Space Weather impacts on Ionospheric wave propagation

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Focus on GNSS and HF

Space Weather Education Center

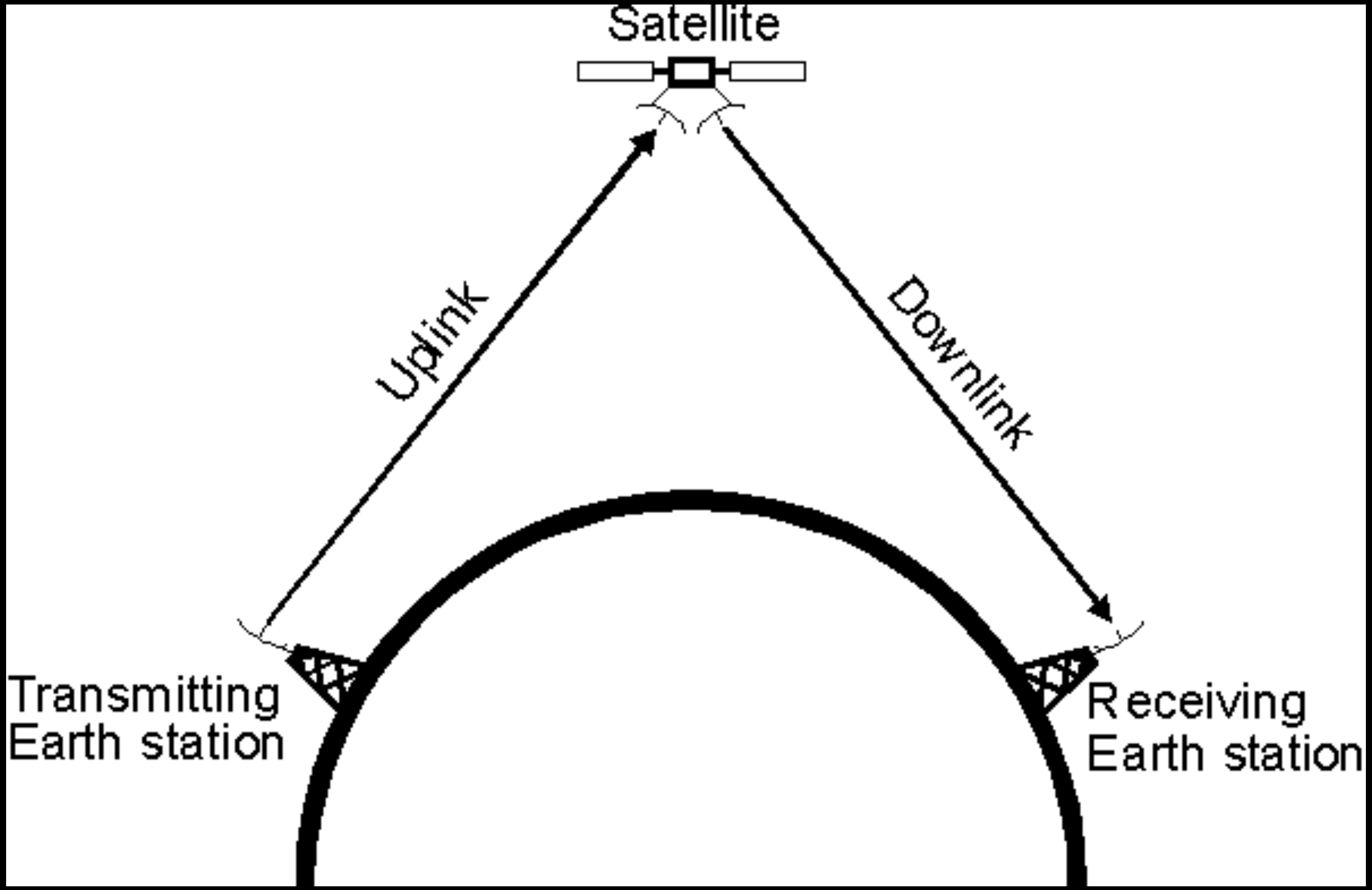
Solar-Terrestrial Centre of Excellence

SPACE WEATHER DISTURBANCES

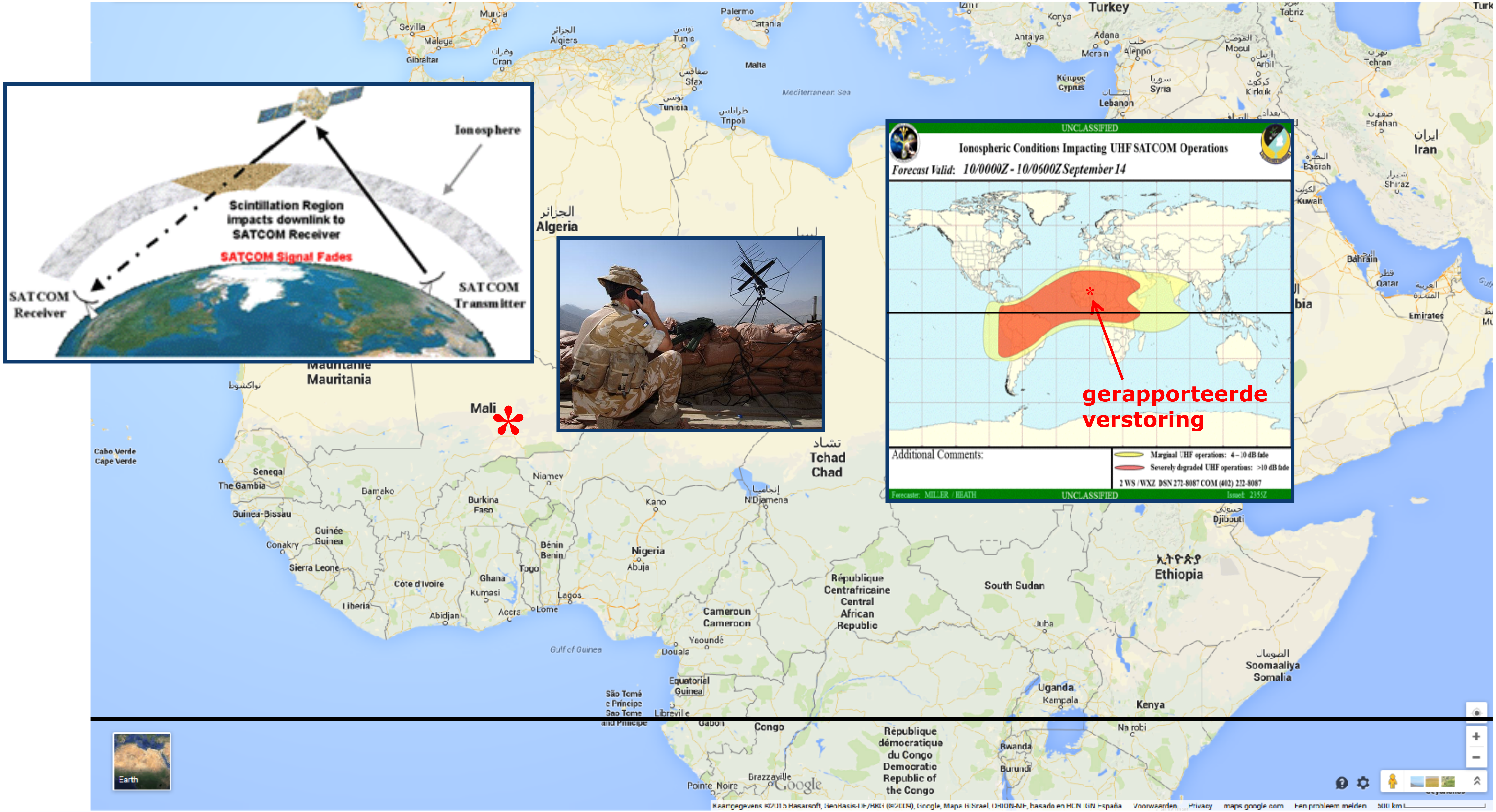
