Activities of the International Earth Rotation and Reference Systems Service

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History of the IERS

• The “International Earth Rotation Service” (IERS) was created in 1987
• Responsible to the International Astronomical Union (IAU) and the International Union of Geodesy and Geophysics (IUGG)
• IERS began operations on 1 January 1988 replacing the “International Polar Motion Service” (IPMS) and the Earth Rotation Section of the “Bureau International de l’Heure” (BIH)
• IERS changed its name to “International Earth Rotation and Reference Systems Service” in 2003 to better represent its responsibilities
• Earth orientation relies directly on having accurate, well-defined reference systems
• IERS functions as an IAG Scientific Service
What does the IERS Provide?

• International Terrestrial Reference System (ITRS) and its realization ITRF
• International Celestial Reference System (ICRS) and its realization ICRF
• Earth Orientation Parameters
• Global geophysical fluids data to study and understand variations in the reference frames and in Earth rotation
• Conventions, standards, models, and formats used in generating and providing the reference frames and Earth orientation products

November 12, 2019
SIRGAS 2019, Rio de Janeiro
Current Structure of the IERS
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- Directing Board (DB)
- Analysis Coordinator
- Product Centres
- Technique Centres
- Central Bureau
- ITRS Combination Centres
- Working Groups
Relation with IAG Technique Services

The IAG Services specific for the space-geodetic techniques GNSS, VLBI, SLR/LLR and DORIS are incorporated into the IERS as Technique Centres:

• International GNSS Service
• International VLBI Service for Geodesy and Astrometry
• International Laser Ranging Service
• International DORIS Service
Directing Board of the IERS
Two Product Centres for EOPs

1) **Earth Orientation Centre** (Observatoire de Paris)
   - Monitoring of long-term EOPs
   - Generate „Final“ IERS EOP series: C04
   - Publications of time disseminations
   - Leap seconds announcements

2) **Rapid Service / Prediction Centre** (USNO)
   - Generate „Rapid“ IERS EOP series: Bulletin A
   - Provide predictions of EOPs

- Since February 2017: all EOP series are aligned to ITRF2014
- All EOP series are multi-technique combined products
Product Centre for ICRS / ICRF

• Operated by Observatoire de Paris and USNO

• Responsible for maintaining the International Celestial Reference System and Frame

• New realization ICRF-3 was adopted by IAU GA 2018 and became effective on January 1st, 2019

• ICRF-3 was prepared together with IAU Division A Working Group on ICRF3

• ICRF-3 includes X-, K-, KA-band
Product and Combination Centres for ITRS/ITRF

1) **ITRS Product Centre** (IGN France)
   - Publish the long-term terrestrial reference frame
   - Latest realization is ITRF2014; it was published in January 2016
   - Call for Participation for next realization (i.e. ITRF2020) issued

2) **Three ITRS Combination Centres**
   - DGFI-TUM: generated DTRF2014
   - IGN France: generated ITRF2014
   - JPL: generated JTRF2014
Product and Combination Centres for ITRS/ITRF

• All ITRS realizations are multi-technique combinations
• ITRF2014 contains 1499 stations at 975 sites
• Earth Orientation Parameters are estimated along with
• Coordinates + Velocities + non-linear station motions

Altamimi et al. 2016 🌟 VLBI ⚫ SLR ⬤ GNSS ⭕ DORIS
Product Centre for Global Geophysical Fluids

- Coordinated by University of Strasbourg
- Three Special Bureaus for:
  - Atmosphere
  - Ocean
  - Hydrology
- One Special Bureau for mass changes in combined systems
- Provide and evaluate products of global geophysical fluids (mass changes, loading deformation)
Product Centre for Conventions

• Operated in cooperation by USNO and Observatoire de Paris
• Responsible for the maintainenance of the IERS conventional models, constants and standards
• Current version: IERS 2010 Conventions (including partial updates provided on the website)
• Editorial Board is currently organizing a new release of the IERS Conventions: Call for Participation was issued in February 2018
IERS Analysis Coordinator

• Elected for 4 years
• Since December 2018: Robert Heinkelmann (GFZ Potsdam)
• Responsible for the internal and long-term consistency between all IERS products
• Responsible for the appropriate combination of the single-technique contributions into the official IERS multi-technique products
• In preparation: Joint Working Group on consistent realization of CRF, TRF and EOP
  • Under IERS, IAG (sub-commission 1.4) and IAU (Commission A2)
IERS Central Bureau

- Operated by BKG
- General management of the IERS
- Executive arm of the IERS Directing Board
- Maintains the IERS website as central access point: https://www.iers.org
- Maintains a Data and Information System for all products of the IERS
IERS Central Bureau

- Provide tools for visualising and accessing the IERS products

Terrestrial and Celestial Reference Frame

Earth Orientation Parameters

Geophysical fluid models for loading
Analysis and results of ITRF2014

Z. Altamimi, P. Rebischung, L. Methvier, X. Colliieux

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Thank you for your attention

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