
Relationship between GICs and SuperSubStorms: a case study

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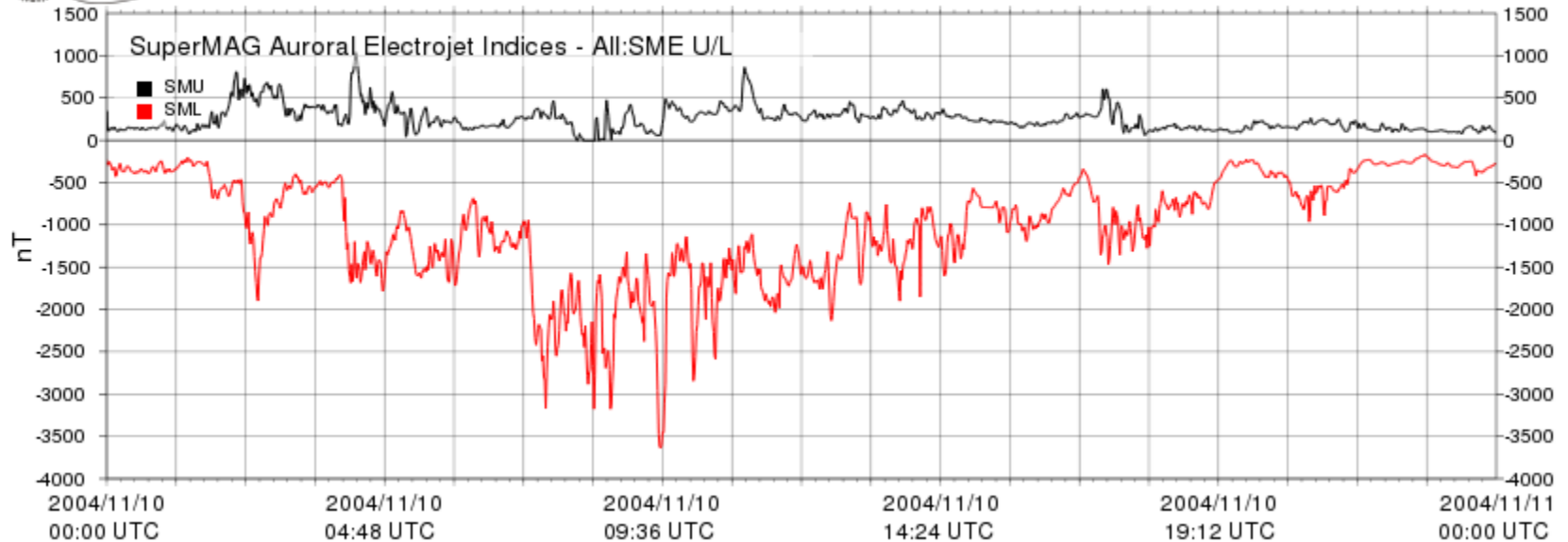


Russian-Bulgarian Project

Name: "Investigation of the geomagnetic disturbances propagation to mid-latitudes and their interplanetary drivers identification for the development of mid-latitude space weather forecast"

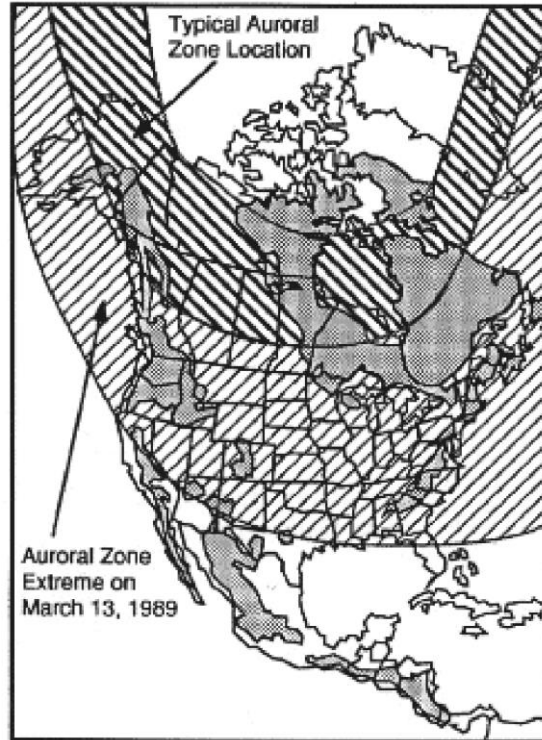
Goal: the analysis of the physical background for possibilities of developing methods of mid-latitudes magnetic disturbances forecast

