

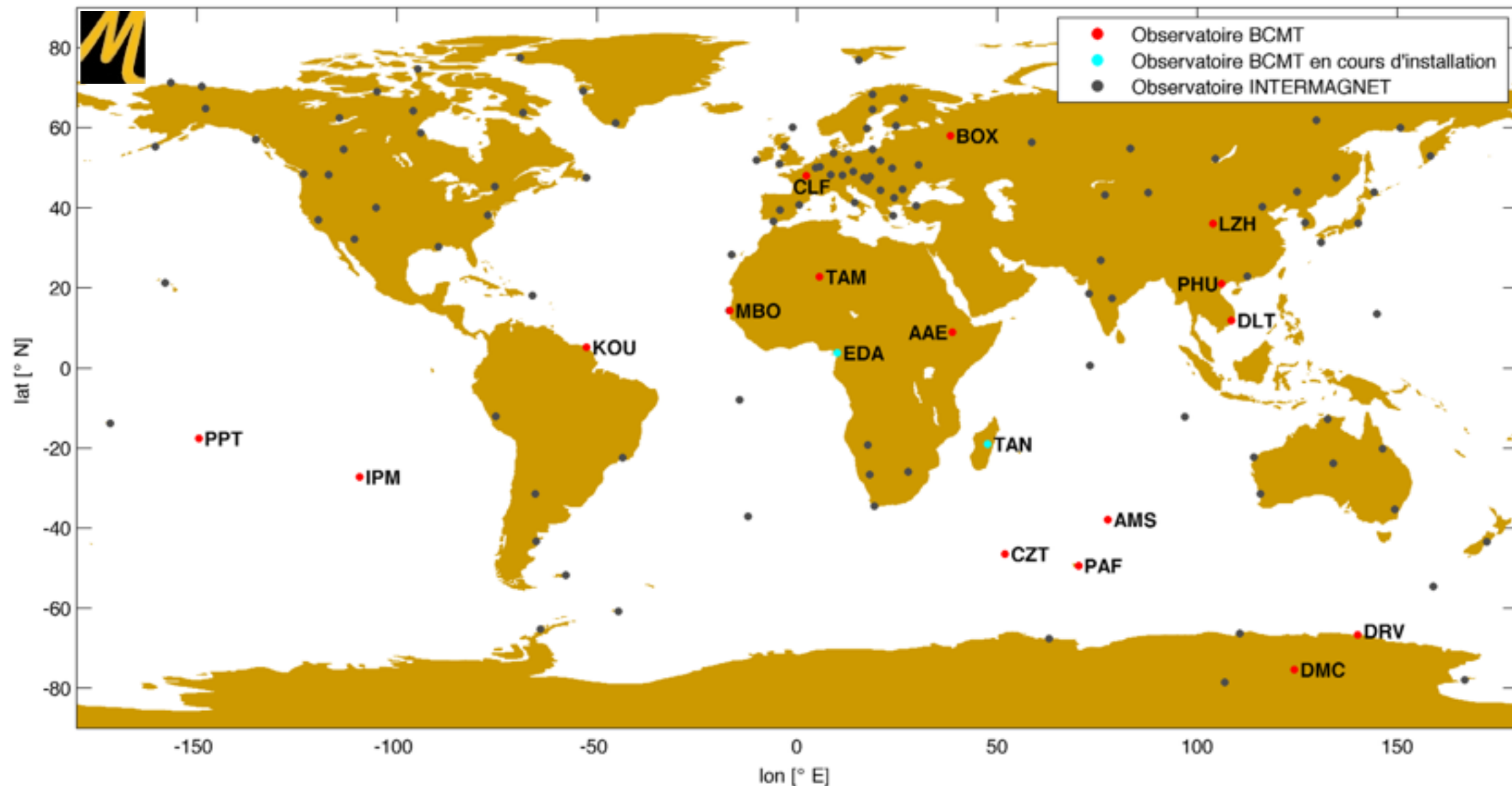
# Detection of space weather events in magnetic data

