SPACE WEATHER INTRODUCTORY COURSE

Collaboration of

Solar-Terrestrial Centre of Excellence

Koninklijke luchtmacht

Koninklijk Nederlands
Meteorologisch Instituut
Ministerie van Infrastructuur en Milieu

Space Weather into practice – SIDC/RWC & URSIgram

Jan Janssens

SIDC/RWC & URSIgram - Contents

- SIDC/RWC
- URSIgram
  - Overview features
- SWx alerts
- Exercises

SIDC/RWC & URSIgram - Contents

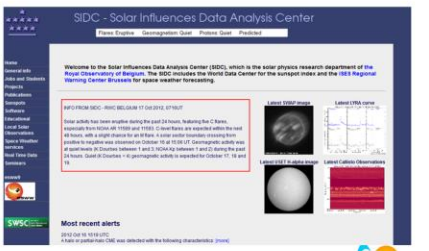
- SIDC/RWC
- URSIgram
  - Overview features
- SWx alerts
- Exercises

The SIDC

- 1981
  - Sunspot Index Data Centre
    - Sunspot number
- 2000
  - Solar Indices Data analysis Centre
    - = OD « Solar Physics and Space Weather »
    - Incl. SWx services
      - SIDC/RWC
- 2013
  - SILSO
    - Sunspot Index and Long-term Solar Observations

The SIDC / RWC
Team of space weather forecasters

- Team of +/- 8 forecasters
  - Scientists
    - Cumul job
    - Experts
  - Weekly tour of duty
    - 7/7, 14/24
    - Back-up by automated services and tools
  - IT supported
    - Previweb
      - Interface
    - Web page
    - Mailing service
  - Monthly SWOP meeting
  - ICAO support: PECASUS
    - HF, radiation, GNSS



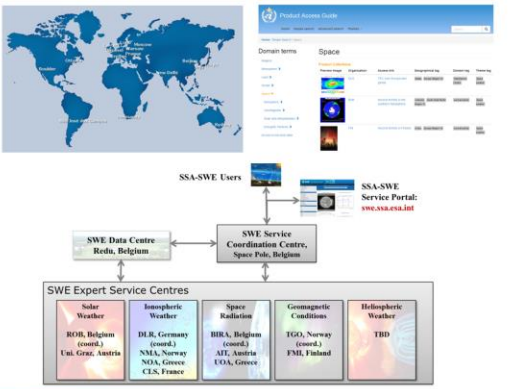
International Space Environment Service

ISES (International Space Environment Services): international network
● ROB/SIDC is RWC (Regional Warning centre) since 2000
● endorsement by national government
● Services delivered to SWE network developed under ESA SSA (Space Situational Awareness) program (cfr. presentation by MK). Expert Group coordinating the Expert Service Centre “Solar Weather”

ICAO: International Civil Aviation Organization
PECASUS: Pan European Consortium for Aviation Space weather User Services

The SIDC / RWC
Regional Warning Centre Brussels

- International context
  - ISES
    - International Space Environment Service
  - ESA / SSCC
    - Services and expertise
  - WMO / ICTSW
  - ICAO / PECASUS



International Space Environment Service
http://www.spaceweather.org/

ISES (International Space Environment Services):
international network
● ROB/SIDC is RWC (Regional Warning Centre) since 2000
● endorsement by national government
● Services delivered to SWE network developed under ESA SSA (Space Situational Awareness) program (cfr. presentation by MK). Expert Group coordinating the Expert Service Centre “Solar Weather”

WMO: WMO: ICTWS: 4-year → plan for consolidation of SWx services in WMO.
ICTSW: Interprogramme Coordination Team on Space Weather
WMO: World Meteorological Organization

Weekly SIDC SWx briefing

From the TV5 documentary: "La météo de l'espace: l'émergence d'une nouvelle science"
https://www.youtube.com/watch?v=wXAMKdA8w34

