

About the project

T-FORS is an EU funded project and part of the Horizon Europe Programme. A consortium of ten experienced partners is working together towards a Forecasting system for Travelling Ionospheric Disturbances (TIDs).

What are TIDs?

TIDs constitute a specific type of space weather disturbance affecting the performance of critical space and ground infrastructure by disrupting operations and communications in multiple sectors

TIDs are perturbations that propagate as waves through the ionosphere disrupting the regular propagation of radio-electrical signals. TIDs can have different sources, from the top, as geomagnetic storms, and from below, as big earthquakes.

Examples of affected infrastructures are satellite communication, geolocation and terrestrial HF communication.

Contact

For more information please visit our website:

<https://t-fors.eu/>

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Project Participants



Travelling Ionospheric Disturbances FOREcasting System T-FORS



Funded by the European Union

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What are the T-FORS objectives?

T-FORS aims at providing new models able to interpret a broad range of observations of the solar corona, the interplanetary medium, the magnetosphere, the ionosphere and the atmosphere, and to issue forecasts and warnings for TIDs several hours ahead.

To enable reliable forecasting, an even better understanding of the ionospheric dynamics is needed. Important achievements in this area were already obtained in preceding projects. Based on these findings, now the T-FORS project is focusing on the warning (Nowcast) of current or directly approaching disturbances as well as on the forecast of TIDs, which will influence the transmission of radio-electric signals within the next couple of hours.

This is an important research challenge because radio communication systems typically cannot detect TID-inflicted errors by themselves.

The T-FORS project structure

The T-FORS consortium members are working together in six work packages.

The structure is as follows:

Work package 1 regards strategy and capabilities. In work package 2 machine learning (ML) methods for the forecasting of large scale TIDs (LSTIDs) are evaluated. Work package 3 addresses climatology and probabilistic forecasting of medium scale TIDs (MSTIDs), while work package 4 focuses on the demonstration and evaluation of the obtained findings. The work package 5 deals with dissemination, communication and exploitation of the research results. Finally, the project management and consortium coordination is covered in 6th working package.

Project results will be shown in demonstrators and published in project reports and deliveries as well as in scientific papers.

How is it done?

Machine Learning techniques are used to train the models based on existing databases developed in the frames of past Horizon 2020 projects, to estimate the occurrence probability of medium scale TIDs and to forecast the occurrence and propagation of large scale TIDs. Prototype services are developed based on specifications from the users' community and following harmonized standards and quality control similar to the best practices of meteorological services. On ground demonstration tests are organised, by aerospace and civil protection agencies, to validate the performance of the T-FORS prototype services. A comprehensive architectural concept is proposed, including the densification of ground instrument networks, and new space missions, and possible future adjustments in order to develop a real-time operational service fully compliant and complementary to the ESA Space Weather services.

Project Duration

The project is running from January 2023 till December 2024.