Report of the International Astronomical Union (IAU)
to the 26th meeting of the CCU (9-11 **April 2024)**

Mission and organization of the International Astronomical Union

As part of its mission to promote progress in the major fields of astronomy through international cooperation, the scientific work of the IAU is structured into 9 Divisions, 38 Commissions and 48 Working Groups. Additionally, it collaborates with various scientific organizations around the world. It also serves as the internationally recognized authority for assigning designations to celestial bodies and their surface features. Other tasks include the definition of fundamental astronomical and physical constants, unambiguous astronomical nomenclature, and informal discussions on possibilities for future large-scale international installations. Six offices were also established to support astronomy for development, outreach, young astronomers, education, and one Center for the Protection of dark and quiet skies from interference from satellite constellations.

Every year the IAU sponsors about ten international IAU Symposia with the publication of symposium proceedings series. Every three years the IAU holds a General Assembly, which offers six symposia on various astronomical topics, a dozen of focus meetings on topical issues, individual business and scientific meetings of the divisions, commissions and working groups.

Recent activities of the International Astronomical Union 2021-2024

The 31st IAU General Assembly, which was to be held in August 2021, was, due to the health situation, partly organized in virtual format (for the "business" sessions), and partly postponed for a year for scientific sessions (symposia, exchange meetings, scientific meetings of divisions, commissions and GT meetings, which took place in Busan (South Korea) in August 2022.

Four resolutions were adopted by the GA, with recommendations on the protection of geodetic radio astronomy against radio frequency interference, on the improvement of theory and models of Earth's rotation, on the adoption of the Gaia celestial frame of reference and on the use of a standard UV photometric system.

The 32nd AG will be held in Cape Town, South Africa in August 2024.

List of current IAU scientific bodies relevant to CCU matters

The Division that is the most relevant to the CCU matters is Division "Fundamental Astronomy" which is in charge through specific Commission or Working Groups, of providing definitions and models that describe reference systems and frames used in astronomy to determine positions and motions of celestial objects in space and time, investigating dynamical behavior of celestial bodies, obtaining physical information on celestial objects and offering services that provide data and ephemerides of solar system bodies, Earth orientation data, time scales, astronomical constants, models including relevant software procedures, etc., for users within the astronomical community as well as within society.

The Div A Commissions and WG that are in charge of most of these tasks are Commission on *Fundamental standards*, Commission on *Earth Rotation,* Commission on *Solar System Ephemerides, the* WG on *Standards of Fundamental Astronomy*, and the WG on *Metrology standards*

Main objectives and activities of the IAU Commission and WG relevant to CCU matters

Commission on *Fundamental standards* is developing, implementing, and communicating fundamental IAU-endorsed standards for fundamental astronomy and the associated nomenclature. This concerns celestial & terrestrial reference systems/frames and the transformations among them,

time scales, precession-nutation models, Earth rotation and polar motion, including physical models (e.g., Earth's gravity field, lunar gravity field, Earth interior model, solid Earth-tide modelling); star catalogues; ephemerides of solar system bodies; special and general relativistic models for time and space. It is also in charge of upkeeping of the Numerical Standards for Fundamental Astronomy such as body constants for the Earth and of the ratio of the masses of planets with respect to that of the Sun.

The Commission has been especially interested during the triennium 2021-2024 by the following issues 1) the upcoming continuous UT1-UTC and 2) the lunar standards to be defined for time, reference frame(s) and coordinate systems. Resolution proposals have been submitted to the IAU for the next GA for recommending the development of works on this issue.

*Commission on Earth Rotation is d*eveloping methods for improving the accuracy and understanding of Earth orientation variations and related reference systems/frames. And ensuring agreement and continuity of the reference frames used, encouraging and developing cooperation in observation and theoretical studies of Earth orientation variations. It is also serving the astronomical community by linking it to the official organizations that provide the International Terrestrial and Celestial Reference Systems/Frames and and Earth orientation parameters

Commission on Solar System Ephemerides is promoting the acquisition and dissemination of observations of solar system bodies and estimates of their ephemerides and rotational elements. New activities for the current triennium are hints of larger bodies on the Kuiper belt that may exist and correlate the orbits of the main belt and very distant objects.

The WG *Standards of Fundamental Astronomy (SOFA)* has the task of establishing and maintaining an accessible and authoritative set of algorithms and procedures that implement standard models used in fundamental astronomy. The service is managed by an international panel, the SOFA Board and works closely with the International Earth Rotation and Reference Systems Service (IERS).

The WG on *Time Metrology Standard*s is to maintain interaction between the astronomical community and the time and frequency metrology communities. The latter is providing the reference time scale, of atomic nature, which is the basis of coordinate times used for space-time referencing in astronomy. Consideration is also given to the dynamical time scale based on precision timing of pulsars which has the potential of improving the long-term standard of time.

Activities of this WG during the triennium 2021-2024 have been mostly devoted to 1) the actions towards a continuous UTC (CGPM 2022 Resolution 4 deciding that the maximum value for the difference UT1–UTC will be increased in, or before, 2035, 2) the actions towards a redefinition of the SI second and 3) the discussions on the realization of a time reference on the Moon.
The WG took no particular action on the redefinition of the SI second, but kept updated on the evolution of the process at the CCTF and at the CGPM. There is no impact of a redefinition on astronomical work, but is important that the astronomical community follow the process.

A Group on Lunar Time Scale was created within the WG in 2023. The aim of this group was to exchange ideas on the time reference to the Moon and to liaise with other groups, including other IAU bodies.

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