P. Coïsson, B. Heumez, K. Telali, X. Lalanne,  
T. Luc, V. Maury, A. Chambodut



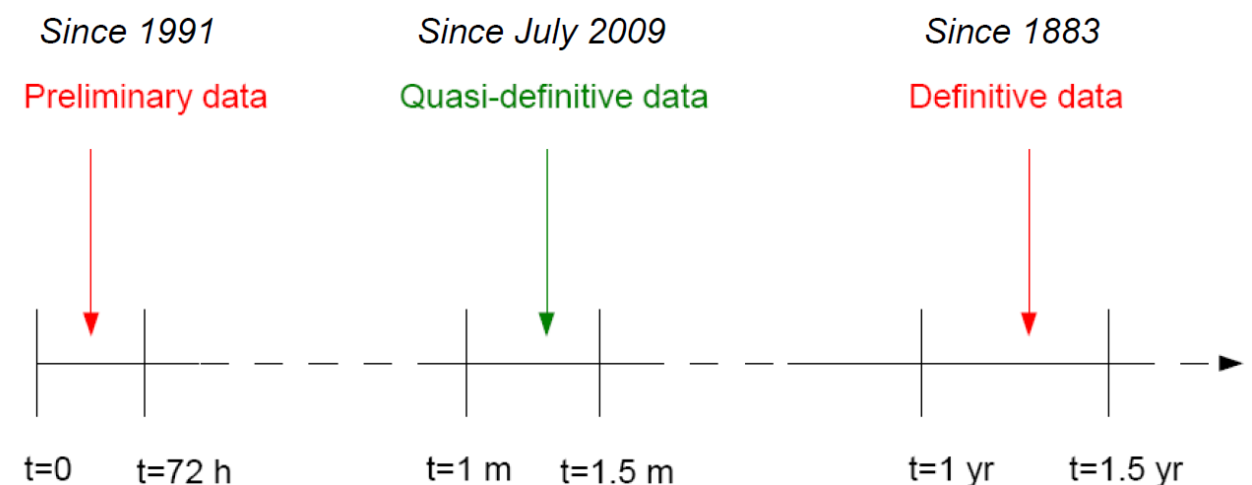
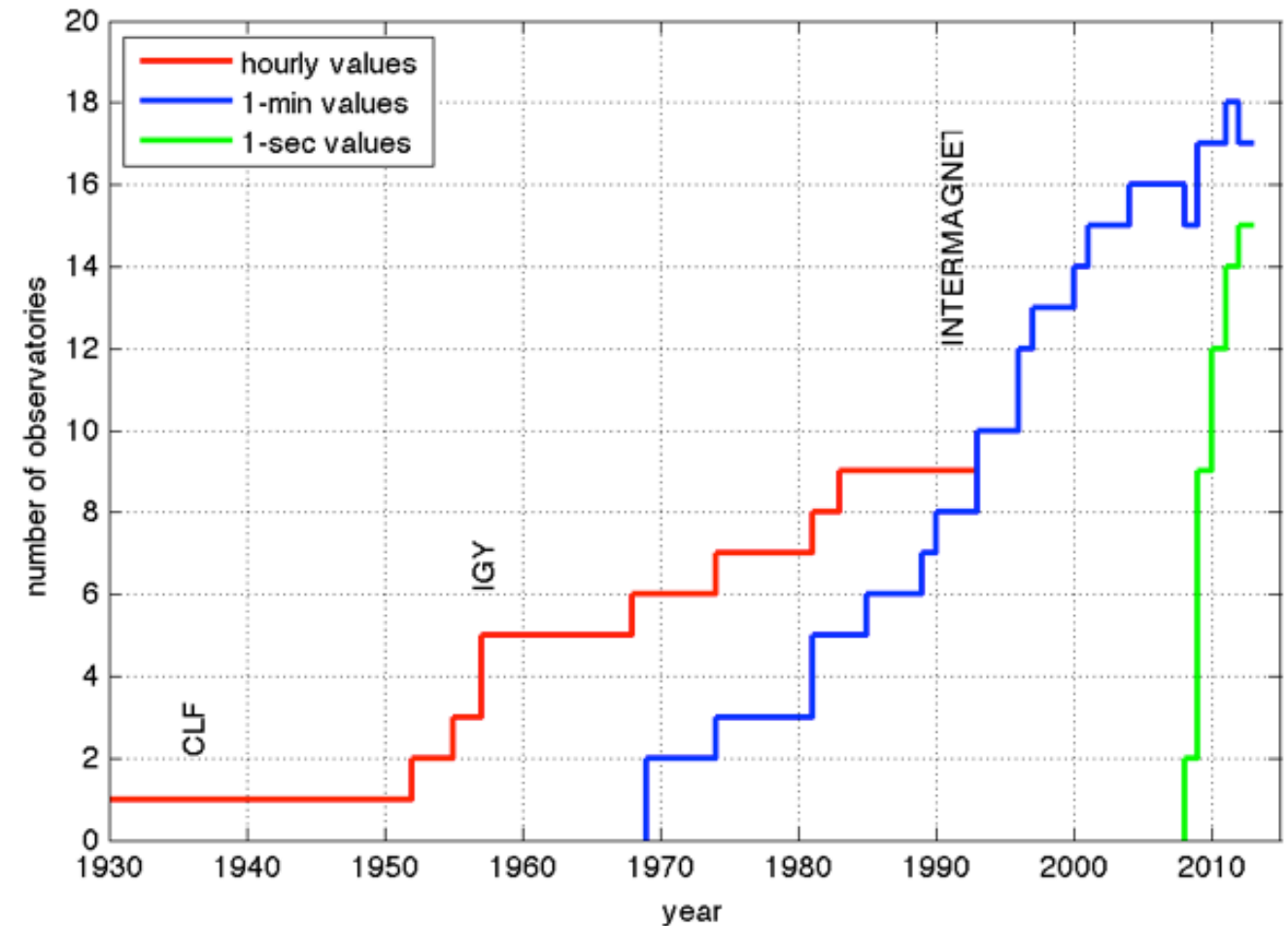
# BCMT

