

# *Preliminary investigation of the possibility of GLC development in Greece*

Adamantia Zoe Boutsis <sup>(1,2)</sup>, Georgios Balasis <sup>(1)</sup>, and Ioannis A. Daglis <sup>(2,1)</sup>

<sup>1</sup>IAASARS, National Observatory of Athens, Greece

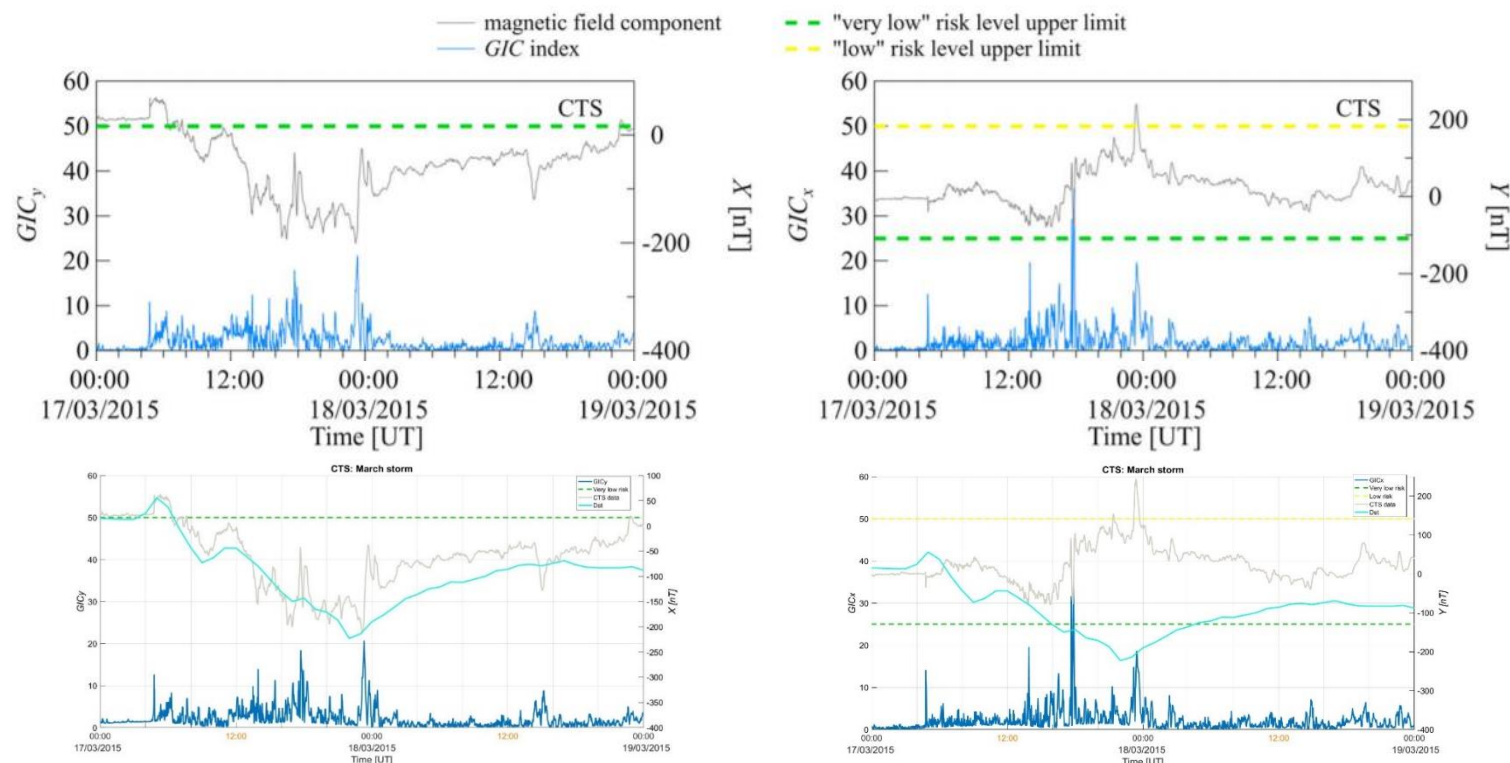
<sup>2</sup>Department of Physics, National and Kapodistrian University of Athens, Greece

Method

Data /  
Results

Remarks





Reproduction of the GIC index results (Tozzi et al., 2019) for Italy during the 2015 St. Patrick's storm.

GIC index:

1. Remove linear trend from geomagnetic field time series
2. Apply the following formulas (Marshall et al., 2011) using moving windows of 1440 points, each:

- $GIC_x(t) = |FFT\{Y(f)Z(F)\}^{-1}|$
- $GIC_y(t) = |FFT\{X(f)Z(F)\}^{-1}|$

$$Z(f) = e^{i\pi/4} \sqrt{f/f_N} \quad (\text{filter function})$$

$f$ : variable frequency

$f_N$ : Nyquist frequency ( $f_N=8.3$  mHz for sampling rate: 1 value/min)

## ENIGMA Magnetometer Network

<http://enigma.space.noa.gr/>:

Station	Latitude (°N)	Longitude (°E)	Sampling frequency
Klokotos (THL)	39.565	22.014	5 Hz
Dionysos (DIO)	38.078	23.933	1 Hz
Velies (VLI)	36.718	22.947	1 Hz
Finokalia (FIN)	35.338	25.670	10 Hz