GNSS, SATcom & LEO

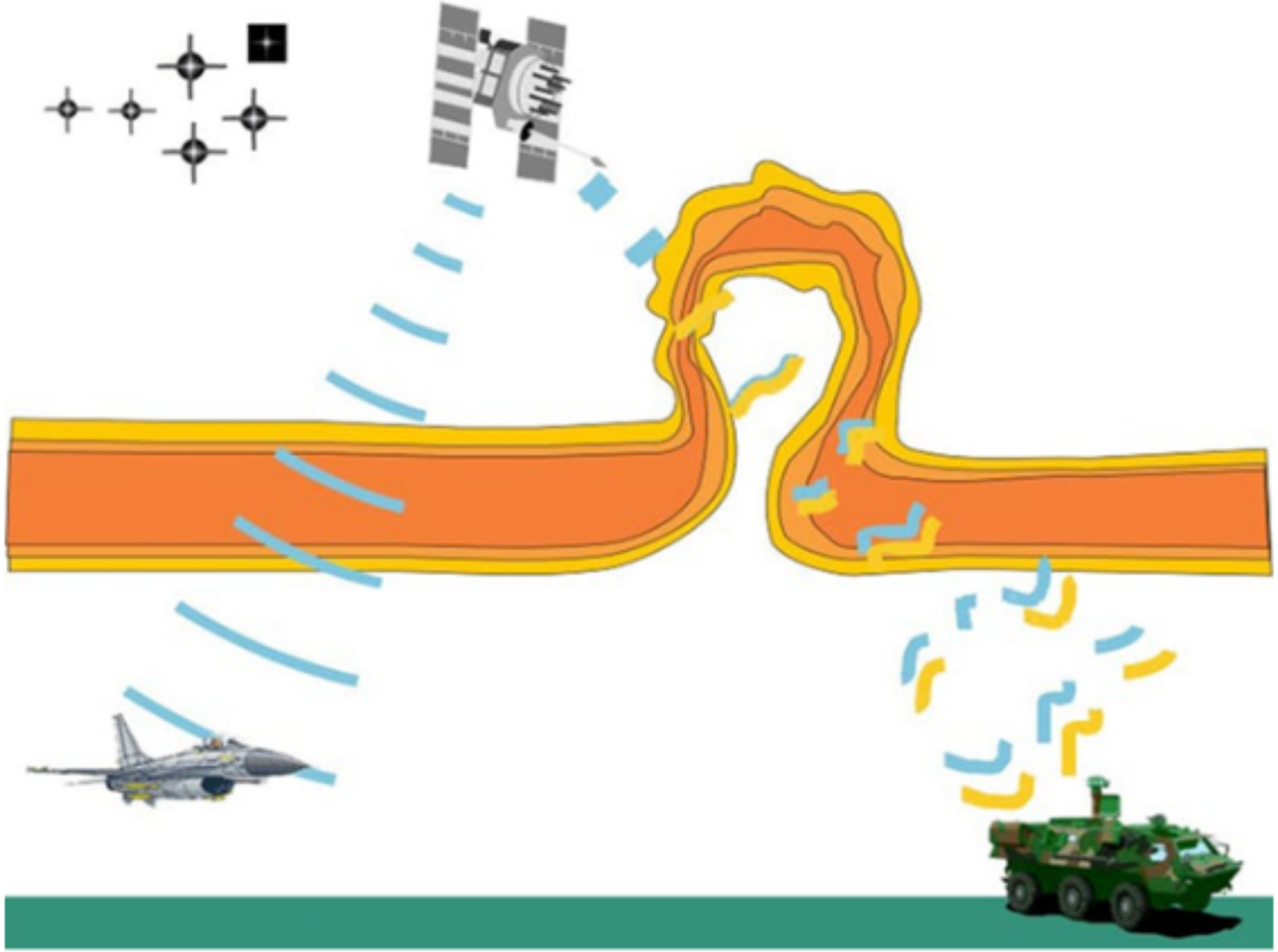
Jean-Marie Chevalier & Petra Vanlommel
Solar-Terrestrial Centre of Excellence (STCE)