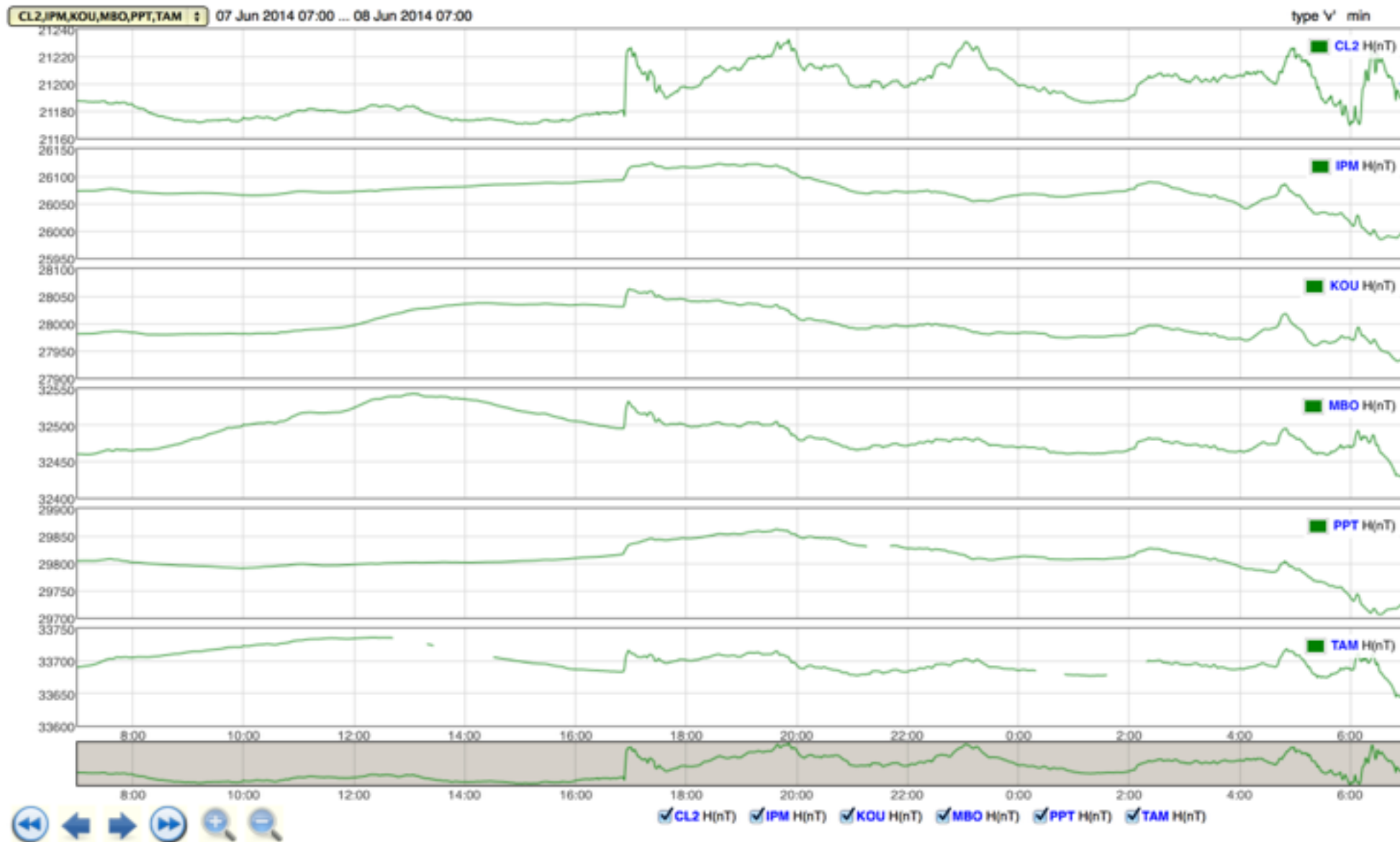
- Bureau Central du Magnétisme Terrestre
  - 11 magnetic observatories managed by IPGP
  - 5 magnetic observatories managed by EOST



# Geomagnetic data

- Data production has evolved in time to provide new services
- All data are processed to remove spikes and correct for the baseline
- *Definitive* data are available 1 year after acquisition
- Since 2009, *quasi-definitive* data are produced within 1 month of data acquisition