The weekly bulletin

```
:Issued: 2017 Jan 30 1406 UTC
:Product: documentation at http://www.sidc.be/products/bul
#-----------------------------------------------------------------------#
# SIDC Weekly bulletin on Solar and Geomagnetic activity                #
#-----------------------------------------------------------------------#
WEEK 839 from 2017 Jan 23
SOLAR ACTIVITY
--------------
Solar activity was very low to low, with a single C-class flare produced by spotless
active region NOAA 2627 near the west limb on 28 January (C2 flare peaking at
21:09UT). A new region, NOAA 2629, developed quickly on 24 January and was
responsible for most of the B-class flaring on 24-26 January. The other regions were
mostly quiet and decaying. No earth-directed coronal mass ejections (CMEs) were
observed in available coronagraphic imagery. The greater than 10MeV proton flux was
at nominal levels. A small positive equatorial coronal hole (CH) started its transit
of the central meridian on 23 January, and a negative trans-equatorial CH was
transiting the central meridian (CM) by the end of the period.
GEOMAGNETIC ACTIVITY
--------------------
Solar wind conditions near Earth were determined by the high speed stream (HSS) from
the small positive coronal hole (CH). The co-rotating interaction region (CIR) that
preceded it, drove a small shock on 26 January at 07:12UT. The proper HSS arrived a
few hours later around 13:45UT of the same day, with solar wind speed gradually
increasing from an initial 375 km/s up to values near 670 km/s around 06UT on 27
January. Bz oscillated wildly between -12 nT and +13 nT, preventing the development
of a strong geomagnetic disturbance. As a result, only active geomagnetic conditions
were observed on 26 and 27 January, while the rest of the week was at quiet levels
with an occasional unsettled episode.
-------------------------------------------------------------------------------
DAILY INDICES
DATE            RC   EISN  10CM   Ak   BKG    M   X
2017 Jan 23   ///    057   084   006   B1.0   0   0
2017 Jan 24   053    042   082   003   B1.0   0   0
2017 Jan 25   064    046   085   005   B1.4   0   0
2017 Jan 26   053    039   083   012   B1.1   0   0
2017 Jan 27   033    028   080   021   A9.1   0   0
2017 Jan 28   ///    029   079   010   A8.5   0   0
2017 Jan 29   ///    032   077   007   A8.2   0   0
-------------------------------------------------------------------------------
# RC   : Sunspot index (Wolf Number) from Catania Observatory (Italy)
# EISN : Estimated International Sunspot Number
# 10cm : 10.7 cm  radioflux (DRAO, Canada)
# Ak   : Ak Index Wingst (Germany)
# BKG  : Background GOES X-ray level (NOAA, USA)
# M,X  : Number of X-ray flares in M and X class, see below (NOAA, USA)
-------------------------------------------------------------------------------

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX  END  LOC    XRAY OP  10CM Catania/NOAA RADIO_BURST_TYPES
NONE
```

STCE Newsletter

23 Jan 2017 - 29 Jan 2017

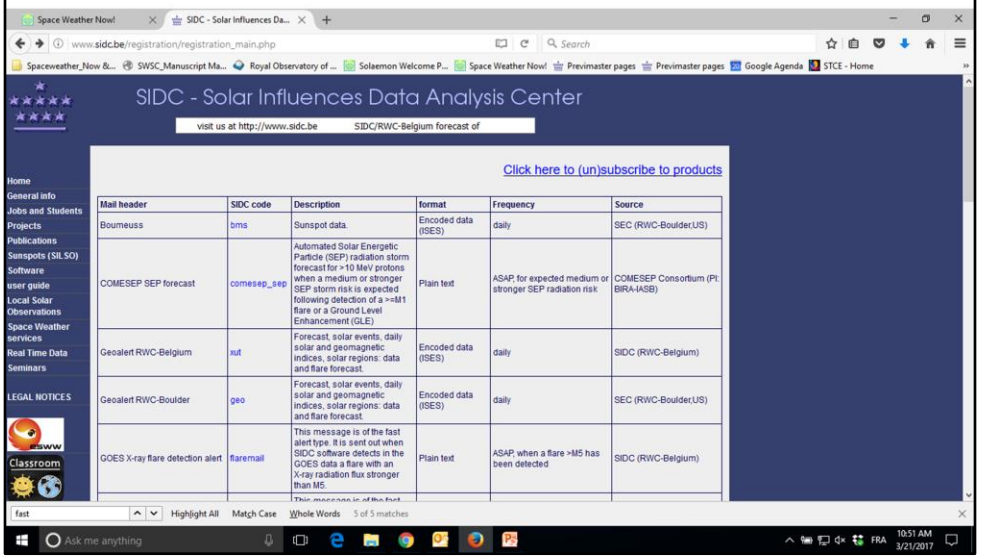
Published by the STCE - this issue : 3 Feb 2017. Available online at http://www.stce.be/newsletter/ .

