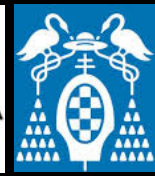




RED
ELÉCTRICA
DE ESPAÑA



Universidad
de Alcalá



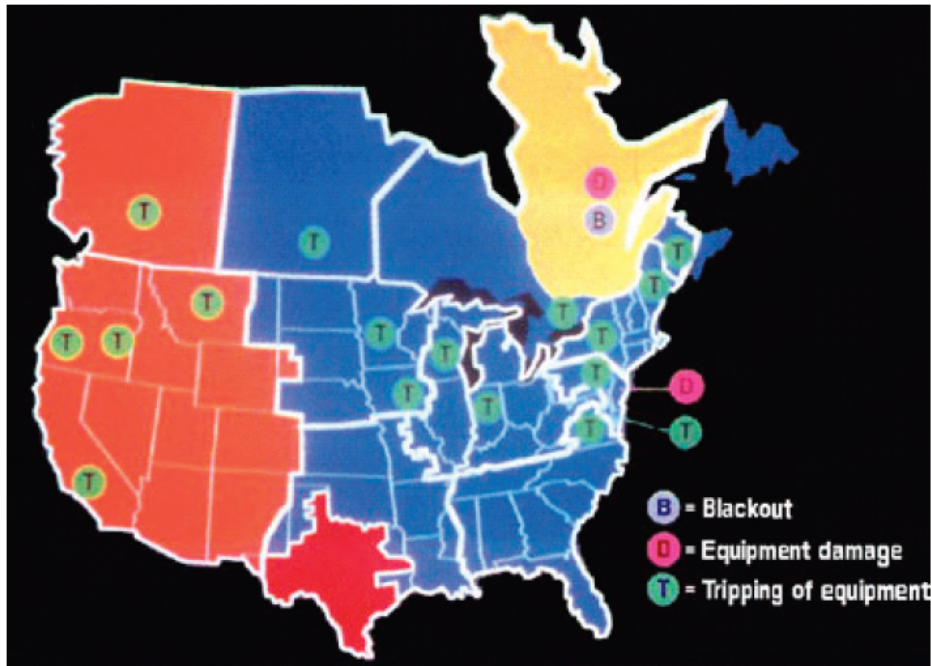
Influencia de fenómenos relacionados con la Meteorología Espacial en las infraestructuras de REE

C. Cid, E. Saiz, Y. Cerrato, A. Guerrero y J. Palacios

Universidad Alcalá

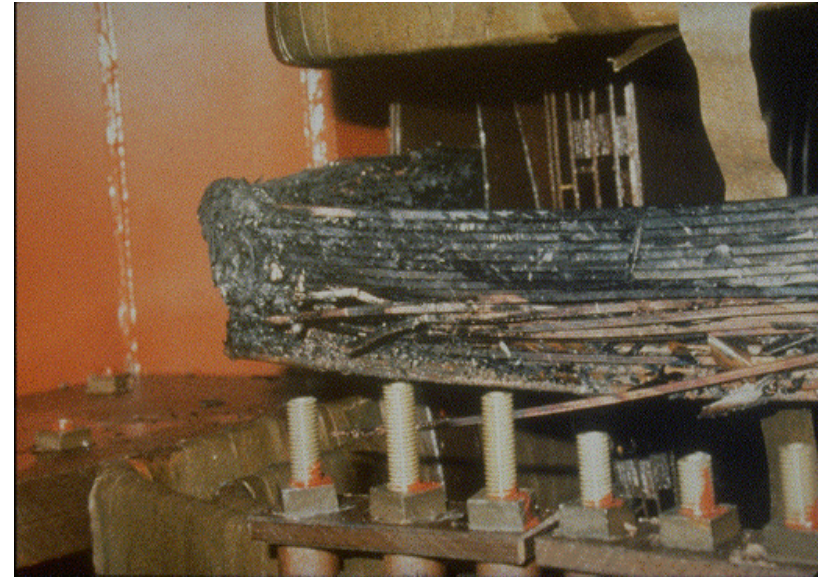


Antecedentes – 1



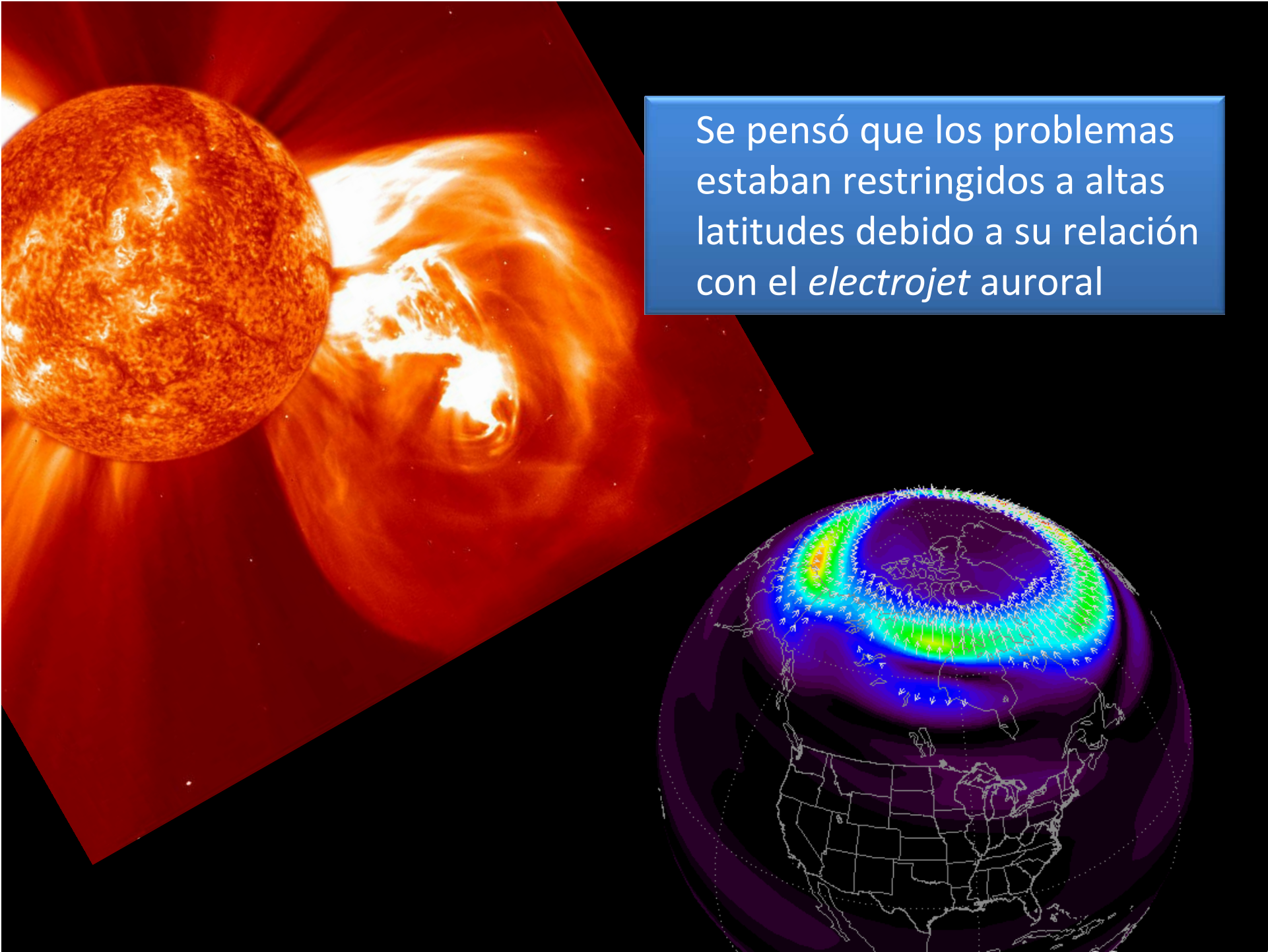
Power system events due to the March 13, 1989, geomagnetic storm.

SOURCE: Electric Power Research Institute, Inc.



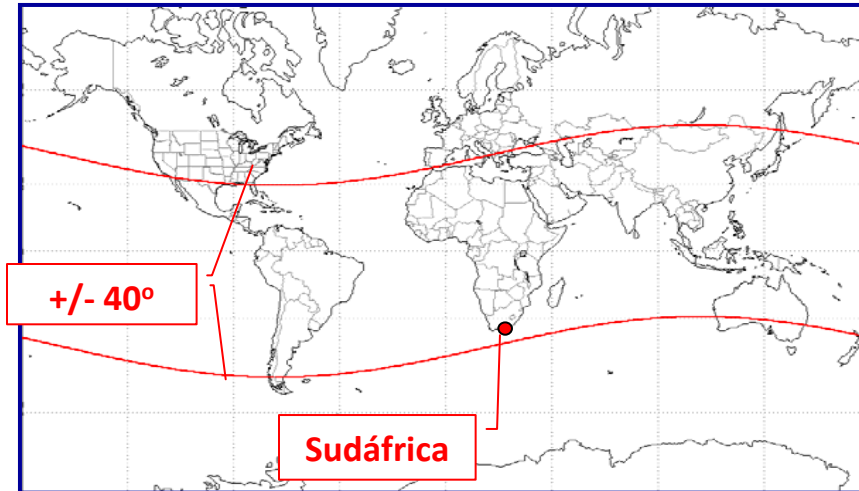
Sobrecalentamiento y daños irreparables en el transformador de la central de Quebec

Marzo de 1989: Serios problemas en la red eléctrica de Canadá y Estados Unidos debidos a la actividad solar durante 30 h



Se pensó que los problemas
estaban restringidos a altas
latitudes debido a su relación
con el *electrojet* auroral

Antecedentes – 2



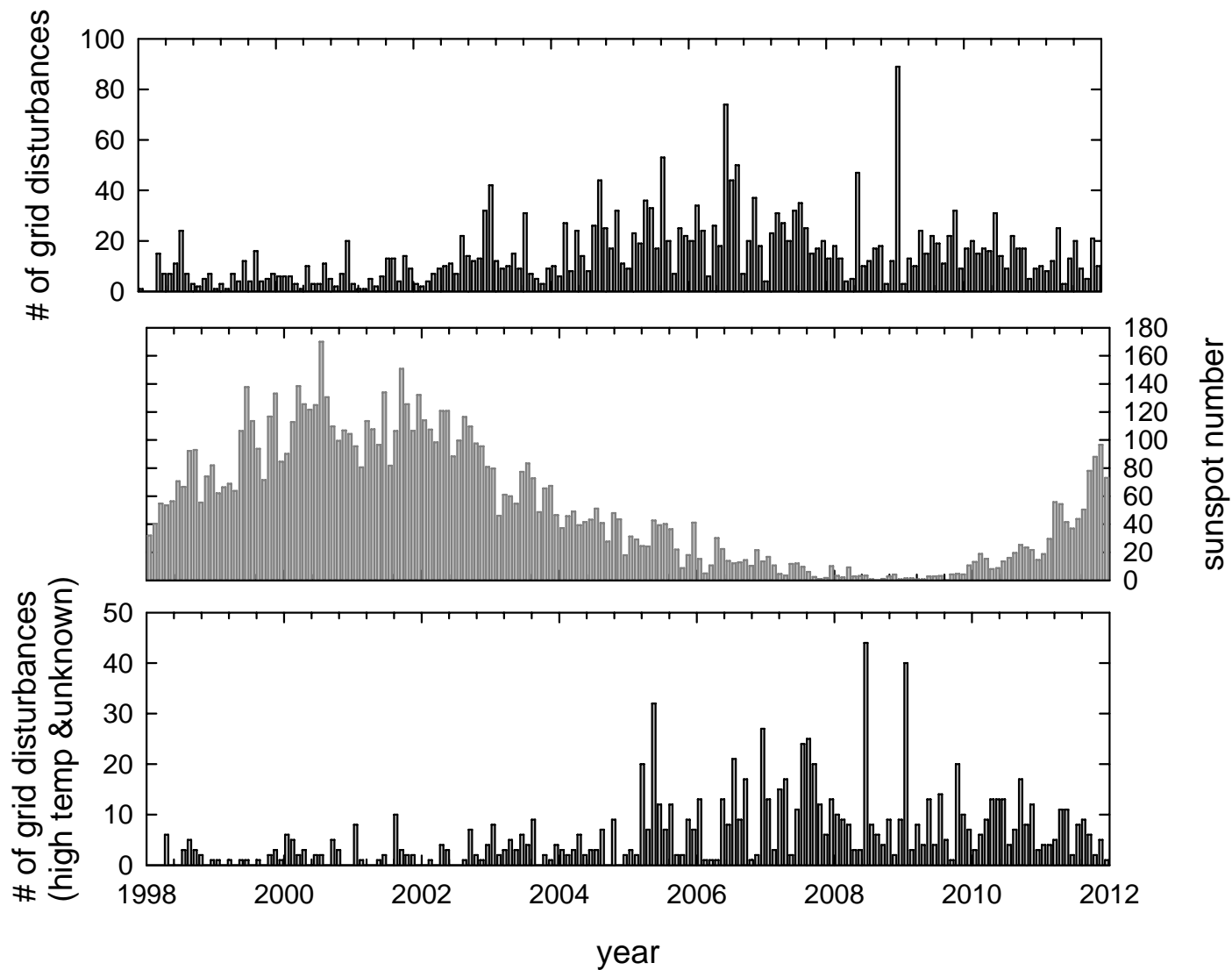
Sobrecalentamiento y daños irreparables en los transformadores de Sudáfrica en Octubre-Noviembre de 2003

¡¡Pero el problema no es sólo de altas latitudes!!!

