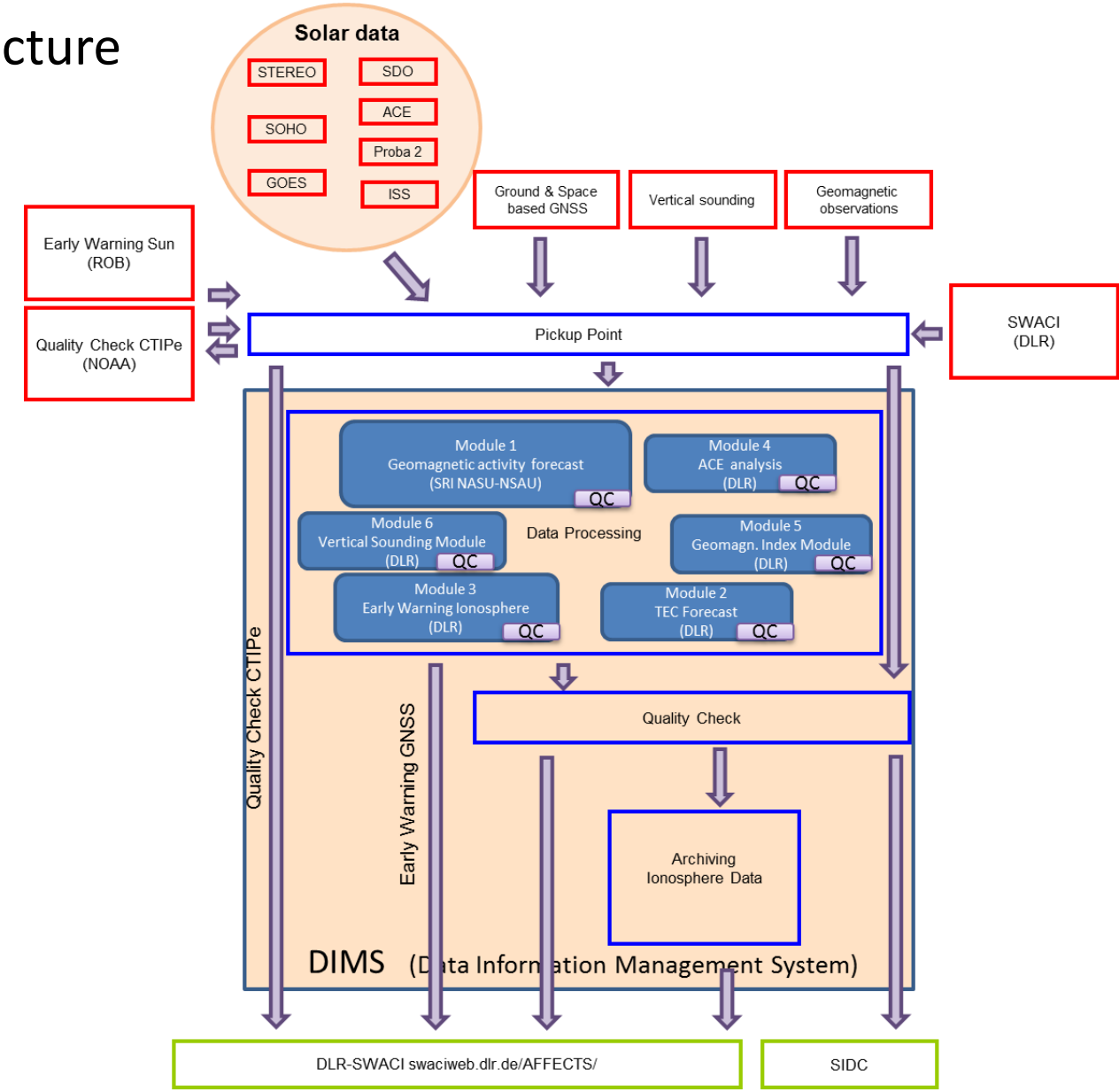
AFFECTS space weather tools and services