The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

Content	Page
1. STCE Workshop "Geomagnetic storms and solar eruptions: from Sun to Earth"	2
2. The STCE meets	6
3. PROBA2 Observations (23 Jan 2017 - 29 Jan 2017)	6
4. Review of solar and geomagnetic activity	10
5. The International Sunspot Number	12
6. Geomagnetic Observations at Dourbes (23 Jan 2017 - 29 Jan 2017)	13
7. Review of ionospheric activity (23 Jan 2017 - 29 Jan 2017)	14

The space weather briefing as a ppsm : http://www.stce.be/movies/SIDCbriefing-2017-01-30_pv.ppsm

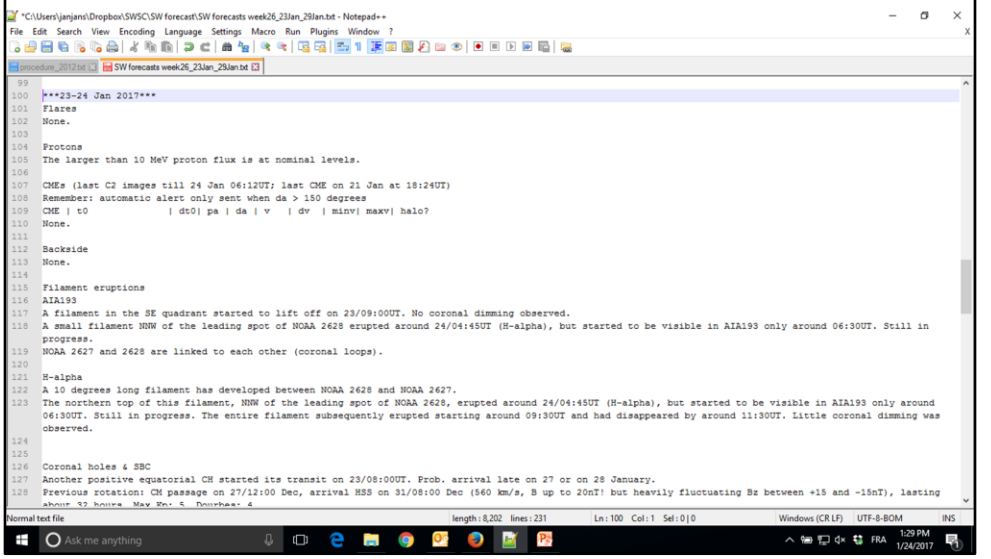
SIDC products – Free online



SIDC/RWC & URSIgram - Contents

- SIDC/RWC
- URSIgram
  - Overview features
- SWx alerts
- Exercises

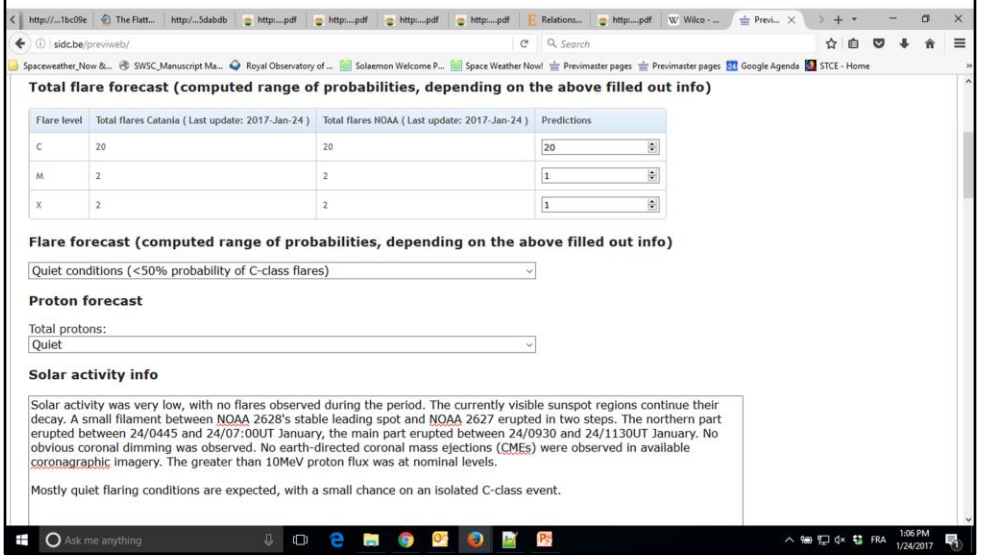
URSIgram – 1. Preparation



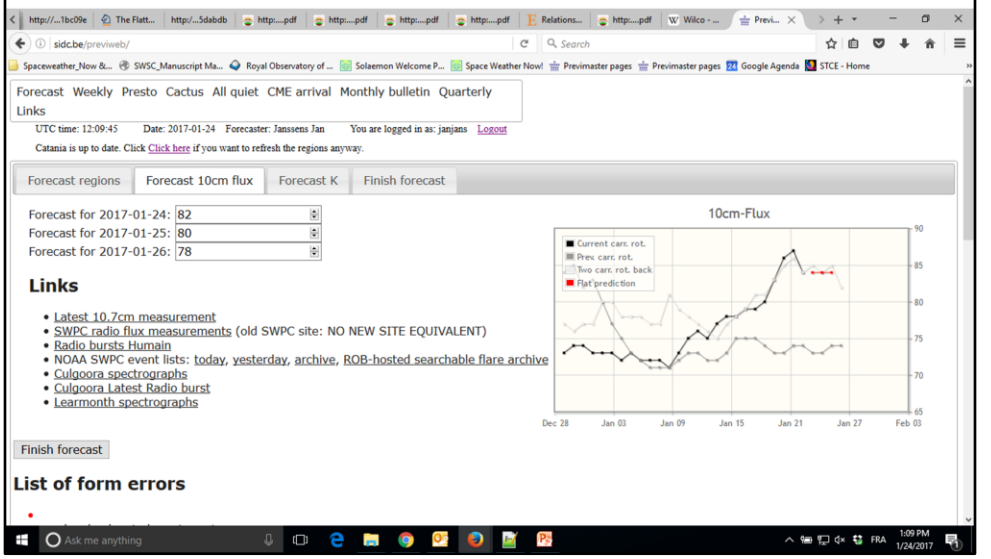
From https://www.merriam-webster.com/dictionary/ursigram
URSIgram: **Origin and Etymology of *ursigram***
International Scientific Vocabulary
⇒ *ursi-* (from French *U*nion *R*adiophonique *S*cientifique *I*nternationale, organization which inaugurated the broadcast in 1930) + *-gram*