SATcom

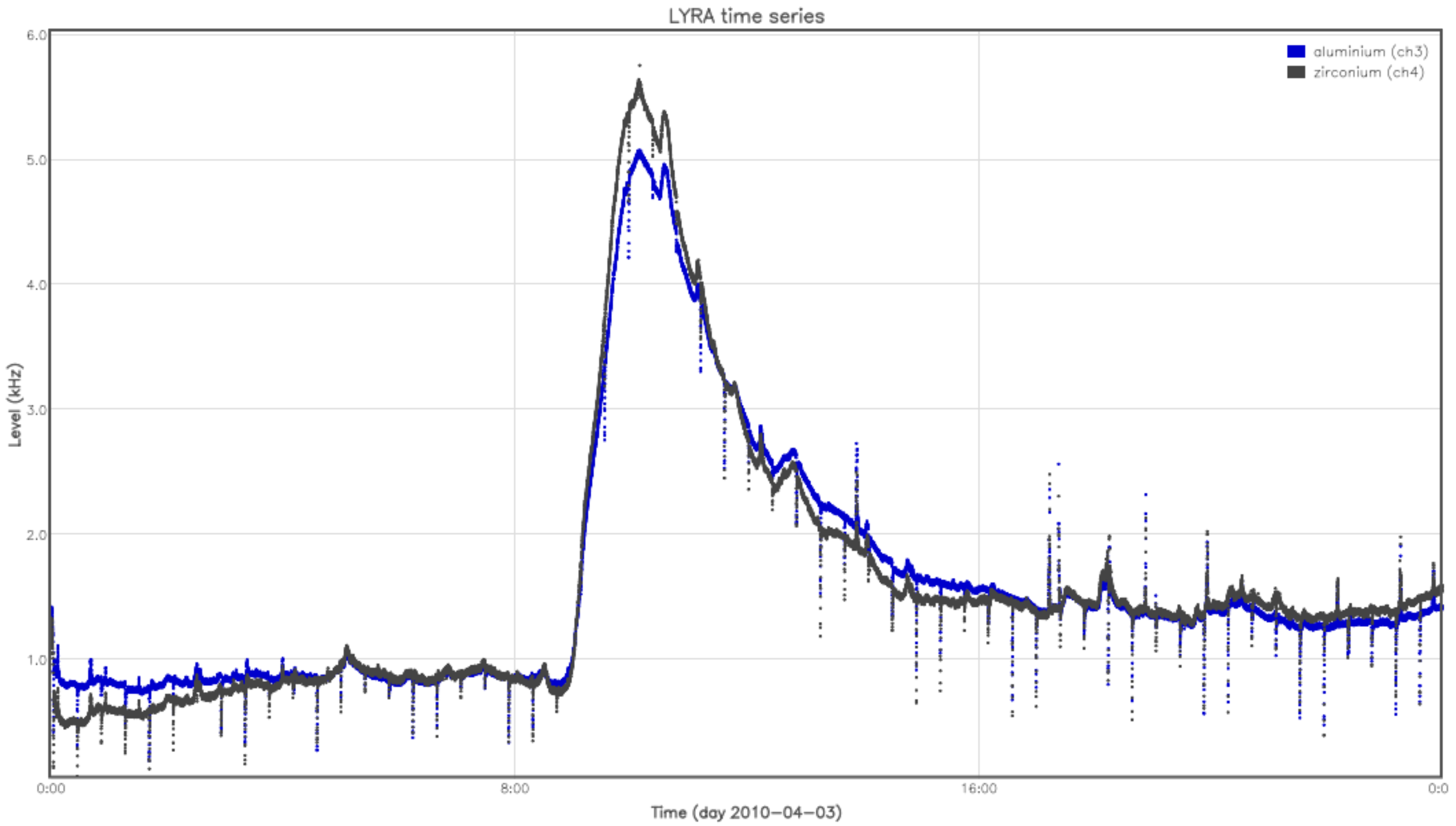

Satellite
Uplink
Downlink
Transmitting
Earth station
Receiving
Earth station

Outage due to Ionospheric scintillation





April 3, 2010


LYRA time series
aluminium (ch3)
zirconium (ch4)
Level (kHz)
6.0
5.0
4.0
3.0
2.0
1.0
0:00
8:00
16:00
0:0
Time (day 2010–04–03)


ALERT

As you are aware there was a very interesting geomagnetic storm period over the Easter period this year, this period was particularly significant as the disturbed space environment caused a number of spacecraft anomalies, including the well publicised Galaxy 15 failure suffered by our competitor Intelsat. The Presto Alerts and Daily Bulletins ('URSIGRAM') issued by SIDC at the time were superior to alternative products issued by NOAA SWPC, both in terms of timeliness and content.

In general I find that the level of technical content and commentary included in your Daily Bulletins and other products are exactly what we need as a spacecraft operator, and I find that these products compare very favourably with the alternative products issued by NOAA SWPC. You are tending to include greater detail in your commentary regarding events observed on the sun and the effects likely to be experience at earth, we value this additional detail.

I hope these comments are of use and trust that your team will keep up the good work!

August 10, 2022

Broadcasting

Intelsat Loses Command of Galaxy 15 Satellite

By Rachel Jewett | August 22, 2022

Rendering of the Galaxy 15 satellite. Photo: Intelsat

Intelsat has lost the ability to command its Galaxy 15 satellite after an anomaly caused by a space weather event. The anomaly caused the loss of commanding links, which is the signal used to fly the satellite and to receive telemetry data, an Intelsat spokeswoman told *Via Satelite*.