Additional data used:			
Penteli (PEG)	38.100	23.900	1 Hz



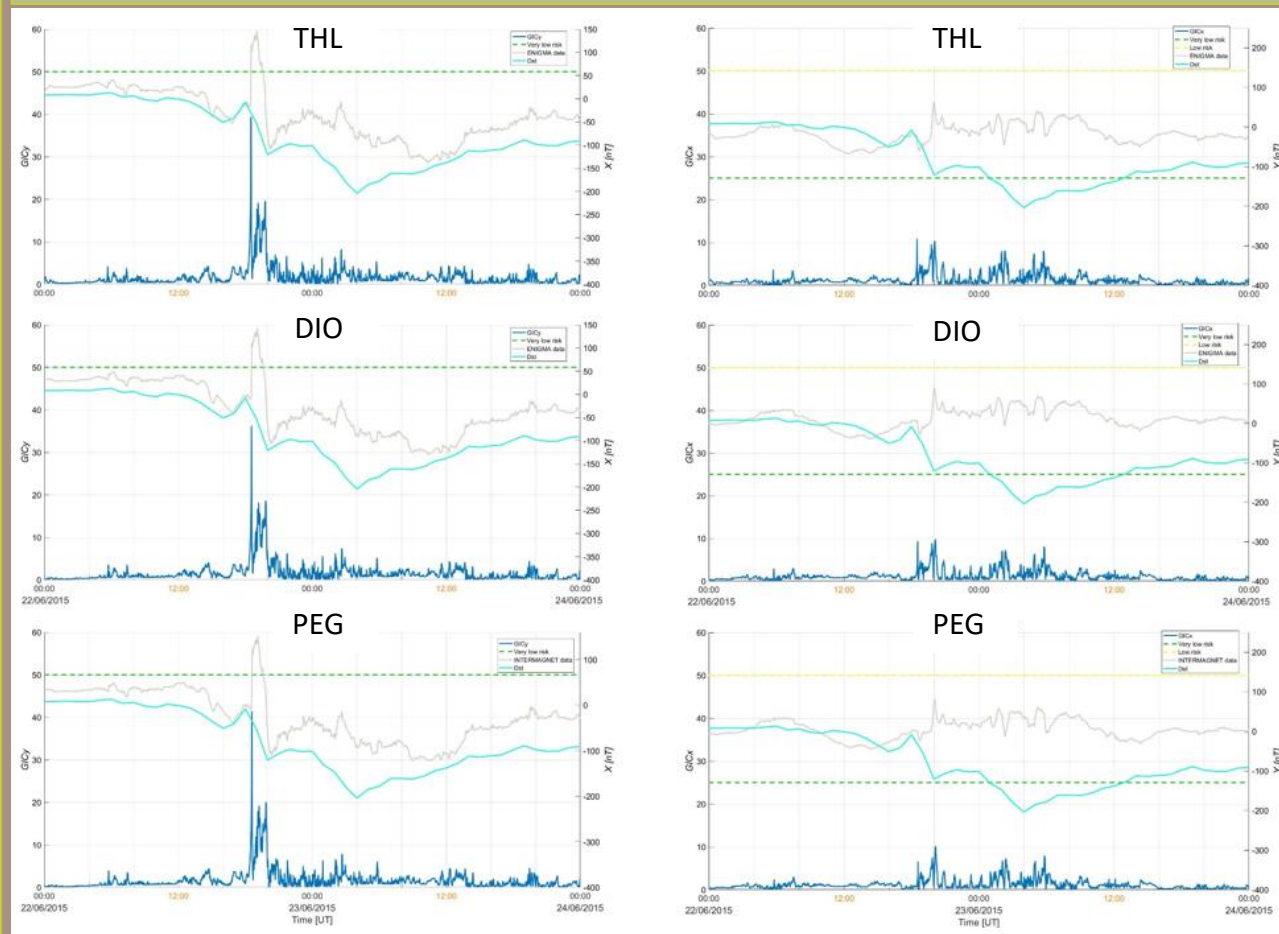
## Strongest geospace magnetic storms of solar cycle 24:

A/A	Date	Dst index*
1	17/03/2015	-223
2	23/06/2015	-204
3	26/08/2018	-174
4	20/12/2015	-155
5	25/10/2011	-147
6	09/03/2012	-145
7	15/07/2012	-139
8	17/03/2013	-132
9	28/05/2017	-125
10	07/10/2015	-124

Calculation of the GIC index for Greece during the 4 most intense storms of solar cycle 24.

Here, the results of the 23 June 2015 event are displayed:

## Magnetic storm of 23 June 2015 ( $Dst = -204$ nT)



GIC index is a **proxy** of the geoelectric field and is estimated straightforwardly from **magnetic field data**.

GIC index provides a first estimation of the risk level due to geomagnetically induced currents around the area of the magnetic station / observatory.

Our results show that the higher the geographic latitude of the magnetic station / observatory, the higher the GIC index values that are calculated.

At a first glance, during the investigated storms Greece did not seem to be much affected by geomagnetically induced currents.

However, it should be noted that the present GIC index is calculated without taking into account the **geoelectrical structure** of the area that the station is located (i.e., the electrical conductivity of the subsurface), which might seriously affect the development of GIC.