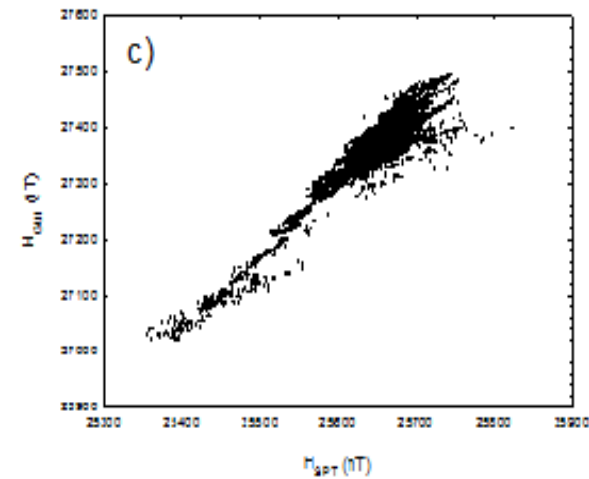
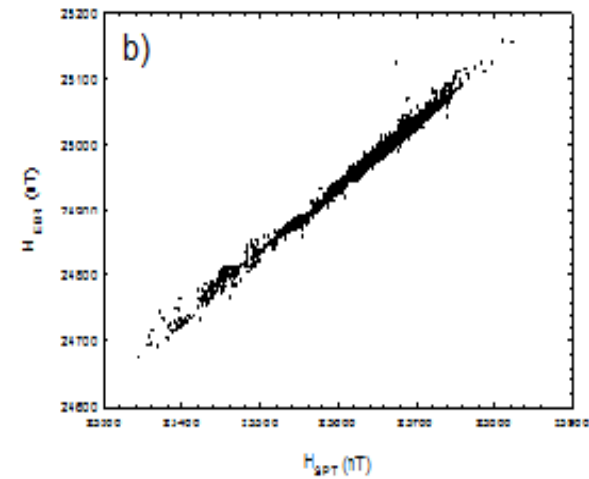
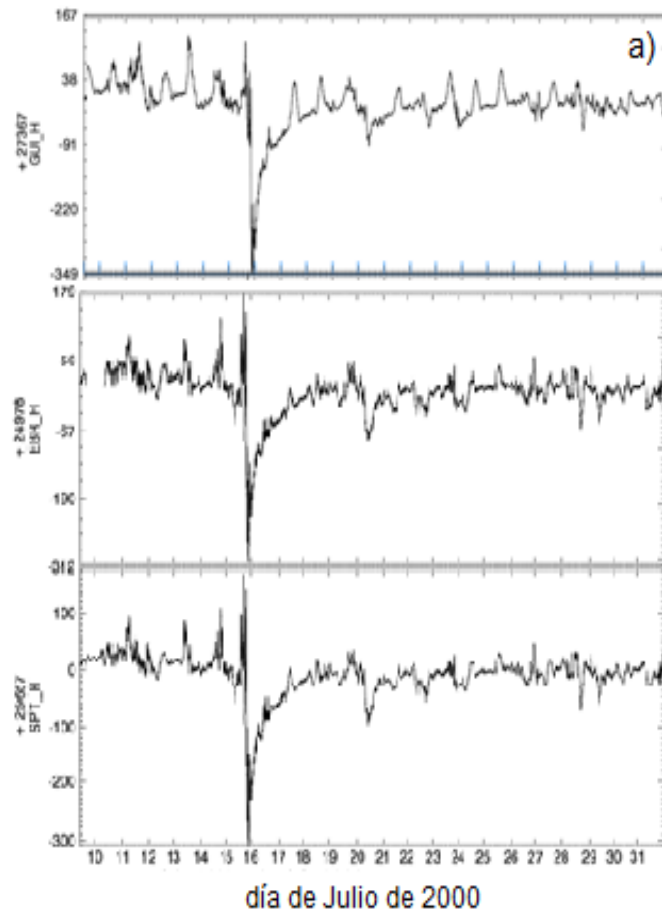
- Actualmente los científicos siguen considerando que la clave está en las corrientes magnetosféricas:
 - bajas latitudes: anillo de corriente
 - altas latitudes: *electrojet* auroral

