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Estimation of EOP series by a combination of different space geodetic techniques

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The between the terrestrial and the celestial reference systems can be realized through five Earth orientation parameters (EOP). Estimated diurnal pole coordinates (x,y) describe the motion of the "Celestial Intermediate Pole" (CIP) relative to the terrestrial reference system. Pole coordinates can be determined by all space-geodetic techniques, such as VLBI, GPS or SLR. The motion of the CIP relative to the celestial reference system can be described by estimated diurnal nutation angles (X, Y). Finally, the fifth parameter is the rotation angle of Earth (dUT1=UT1-TAI) expressed in the intermediate reference system. In an absolute sense, the three parameters dUT1, X and Y can only be determined by VLBI, since this observation technique uniquely observes the quasi-fix point-like radio sources in the celestial reference system. Since there are high correlations between orbit parameters and rotation parameters (dUT1, X and Y), the satellite techniques, GPS and SLR, can contribute to these parameters (dUT1, X and Y) only relatively by providing their rate of change (the first time derivatives). Due to these correlations, the dUT1 can be also affected systematically by deficiencies of the orbit modeling. These systematics of UT1 are studied in detail.
Up to four times a week VLBI can provide data from 24-hour sessions. Hence, for providing time-series of dUT1 and the nutation angles with diurnal sampling, it is necessary to close the observation gaps between the VLBI sessions. In this contribution we investigate the ability of the satellite techniques, GPS and SLR, for closing the VLBI observational gaps. Another possibility to densify the UT1 series could be to include the so-called VLBI "intensive" observing sessions. The intensives, however, are scheduled as one-baseline sessions with an observation time frame of only one hour per day. Therefor intensives can have much smaller accuracies than the 24-hourly VLBI sessions.
The combination of VLBI and satellite techniques is performed at the normal equation level. EOP and the station networks are combined and adjusted consistently. In order to validate our combination results we compare the derived time-series of the five EOPs to the IERS 08 C04 and evaluate the offsets at the weekly boundaries.