

XXXIst GENERAL ASSEMBLY

RESOLUTIONS PRESENTED TO THE XXXIst GENERAL ASSEMBLY

RESOLUTION B2

Improvement of the Earth's Rotation Theories and Models

Proposed by the IAU Commission A2 'Rotation of the Earth'

The XXXI General Assembly of the International Astronomical Union,

noting

1. that the consistent definition and determination with increased accuracy of the rotation between the International Terrestrial and Celestial Reference Systems and Frames, adopted by Resolutions B1 and B2 of the XXX IAU General Assembly in 2018, is necessary for the accurate realization of those two frames, advancing astrometry and furthering our insight into the realizations of celestial reference frames at different wavelengths, investigating the global change of the Earth, and determining global geodetic variables, among numerous scientific and technical topics related to precise positioning on Earth and space navigation;
2. that the IAU adopted the nutation theory IAU2000A and the precession theory IAU2006, by Resolutions B1.6 and B1 of its XXIV and XXVI General Assemblies, which were endorsed by Resolutions 4 and 1 of the XXIII and XXIV General Assemblies of the International Union of Geodesy and Geophysics (IUGG), respectively;
3. that the current Earth rotation theories, even including supplemental models provided by the International Earth Rotation and Reference Systems Service (IERS), are unable to model and predict the Earth orientation parameters (EOP) with an accuracy close to the current stringent requirements, for instance those set by the Global Geodetic Observing System of the International Association of Geodesy (GGOS/IAG), in spite of the improved accuracy and precision of the individual and combined solutions derived from single or multiple techniques;
4. that the precession-nutation theories IAU2000 and IAU2006 suffer from internal inconsistencies and systematics whose correction is partially available, but also from inconsistencies due to incorporating outdated models instead of the state-of-art models used in EOP determination,
5. that the theoretical precession-nutation models and the observations of the different EOPs are not always referred to the current IAU and IUGG/IAG standards, in particular regarding terrestrial reference frames;

recognizing

6. the outcomes of the IAU Commission A2 Joint Working Group on Theory of Earth Rotation and Validation (JWG TERV), joint with the IAG Commission 3, summarized in its report published in the IAG Travaux 2015-2019 (Vol. 41, pp 292-301);
7. that the IAG Council at the XVII IUGG General Assembly in Montreal 2019 adopted the IAG Resolution 5 on Improvement of the Earth's Rotation Theories and Models, accepting the conclusions of the IAU/IAG JWG TERV, published in Ferrándiz J.M., Gross R.S., Escapa A., Getino J., Brzeziński A., Heinkelmann R. (2020) Report of the IAU/IAG Joint Working Group on Theory of Earth Rotation and Validation. In: International Association of Geodesy Symposia, Springer, https://doi.org/10.1007/1345_2020_103;
8. the need of taking advantage of the advances accomplished or yet in progress on different aspects of the theoretical and empirical modelling and prediction of the Earth's rotation to get closer to the accuracy currently required and foreseen in the near future; and
9. the need of better consistency between the IAU, IAG, and IUGG standards and products,

resolves

10. to encourage a prompt improvement of the Earth rotation theory regarding its accuracy, consistency, and ability to model and predict the essential EOP;
11. that the definition of all the EOP, and related theories, equations, and ancillary models governing their time evolution, must be consistent with the reference frames and the resolutions, conventional models, products, and standards adopted by the IAU, IUGG/ IAG and its components;
12. that the new models should be closer to the dynamically time-varying, actual Earth, and adaptable as much as possible to future updating of the reference frames and standards; and
13. that the IAU acts in close cooperation with IUGG/IAG and other concerned organizations.