Base de datos REE

Correlación con el ciclo solar

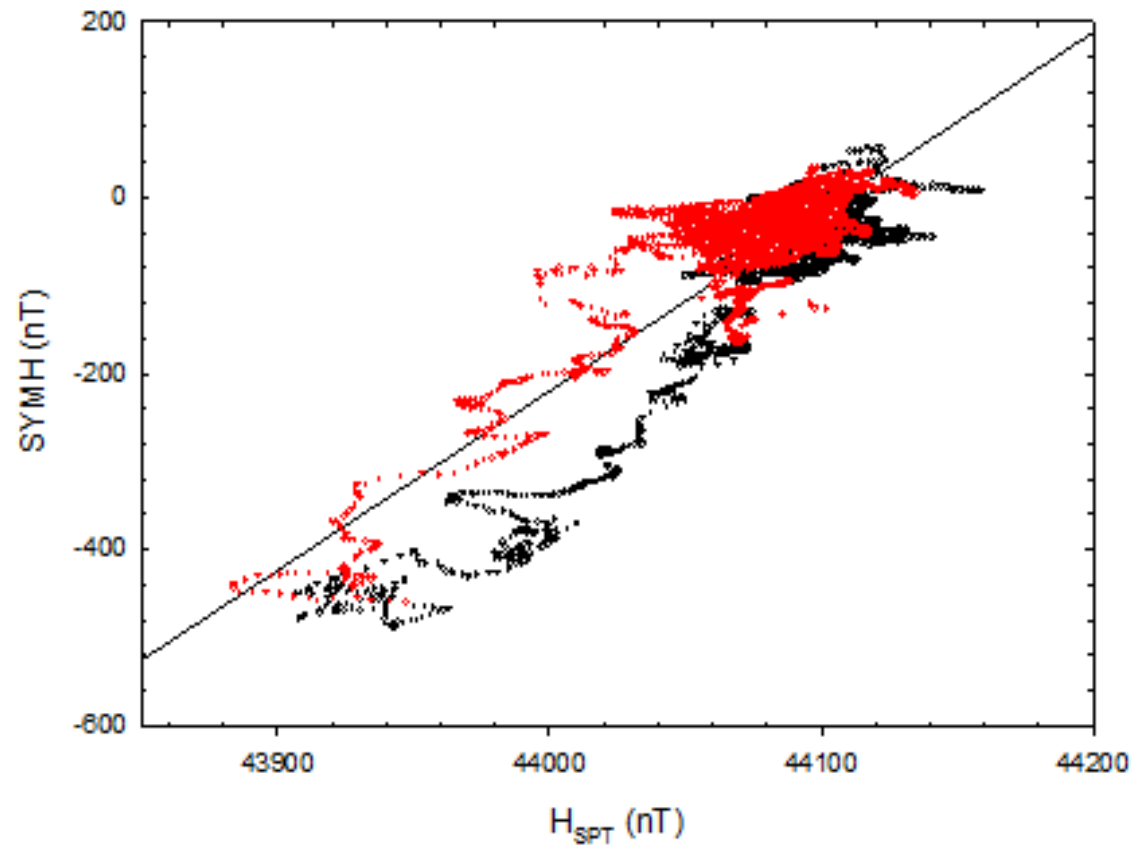


El campo magnético en España

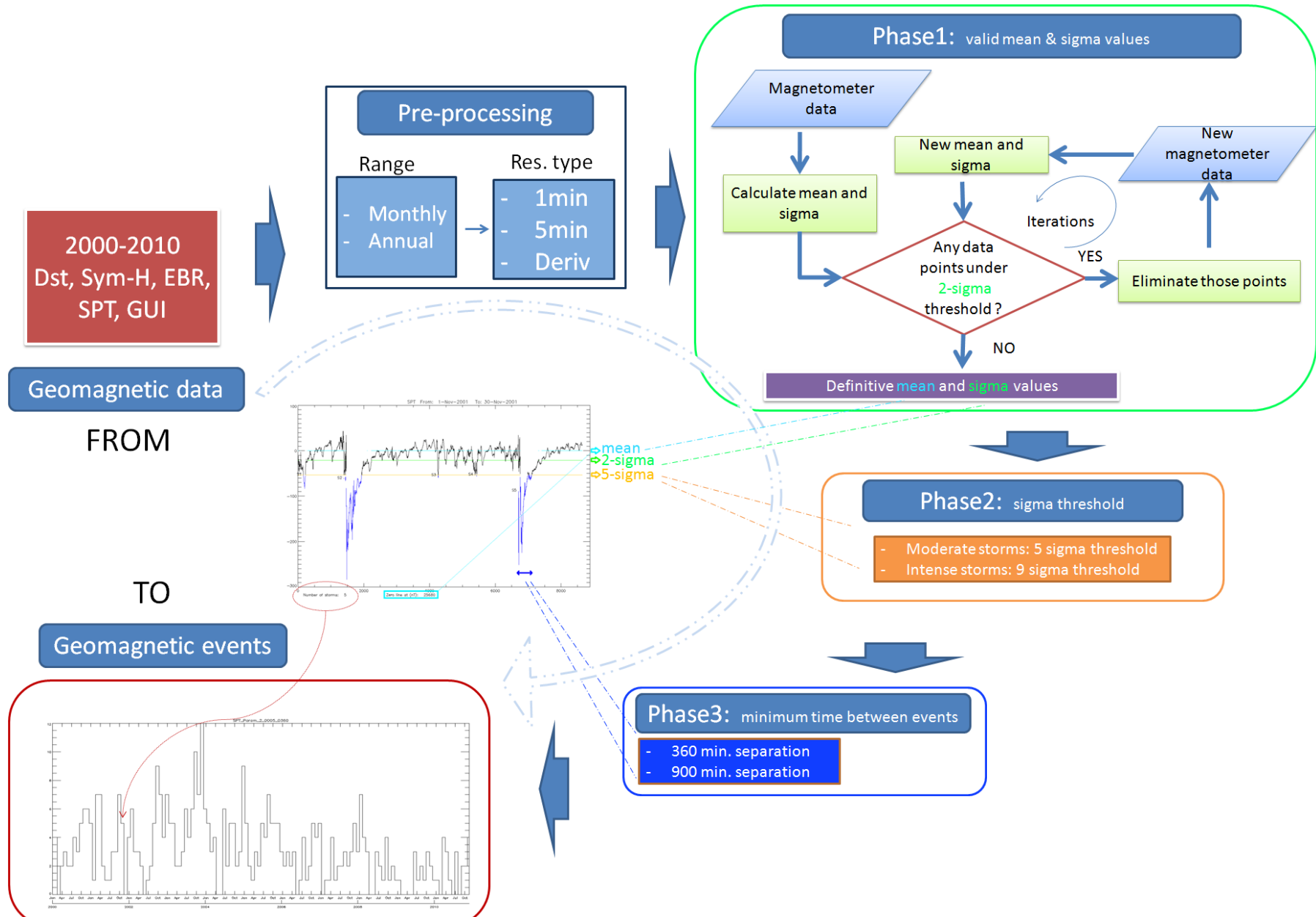


Indice SYM-H frente a H_{SPT}

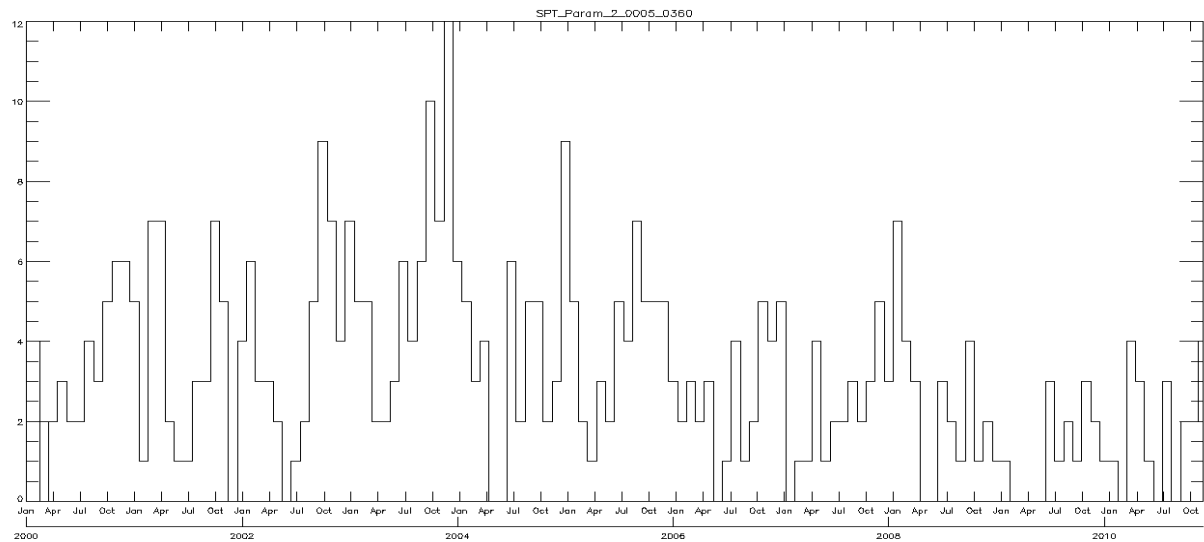
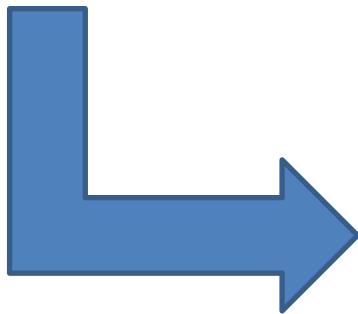
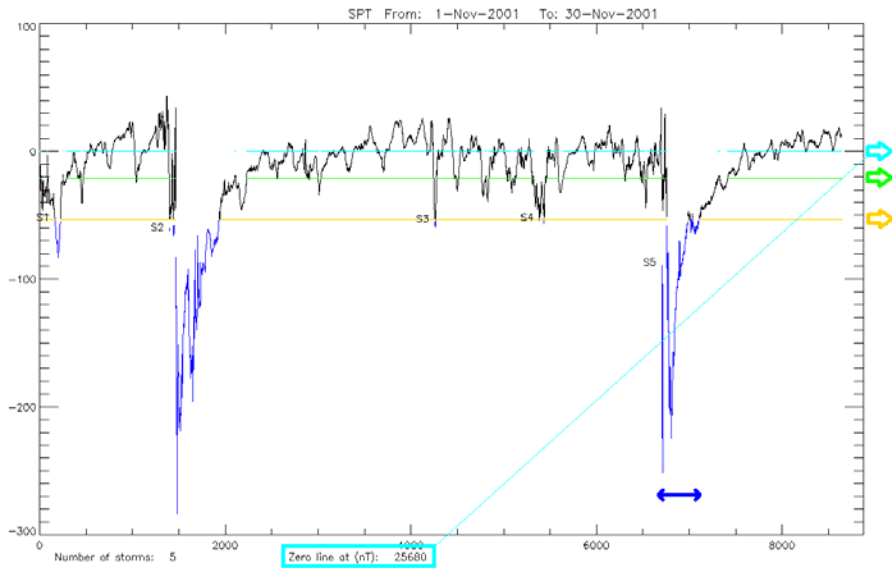
Nov 2003 (6-18 horas UT)



Búsqueda de sucesos

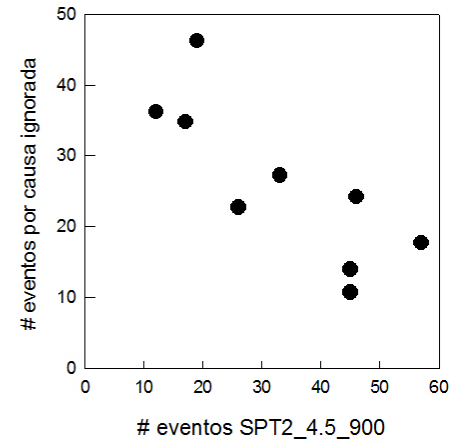
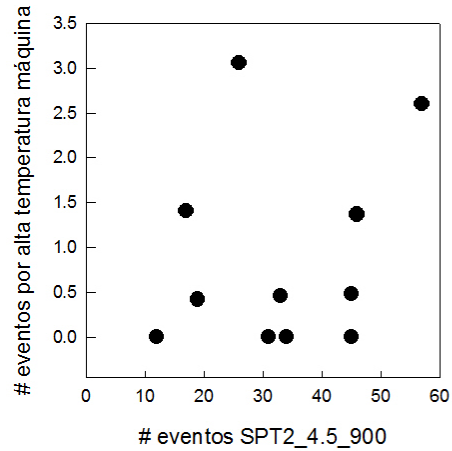


De datos geomagnéticos ... a sucesos geomagnéticos (2000-2010)

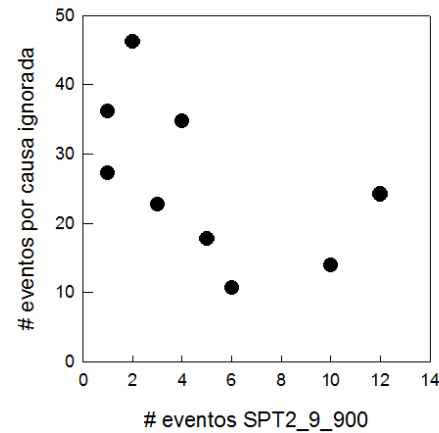
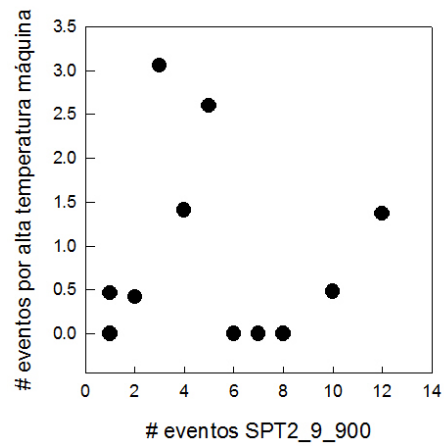


Los resultados no muestran correlación alguna

(# eventos normalizados al número total de elementos)*100



(# eventos normalizados al número total de elementos)*100



Tormentas más intensas del ciclo solar 23 (según pico Dst)

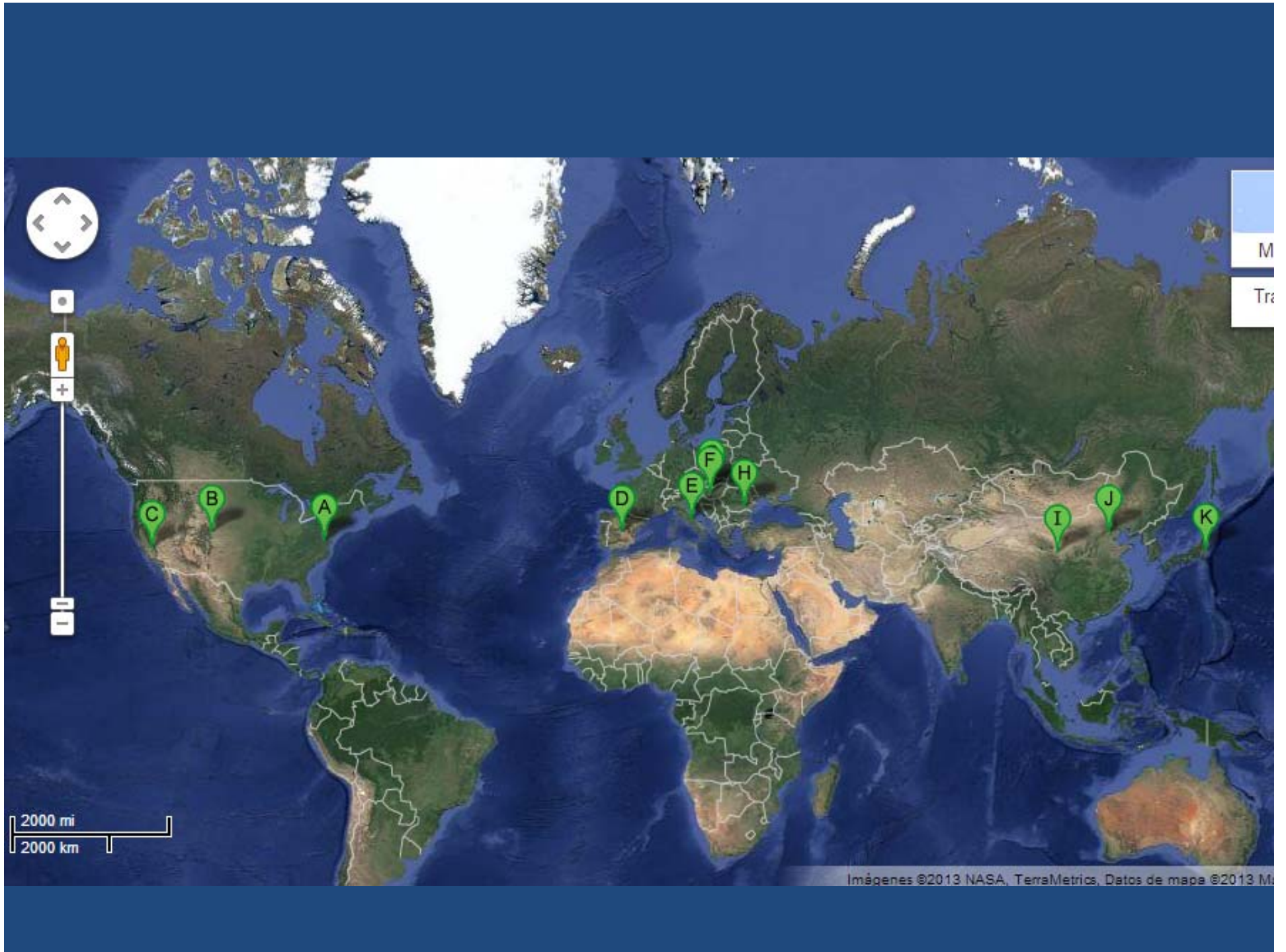
| Suceso n° | Fecha (día-mes-año) | Dst_{min} (nT) |
|------------------|--------------------------------|-----------------------------------|
| S1 | 22-10-1999 | -237 |
| S2 | 06-04-2000 | -288 |
| S3 | 15-07-2000 | -301 |
| S4 | 31-03-2001 | -387 |
| S5 | 11-04-2001 | -271 |
| S6 | 06-11-2001 | -292 |
| S7 | 29-10-2003 | -383 |
| S8 | 20-11-2003 | -422 |
| S9 | 07-11-2004 | -373 |
| S10 | 15-05-2005 | -263 |