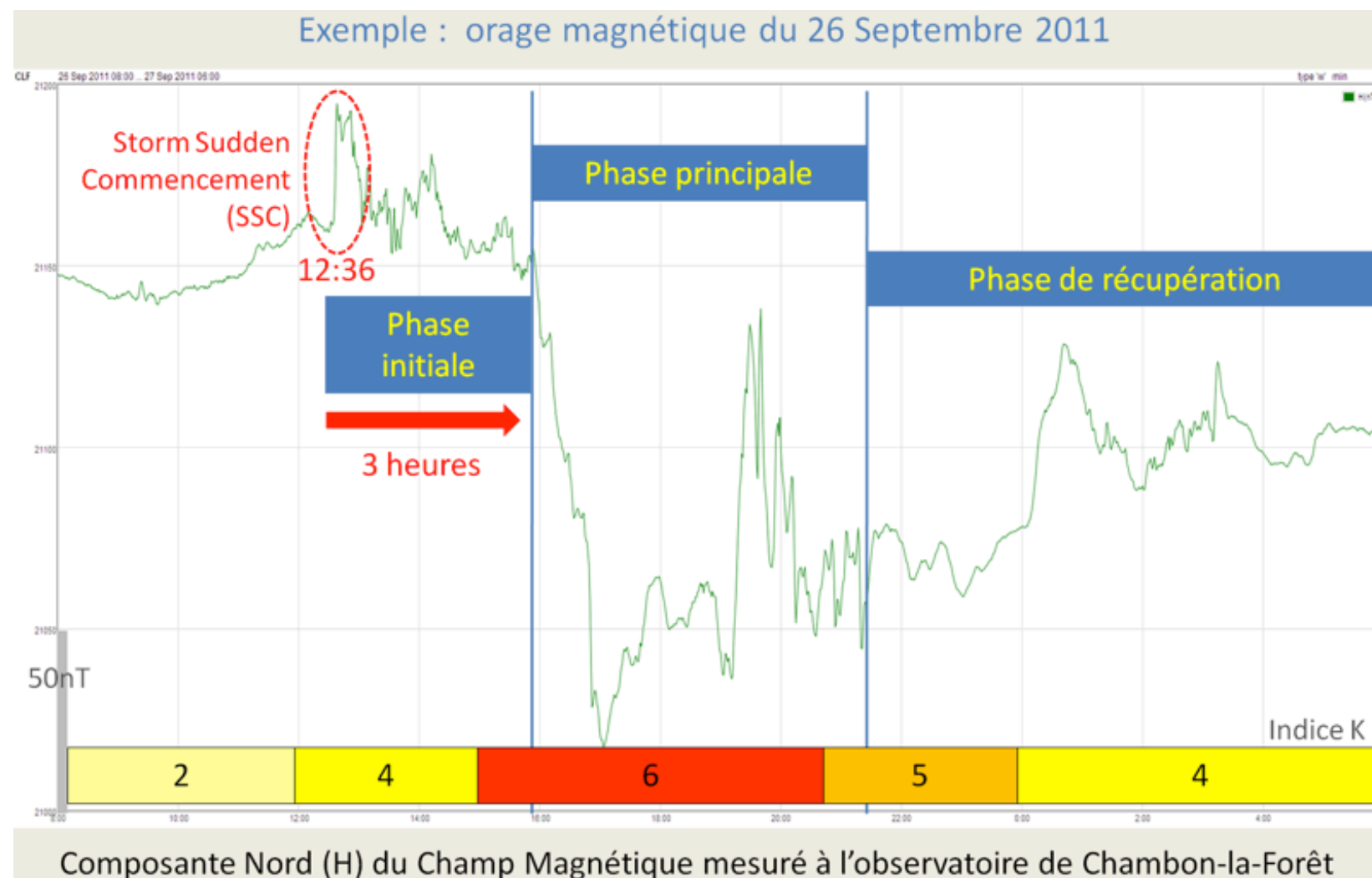




- Data availability: [www.bcmt.fr](http://www.bcmt.fr)
- Real-time data are transmitted to:
  - INTERMAGNET
  - NOAA Space Weather Prediction Center
  - CDAOA (French Air Force)

# SSC detection

- Sudden Storm Commencement email service
- Based on simultaneous detection at multiple BCMT observatories

