

# Access to data products for TID identification

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Earth Physics  
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Horizon  
Europe

# Access to data products for TID identification

- I used the products for TID identification during my TNA project
- I mainly used the TechTIDE Warning Services User Interface

[https://esc.pithia.eu/data-collections/DataCollection\\_TechTIDE\\_LSTIDx/](https://esc.pithia.eu/data-collections/DataCollection_TechTIDE_LSTIDx/)

<https://techtide-srv-pub.space.noa.gr/techtide/#/pages/intro>

- It offers different methods/products to determine the Large Scale and Medium Scale TIDs, a detailed description of the products is available in the following article:

Belehaki A, Tzagouri I, Altadill D, Blanch E, Borries C, et al. 2020. An overview of methodologies for real-time detection, characterisation and tracking of traveling ionospheric disturbances developed in the TechTIDE project. J. Space Weather Space Clim. 10, 42. <https://doi.org/10.1051/swsc/2020043>.

# Access to data products for TID identification



- I mainly used the TechTIDE Warning Services User Interface
- Here I present the most important products with a detailed case study
  - LSTIDs generated by the geomagnetic storm occurred 23-24 March, 2023

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## TechTIDE LSTID activity index

Time plot of the Large Scale Travelling Ionospheric Disturbances (LSTID) over European and South African Digisonde stations, providing the relative standard deviation of the critical frequency of the F2 layer of the ionosphere (foF2) within an hour, updated every 15 min. The product provides the current level of ionospheric perturbation to warn space and ground systems' operators for activity related to large scale travelling ionospheric disturbances.

### Interact

Interaction Method	Description	Data Format	Link
Direct Link to Data Collection	The TechTIDE Warning Services provides a browser-based user interface for data browsing and downloading.	<a href="#">application/json</a> (click the link to show information on this ontology term)	<a href="#">Open TechTIDE Warning Services User Interface in new tab</a> 
Direct Link to Data Collection	The TechTIDE API provides a browser-based user interface for data browsing and downloading.	<a href="#">application/json</a> (click the link to show information on this ontology term)	<a href="#">Open TechTIDE API in new tab</a> 

### Identifier Properties

<b>Local ID</b>	DataCollection_TechTIDE_LSTIDx
<b>Namespace</b>	noa
<b>Version</b>	1
<b>Created</b>	Sunday 12th March 2023, 16:57:00
<b>Last Modified</b>	Monday 13th March 2023, 14:00:00

# Drivers – geomagnetic activity, 23 – 24 March 2023

The screenshot displays the TechTIDE website interface, which provides real-time data and warnings for geomagnetic activity. The main title is "TechTIDE - Drivers" with the subtitle "Warning and Mitigation Technologies for Travelling Ionospheric Disturbances Effects – TechTIDE".

The website features a navigation bar with the following elements:

- Logos for COMET3 - Space Weather 2017 and HORIZON 2020.
- TechTIDE logo.
- Navigation menu: HOME, API, INDIV SENSORS, INDICATORS, DRIVERS (highlighted), ACTIVITY, ABOUT, HELP, LOGIN.

The main content area is divided into several panels, each displaying a different indicator or driver:

- PC Index:** Real-time PC Index graph showing magnetic activity over time.
- AE Indices:** Real-time AE(10) indices graph for 2023-09-12, showing AL, AE, and AO indices.
- DST Index:** Real-time DST index graph for September 2023, showing the disturbance storm time (Dst) index.
- Global Earthquakes:** A world map showing the locations of global earthquakes.
- Solar Flares:** A screenshot of the NOAA SWPC/GOES website showing solar flare data.
- Solar and lunar eclipse:** A series of images showing the phases of the moon and the sun during a solar and lunar eclipse.
- Daynight Global Map:** A satellite-style map of the Earth showing day and night.
- Kp Index:** A bar chart showing the Kp index for 2023-09-12 (9-hour UTC).