Forecast System Ionosphere

Presentation by Jens Berdermann

DLR

System architecture overview

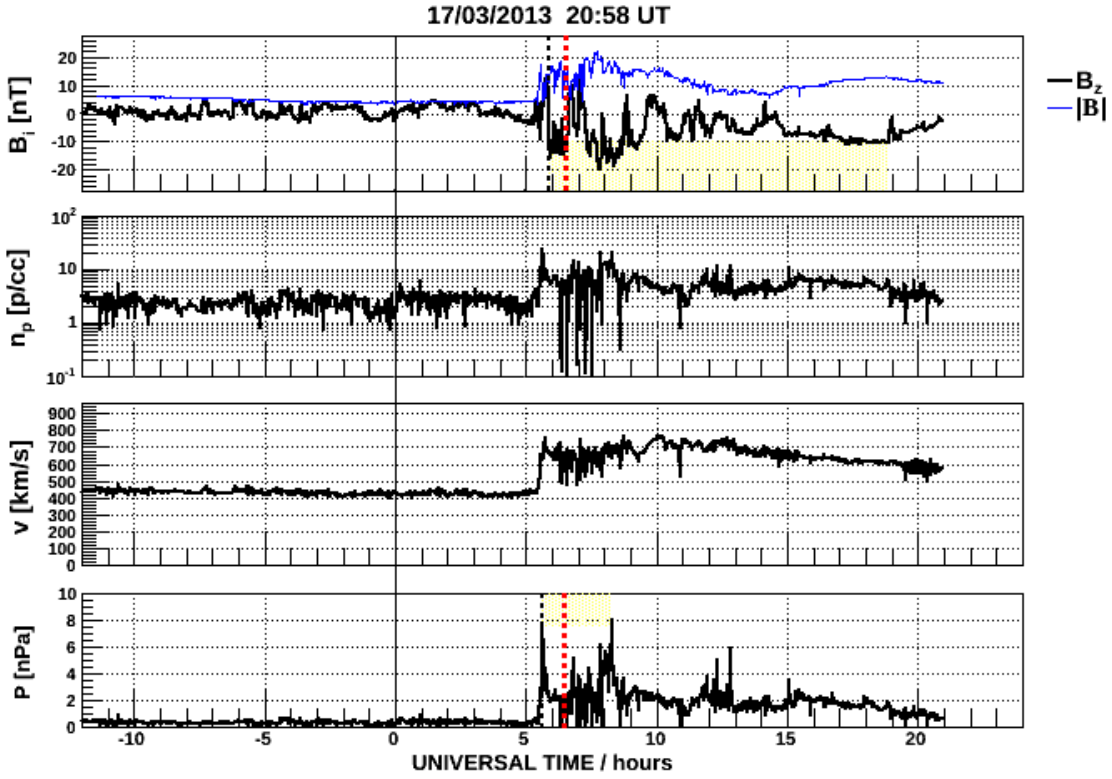


Input data

Solar Wind Data	• ACE data
Ground & Spaced based GNSS	• TEC maps
Vertical Sounding	• SAO Files
Geomagnetic Observation	• indices
Early Warning	• Early Warning Message Sun
CTIPe	• TEC maps

ACE Analysis

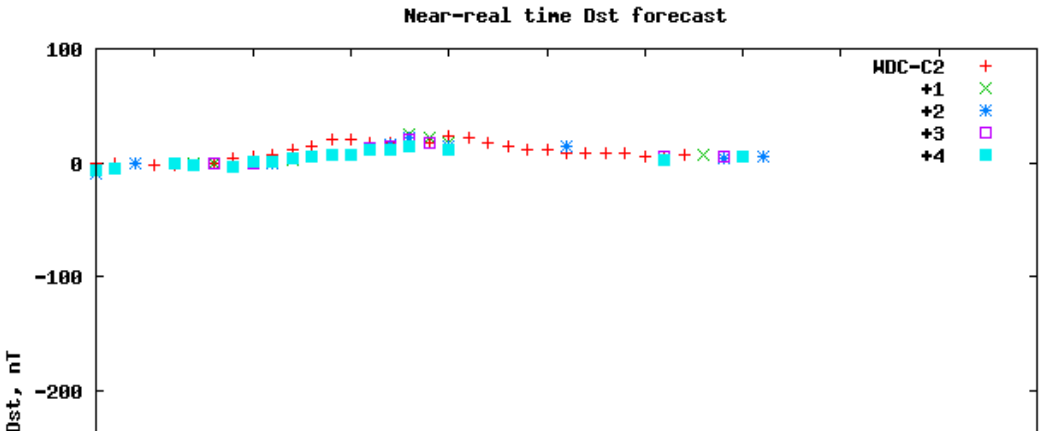
- Processor developed at DLR
- Used for Pre-analysis and correlation studies on ACE measurements and storm onset definition
- Input: ACE data (NOAA-ESWDS)
- Output: data file, plot