Supersubstorm (SSS)



Geomagnetically Induced Currents (GICs)

- low-frequency currents flowing in earth-ground conductor systems owing to rapid changes of the geomagnetic fields
- ground manifestation of the complex space weather chain
- can cause the blackout



Gray area is a igneous rock. Power systems in these areas are the most vulnerable to the effects of intense geomagnetic activity because the high resistance of the igneous rock encourages GICs to flow in the power transmission lines situated above the rock.

STATION SELECTION

Vykhodnoy
Select GIC station

Lovozero
Select MAGNETIC station

CALENDAR

Previous day Next day

Use ← and → keys to navigate using keyboard

Sep 2021

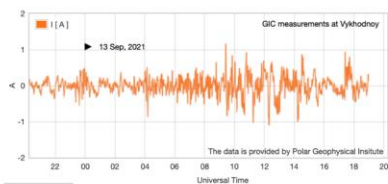
Su Mo Tu We Th Fr Sa

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4		
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Calendar colors description:

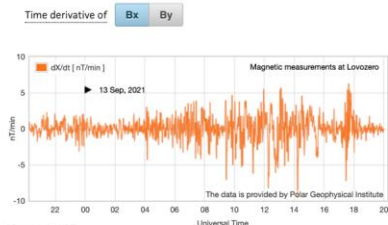
- 31 - GIC & magnetic data is available
- 31 - GIC data is available (magnetic - not)
- 31 - Magnetic data is available (GIC - not)
- 31 - GIC & magnetic data is not available

GIC MEASUREMENTS



Save As PNG

MAGNETIC FIELD MEASUREMENTS



Save As PNG

GIC PLOT ADJUSTMENTS

Y-axis range: **Auto** Manual

Move slider to adjust the y-axis range

Curve color:



MAGNETIC PLOT ADJUSTMENTS

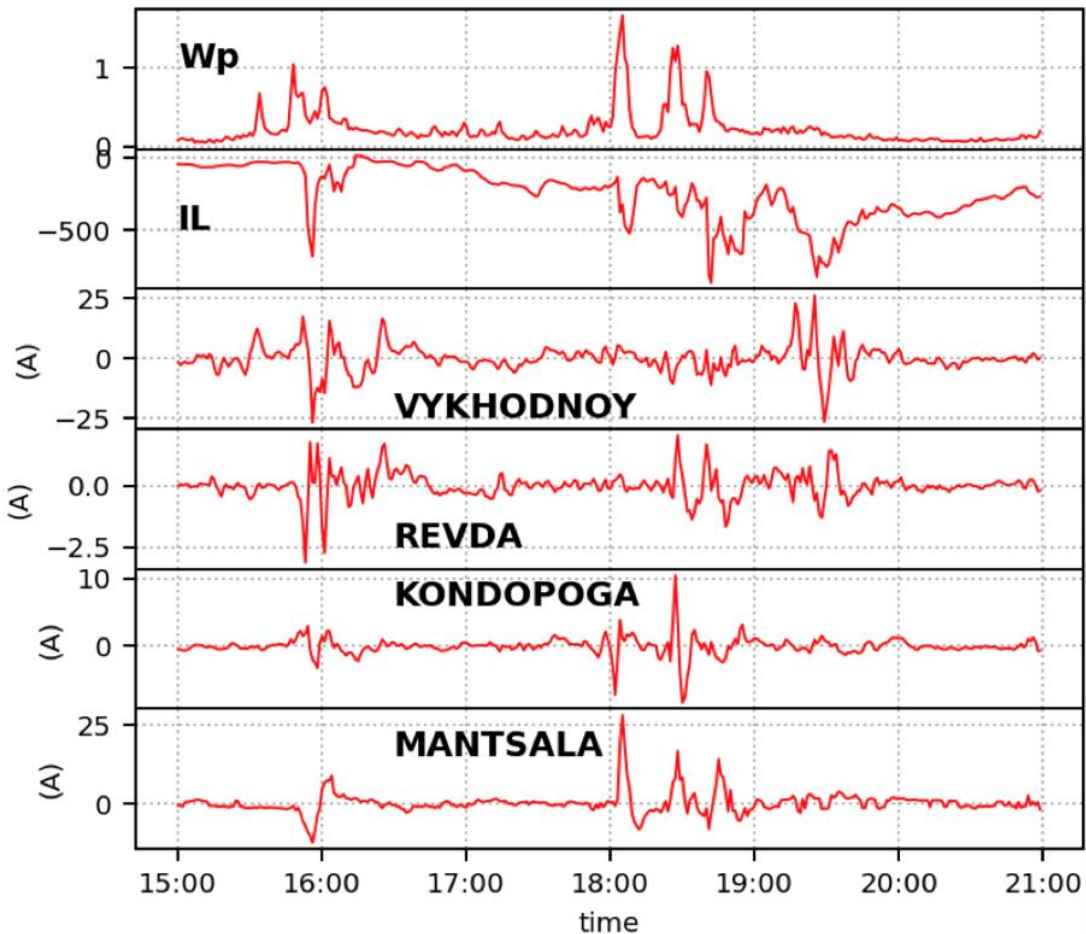
Y-axis range: **Auto** Manual

Move slider to adjust the y-axis range

Curve color:



17 March 2013



Wp index (wave planetary) -