⇒ http://www.spaceweather.org/ISES/code/code.html

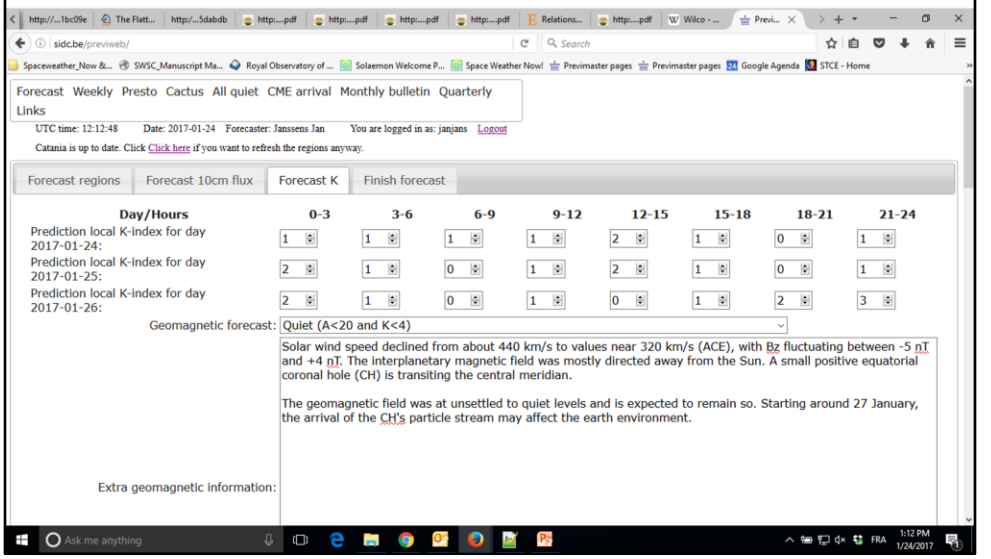
URSIgram – 2. Previweb / Flares



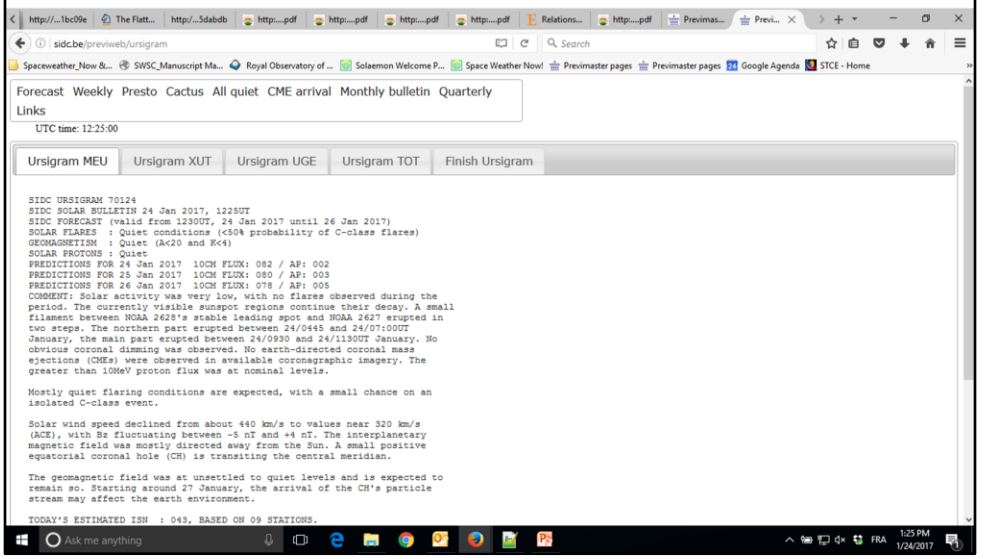
URSIgram – 3. Previweb / Radioflux



URSIgram – 4. Previweb / Geomagnetism



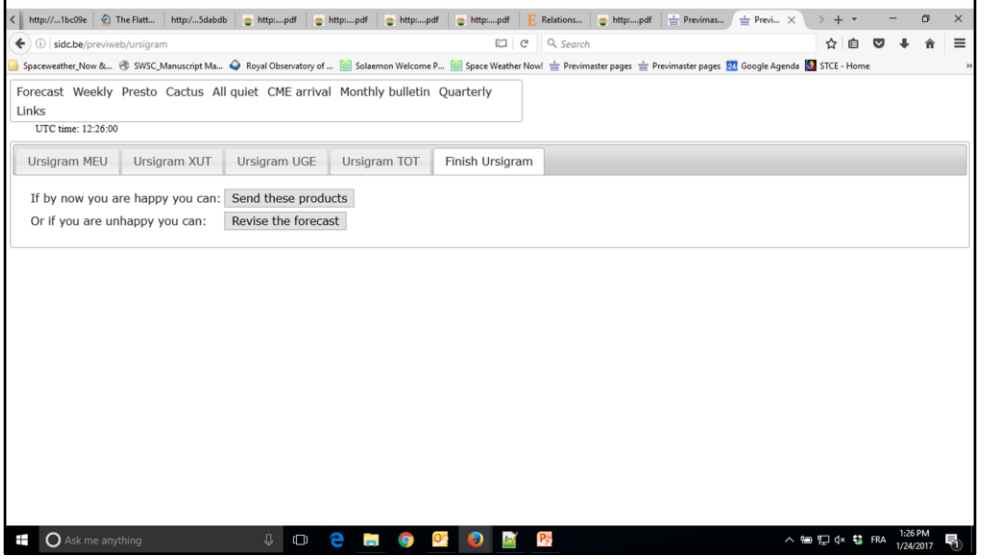
URSIgram – 6. Previweb / Final



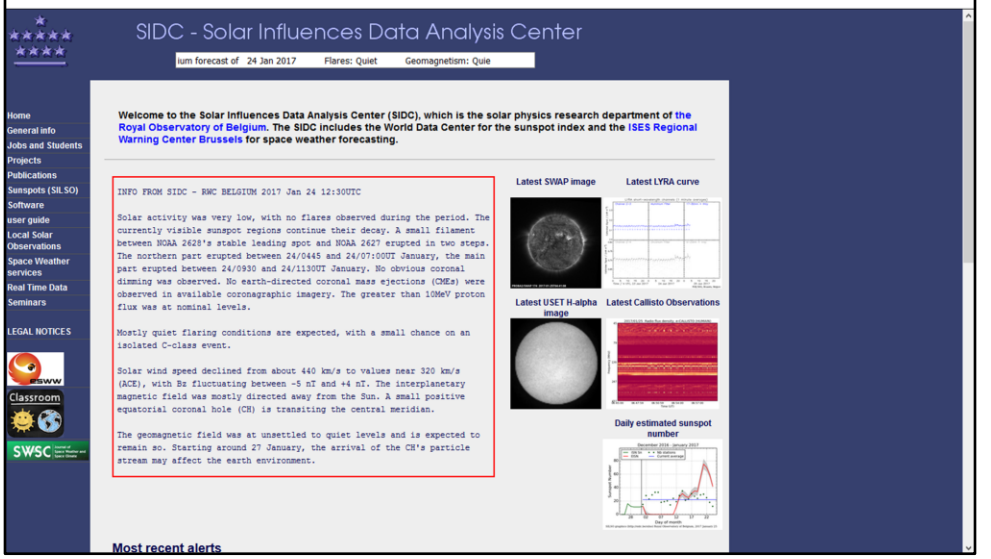
Especially to see if the IT is working properly, lay-out, one final check,…

Notice already additional information such as calculated Ap.

URSIgram – 7. Previweb / Send



URSIgram


SIDC - Solar Influences Data Analysis Center
ium forecast of 24 Jan 2017 Flares: Quiet Geomagnetism: Quie
Home
General info
Jobs and Students
Projects
Publications
Sunspots (SILSO)
Software
user guide
Local Solar Observations
Space Weather services
Real Time Data
Seminars
LEGAL NOTICES
Classroom
SWSC
Welcome to the Solar Influences Data Analysis Center (SIDC), which is the solar physics research department of the Royal Observatory of Belgium. The SIDC includes the World Data Center for the sunspot index and the ISES Regional Warning Center Brussels for space weather forecasting.
INFO FROM SIDC - RWC BELGIUM 2017 Jan 24 12:30UTC
Solar activity was very low, with no flares observed during the period. The currently visible sunspot regions continue their decay. A small filament between NOAA 2628's stable leading spot and NOAA 2627 erupted in two steps. The northern part erupted between 24/0445 and 24/07:00UT January, the main part erupted between 24/0930 and 24/1130UT January. No obvious coronal dimming was observed. No earth-directed coronal mass ejections (CMEs) were observed in available coronagraphic imagery. The greater than 10MeV proton flux was at nominal levels.
Mostly quiet flaring conditions are expected, with a small chance on an isolated C-class event.
Solar wind speed declined from about 440 km/s to values near 320 km/s (ACE), with Bz fluctuating between -5 nT and +4 nT. The interplanetary magnetic field was mostly directed away from the Sun. A small positive equatorial coronal hole (CH) is transiting the central meridian.
The geomagnetic field was at unsettled to quiet levels and is expected to remain so. Starting around 27 January, the arrival of the CH's particle stream may affect the earth environment.
Latest SWAP image
Latest LYRA curve
Latest USET H-alpha image
Latest Callisto Observations
Daily estimated sunspot number
Day of month
Most recent alerts