Geomagnetic activity forecast

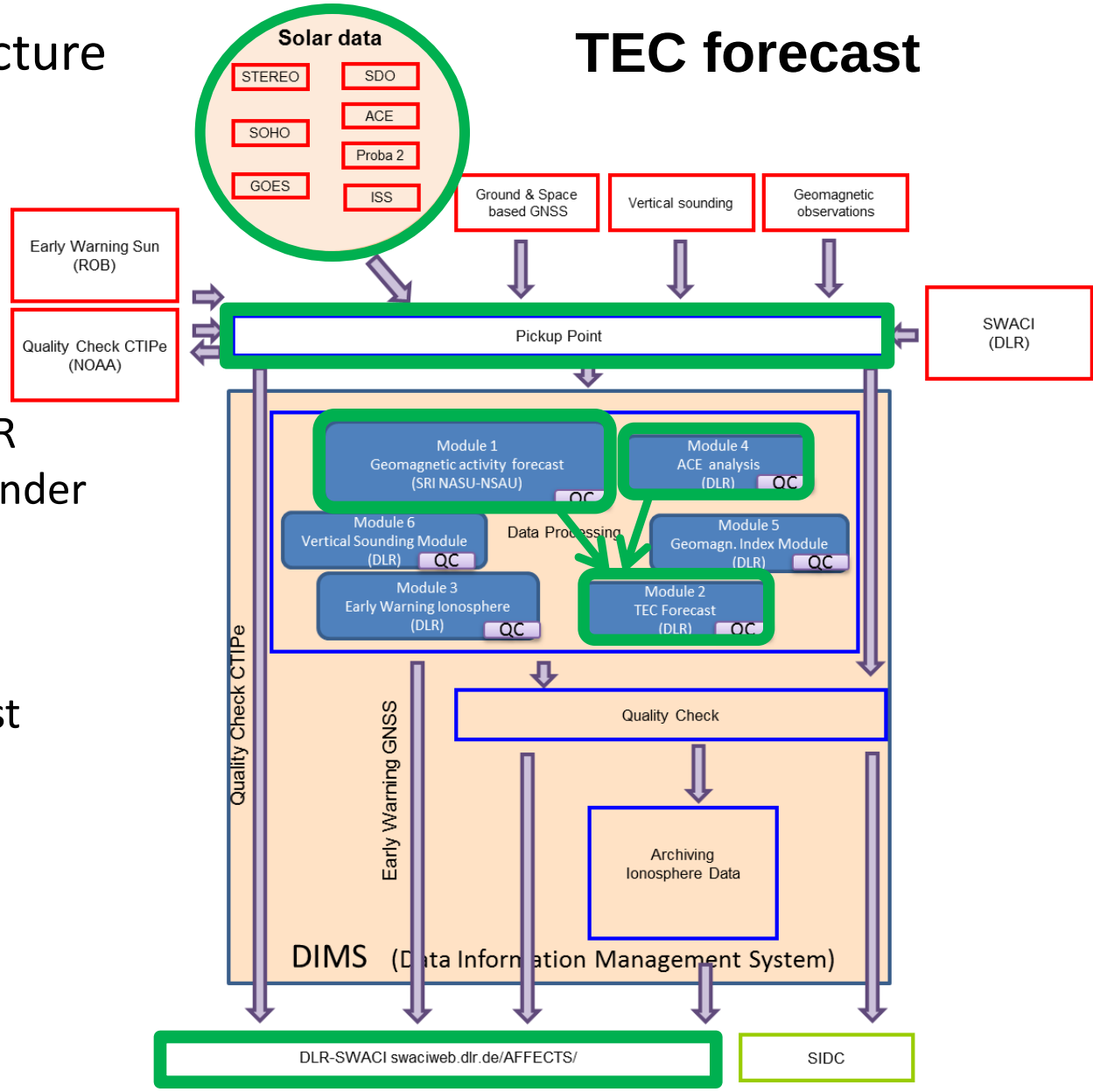
- Processor developed at SRI NASU-NSAU
- Predicts the geomagnetic index Dst up tp 4 hours in advance, storm onset definition
- Input: ACE data and previous Dst values
- Output: Dst forecast data file