wave activity of substorm
[Nose et al. 2012]

IL index - westward electrojet
intensity on the IMAGE meridian

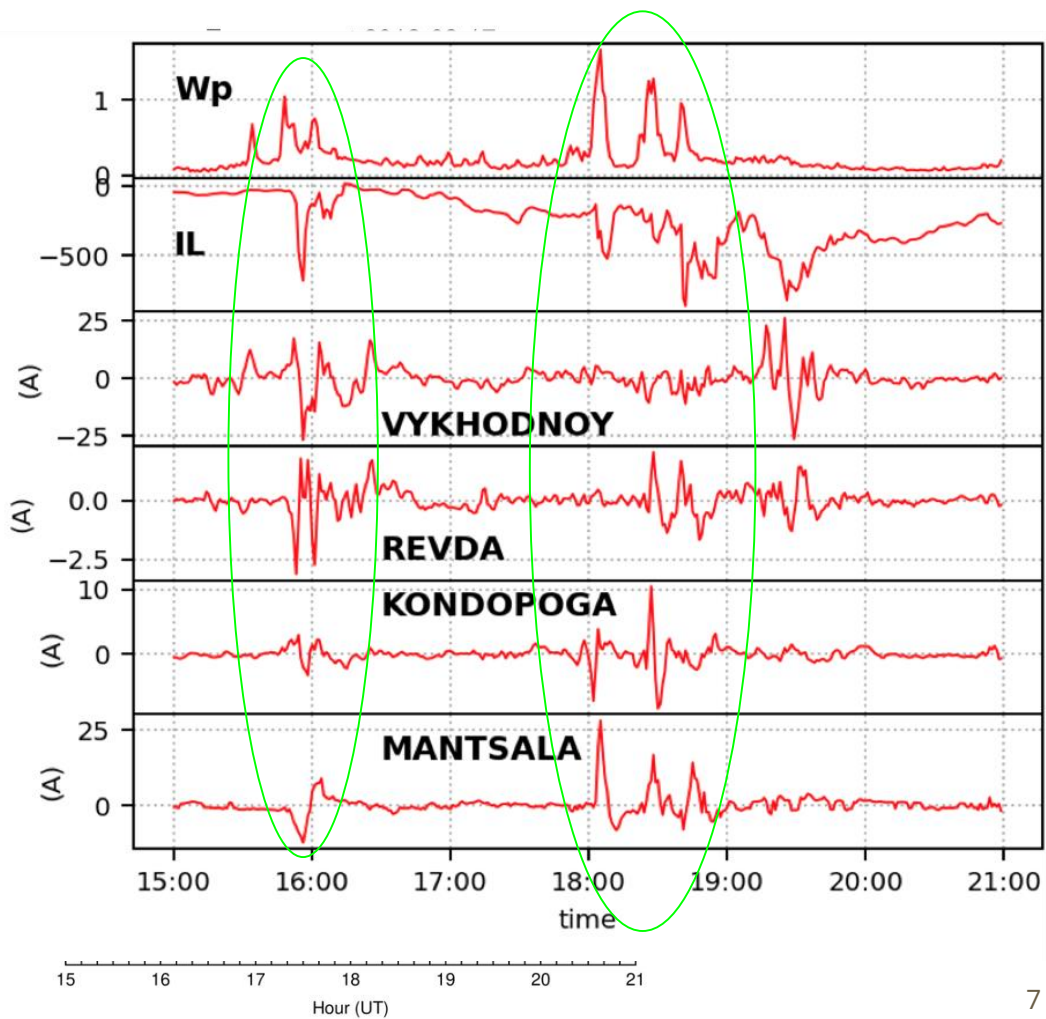
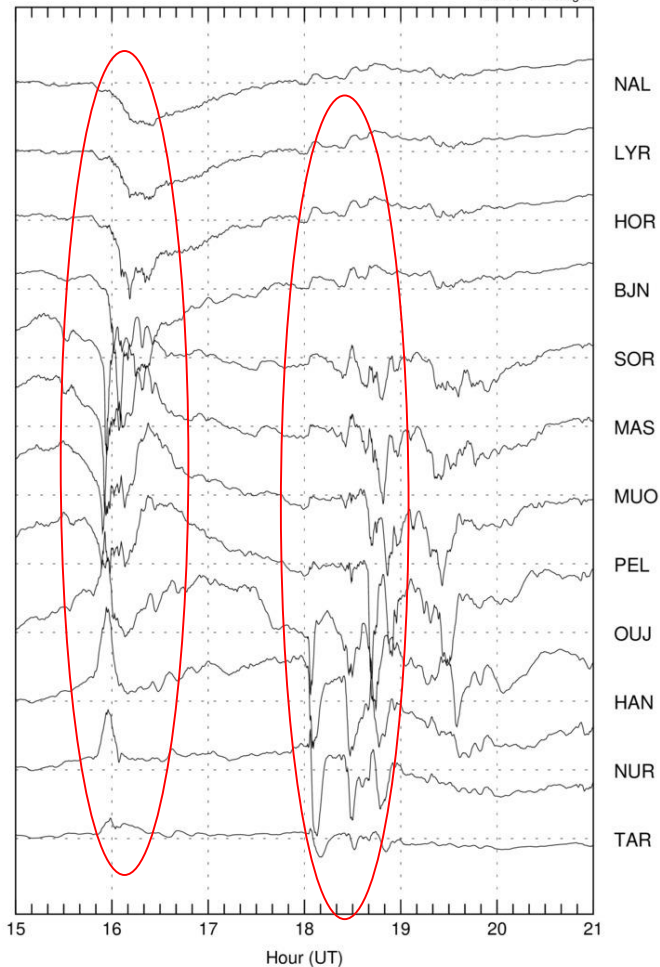
"Northern Transit"