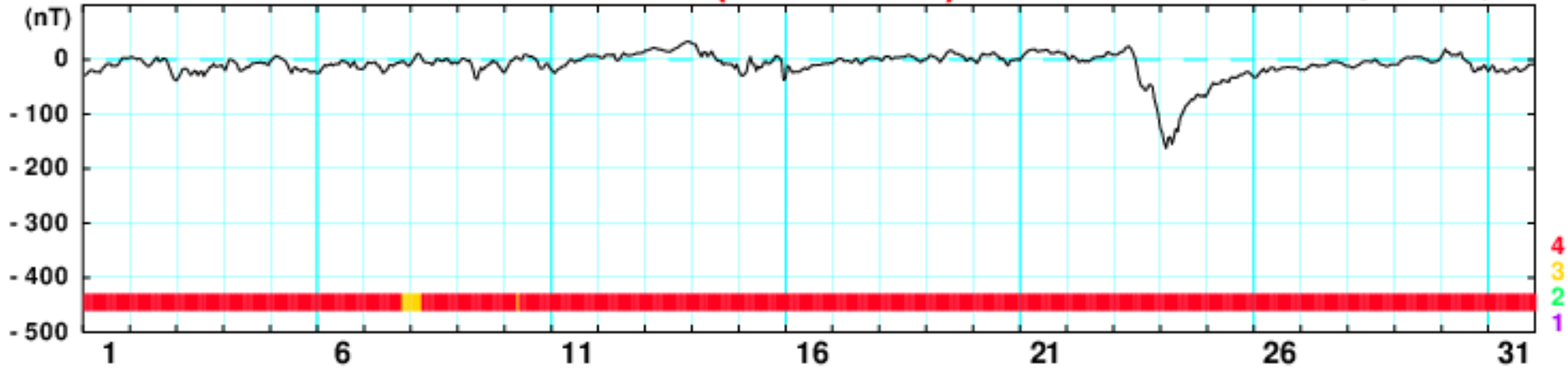
At the bottom of the page, there is a footer with the HORIZON 2020 logo and text: "from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776011." The European Union flag is also visible.

# Drivers – geomagnetic activity, 23 – 24 March 2023

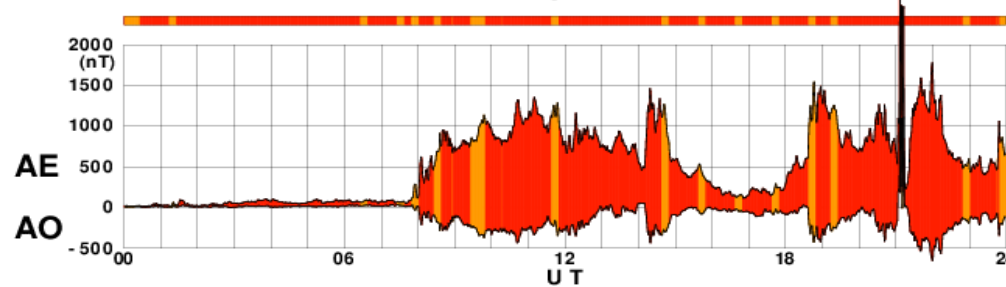
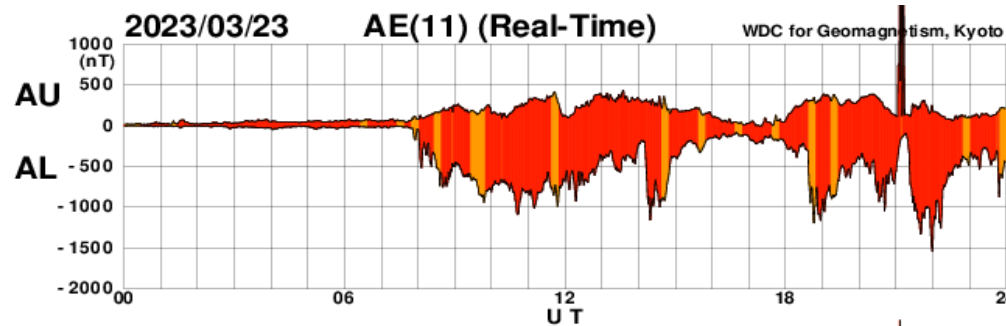
March 2023

Dst (Real-Time)