HOY	HTND	YYYY	MM	DD	DOY	HH	Dst [nT]	FC+01H [nT]	FC+02H [nT]	FC+03H [nT]	FC+04H [nT]
653	476	2013	1	28	28	4	-15.	-13.	-15.	-12.	-13.
654	475	2013	1	28	28	5	-17.	-16.	-14.	9999.	-12.
655	474	2013	1	28	28	6	-17.	-17.	-16.	-15.	-15.
656	473	2013	1	28	28	7	-19.	-15.	-17.	-15.	-14.

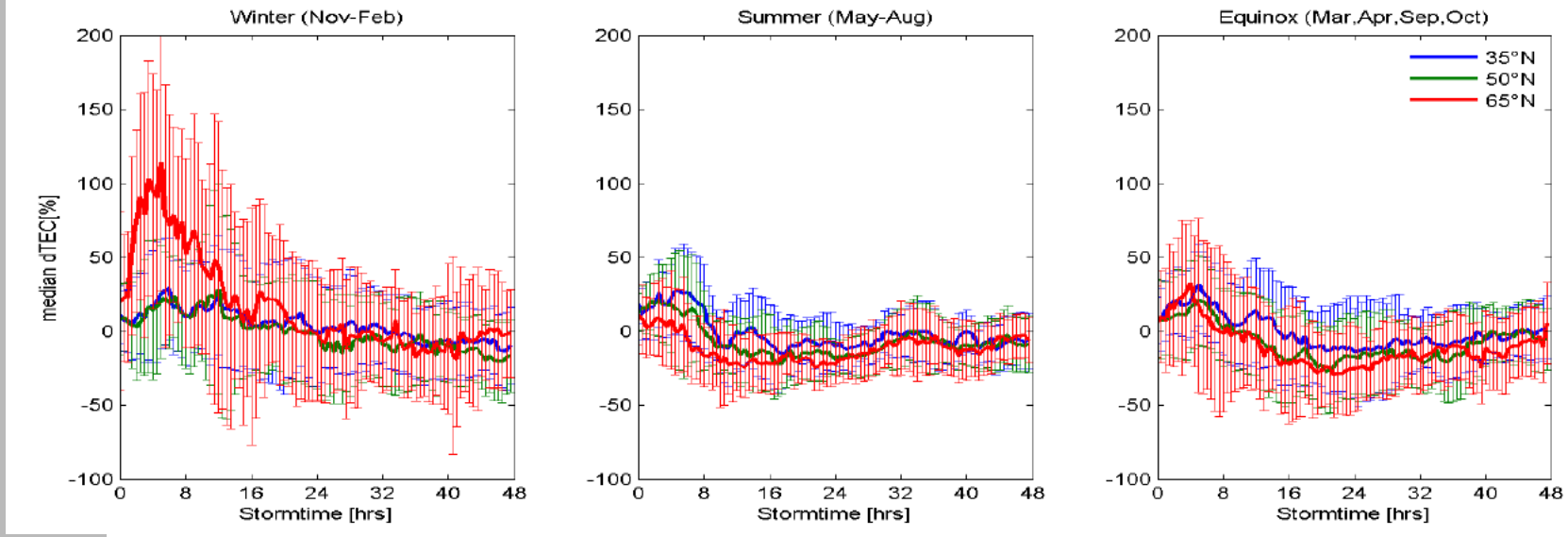


System architecture overview

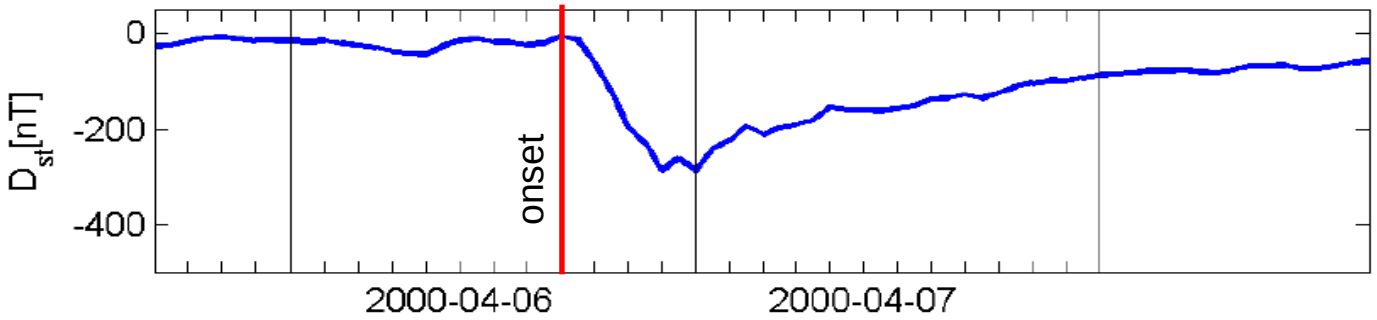
- Processor developed at DLR
- Predicts TEC over Europe under perturbed conditions (24 hours in advance)