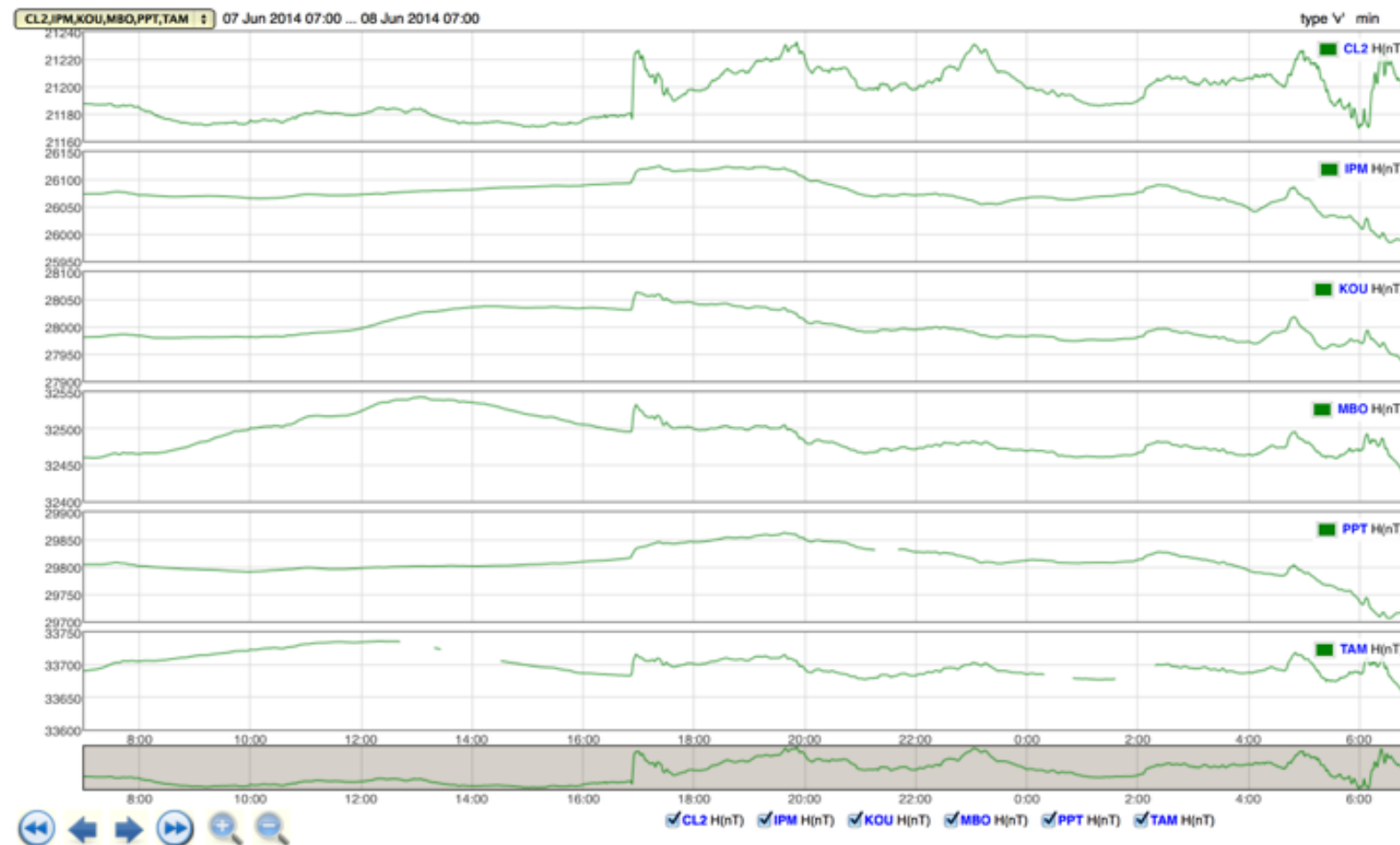


L. Deker

# SSC alert

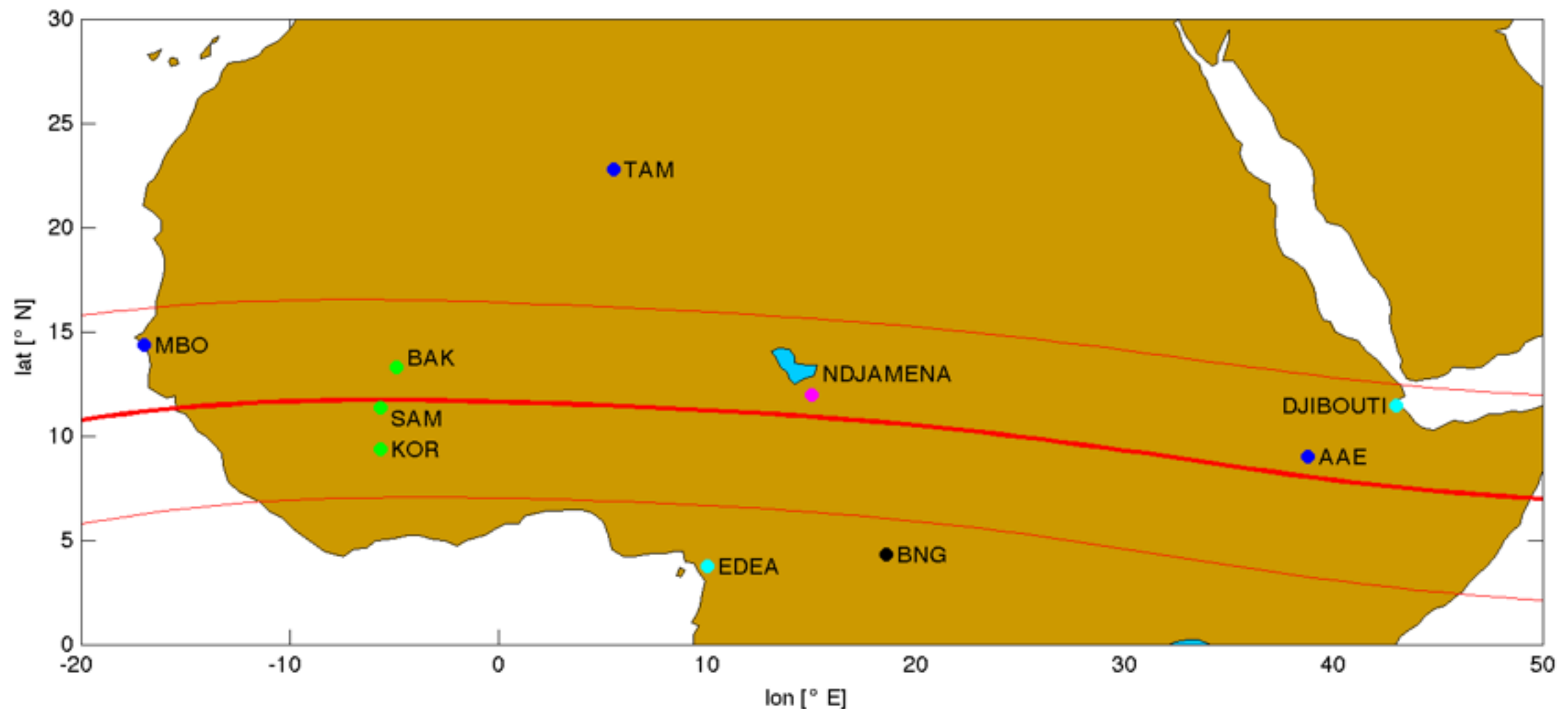
Automatic alert message broadcast by the IGP Magnetic Observatories team (*experimental system*).

Geomagnetic event	<b>Sudden Impulse, possible Sudden Storm Commencement (SSC)</b>
Reliability	high
Start date	07-Jun-2014 16:52:00 UT
Duration	6 minutes