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#----------#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#----------#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

Finding your way in the URSIgram

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

Satellites and instruments

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#---#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#---#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

Finding your way in the URSIgram

Catania regions

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

Sunspot numbers

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#-----#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#-----#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

Flare classification

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#-----#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#-----#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

Flare features

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#---#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#---#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

Radio bursts

NOTICEABLE EVENTS SUMMARY

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	Catania/NOAA	RADIO_BURST_TYPES
16	1954	1959	2004	S14E09	M1.0	1N		24/2035	II/2

END

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#----------#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#----------#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

Finding your way in the URSIgram

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

Active region classification & filaments / prominences

Flare prediction

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#---#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#---#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

Finding your way in the URSIgram

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

10.7cm Radio flux

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#----------#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#----------#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

Finding your way in the URSIgram

Proton flux / events

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#----------#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#----------#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

CME & ICME

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

:Issued: 2014 Apr 17 1325 UTC
:Product: documentation at http://www.sidc.be/products/tot
#----------#
DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC
#----------#
SIDC URSIGRAM 40417
SIDC SOLAR BULLETIN 17 Apr 2014, 1304UT

SIDC FORECAST (valid from 1230UT, 17 Apr 2014 until 19 Apr 2014)
SOLAR FLARES : Active (M-class flares expected, probability >=50%)
GEOMAGNETISM : Quiet (A<20 and K<4)
SOLAR PROTONS : Quiet

PREDICTIONS FOR 17 Apr 2014 10CM FLUX: 180 / AP: 013
PREDICTIONS FOR 18 Apr 2014 10CM FLUX: 184 / AP: 007
PREDICTIONS FOR 19 Apr 2014 10CM FLUX: 188 / AP: 005

COMMENT: Eleven sunspot groups were reported by NOAA today. NOAA ARs 2035,2036, and 2037 (Catania numbers 24, 25, and 26 respectively) maintain the beta-gamma configuration of the photospheric magnetic field. The strongest flare of the past 24 hours was the M1.0 flare peaking at 19:59 UT yesterday in the NOAA AR 2035 (Catania number 24). The flare was associated with an EIT wave and a weak coronal dimming, but the associated CME was narrow and is not expected to arrive at the Earth.
We expect further flaring activity on the C-level, especially in the NOAA ARs 2035 and 2037 (Catania numbers 24 and 26 respectively) as well as in the NOAA AR 2042 (no Catania number yet) that yesterday appeared from behind the east solar limb, with a good chance for an M-class event.

Since yesterday evening the Earth is situated inside a solar wind structure with an elevated interplanetary magnetic field magnitude (occasionally up to 10 nT). It may be a weak ICME or the compression region on the flank of an ICME that missed the Earth. The solar origin of this structure is not clear. The north-south magnetic field component Bz was not strong, so no significant geomagnetic disturbance resulted (K index stayed below 4). Currently the solar wind speed is around 380 km/s and the IMF magnitude is around 8 nT.
We expect quiet to unsettled (K index up to 3) geomagnetic conditions, with active geomagnetic conditions (K = 4) possible, but unlikely.