- Input: ACE data
  Geomagnetic forecast
  TEC maps
- Output: TEC forecast maps



- 67 geomagnetic storms over europe in the periode 1995-2009 analysed
- Superposition of median differential TEC values for storms of defined subsamples depending on season, storm time and latitude
- Parametrization of a mean storm behaviour within the subsamples

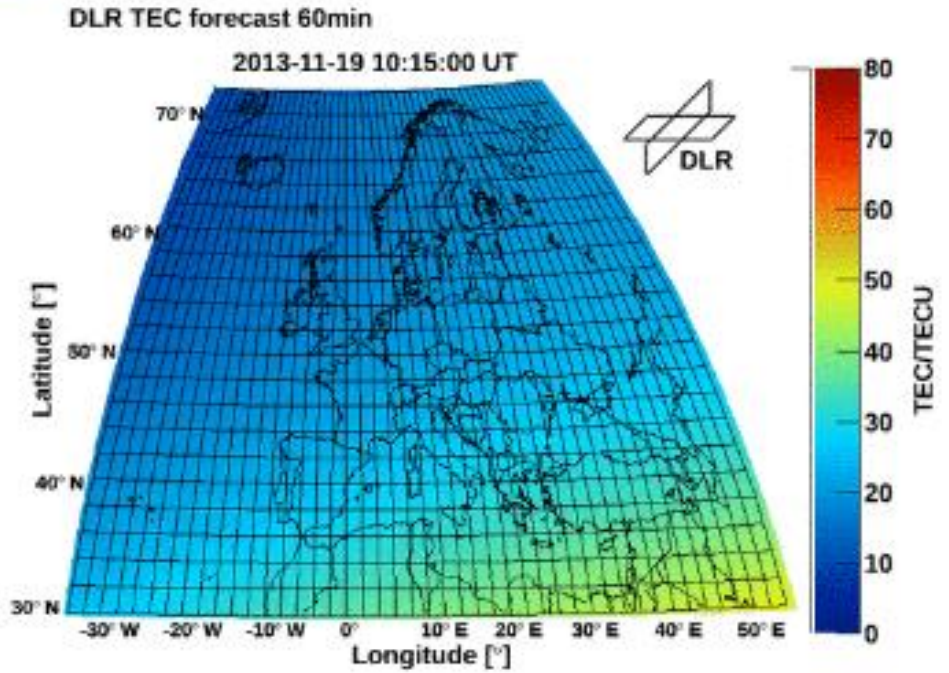


Example for defining the storm onset via the forecasted Dst index.