Entre 40° y 50°

Extendidos por
todo el globo

Observatorios utiliz

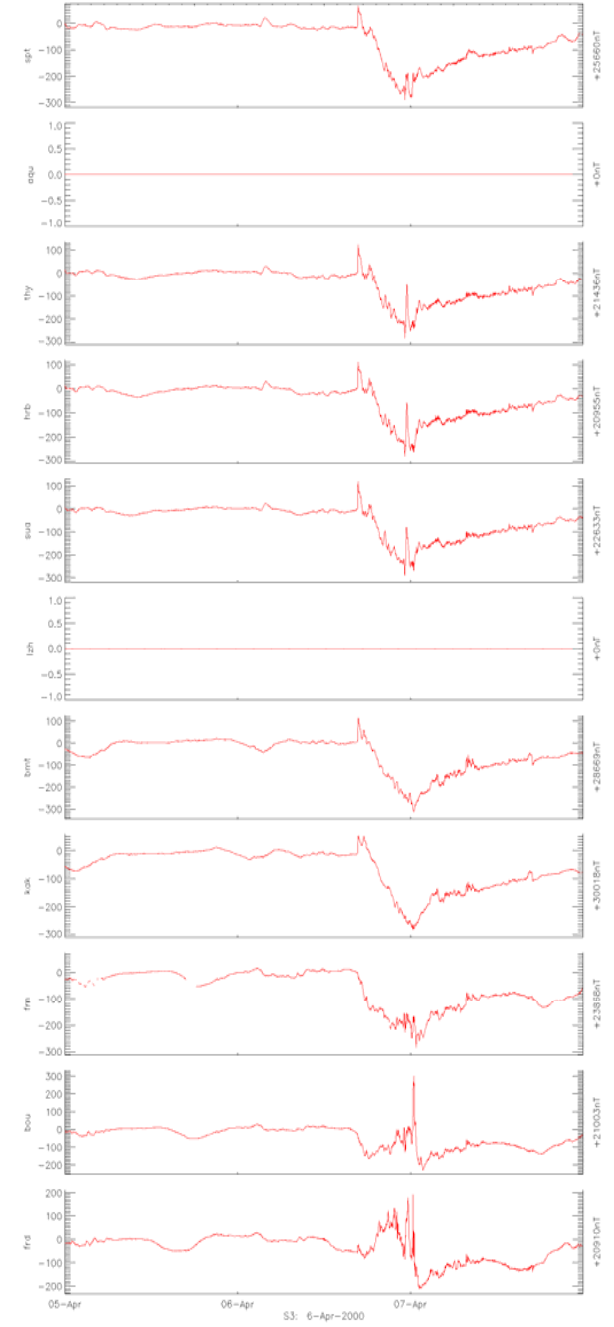
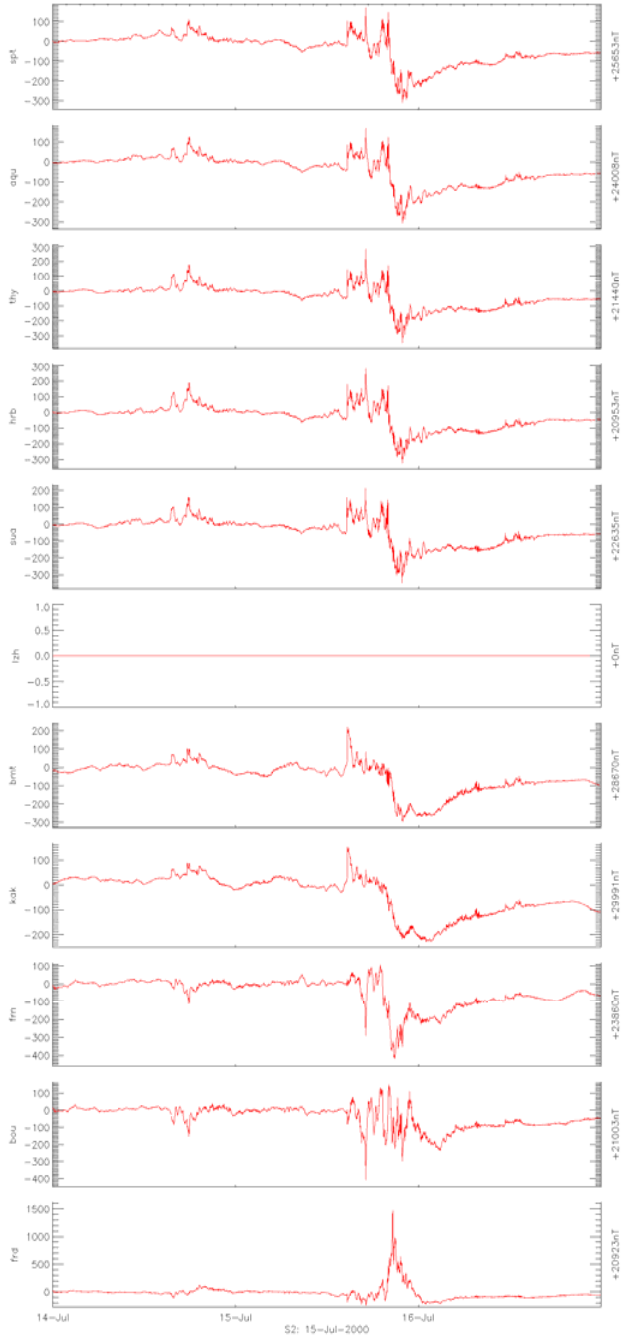
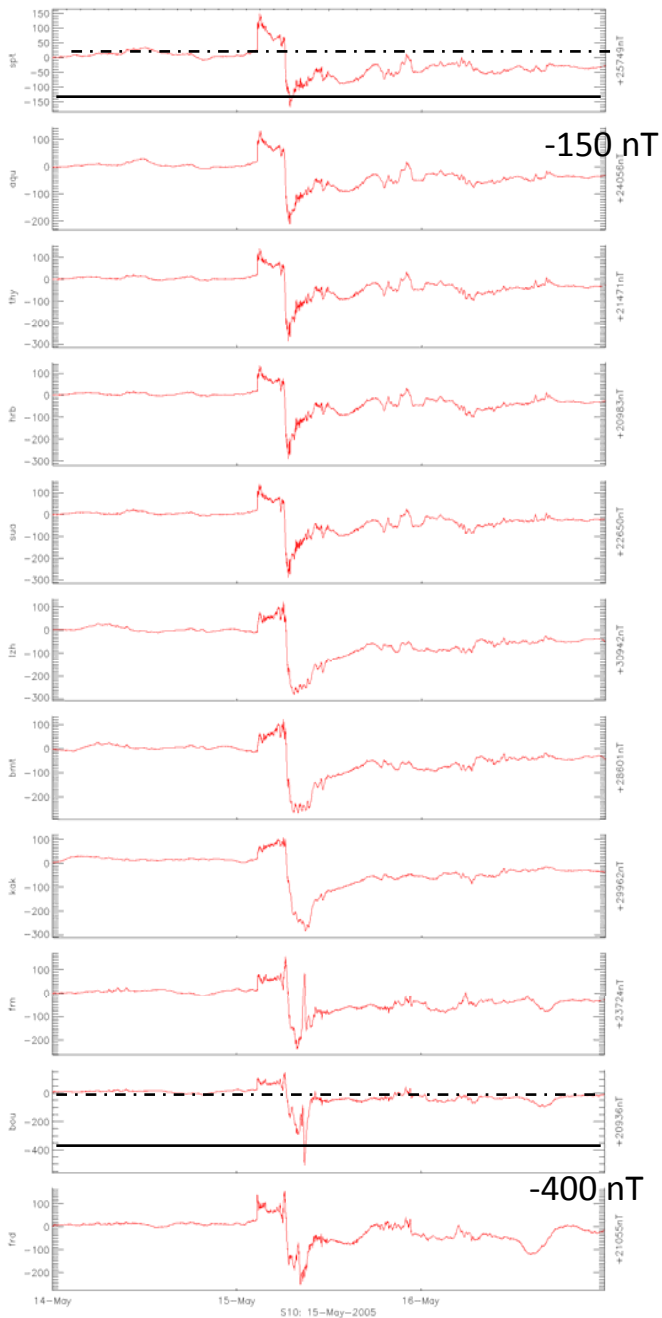
| Nombre | País | Código | Colatitud (°) | Longitud (°) |
|--------------------|------------|--------|------------------|-----------------|
| San Pablo - Toledo | España | SPT | 50.45 | 355.65 |
| L'Aquila | Italia | AQU | 47.62 | 13.32 |
| Tihany | Hungría | THY | 43.10 | 17.54 |
| Hurbanovo | Eslovaquia | HRB | 42.14 | 18.19 |
| Surlari | Rumanía | SUA | 45.32 | 26.25 |
| Lanzhou | China | LZH | 53.90 | 103.84 |
| Beijing Ming Tombs | China | BMT | 49.70 | 116.20 |
| Kakioka | Japón | KAK | 53.77 | 140.18 |
| Fresno | USA | FRN | 52.91 | 240.28 |
| Boulder | USA | BOU | 49.86 | 254.76 |
| Fredericksburg | USA | FRD | 51.80 | 282.63 |