Gas pipeline

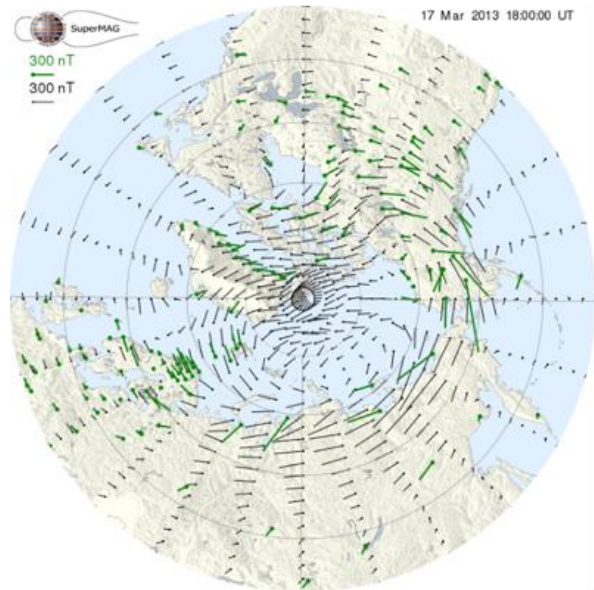
X component 2013-03-17

10 second averages

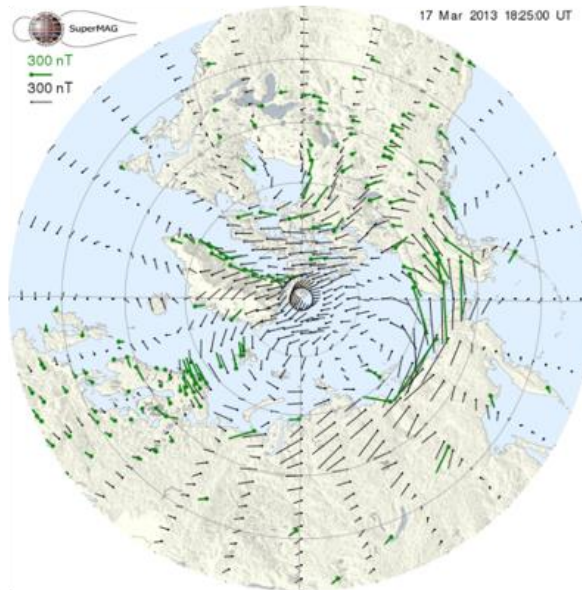
500 nT