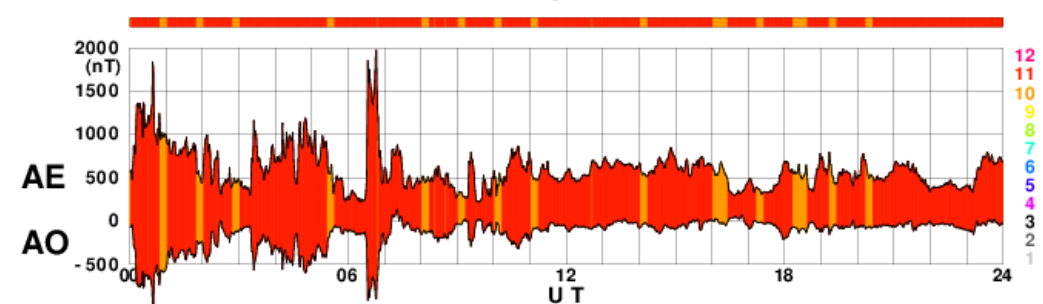
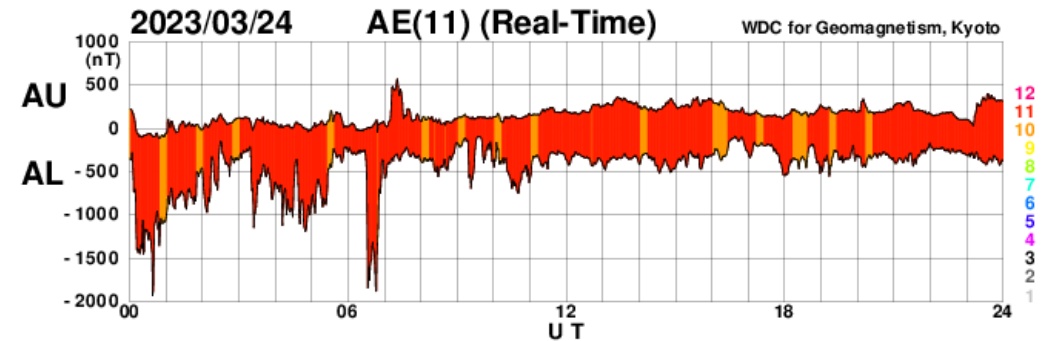
WDC for Geomagnetism, Kyoto



[Created at 2023-06-30 15:05UT]



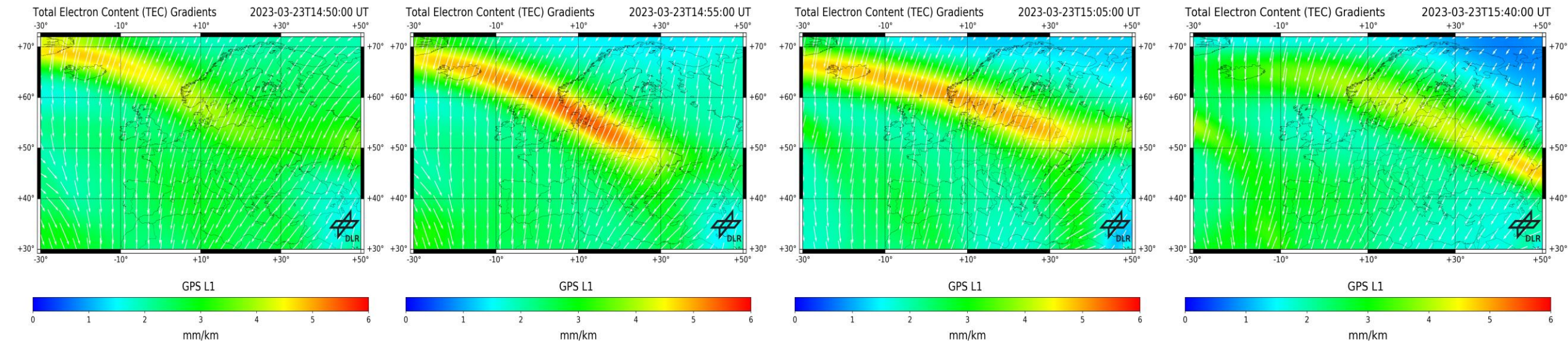
[Created at 2023-06-30 15:12UT]



[Created at 2023-06-30 15:12UT]

# LSTID activity on March 2023 - Indicators

- **AATR Global Map, AATR EU Map** - AATR is an indicator for LSTID activity. Along the Arc TEC Rate (AATR) indicator method
- **AATR Daily Plot** - Daily plot of the AATR indicator at four locations at high, middle and low latitudes.
- **GNSS TEC gradient method** - European map of gradients in vertical TEC, which at high latitudes are considered to be precursors of LSTID activity.

