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Oral
Three general relativistic (GR) orbital corrections are currently recommended in the IERS Conventions for Earth-orbiting satellites. All of these corrections assume that the Earth is a regular sphere, whereas the oblateness-induced correction is omitted. We discuss the impact of the relativistic orbit oblateness correction on the satellite orbits and GRACE-FO-based gravity field determination results. We test the correction on GRACE-FO, Starlette, and LARES orbits, as well as MAGIC – the future ESA/NASA mission for gravity field recovery. We found that the orbital GR correction is approximately three times larger for LEO than the geodetic precession, i.e., the effect included in the IERS Conventions 2010. The accelerations introduced by GR oblateness orbit correction are of the order of 10-10 m/s2 for LEOs, which is above the sensitivity of orbit determination procedures. The maximum secular rates on LEO orbits due to the GR oblateness effect accumulate up to 14 mm/day for near-polar orbits. The missing GR correction introduces a systematic bias to the GRACE-FO-derived C20 values of 3·10-12. The GR effect rapidly decreases with the orbital height; thus, the effect is different for LAGEOS and LARES-2 satellites in the MEO orbits and low orbiting satellites, introducing discrepancies between the Earth’s oblateness derived from GRACE/GRACE-FO in LEO and LAGEOS/LARES-2 in MEO regions.
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