

TEC SHARING DAYS

**GENERATION OF INDEPENDENT EARTH
ORIENTATION PARAMETERS (EOP)**

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OUTLINE

- Introduction
- Study objective
- Study results
- Conclusions and utilisation within ESA missions



INTRODUCTION (1/2)

The availability of highly accurate, up-to-date Earth Orientation Parameters (EOP) is of major importance for all space missions and in particular for positioning and navigation applications on Earth, Sea, in Air and also in Space.

Today, the EOP predictions are generated based on contributions from organisations around the world by the International Earth Rotation Service (IERS), provided on a non-European server.

Considering the importance of up-to-date Earth Orientation Parameters, the dependency on a single source outside Europe is considered as a risk for ESA space missions, EU programmes and also for European industry.



INTRODUCTION (2/2)

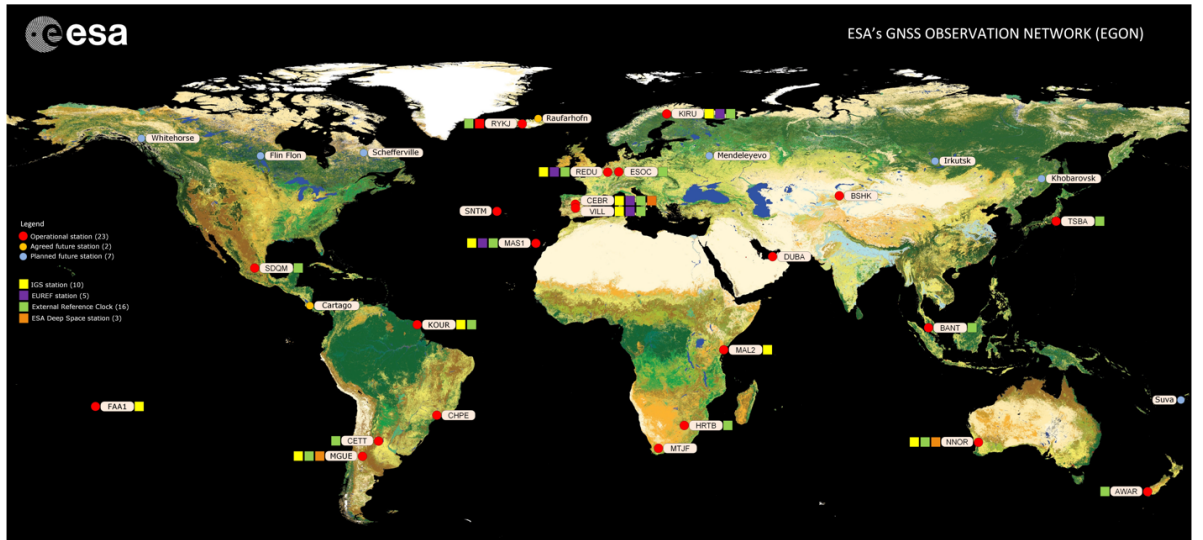
ESA's Navigation Support Office is responsible for providing the Geodetic reference for ESA missions. As Coordinator of the Galileo Reference Service Provider (GRSP) it is responsible for providing the Geodetic reference and corresponding EOP's also for Galileo.

ESA operates Ground Infrastructure

- [ESA'S GNSS Observation Network \(EGON\)](#)
- ESA/Europe is building up SLR stations
- European Space Tracking network (ESTRACK)
Note: Stations and correlator are not yet ready for VLBI

ESA operates Data Centres

- [GNSS Science Support Centre \(GSSC\)](#)



ESA generates all input products needed for the generation of EOPs and contributes already to IERS. ESA's contributions (products) to International Association of Geodesy (IAG) are always among the best in the world.

Although all required input products are generated by ESA, ESA and its customers are still relying on a single non European source - IERS.