"Intelsat, working with the satellite manufacturer, has concluded that the anomaly is likely due to a lock up of both baseband electronics units triggered by space weather, i.e., solar eruptions of plasma and magnetic fields that can disrupt electronics," the spokeswoman said.

Satellite Operator's interest

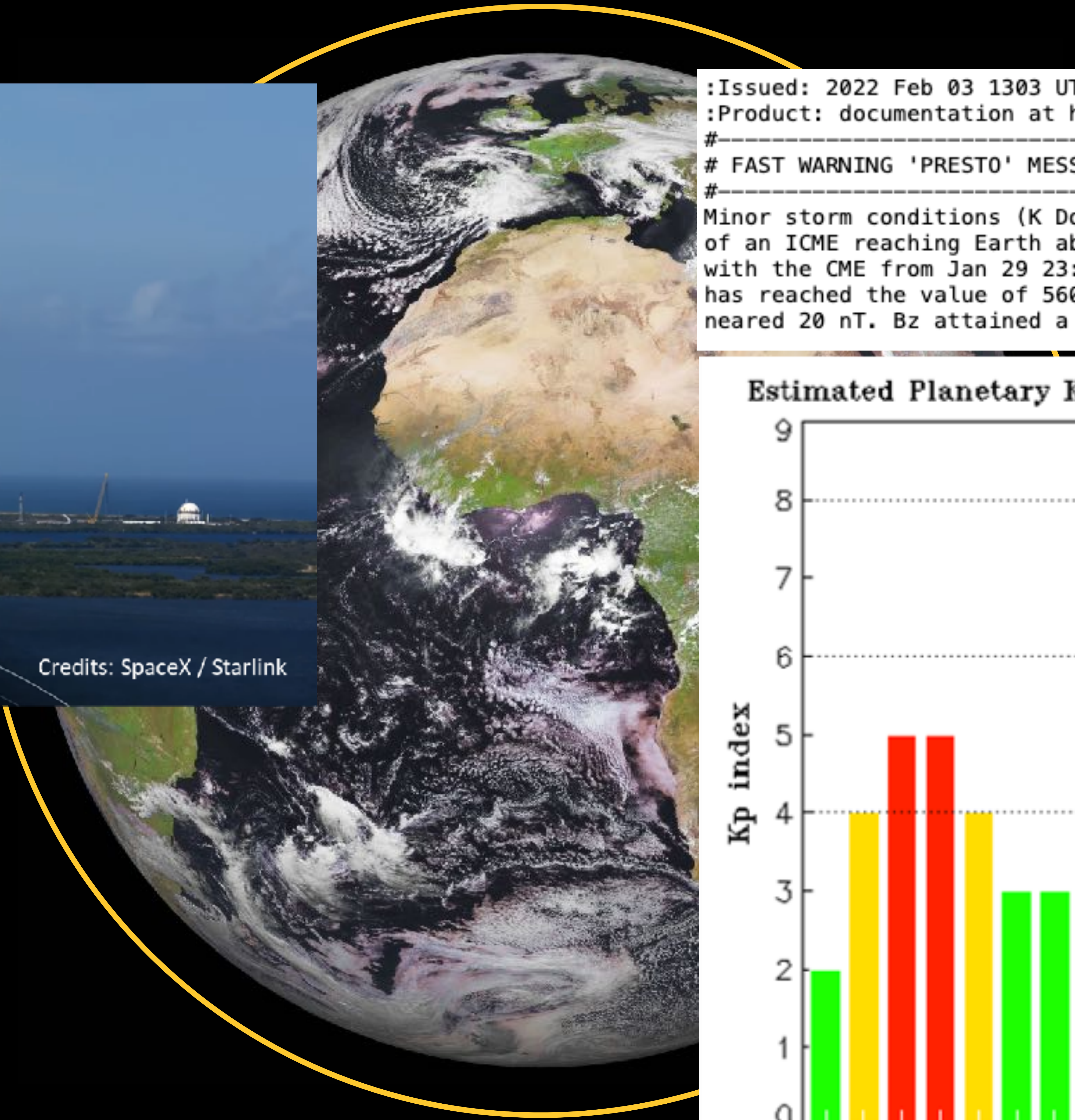
Aug 01, 2010

Nr	Time	Instrument	description
1.	02:59UT	SDO/AIA-193	a coronal dimming of small extent in NOAA AR 1092
2.	03:39UT	STEREOA/COR2	CME front coming from behind the occulted area directed to the upper left of the COR2 field of view (FOV). This CME is associated with event 1.
3.	05:29UT	STEREOA/HI1	CME front coming from behind the occulted area on the right directed to the left of the HI1 FOV. This is the same faint CME as in 2
4.	05:29UT	SDO/AIA-193	Start of rise of filament in the western hemisphere, near the North Pole, stretched from N60W0 to N30W50
5.	05:30UT	SDO/AIA-304	Start of rise of filament in the western hemisphere, near the North Pole, same as event 4.
6.	07:55UT	GOES-X-rays	Start of long duration C3.2 flare
7.	07:59UT	SDO/AIA-193	EUV-wave, seen as a running EUV intensity disturbance, and a coronal dimming, i.e. the evacuated plasma leaves a black gap in EUV-images, around NOAA AR 1092
8.	08:24UT	STEREO/COR2	CME front coming from behind the occulted area in the upper left of the COR2 FOV, associated with 6. **This is a halo CME.**
9.	08:26UT	GOES-X-rays	peak of C3.2 flare
10.	09:30UT	SDO/AIA-304	Polar filament, mentioned in event 5 lift off
11.	09:54UT	STEREOA/COR2	CME front coming from behind the occulted area directed to the upper left of the COR2 FOV, this CME has a smaller angular extent compared to the CME mentioned in 7. **This is a halo CME** associated with the polar filament mentioned in 10.
12.	09:59UT	SDO/AIA-193	Start of rise of post-flare loops in NOAA AR 1092
13.	10:09UT	STEREOA/HI1	CME front coming from behind the occulted area on the right directed to the left of the HI1 FOV. This is the same CME as in 8
14.	10:14UT	SDO/AIA-193	Start of rise of magnetic arcade at the position of the filament mentioned in 4.
15.	10:30UT	SDO/AIA-304	Start of rise of a filament at the same position of the filament mentioned in 5.
16.	11:15UT	SDO/AIA-304	Last SDO/AIA-304 image of the filament mentioned in 15.
