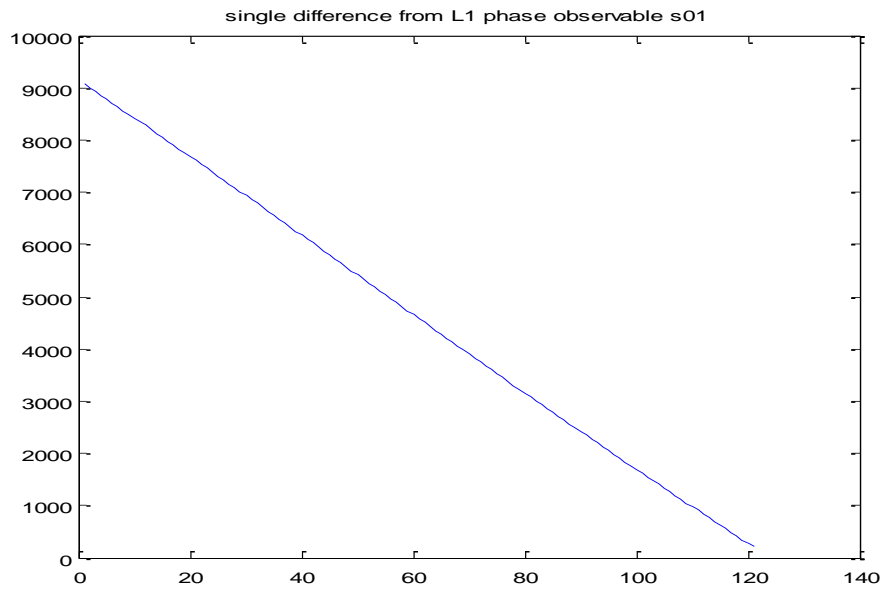


orbit planes #3

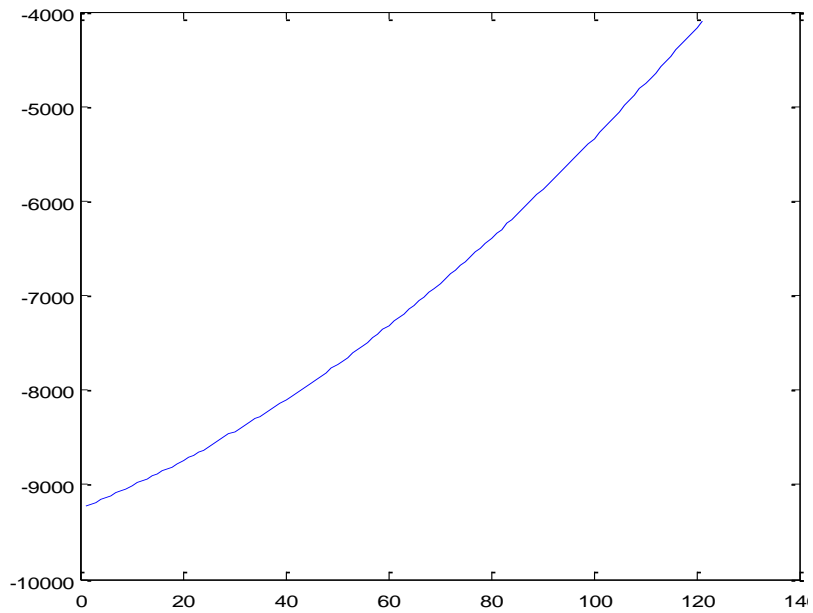


skyplot 28 aug 2014 red=S01, green=S28, blue=PRDU-INWL base

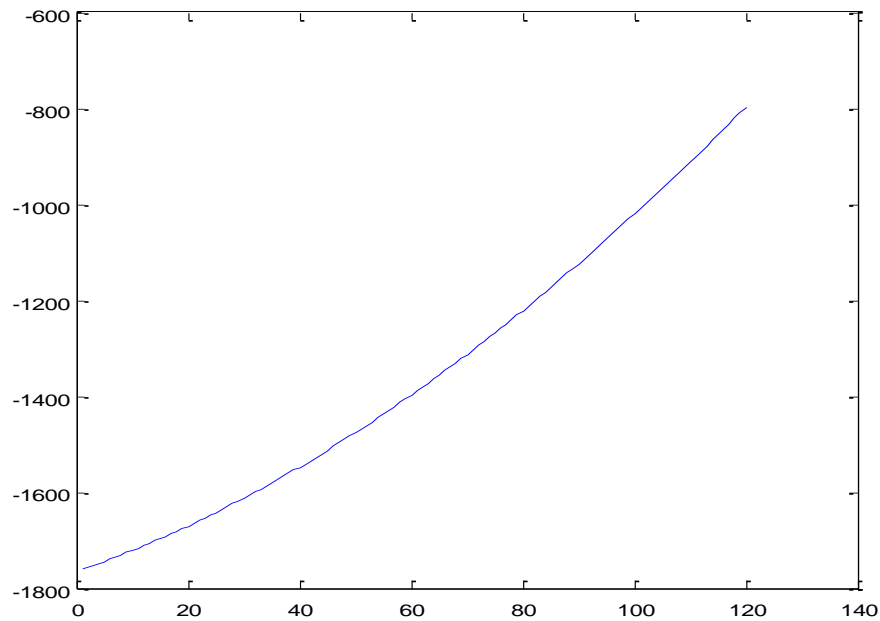


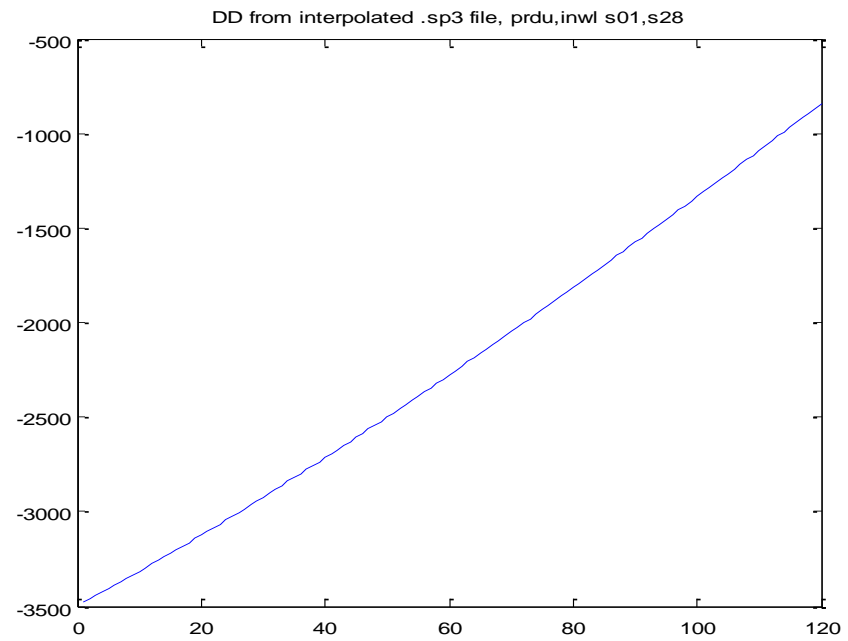
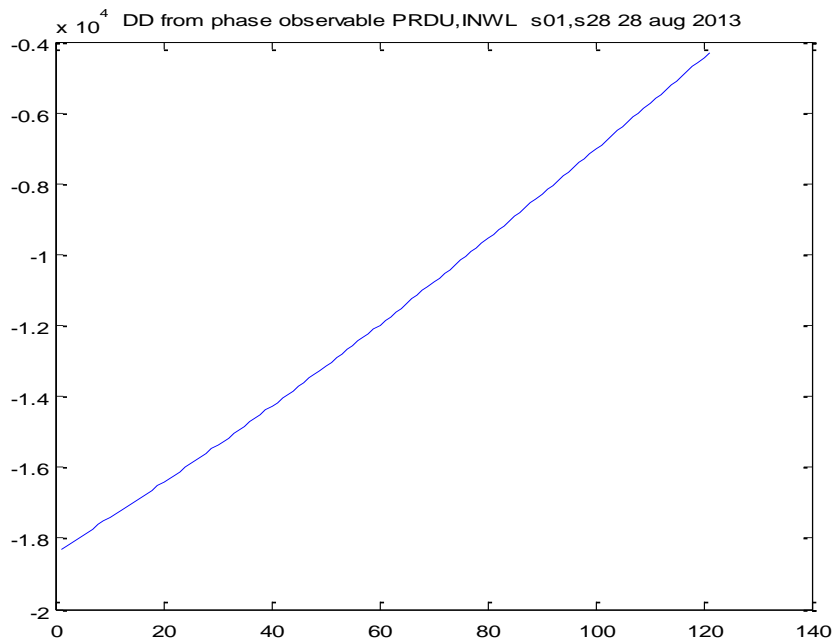