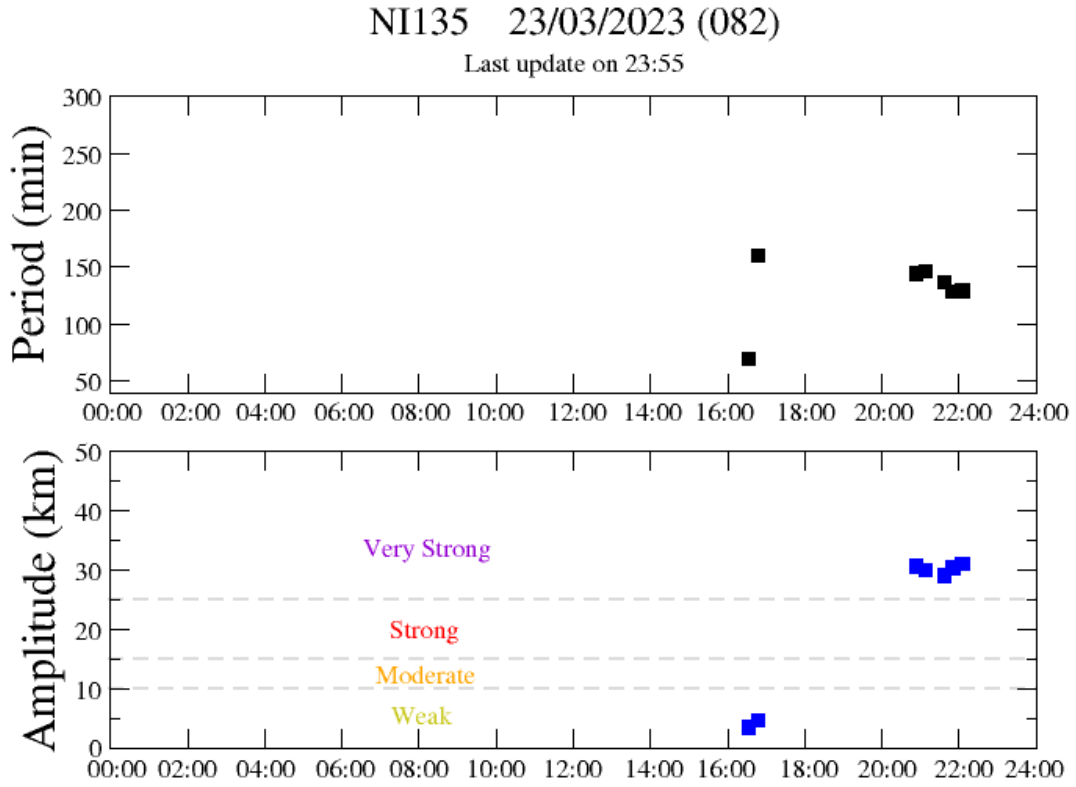
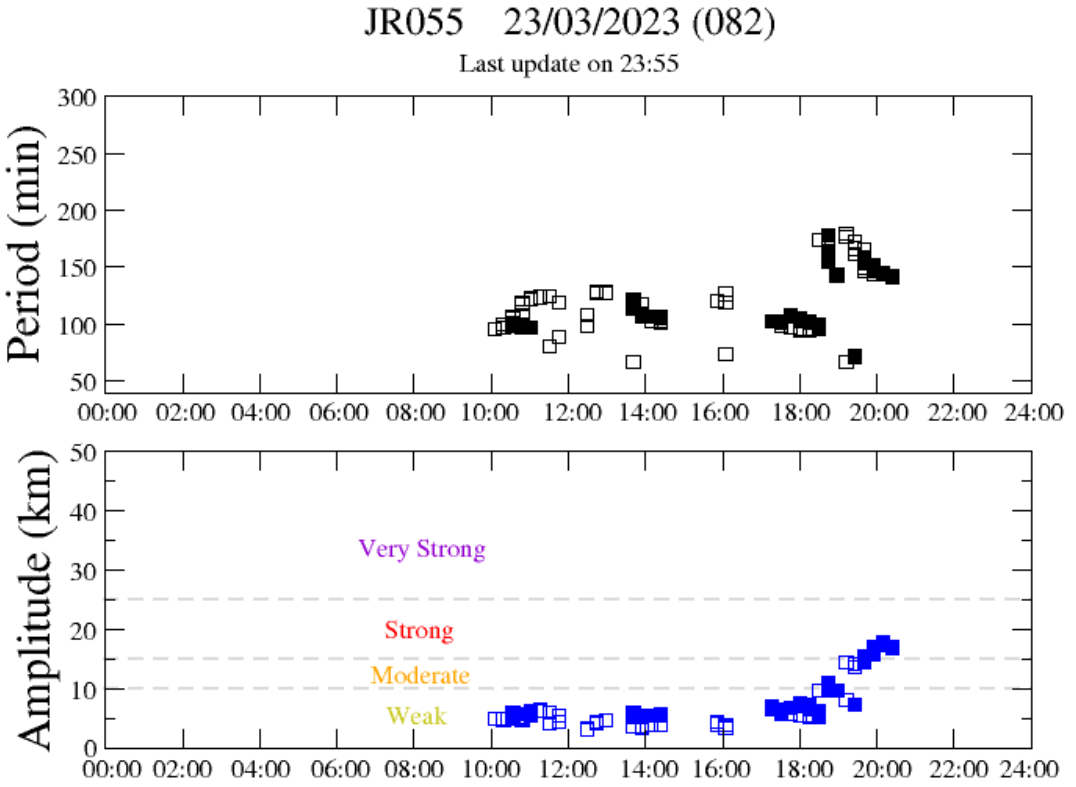