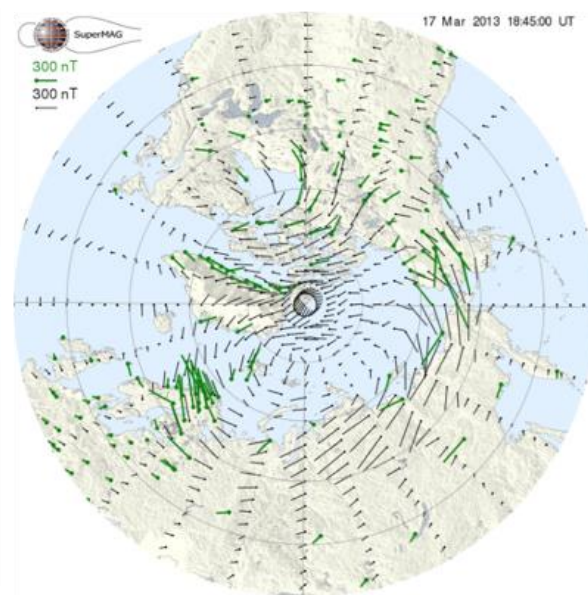
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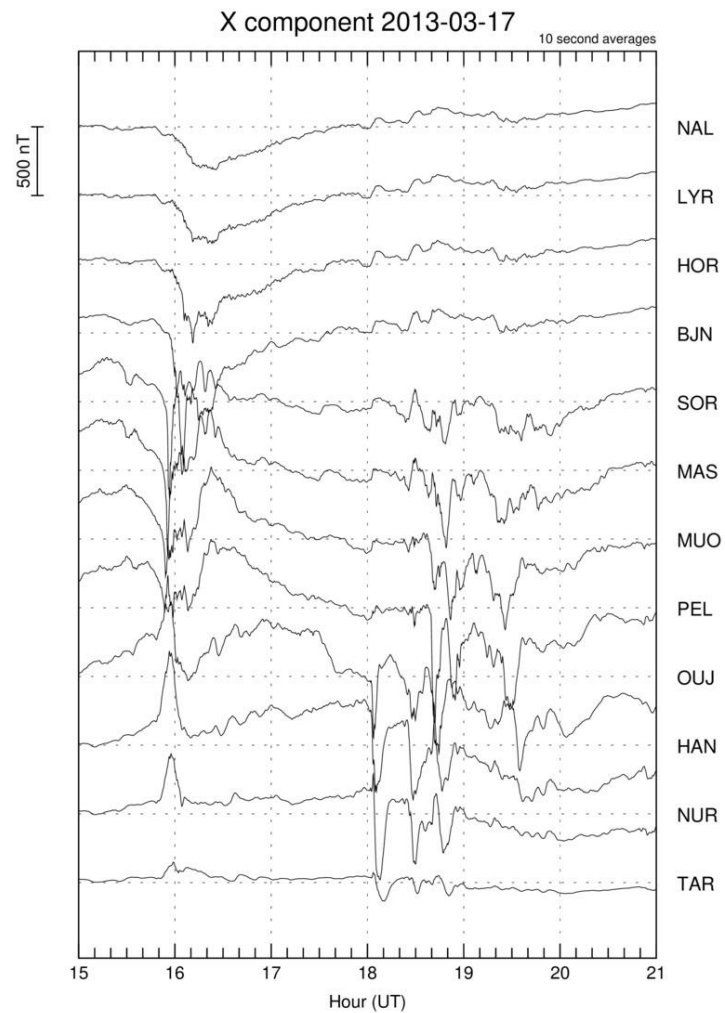
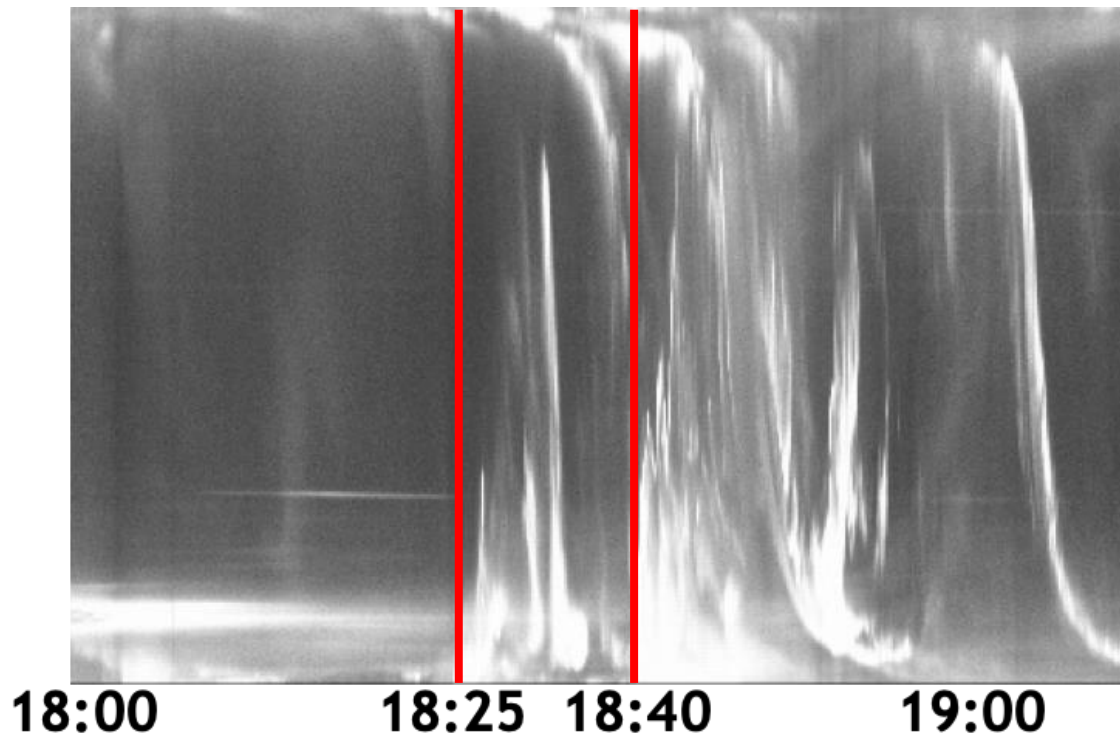
18:25



