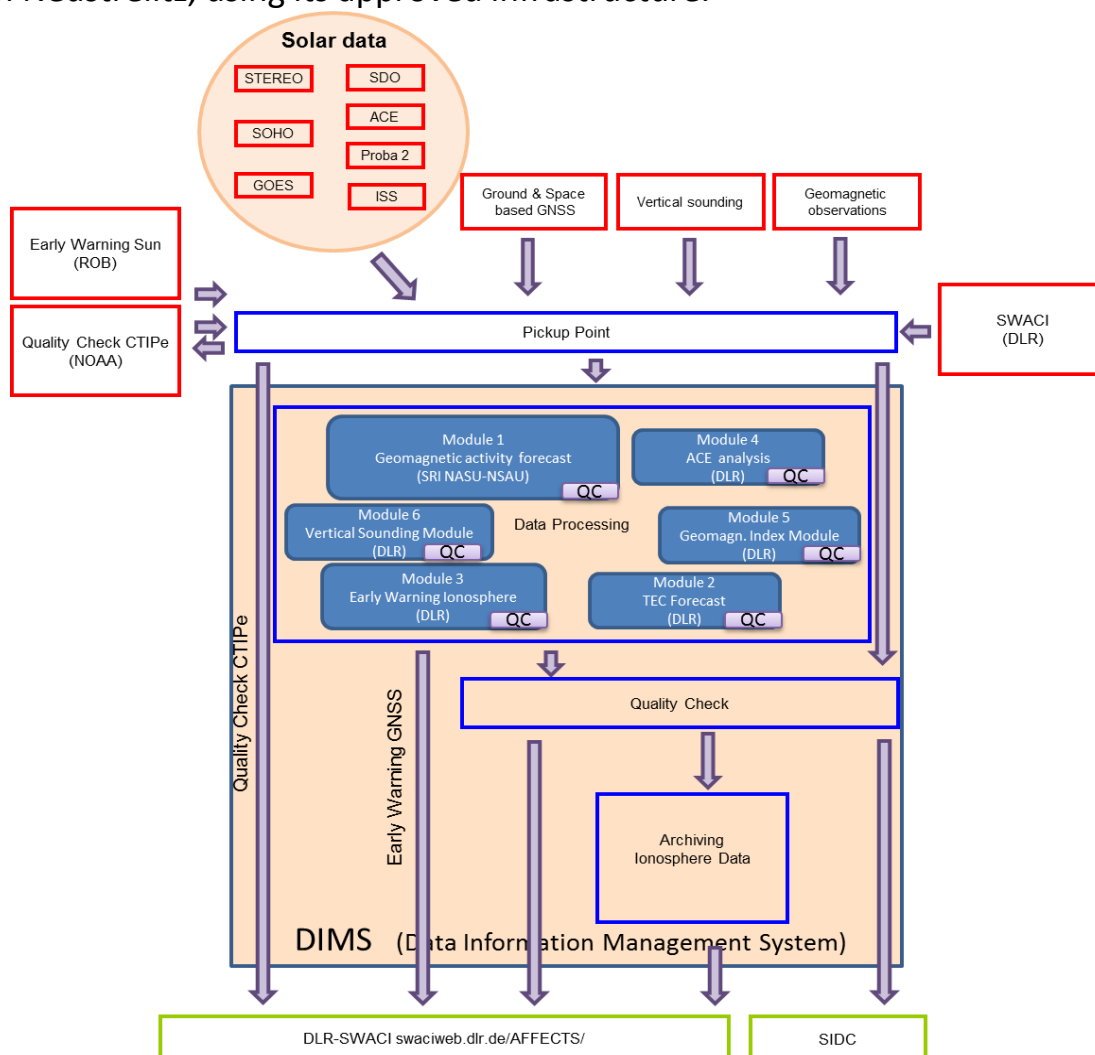# Forecast System Ionosphere

General description

A Forecast System Ionosphere (FSI) is developed as part of
the FP7 AFFECTS project (Advanced Forecast For Ensuring Communication
Through Space).
It is intended to help European citizens mitigating the impact of space weather
events on its communications systems. For this purpose the FSI will
operationally provide a prediction of space weather related geomagnetic and
ionospheric perturbations for Europe. Solar observations and measurements
are used for forecasting of geomagnetic activity and Total Electron Content
(TEC). Additionally, high latitude geomagnetic monitoring and early warning for
GNSS users is incorporated in the FSI. The FSI is developed as a subsystem of
the Space Weather Application Center - Ionosphere (SWACI) running at the
DLR in Neustrelitz, using its approved infrastructure.

List of Modules

Modules	Description	
Module 1: geomagnetic activity forecast **Delivery SRI NASU-NSAU**	The geomagnetic forecast module predicts the geomagnetic index Dst 3 hours in advance. Kp or ap forecast can also be provided.	
	Input	ACE data for last 24 hours Previous Dst values for last 40 days.
	Output	Dst forecast (3h lead time, 1 h cadence)
	Other parameter	
Module 2: TEC forecast **DLR**	The Total Electron Content (TEC) forecast module is designed to predict TEC over Europe 6, 12 & 24 hours in advance. The advantage of this TEC forecast module is the use of a new TEC perturbation model, which predicts TEC during ionospheric disturbances caused by strong solar wind. Therefore it uses geomagnetic forecast and ACE solar wind measurements.	
	Input	EU TEC map nowcast Dst forecast ACE measurements
	Output	EU TEC forecast map EU TEC quality map
	Other parameter	F10.7cm radioflux index
Module 3: Early Warning Message **DLR**	This module generates an early warning message which is primarily directed to users of GNSS systems. It uses solar alert disseminated by ROB and translates it to the special needs of GNSS users.	
	Input	Presto alert (ROB) ACE measurements
	Output	Early warning message Statistics
	Other parameter	
Module 4: ACE Analysis **DLR**	The ACE analysis module applies preanalysis and correlations studies on ACE measurements in preparation for the TEC forecast module.	
	Input	ACE measurements EU TEC map nowcast
	Output	ACE analysis, ACE Plot
	Other parameter	
Module 5: Geomagn. Index Module **DLR**	Magnetometer measurements which are provided for the AFFECTS consortium are analyzed and prepared to be used for TEC forecast.	
	Input	Magnetometer measurements

Modules	Description	
	Output	Magnetometer chain data plot
	Other parameter	
Module 6: Vertical Sounding Module DLR	The slab thickness is calculated on the basis of vertical sounding data and TEC measurements.	
	Input	Vertical sounding EU TEC maps
	Output	Slab thickness profiles

Table 1 Module Description

4. Acknowledgements

5. Disclaimer

6. Contact information

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AFFECTS project: http://www.affects-fp7.eu/
FSI: http://swaciwebdevelop.dlr.de/forecast-system-ionosphere/