single difference from L1 phase observable s28

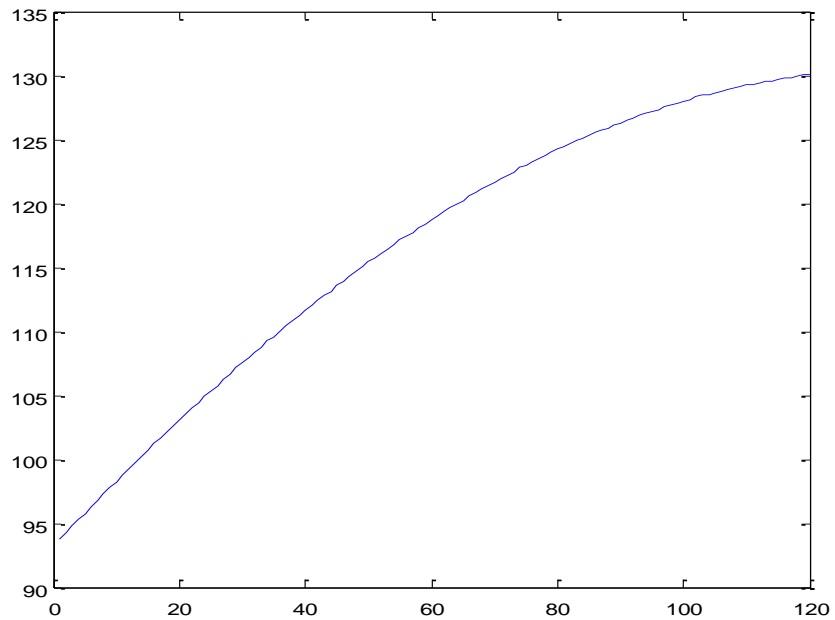


Single difference simulated from orbit data s28





TD from phase observable PRDU,INWL s01,s28 28 aug 2013



TD from interpolated .sp3 file, prdu,inwl s01,s28