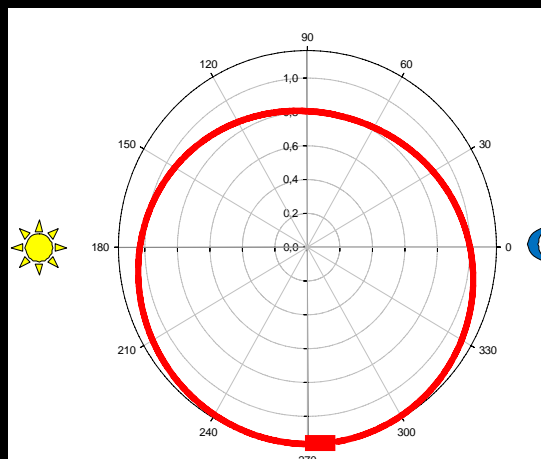
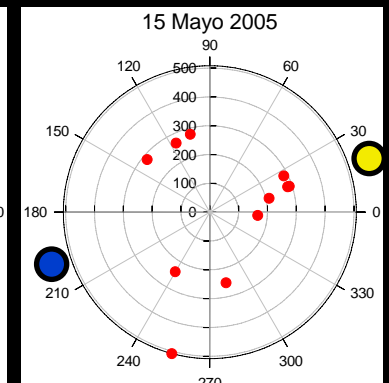
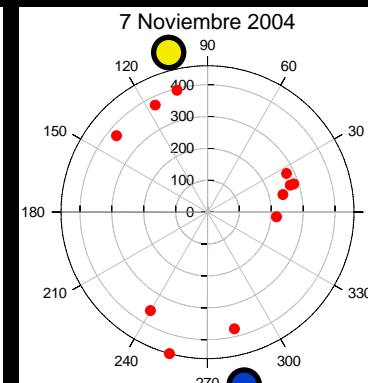
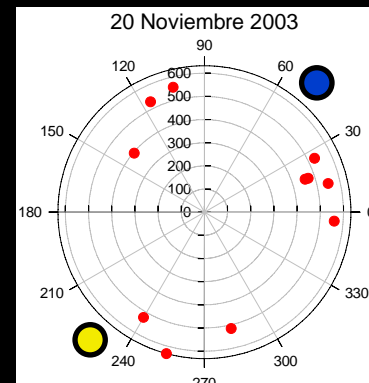
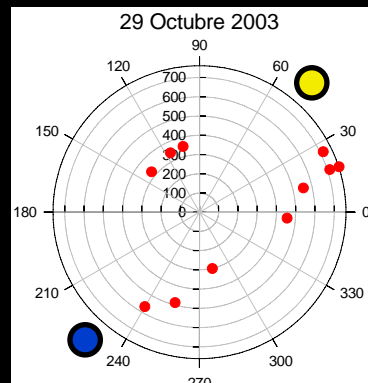
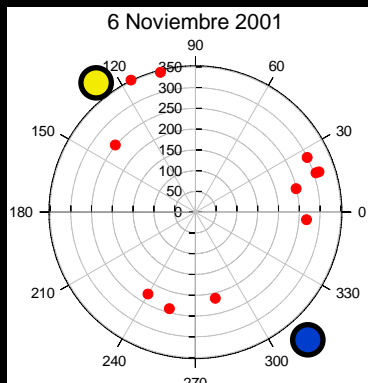
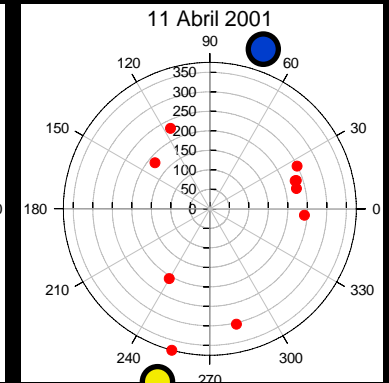
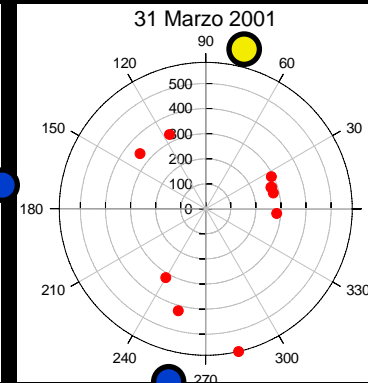
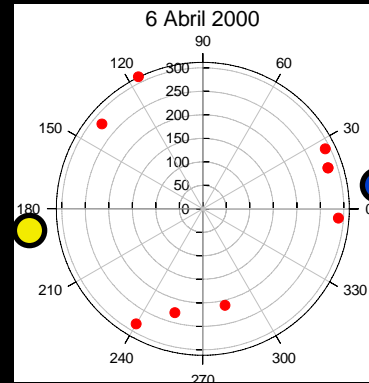
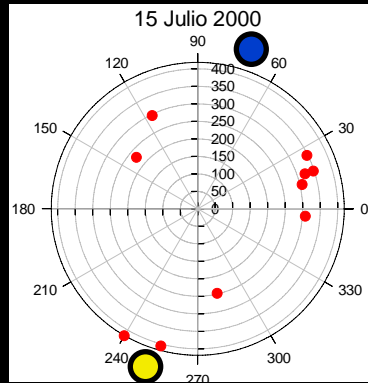
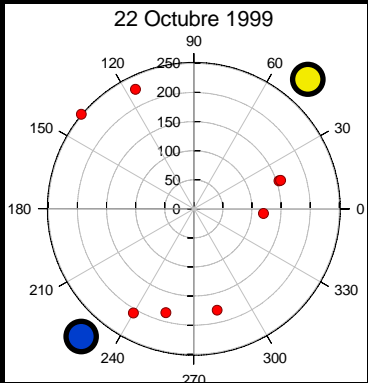


M
Tra

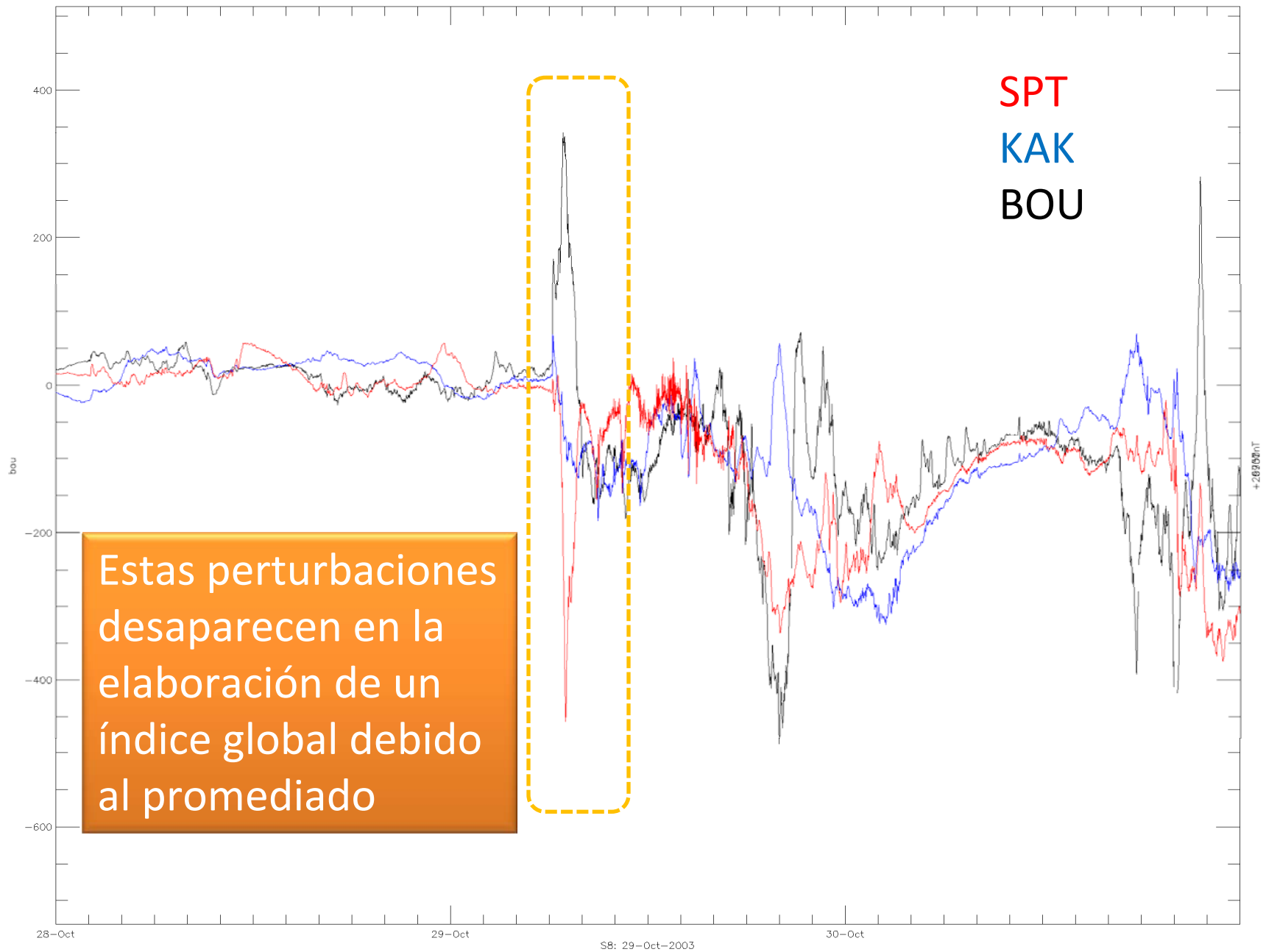
2000 mi
2000 km

Imágenes ©2013 NASA, TerraMetrics, Datos de mapa ©2013 M





Love & Gannon, 2009

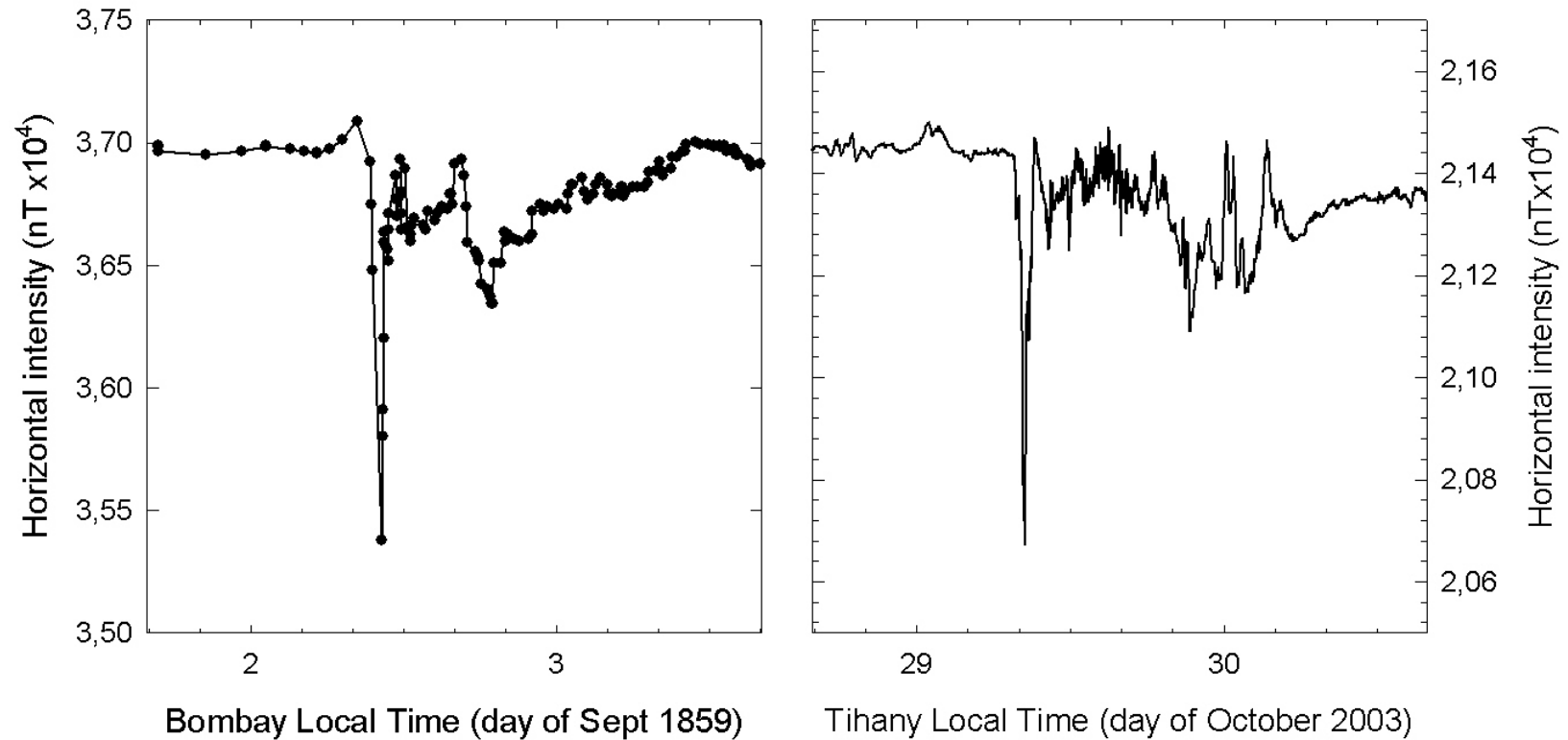


Los índices geomagnéticos no sirven para representar lo ocurrido en tierra en tormentas como Halloween (29 oct 2003) o la Bastilla (15 julio 2000)