## LSTID activity on March 2023 – Individual Sensors

- **MSTIDidx Global Map** - The global map of the MSTID activity index (MSTIDidx) with 5 min refresh rate. Spatial and Temporal GNSS analysis provides the MSTID index (MSTIDidx)
- **MSTIDidx Daily Plot** - The daily plot for the MSTID index dynamically refreshed every 5 min, with the results from four representative GNSS receivers at high, middle and low latitudes.
- **CDSS Doppler Shift** - Doppler shift recorded with the Continuous Doppler Sounding System located in Czech Republic.

# LSTID activity on March 2023 – Individual Sensors

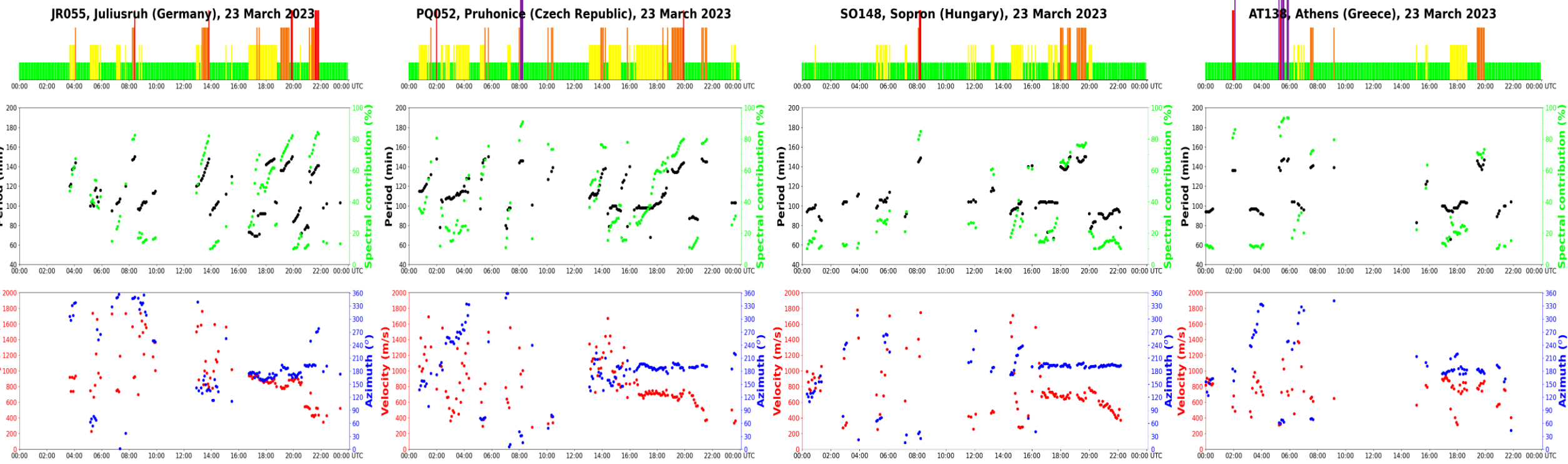
- **HTI EU Map** - Results from the height-time-reflection intensity (HTI) method over Digisonde stations in Europe, indicative of LSTID activity.
- **HTI Station Plots** - Station plots of the height-time-reflection intensity (HTI) method results, indicative for LSTID activity.