18:45



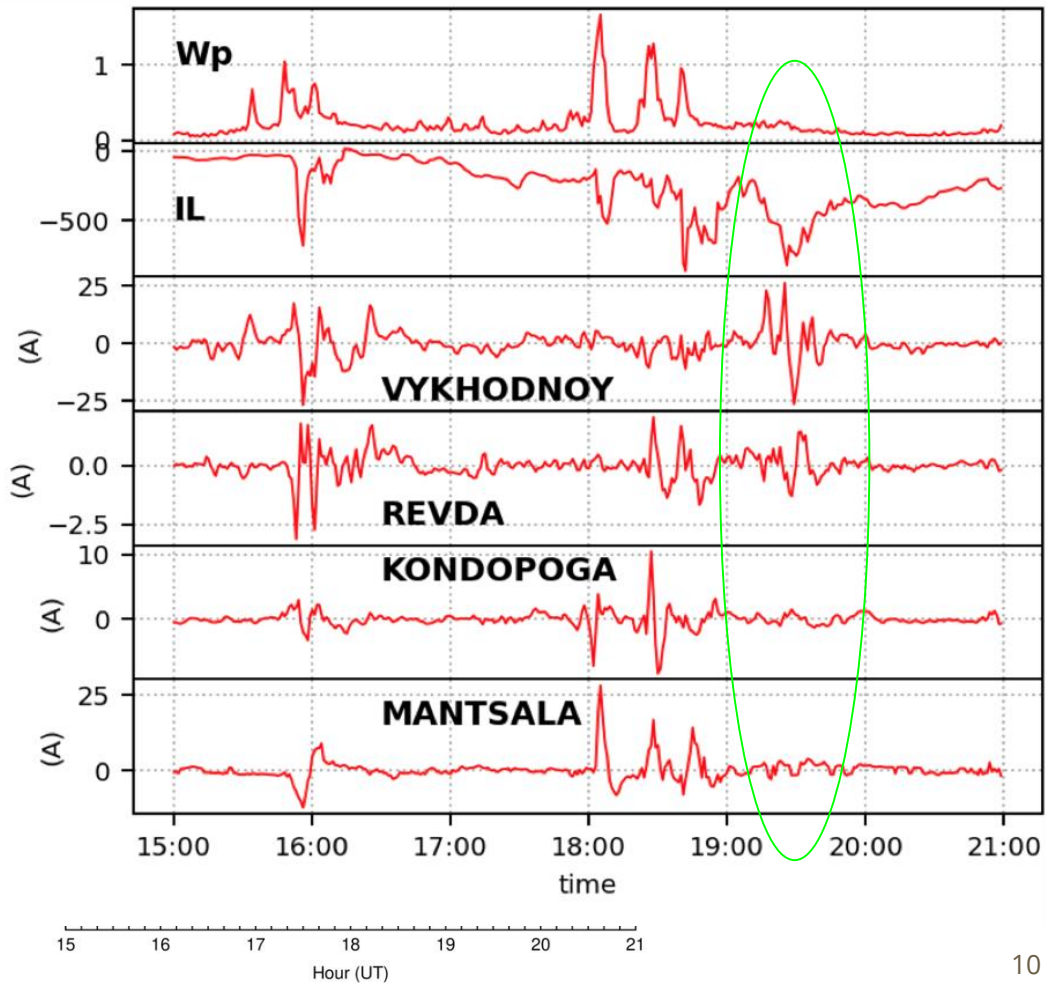
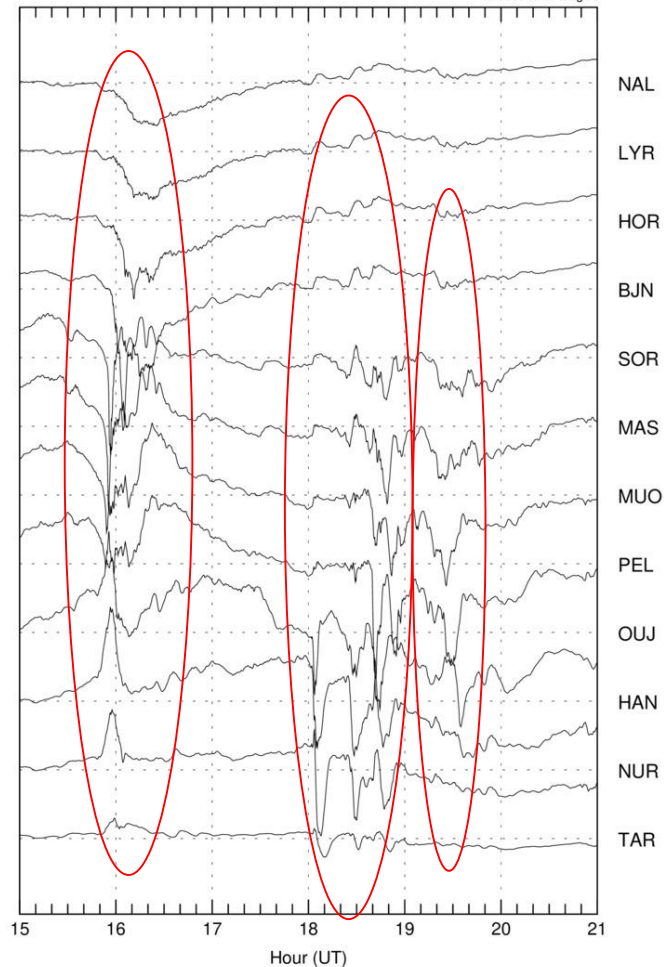
All-sky camera keogram



X component 2013-03-17

10 second averages

500 nT



Conclusion?

In cases under consideration:

- there is good agreement between profiles of GICs and profiles of the Wp and IL indices
- managed to trace the development of GICs on the meridional profile (from Mantsala to Vykhodnoy) in accordance with the spatial distribution of the substorm

Thank you for attention

feel free to ask question
and contact me:
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