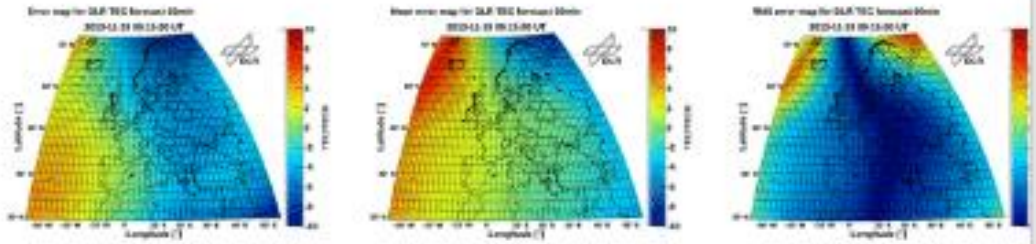
TEC Forecast

60 min | 120 min | 360 min | 720 min | 1440 min



Link to current DAT-file, please click here: DAT

DLR TEC Error views



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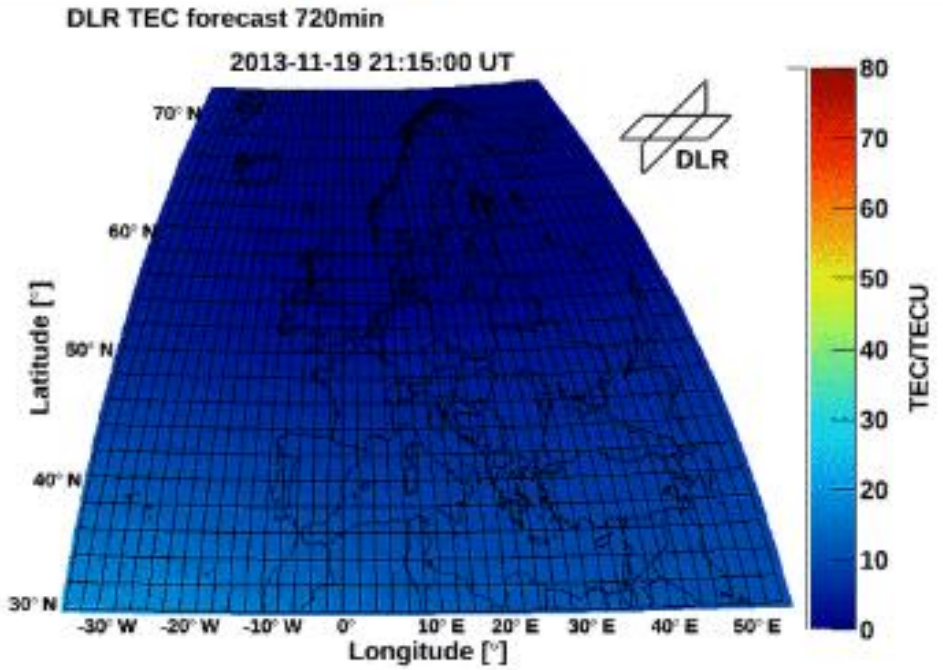