Maximum deviation	49 nT (CL2)
Observatories	CLF, IPM, KOU, MBO, PPT, TAM
Detection time	07-Jun-2014 17:02:02 UT
Magnetograms	<a href="#">realtime data</a> <a href="#">all data</a>



# WAMNET network

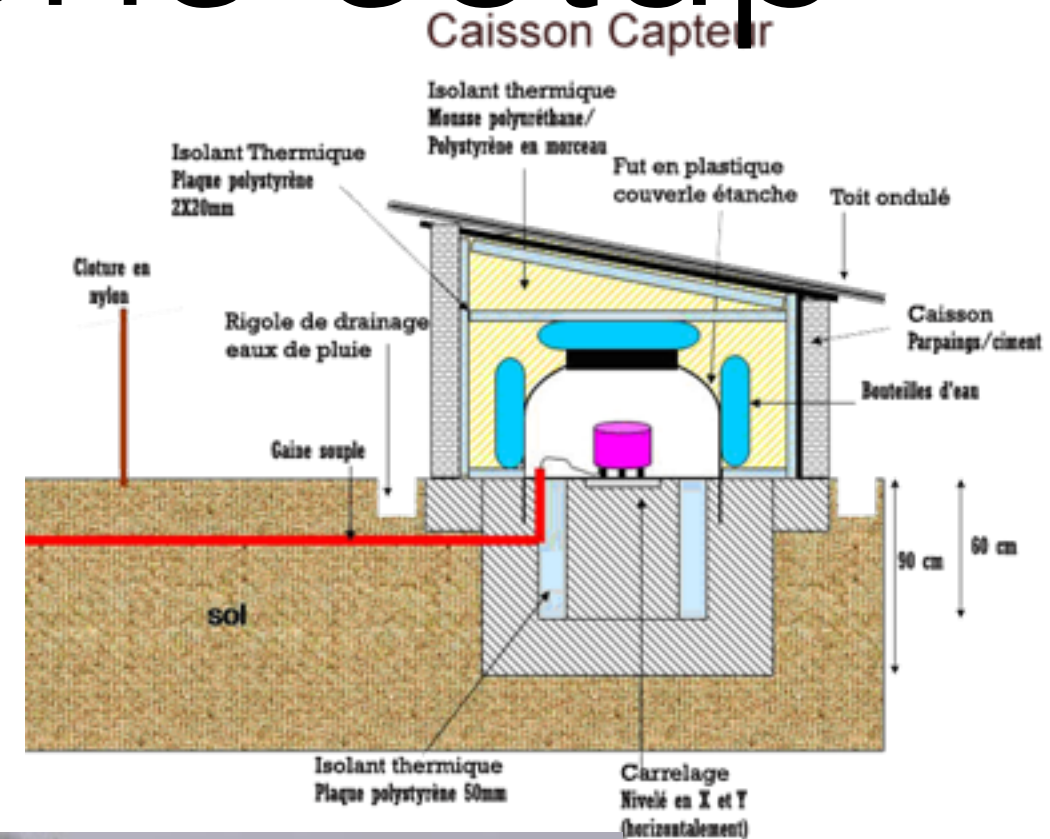
- Chain of 3 magnetic stations installed in Mali-Ivory Coast to record magnetic field variations below the Equatorial electrojet





