High-frequency EOP models assessment with VLBI observations

Anastasiia Girdiuk, BKG, Germany, anastasiia.girdiuk@bkg.bund.de

This report collects the results for 4 EOP models chosen in the Ad Hoc Working Group on HF-EOP. The method of the HF-EOP model assessment, VLBI data set and discussion were reported during last year (Girdiuk et al., 2017, 2018). Two models mentioned in the WG were presented only and two other models were chosen to complete the considered set in which all models are derived from the independent techniques. The high-frequency ERP bands contain certainly small variations, and this fact implies also that the applied models represent substantially similar account. Thus, this analysis aims to highlight the feasible discrepancies per tide term when these models are applied to the observations to see the amount of the signal still retained in the residuals. In the first place the VLBI analysis supplies the common statistical assessment. Now applied models can be distinguished using the standard deviations obtained in the VLBI analysis along with residuals. Since these models are implemented to VLBI observations it is anticipated that the most compact scatter points out the VLBI-derived models and a majority of residuals fall into 3 σ circles of the standard deviations. Also, sizable residuals can be seen familiar to the models by Desai and Sibois (2016) and Madzak et al. (2016) in the diurnal polar motion and dUT1 (K_1 and O_1) as well as a broad scatter in semidiurnal band of polar motion. Both models employ altimetry data which might cause shown residuals, and corresponding dissimilarities might stem from the different ocean models utilized to derive tide terms in the HF-EOP bands: TPXO8 and EOT11a accordingly.

Models:

Petit, G., Luzum, B., 2010, “IERS Conventions (2010)”, IERS Technical Note 36

Desai, S., Sibois, A., 2016, “Evaluating predicted diurnal and semidiurnal tidal variations in polar motion with GPS-based observations”, Journal of Geophysical Research: Solid Earth, vol. 121, pp. 5237–5256

Madzak, M., Schindelegger, M., Böhm, J., Bosch, W., Hagedoorn, J., 2016, ”High-frequency Earth rotation variations deduced from altimetry-based ocean tides”, Journal of Geodesy, vol.90, pp. 1237–1253

Gipson, J., 2017, Ad Hoc Working Group on HF-EOP

References:

Girdiuk, A., Schindelegger, M., Krásná, H., Böhm, J., 2017, ”Assessing recent high-frequency earth rotation models with very long baseline interferometry”, Journées Proceedings

Girdiuk, A., Böhm, J., Schindelegger, M., Krásná, H., Madzak, M., 2017, ”Towards a new conventional high-frequency Earth rotation model”, Geophysical Research Abstracts, vol.20, EGU2018-17047-1, EGU General Assembly 2018

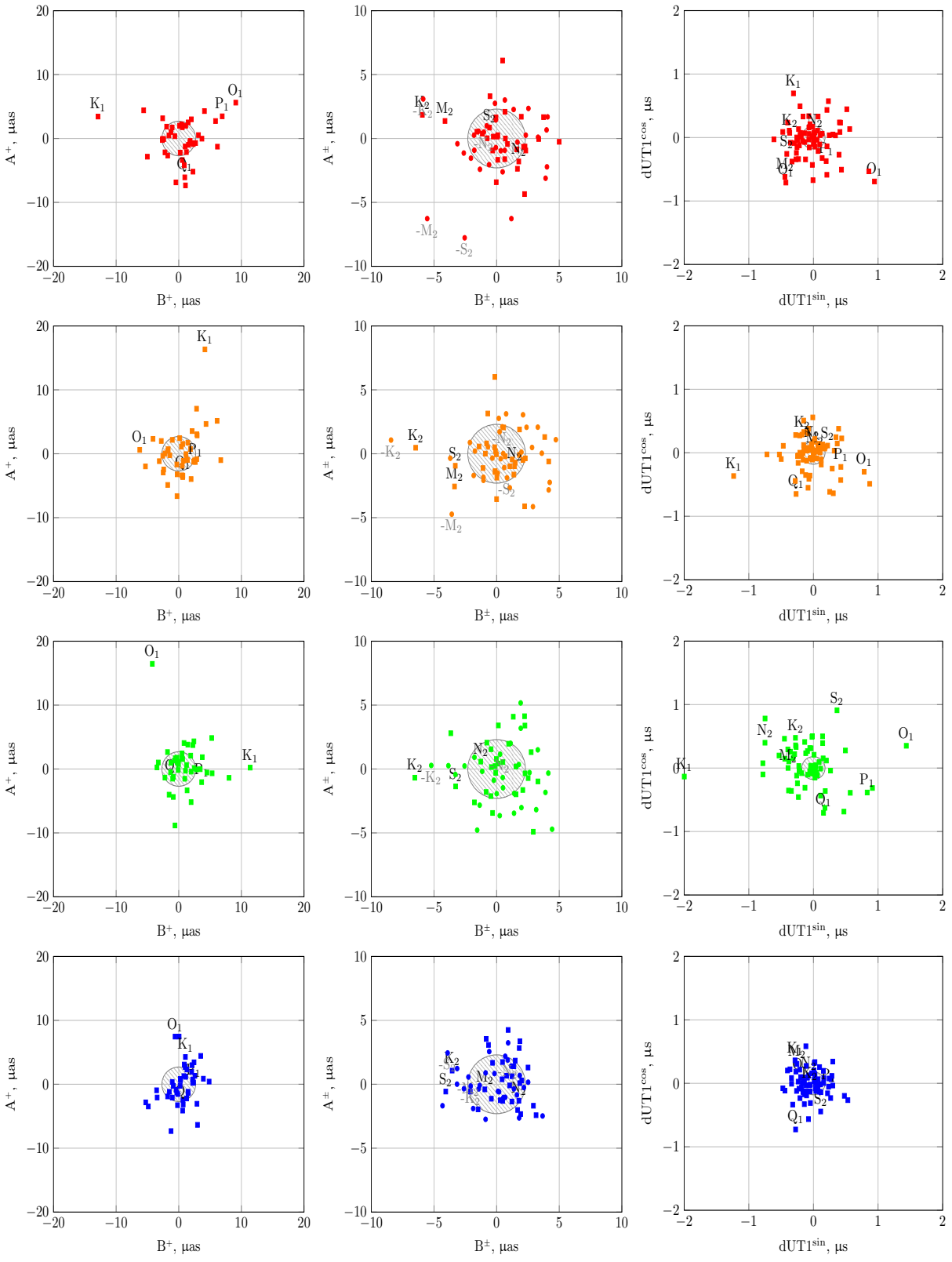

Figure 1: The obtained residuals per tide term for each model. Columns show the estimated amplitude differences for prograde diurnal polar motion, prograde (squares) and retrograde (circles) semi-diurnal polar motion, and dUT1 (from left to right). Annotations mark prograde terms (above the data) and retrograde terms (below the data, in gray). Panels from top to bottom illustrate the results for the Conventional model, Desai and Sibois (2016), Madzak et al. (2016), and John Gipson (2017a). Threefold σ-levels are marked by the gray hatched circle.