Más sobre la influencia de la hora local

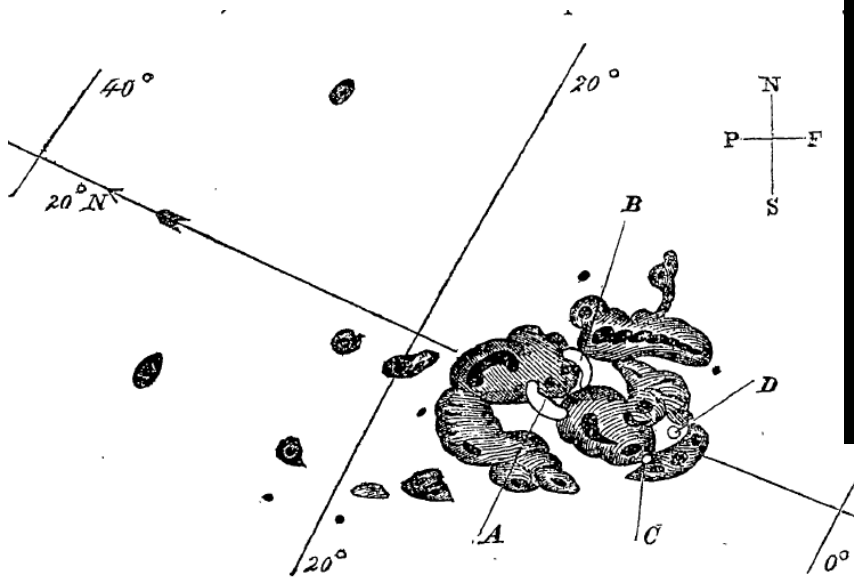
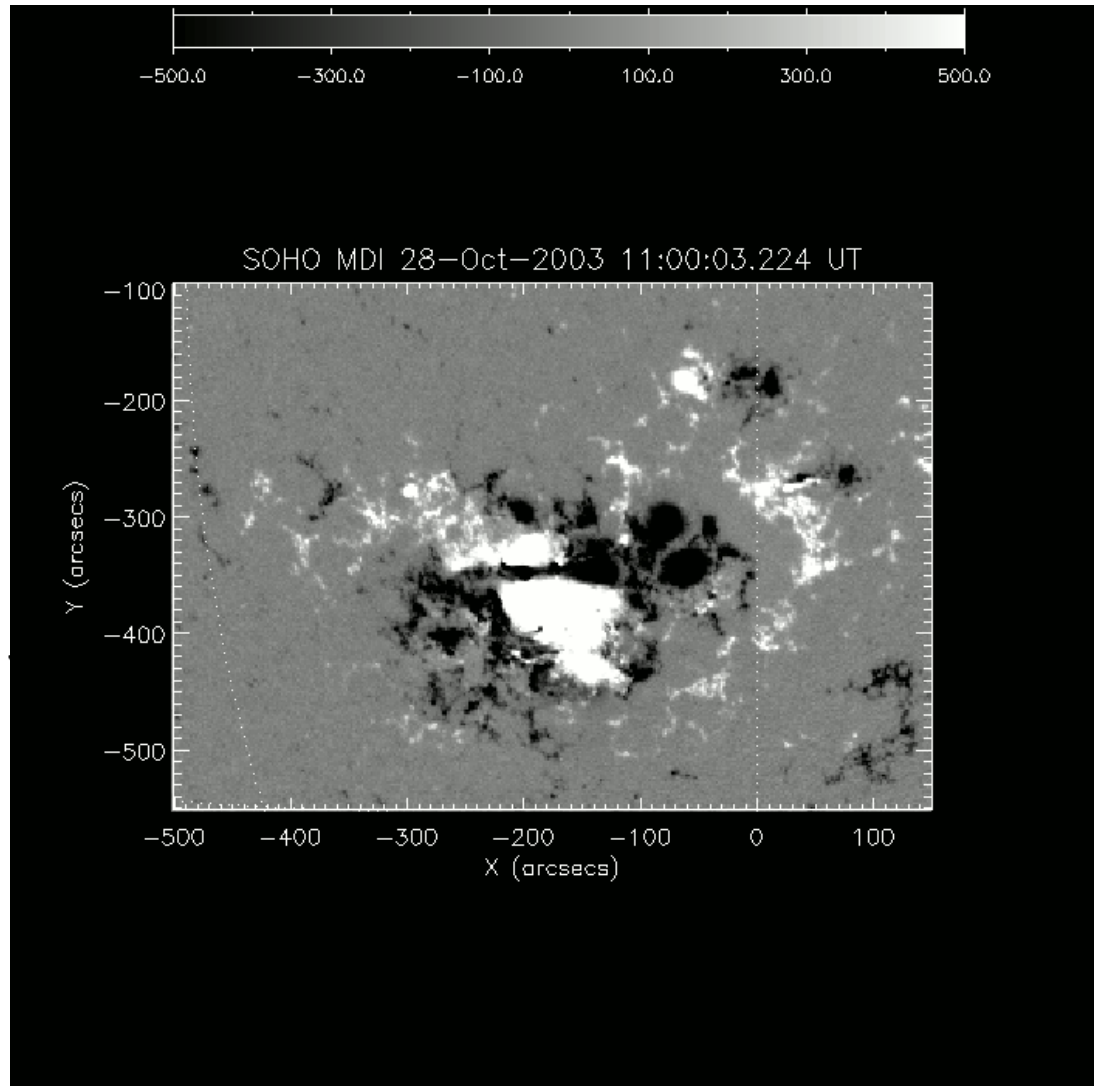
- La tormenta del día de la Bastilla, apenas se notó en España, mientras que nuestra localización fue bastante peligrosa durante la tormenta de Halloween.
- La variación de ~ 450 nT en 50 min el 29 de Octubre de 2003 podría estar relacionada con dos incidencias por causas ignoradas registradas por REE el 31 de Octubre y el 4 de Noviembre

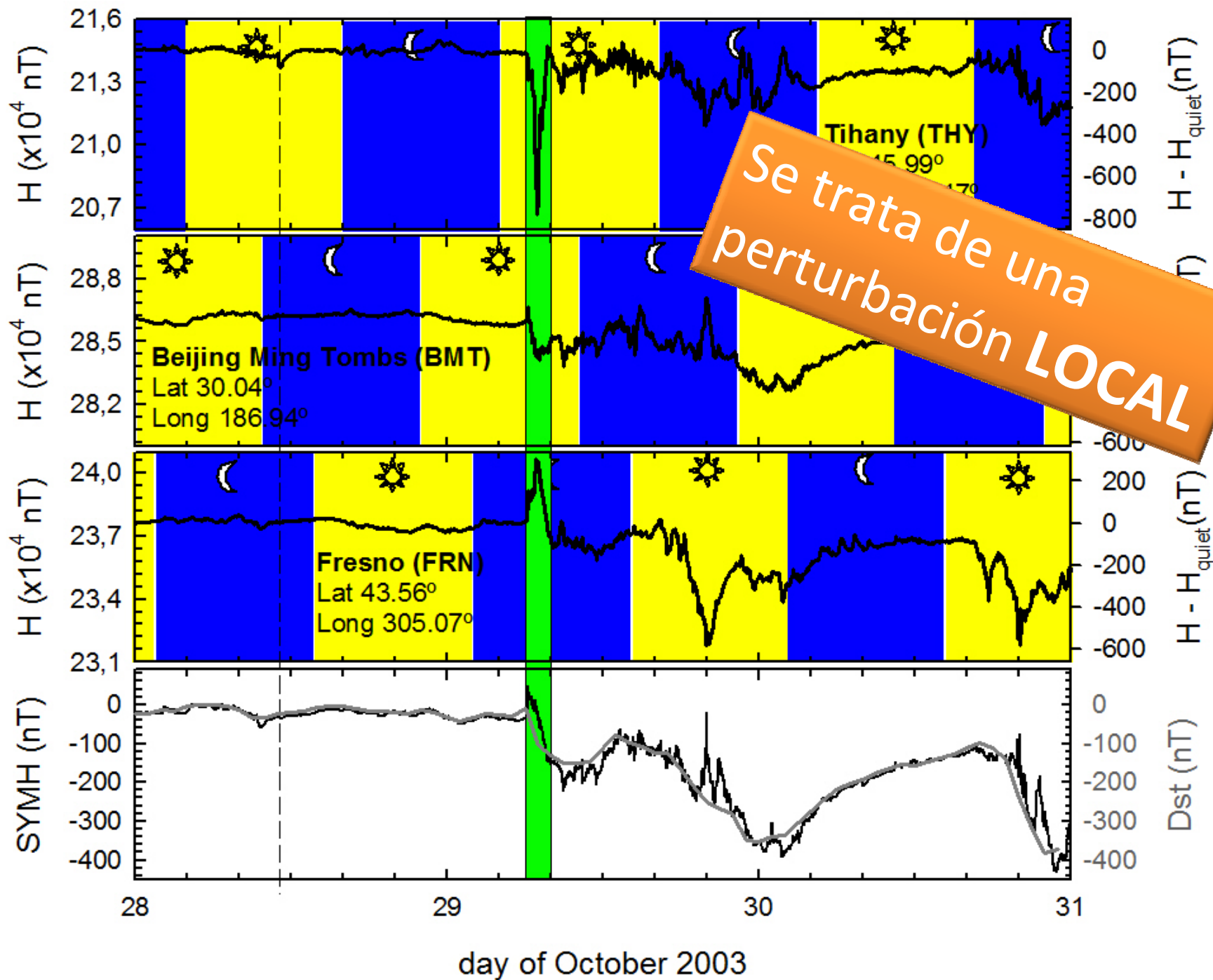
El observatorio de Colaba registró en Septiembre de 1859 la perturbación más extrema relacionada con la actividad solar: la ‘tormenta de Carrington’



Hemos descubierto una perturbación geomagnética registrada en 2003 extraordinariamente similar a la tormenta de Carrington

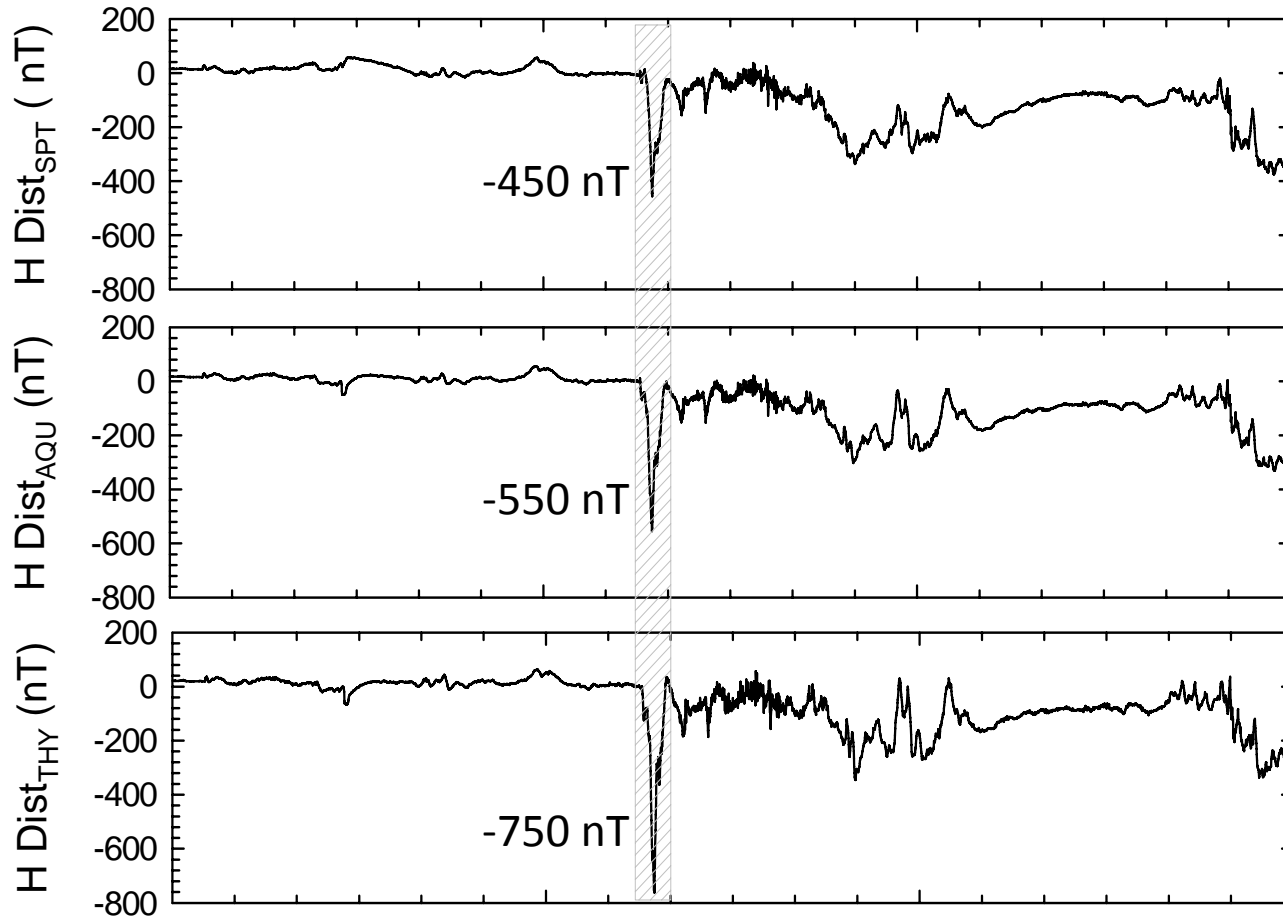
... con un gran conjunto de datos disponible gracias a modernos observatorios disponibles desde el Sol a la superficie terrestre