# WAMNET stations setup

- 2006-2009 re-installation
- Sensor and data logger installed in two separate huts
- No internet, no GPS

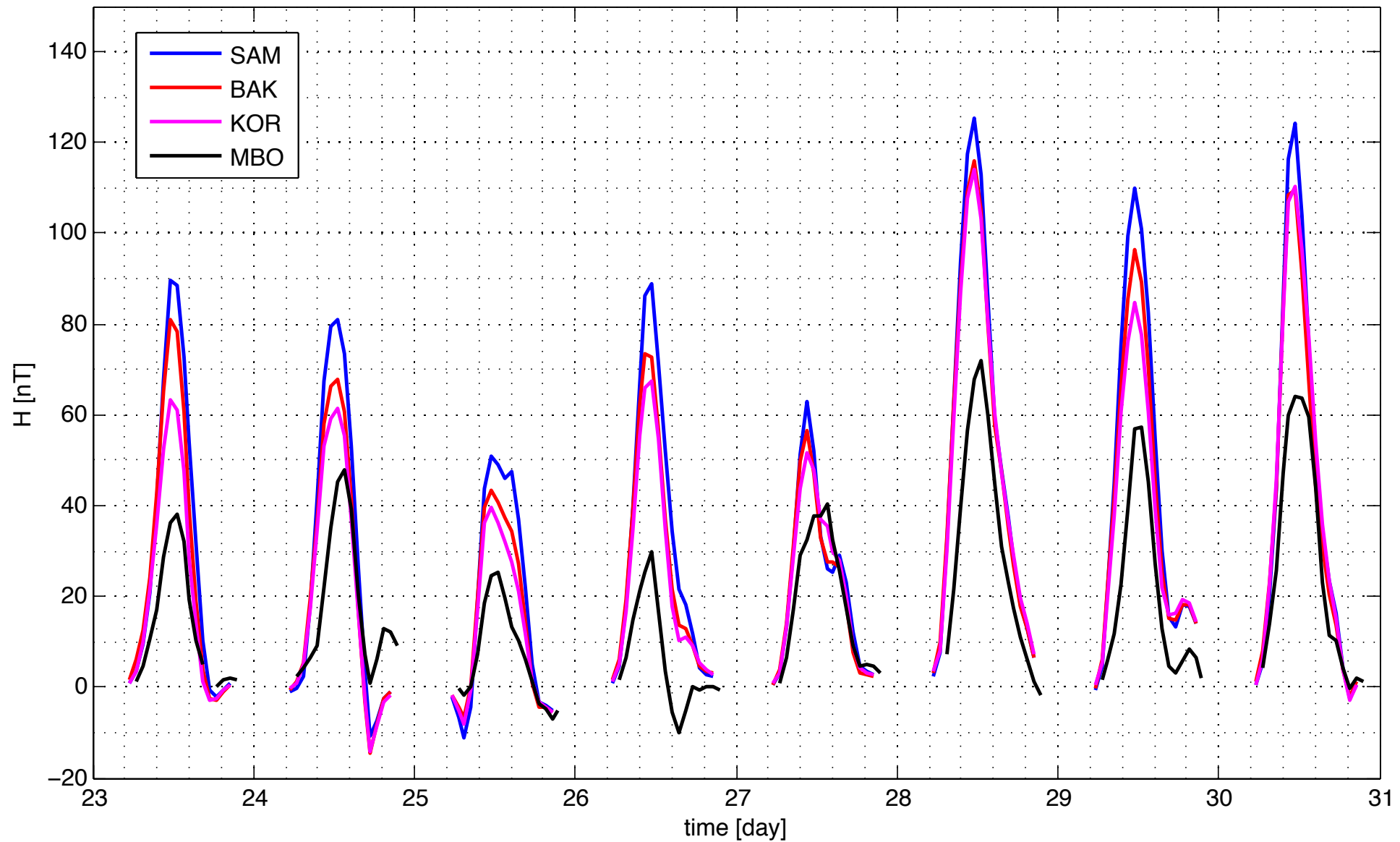


BAK



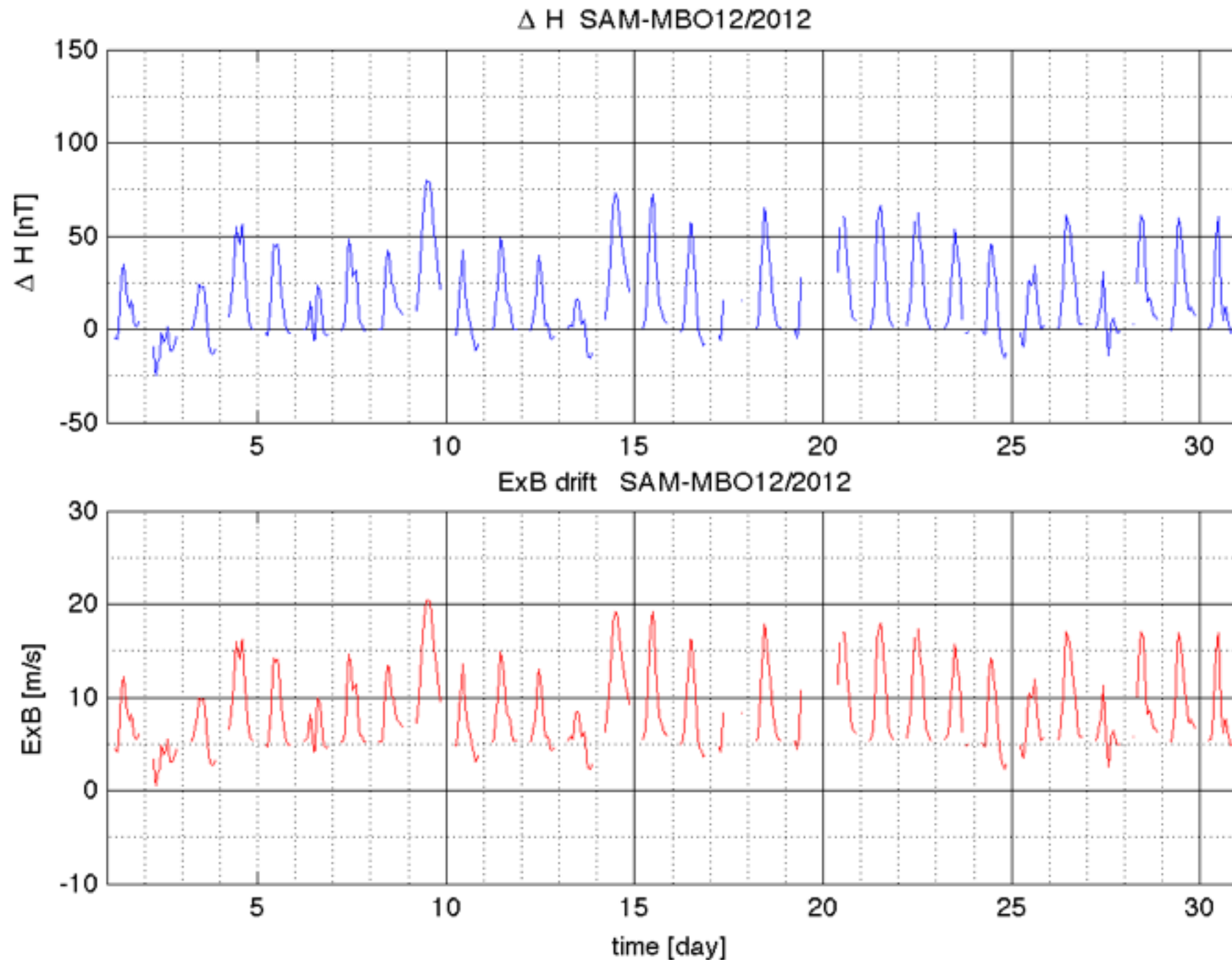
# Electrojet variability

H 12/2012



Day-time variation of hourly average of horizontal magnetic fields component

# $\Delta H$ and ExB drift



$$v_{drift} = 5.2889 + 0.1947\Delta H + 0.0001\Delta H^2 - 0.0000021\Delta H^3$$

# Future magnetometer stations

- Real-time fully automated magnetometer station
  - Sensor installed in a container with high thermal inertia (300 l water).
  - Data acquisition powered by solar panel
  - Two-steps data transmission: sensor-control station(radio) control station-IPGP (3G)
- First station is ready for installation in Djibuti

# Conclusions

- Magnetic observatories data are part of the global networks of Space Weather data provider
- Experimental SSC detection and alert service
- WAMNET and future extension to Djibuti provide data for equatorial electrojet studies
- BCMT and WAMNET data are available at:  
<http://www.bcmt.fr>
- International Service of Geomagnetic Indices:  
<http://isgi.latmos.ipsl.fr/>