INTRODUCTION

In this poster we present the main changes made in the multi-GNSS processing of the CNES/CLS IGS Analysis Center in 2018 and their impact on the

I. Consequences of combined use of Elevation dependent Law weighting, lower elevation cut-off and data sampling increase

- Adoption of elevation cut-off of 8 degrees and a new elevation dependent weighting law & Change of data sampling to 300 sec (vs 900 sec, before)
- Adoption of antenna thrust
- Adoption of Attitude law of ESA release for GALLEO (BOV/FOC)

This choice has a significant positive impact on the estimated coordinates of the stations clearly visible on the global RMS (NEU) of our sinex daily solutions relatively to IGS combined solution (see figure 2).

Our investigations have shown that half of the gain in the upward and East directions is due to the new elevation dependent law (associated with the cut-off of 8 degrees), and the other half is due to the increase of the data sampling (from 900 to 300 seconds). Linked to this, the old spectral signature of ~3.7 days has now disappeared (see figure 3).

Our solution is now in much better agreement with the other Analysis Centers. In the North direction it remains some sub-millimeters discrepancies for which the origin is still unknown.

II. Antenna thrust

Several studies presented in Paris in 2017 discussed the use of improved and more realistic values for antenna thrust. We adopted, after GPS week 1997, the antenna thrust transmitting power values given in Table 1 to compute the associated radial forces acting on the satellites. As expected, we observe a reduction of the global scale disagreement of our orbits relatively to other Analysis Centers solutions, clearly visible in the scale residuals issued from the IGS combination process (see figure 4).

IV. Galileo Ambiguity in MGEX solutions

Starting with GPS week 2022 the Galileo products delivered to MGEX (grn) are computed with undifferenced ambiguities fixed. The processing strategy is similar to the one described by G. Katigianu and al in 2018 (2)

Some details are also given in the Multi-GNSS poster session "Improving Galileo Orbit Determination using Zero-difference Ambiguity Fixing in a Multi-GNSS Processing". The method used here was just adapted to support operational weekly processing constrains.

The improved quality of the orbits can be accessed either by external check (using SLR) or internally by computing orbit differences between successive overlapping orbits; Figure 7 illustrates the gain achieved with the ambiguity fixing: for the month of September 2018 the 3D RMS of the overlaps decrease by a factor of two for all satellites (The method was identically applied to the eccentrics satellites E14 & E18).

Conclusions

Our solution quality has been significantly improved and several historical problems have been solved:

- Improved stations coordinates thanks to revisiting elevation dependent weighting laws and data sampling.
- Reduced orbit scale thanks to antenna thrusts
- Better attitude law for Galileo
- Galileo orbits internal consistency divided by two thanks to ambiguity fixing

REFERENCES

(5) Galileo Satellite Metadata from ESA release (Autumn 2017), accessed on line: www.gsc-europa.eu/support-to-developers/galileo-satellite-metadata