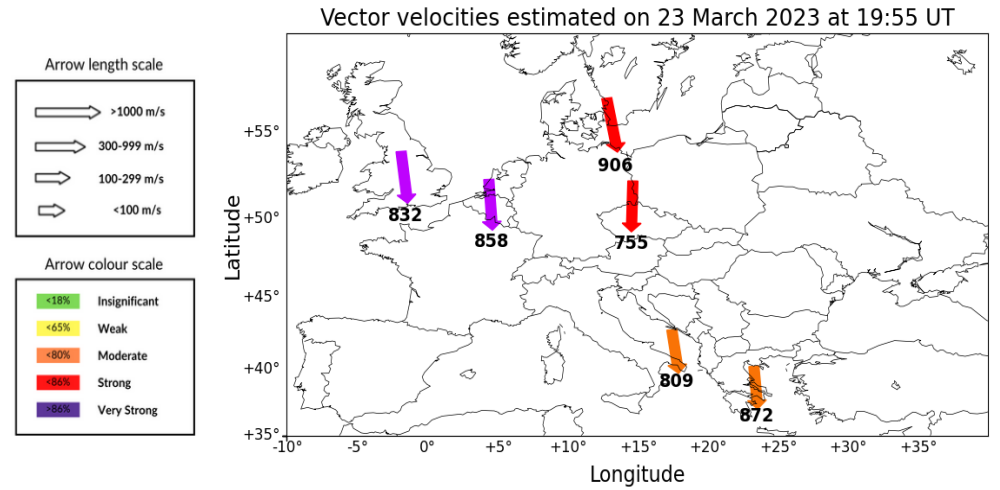
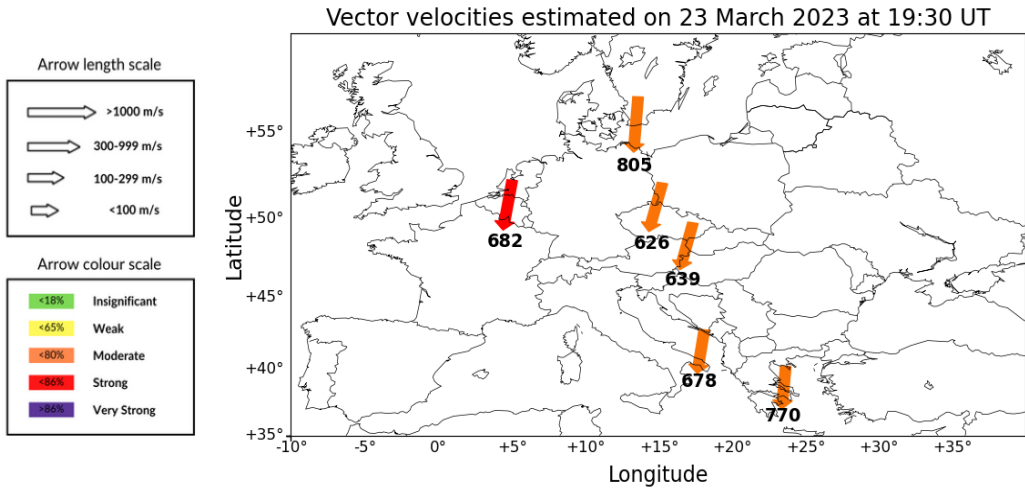
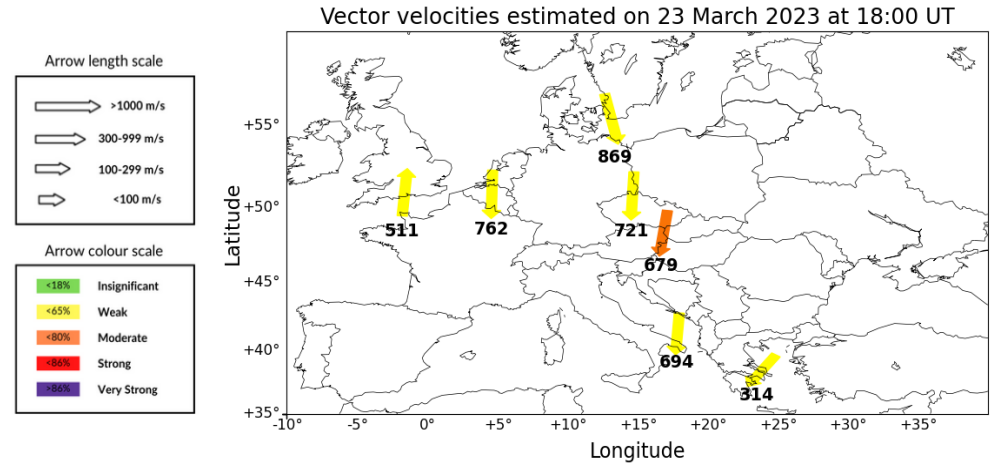
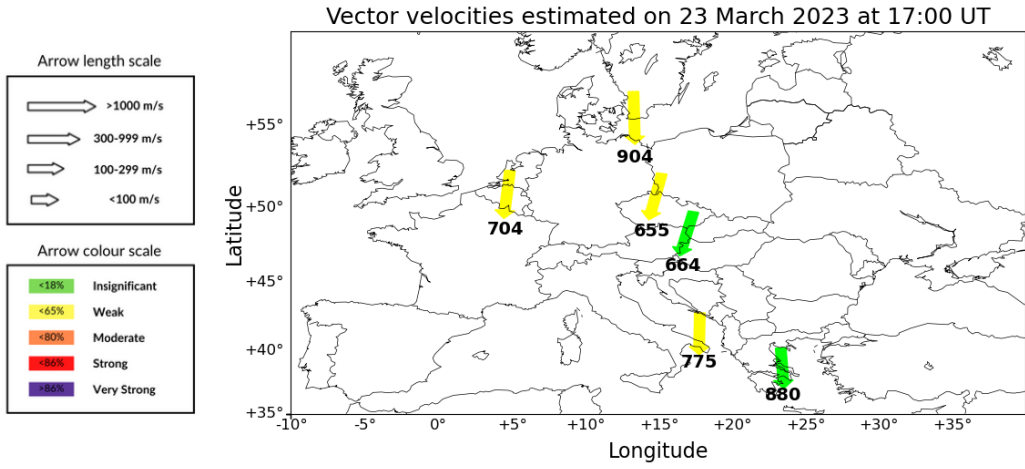
# LSTID activity on March 2023 – Individual Sensors

- **HFI Station Plots** – Station plots of the HF Interferometry (HFI) method results, at each Digisonde location, indicative for LSTID activity.



# LSTID activity on March 2023 – Individual Sensors

- HFI EU Map** – Results from the HF Interferometry (HFI) method over Digisonde stations in Europe, indicative for LSTID activity.





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# Thank You!

Belehaki A, Tsagouri I, Altadill D, Blanch E, Borries C, et al. 2020. An overview of methodologies for real-time detection, characterisation and tracking of traveling ionospheric disturbances developed in the TechTIDE project. *J. Space Weather Space Clim.* 10, 42.  
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