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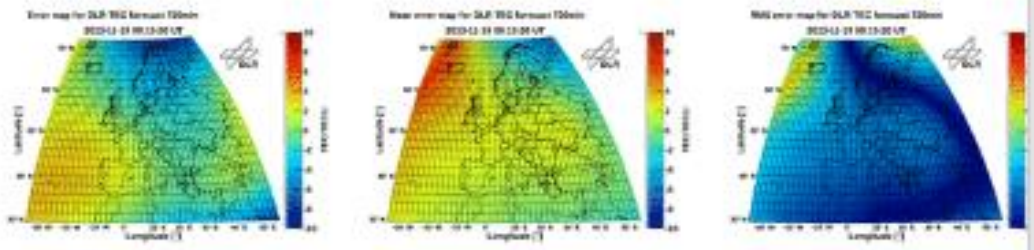
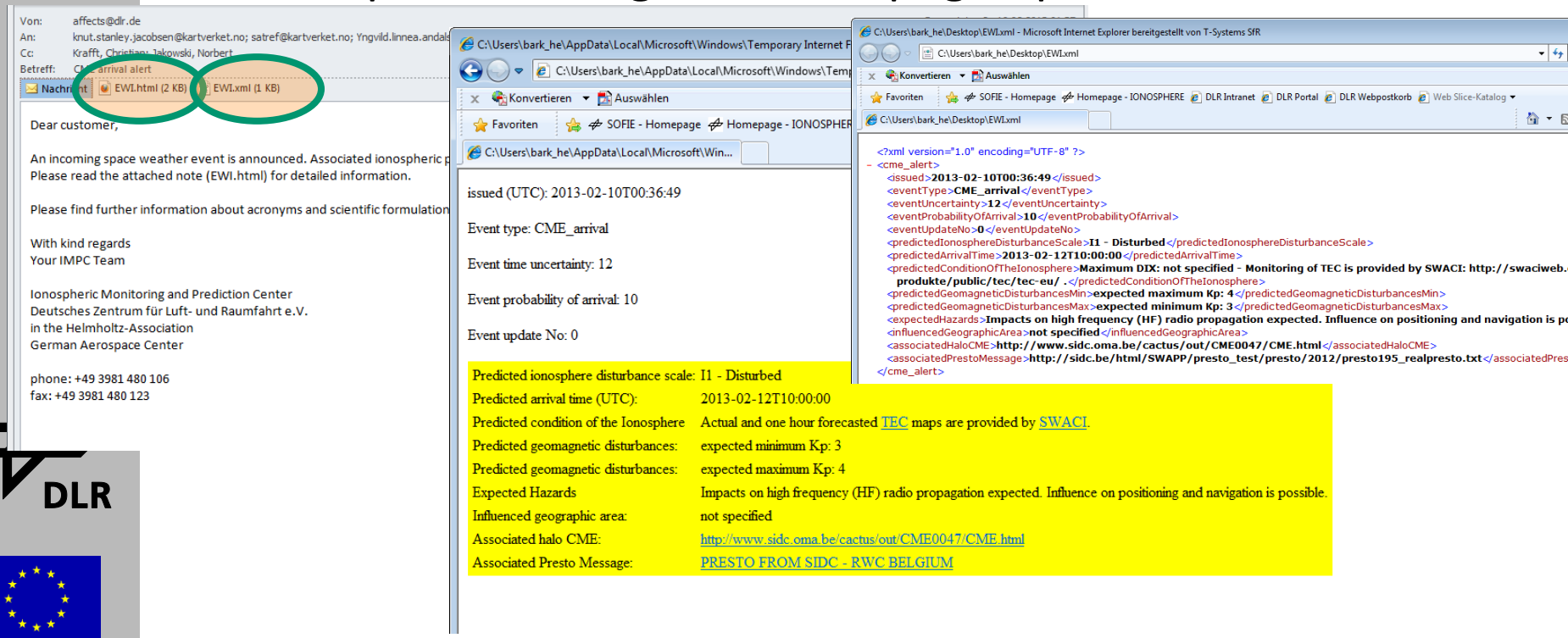
DLR TEC Error views



Early Warning Message

- Processor developed at DLR
- Generates an early warning message primarily directed to users of GNSS systems
- Input: Solar alerts disseminated by ROB (UGOE)
- Output: Warning mail, Webpage update



Automated check system for FSI products.

The system allows to detect missing products at the earliest possible time and informs the corresponding colleagues for maintenance via email.

Warning:

You got this automatically generated message because the following products on swaciweb.dlr.de are outdated or not available:

Product	Status	Delay	Maximal Delay
Total Electron Content (TEC)	304: Ok	31 minutes 07 seconds	20 minutes 00 seconds
One Hour TEC Forecast	304: Ok	31 minutes 00 seconds	20 minutes 00 seconds
TEC Error	304: Ok	31 minutes 01 seconds	20 minutes 00 seconds
TEC Forecast Quality	304: Ok	31 minutes 01 seconds	20 minutes 00 seconds
TEC Median - 27 days	304: Ok	31 minutes 07 seconds	20 minutes 00 seconds
Model Total Electron Content (TEC)	304: Ok	31 minutes 10 seconds	20 minutes 00 seconds
TEC Gradient - Latitude	304: Ok	31 minutes 04 seconds	20 minutes 00 seconds
TEC Gradient - Longitude	304: Ok	31 minutes 04 seconds	20 minutes 00 seconds
TEC Rate	304: Ok	31 minutes 15 seconds	20 minutes 00 seconds

Please note:

This message was sent to the following receivers:

- Martin.Kriegel@dlr.de

Thanks for your attention!

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