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Introduction The CRC is an integral part of the Center for Earth Dynamics Research (CEDR) that joins five Czech institutions active in astronomy and geosciences research (Research Institute of Geodesy, Topography and Cartography, Astronomical Institute, Faculty of Civil Engineering, Faculty of Natural Sciences, Institute of Rock Structure and Mechanics). The combination research is maintained principally in two different directions that would hopefully converge to a single combination method in future. On the one hand, we combine some of the Earth Orientation Parameters using the ‘combined smoothing’ algorithm that we recently proposed, without changing the underlying reference frames (terrestrial, celestial). On the other hand, we follow the direction of combining non-SINEX particular solutions of different techniques to determine the Earth orientation parameters simultaneously with station coordinates.

Combination of EOP The original combined smoothing algorithm, worked out in 2000 (Vondrák & „epek 2000), was later slightly modified, in order to account for long-periodic (60 days and longer) systematic errors in GPS observations of length-of-day and celestial pole offset rates that we found in previous years (Gambis et al. 2003, Vondrák et al. 2003). The necessary calibration of GPS-based celestial pole offset rates against VLBI-based celestial pole offsets was used, prior to combination of both series. The calibration was made on intervals 8–15 days long (integer number of intervals between VLBI sessions), and the differences found were removed from GPS data.

Two new combinations of the celestial pole offsets by VLBI (IVS) with their rates by GPS (CODE) were made in 2003, and presented at EGS-AGU-EUG Joint Assembly and IAU 25th General Assembly, respectively. The combined solutions are made for the interval 1994.3–2002.6 (Vondrák 2003a), and 1994.3–2003.0 (Vondrák 2003b), and they are compared with the new model of precession-nutation IAU2000. It is shown that while the *a priori* uncertainties of celestial pole offsets (reported by IVS) is practically equal to the *a posteriori* values derived from the combination, it is not the case for their rates measured by GPS – here the *a posteriori* values are about four times bigger than the *a priori* values (reported by CODE). In spite of this, the combination with GPS helps improving the VLBI-alone solution, both in resolution and accuracy. The consistency of the combined solutions with IAU2000 model is on the level of 0.10–0.15 mas, if the dominant long-periodic part due to FCN (period of about 435 days) is removed. Statistically significant are also smaller differences with annual, monthly and semi-monthly periods, and amplitudes of 0.03–0.04 mas.

Combination of EOP and station coordinates

A method for combining non-SINEX solutions of different techniques to obtain simultaneously station coordinates and Earth orientation parameters was further tested using VLBI, GPS, SLR and Doris data collected for the IERS Sinex Combination Campaign. The method is based on combining position vectors of the stations in the celestial reference frame, with constraints to separate celestial pole offset from polar motion and to tie EOP between different epochs (Kostecký & Pešek 2003).

Systematic differences between the techniques affect the combination, especially when the combination was made over the whole one year interval (Pešek & Kostecký 2003a). The results became more stable when monthly solutions were combined independently (Pešek & Kostecký 2003b). In this case, the effect of combination on EOP is characterized by increments from adjustment of 0.17 mas and 0.021 ms for polar motion and time correction, respectively. Uncertainty of station coordinates decreased from 0.057 m to 0.042 m.

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