STUDY OBJECTIVE

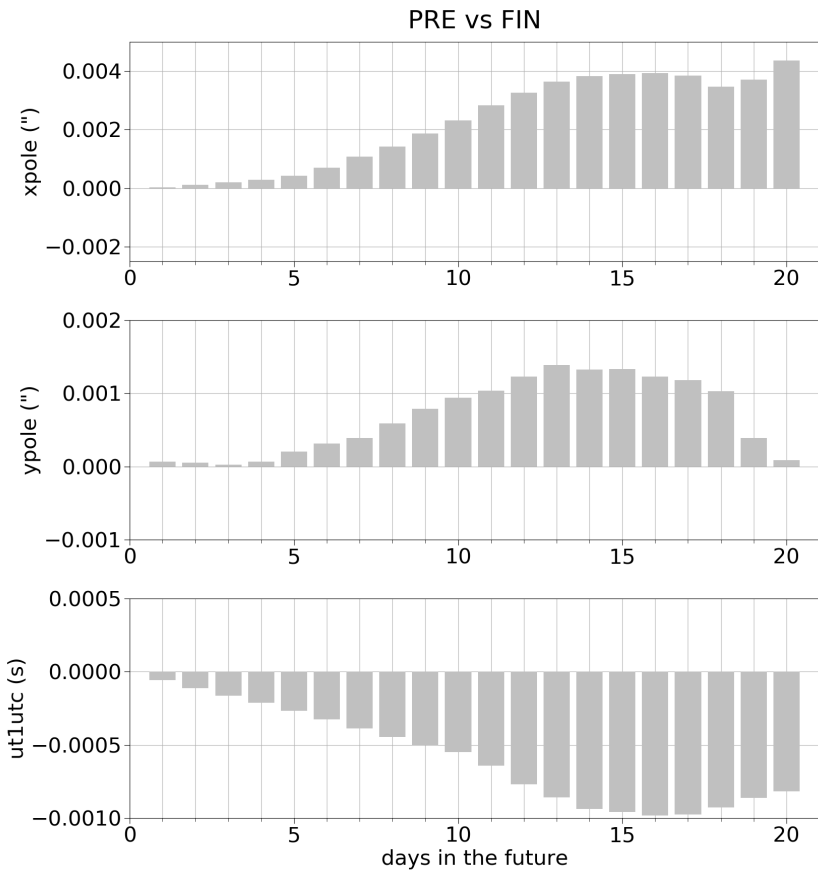
The objective of this activity was the prototype development of Earth Orientation Parameter products, generated independently from existing IERS products.

The new ESA EOP product was supposed to be able to support all ESA missions, by providing the best possible accuracy and precision of EOP predictions, in real-time and for post-processing applications.

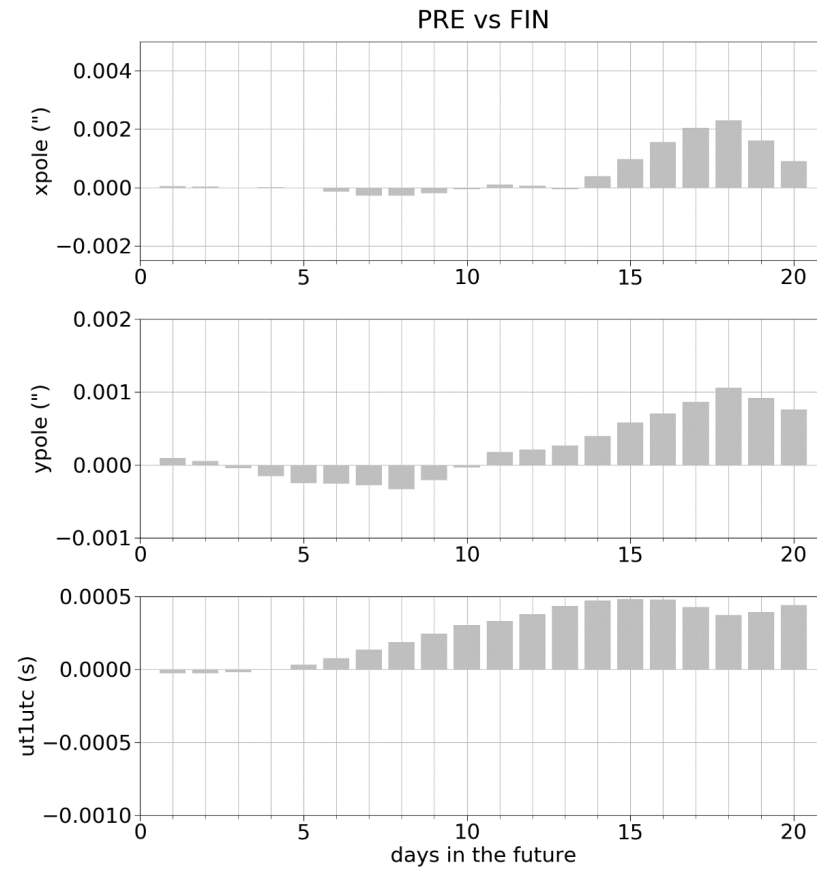


STUDY RESULTS

EOP PREDICTION ERROR



IERS (external EOP product)



ESA (EOP test product)

**ESA EOP test product
outperforms IERS product by
14% - 50% for 10 days
30% - 60% for 20 days**

CONCLUSIONS AND UTILISATION WITHIN ESA MISSIONS

Consortium lead by Technical University of Munich did an excellent job. Developed algorithms are clearly outperforming IERS EOP predictions.

The algorithms are currently being implemented in the Navigation Support Office operational infrastructure.

ESA/ESOC's Earth Orientation Parameter products, are currently under validation and shall become operational in Q3 2021.

ESA/ESOC's Earth Orientation Parameters will be available for all ESA space missions, EU space programmes and also for European Industry.