17.	13:29UT	STEREOA/HI1	CME front coming from behind the occulted area on the right directed to the left of the HI1 FOV. This is the same CME as in 11
18.	13:59UT	SDO/AIA-193	Start of the slow rise of the filament at the lower base of the filament arcade mentioned in 12. This filament is situated at +/- the same latitude as NOAA AR 1092: N35W0.
19.	14:45UT	SDO/AIA-304	Start of the slow rise of the filament, same as in 18.
20.	16:29UT	SDO/AIA-193	Coronal dimming at N20W50
21.	17:09UT	STEREOA/COR2	CME front coming from behind the occulted area in the upper left of the COR2 FOV, possibly linked with 20
22.	20:09UT	STEREOA/HI1	CME front coming from behind the occulted area on the right directed to the left of the HI1 FOV. This is the same CME as in 21
23.	20:44UT	SDO/AIA-193	Last SDO/AIA-193 image of the filament mentioned in 18.
24.	22:00UT	SDO/AIA-304	Filament mentioned in 16, large on disk arcade, ready to lift off.
25.	22:24UT	STEREOA/COR2	CME front coming from behind the occulted area directed to the upper right of the COR2 FOV. This CME is ejected backwards seen from the Earth, which is located to the left of the COR2 images. This is the filament mentioned in 23 and 24
26.	22:09UT	STEREOA/HI2	CME front coming from behind the occulted area on the right directed to the left of the HI2 FOV. This is the same CME as in 13. The CME front 17 cannot be clearly distinguished.

Satellites in LEO

Satellites in LEO

Satellites in LEO



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:Issued: 2022 Feb 03 1303 UTC
:Product: documentation at http://www.sidc.be/products/presto
#--------------------------------------------------------------------#
# FAST WARNING 'PRESTO' MESSAGE  from the SIDC (RWC-Belgium)         #
#--------------------------------------------------------------------#
Minor storm conditions (K Dourbes=Kp=5) were attained on Feb 03 06:00UT, as a result
of an ICME reaching Earth about Feb 02 23:00UT. It is not clear if this is associated
with the CME from Jan 29 23:00UT or if it has another origin. The solar wind speed
has reached the value of 560 km/s and remains enhanced. The magnetic field magnitude
neared 20 nT. Bz attained a southward peak of -19nT.
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