La causa principal de la variación
rápida del campo magnético
durante la tormenta de Carrington
NO fue el anillo de corriente

De Hungría a España



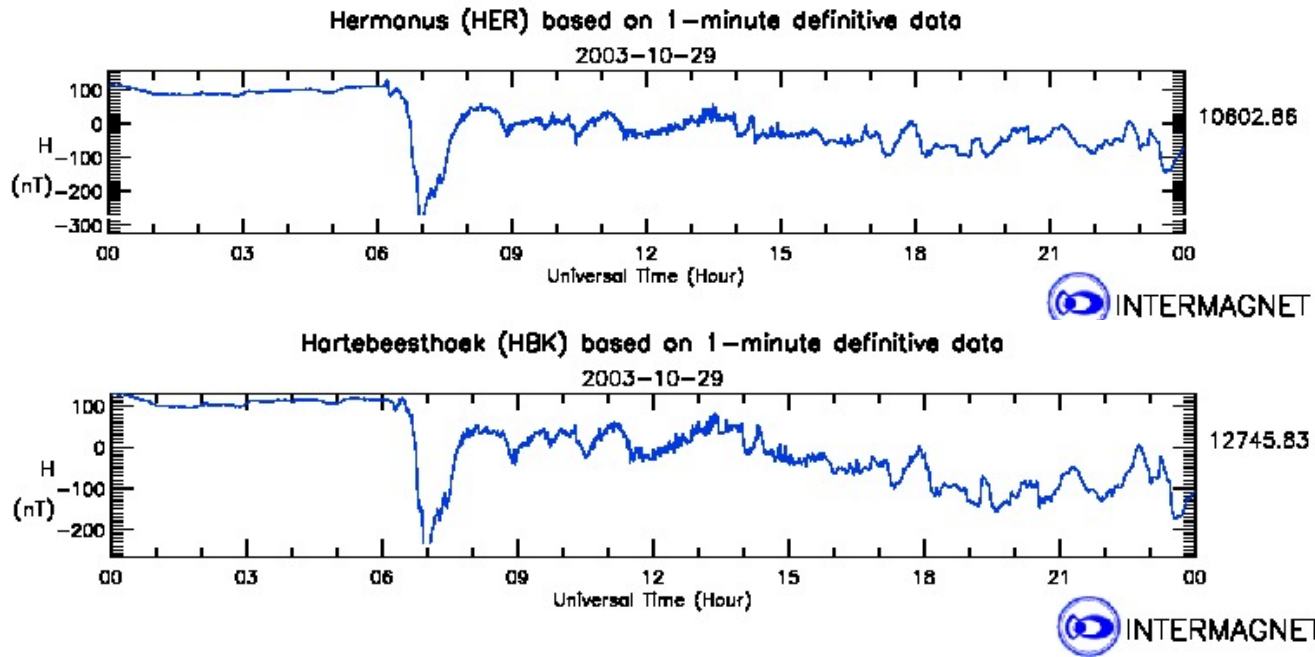
SPT
(50.45, 355.65)
~ -450 nT

AQU
(47.62, 13.32)
~ -550 nT

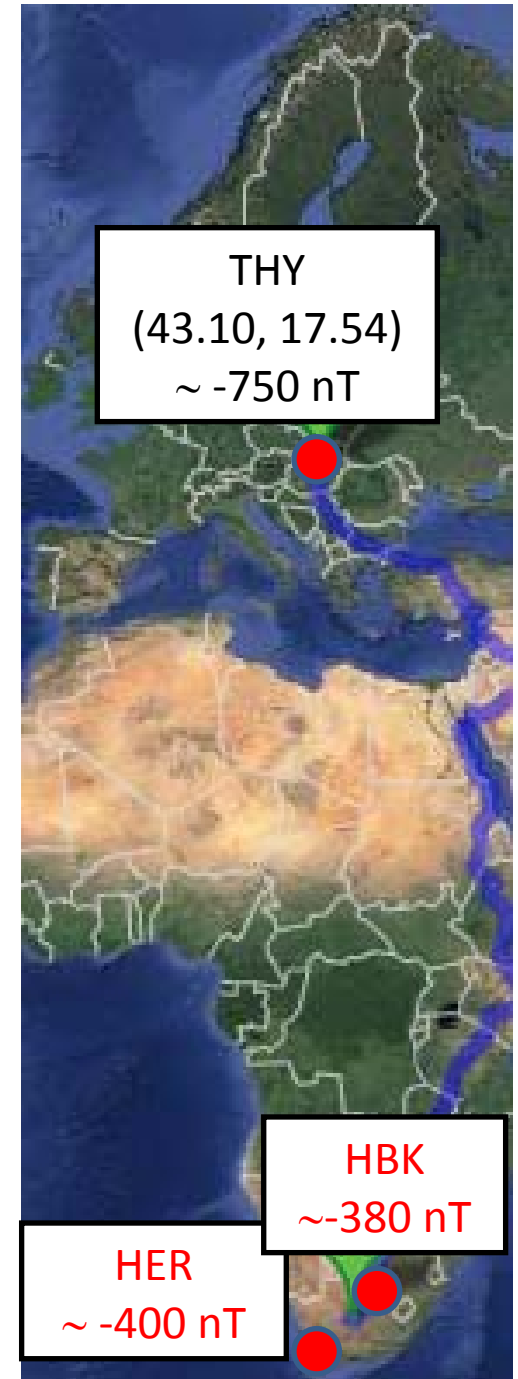
THY
(43.10, 17.54)
~ -750 nT



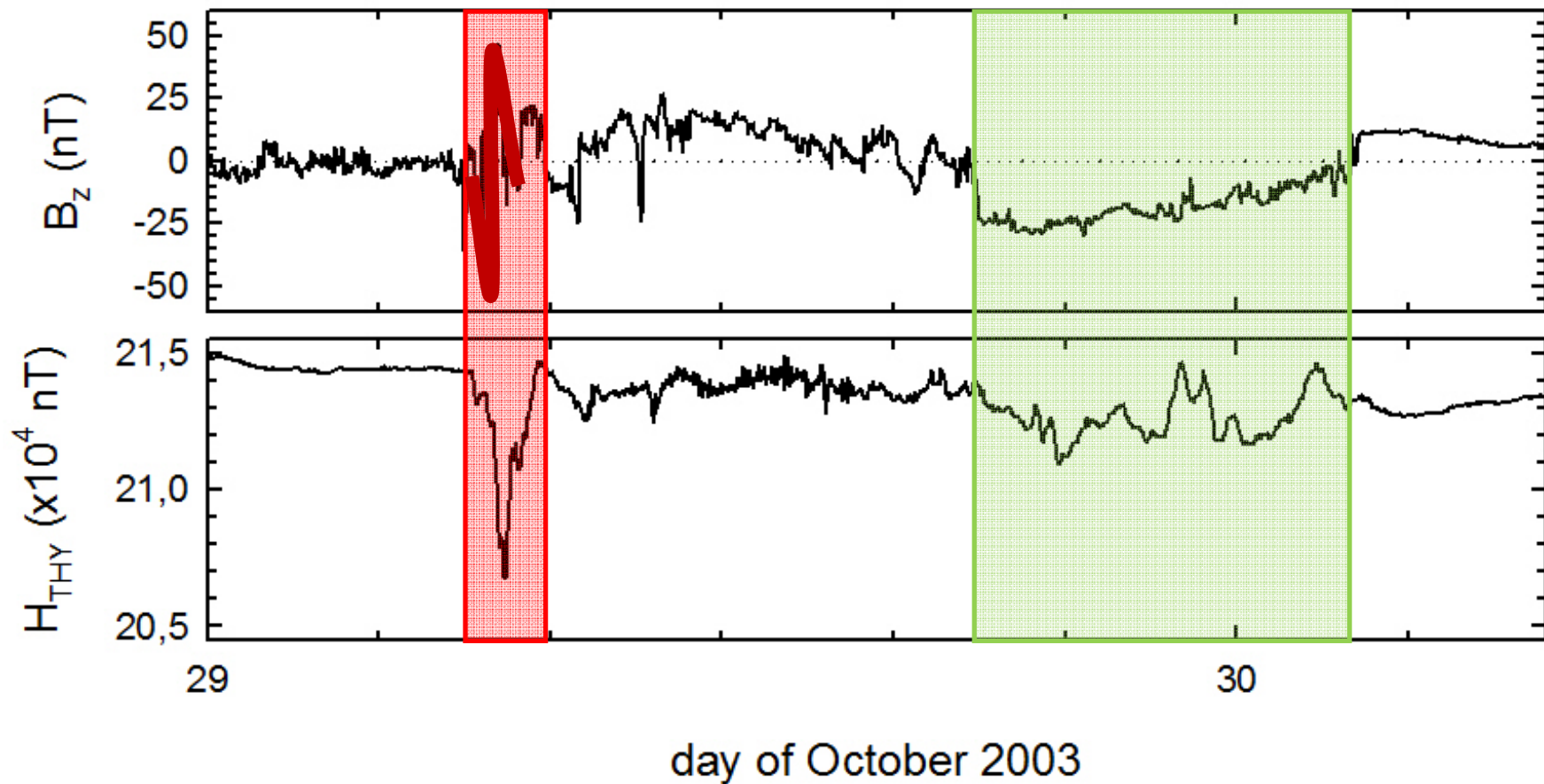
De Hungría a Sudáfrica



| Observatorio | Colatitud | Longitud Este |
|--------------|-----------|---------------|
| HBK | 115.88° | 27.71° |
| HER | 124.43° | 19.23° |



