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VLBI-based assessment of the consistency of the conventional EOP series and the terrestrial reference frames

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Abstract. The Global Geodetic Observing System (GGOS) of the International Association of Geodesy (IAG) envisages stringent accuracy goals for the International Terrestrial Reference Frame (ITRF) realization in terms of position (1 mm) and velocity (0.1 mm/year). These requirements entail that the Earth Orientation Parameters (EOP) should be estimated with similar accuracy.

The ITRF is based on the combination of solutions from the four space geodetic techniques, with each new release incorporating updated data and models. Likewise, the current conventional EOP series, IERS 14 C04, is produced in a separate process following a different strategy, based on a monthly combination of the EOP estimates obtained by the analysis centers of each space geodetic technique. Using independent processes might cause slow degradation of the consistency among EOP and the reference frames or a misalignment of the current conventional EOP series. The recent release of the ITRF2020 brings an exciting opportunity to investigate this topic.

In this work, we empirically assess the consistency among the conventional terrestrial reference frames and EOP through the analysis of Very Long Baseline Interferometry (VLBI) data, taking different terrestrial frames as alternative settings in the analysis. ITRF2020, ITRF2014, and the terrestrial frame used to produce the ICRF3 are considered in this work. This study allows evaluating if the selection of the terrestrial frame has a significant impact on the consistency of the estimated EOP and assesses its agreement with the conventional EOP series.