1. MOTIVATION

To contribute to the analysis of the IERS campaign on the effects of the Non-tidal Atmospheric Loading (NTAL) in space-geodetic (SG) data processing.

2. NATAL MODELS

Time series of station displacements at the ITRF sites (6 h time lag). The models are based on NCEP surface pressure data and the station displacements are expressed in the Center of Mass (CM) frame.

3. DATA EDITING

Why is data cleaning important?

4. NATAL REMOVAL (Figure 1)

Daily/Weekly mean load displacements (ITS, in Fig 1) have been removed from the CM-centered SINEX files.

5. GEOCENTRE MOTION

Translational time series derived from SLR with CM SINEX, cf Fig 1 and without NATAL models (CORR SINEX, cf Fig 1) have been compared.

6. KALMAN FILTER-BASED COMBINATION

CM and CORR SINEX files have been combined. Linear frames have been estimated (no seasonal components in process noise).

7. VELOCITY FIELDS

Single-technique velocity fields related to CM and CORR SINEX files have been estimated and differences for the 2 velocity fields have been determined and plotted in Figure 2 as a function of the number of observations. The horizontal components of the velocities prove less affected by the NTAL corrections. The scatter of the velocity differences increases for the Height component.

8. CONSISTENCY BETWEEN VELOCITY FIELDS

Is it possible to infer the impact of the NTAL corrections on the velocity from the integrated NATAL time series at the ITRF sites? 3 approaches have been tested (see Fig 3).

9. REMOVE/RESTORE

If we restore the removed NTAL displacements adopting the full covariance matrices (ALF, see Fig 3) or the frame offsets and rates differ from zero (with maximum difference up to 0.11 mm (T) and 0.03 mm/yr (T))

CONCLUSIONS

If stations with less than 3 years of observations are removed the reduction observed in the amplitude of the acceleration component of the Tz component of geocentre motion is consistent with the ones related to the NATAL models.

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Figure 1. Steps involved in the removal of NTAL models (left side of the chart) from the SG solutions (right side): GN - standard SINEX, CM - Center of Mass oriented SINEX, CORR - corrected SINEX, TRFs - terrestrial reference frameworks.

Figure 2. Differences btw. the velocities estimated from the integrated NATAL time series with and without the NTAL displacements. The black dotted lines mark the range [-0.3,0.3] mm/yr. Red dots: GPS, Green dots: VLBI, Blue dots: DORIS.

If we adopt instead the identity matrix (AL-LR), the frame offsets and rates differ from zero (with maximum difference up to 0.11 mm (T) and 0.03 mm/yr (T)).