Conocer la causa: el primer paso antes de predecir

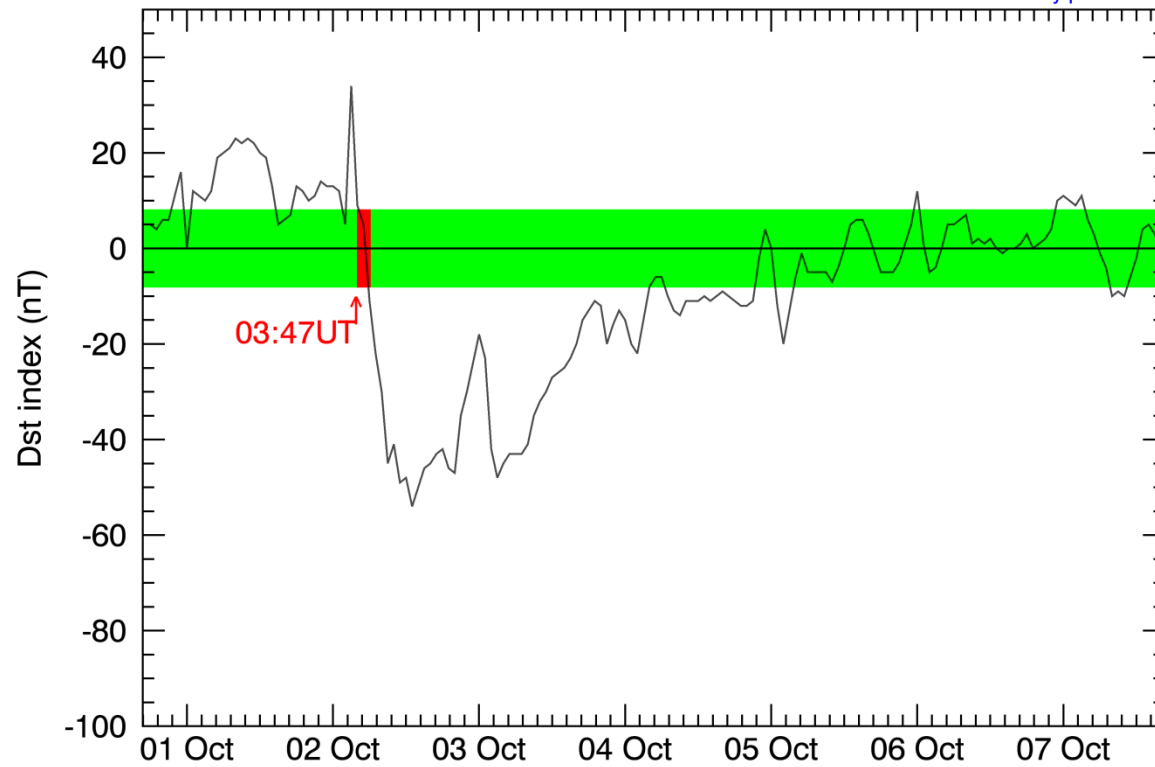


UAH-SWS Warning 2 October 2013

SolarHeed v1.0
University of Alcalá

Last data: 2013-10-07 16:43UT

Legend:
Quiet time
Alarm detected
Recovery phase model

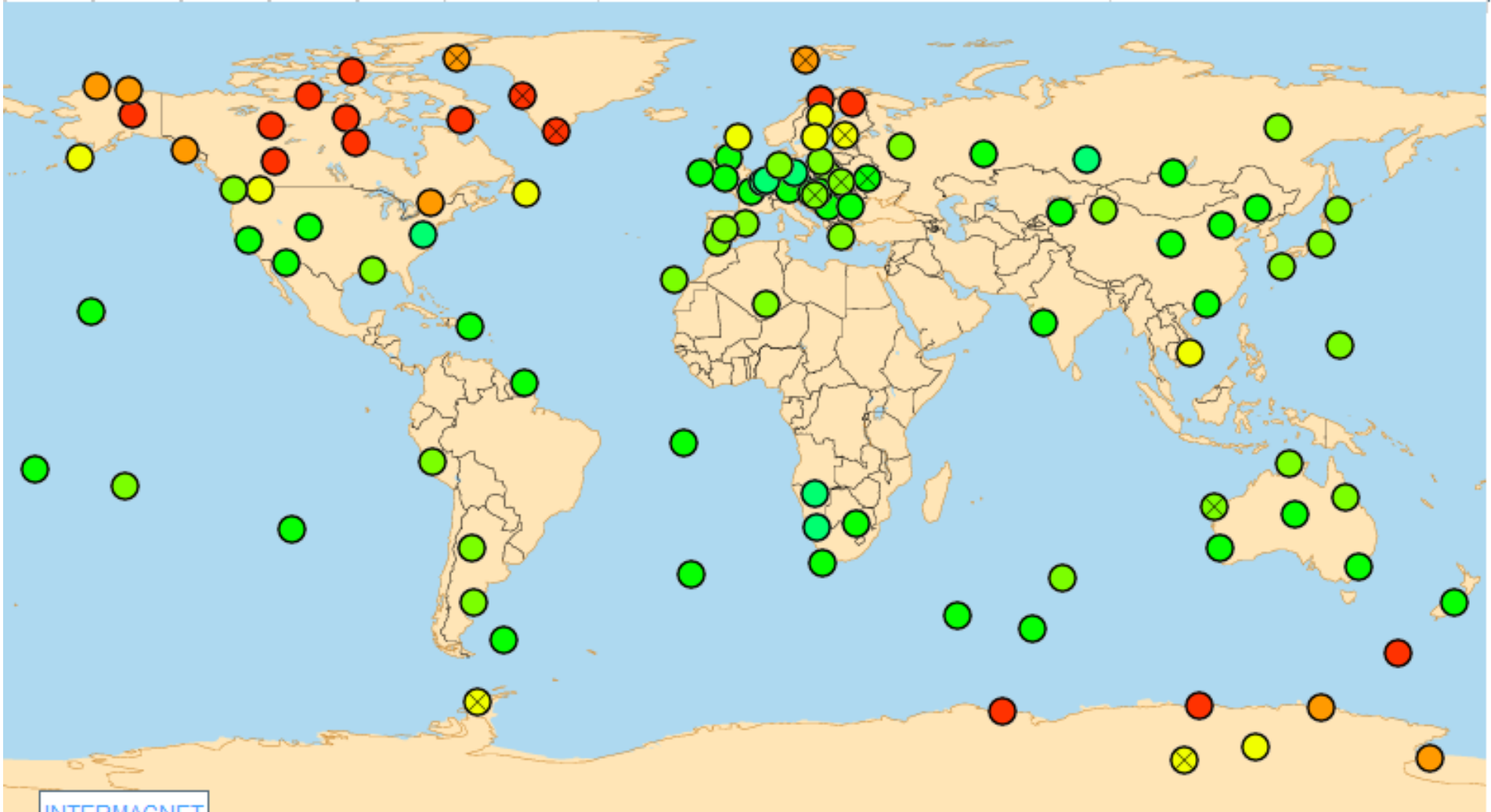


Alarm: 02 Oct 2013 03:47 UT



Colour Scale - Hourly Ranges (nT)

Navigation controls: a set of five blue buttons (back, pause, stop, forward, refresh) on the left, a central text box containing the date and time "2013-10-02 05:00 UT", and a "Help" button on the right.



INTERMAGNET

[Return to Region List]

| Current Outages for North VI | | | | | | |
|------------------------------|-----------------|-----------------|---|-------|---|-----------------|
| Municipality | Date Off | Est. Time ON | Area | # Out | Cause | Last Updated |
| Campbell River | Oct 01 16:02 | Oct 02 12:00 | 600 block WHALETOWN RD P39 View on Map | < 5 | Tree down across our wires | Oct 02 08:27 |
| Courtenay | Oct 01 19:16 | Oct 02 11:00 | 2900 block SMITH RD View on Map | < 5 | Under investigation | Oct 01 22:47 |
| Courtenay | Oct 01 20:02 | Oct 02 12:00 | KOMAS RANCH RD L20 View on Map | < 5 | Transformer burn out | Oct 02 09:15 |
| Nanaimo | Oct 02 09:00 | Oct 02 16:00 | 8506 to 8674 CHEMAINUS RD FROM SWALLFIELD RD TO ASHCROFT RD CHEMAINUS | 11 | Planned Outage Planned work being done on our equipment | Sep 28 13:06 |

Last Updated: Oct 02 09:30 PDT

NEWS ARCHIVES 2013

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May

June

July

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September

October

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Share Our Stories:



Ferris Cancels Classes in Several Big Rapids Campus Buildings Due to Power Outage (Oct. 2, 2013)

Due to an electrical power outage on Ferris State University's Big Rapids campus, all afternoon and evening classes and activities scheduled for today, Wednesday, Oct. 2 in Bishop Hall and the Allied Health, Optometry and Pharmacy buildings are canceled. Services in those buildings will be unavailable today. Employees working in those buildings who have been deemed non-essential do not need to report to work today. There may be other buildings west of State Street that are without power, with the exceptions of General Services, Heavy Equipment and the Sports Complex.

All other University activities will continue as scheduled.

The specific cause of the power outage has yet to be determined, but is related to an issue with the Ferris power grid.

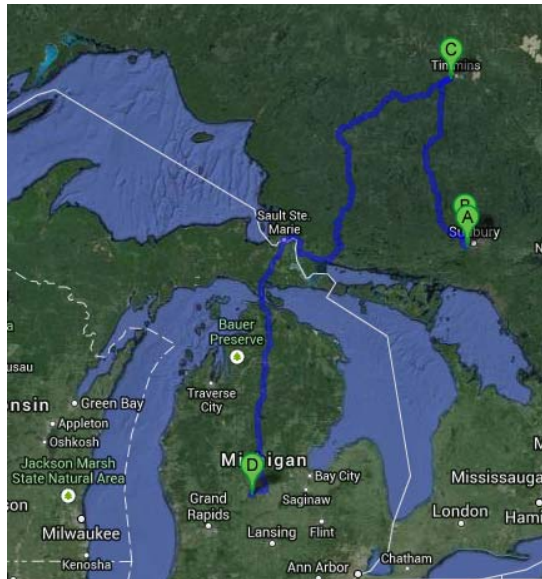
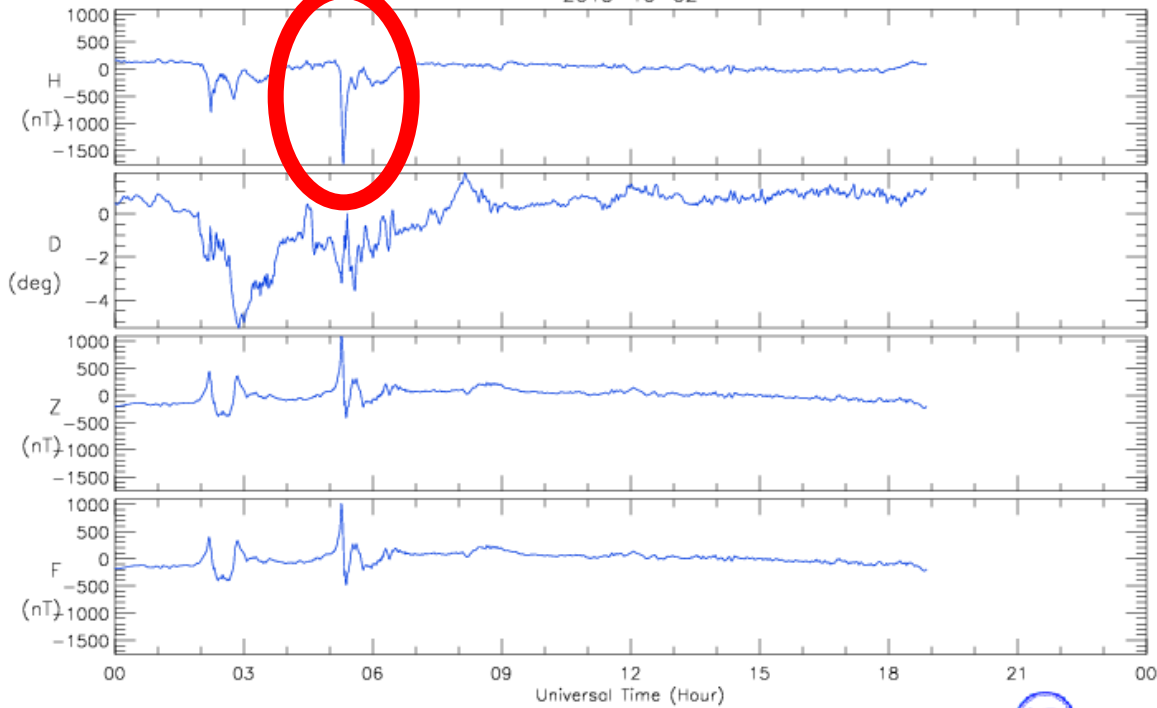
For updated information, visit www.ferris.edu.

Last updated: 10-02-2013



Baker Lake (BLC) based on 1-minute variation data

2013-10-02



NEWS LOCAL

Power outage affects more than 8,000; update 4

Wednesday, October 2, 2013 12:31:17 EDT PM

Greater Sudbury

Update 4:
Full restoration now expected by 4:30 p.m.

Update 3:
As of 12:15 p.m., power has been restored to 3,200 customers. Another 5,500 are still waiting.

Nancy Shaddock, communications officer with Hydro One, said crews are repairing a damaged section of power line. At this time the cause of the damage is not known, she said.

Update 2:
Power has been partially restored, with full restoration now expected by 1:30 p.m. The Star is waiting for word from Hydro One on the cause of the outage, and how many customers are still without power.

Update 1:
The outage has affected 8,000 customers in the area since 11:30 a.m. The cause of the outage is still under investigation.

Power is expected to be back by 1:45 p.m. Wednesday.

8:50 am → 2:30 pm

Seguimos trabajando...