TODAY'S ESTIMATED ISN : 145, BASED ON 17 STATIONS.
99999

SOLAR INDICES FOR 16 Apr 2014
WOLF NUMBER CATANIA : ///
10CM SOLAR FLUX : 184
AK CHAMBON LA FORET : 012
AK WINGST : 004
ESTIMATED AP : 004
ESTIMATED ISN : 139, BASED ON 29 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
16 1954 1959 2004 S14E09 M1.0 1N 24/2035 II/2
END

Geomagnetic activity

SIDC/RWC & URSIgram - Contents

- SIDC/RWC
- URSIgram
  - Overview features
- SWx alerts
- Exercises

Fast alerts: automatic detection by SIDC software

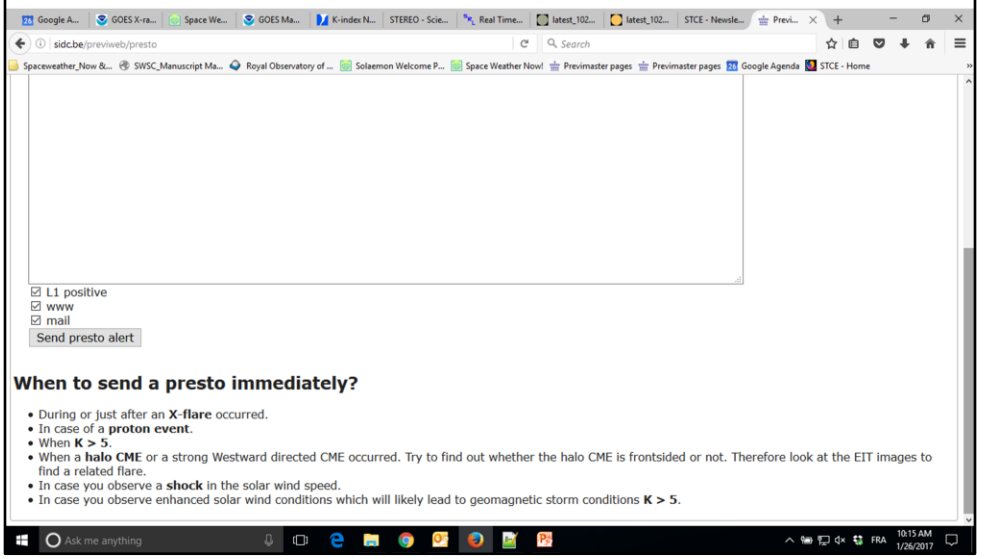
Flare > M5
SIDC in GOES X-ray

```
:Issued: 2016 Jul 24 0516 UTC
:Product: documentation at http://www.sidc.be/products/flaremail
#-----------------------------------------------------------------------#
# Large flare alerts from the SIDC (RWC-Belgium), detected in GOES      #
# X-ray data                                                            #
#-----------------------------------------------------------------------#
A class M5.5 solar X-ray flare occurred on 2016/07/23 with peak time 05:31UT
#-----------------------------------------------------------------------#
# Solar Influences Data analysis Center - RWC Belgium                   #
# Royal Observatory of Belgium                                          #
# Fax : 32 (0) 2 373 0 224                                              #
# Tel.: 32 (0) 2 373 0 491                                              #
#                                                                       #
# For more information, see http://www.sidc.be.  Please do not reply    #
# directly to this message, but send comments and suggestions to        #
# 'sidctech@oma.be'. If you are unable to use that address, use         #
# 'rvdlinden@spd.aas.org' instead.                                      #
# To unsubscribe, visit http://sidc.be/registration/unsub.php           #
#                                                                       #
# Legal notices:                                                        #
# - Intellectual Property Rights:                                       #
#   http://www.astro.oma.be/common/internet/en/data-policy-en.pdf       #
# - Liability Disclaimer:                                               #
#   http://www.astro.oma.be/common/internet/en/disclaimer-en.pdf        #
# - Use and processing of your personal information:                    #
#   http://www.astro.oma.be/common/internet/en/privacy-policy-en.pdf    #
#-----------------------------------------------------------------------#
```

Halo CME (width > 150°)
CACTus in SOHO/LASCO

```
:Issued: 2016 Nov 05 1349 UTC
:Product: documentation at http://www.sidc.be/products/cactus
#-----------------------------------------------------------------------#
# HALO CME ALERTS from the SIDC (RWC-Belgium), generated by CACTUS      #
#-----------------------------------------------------------------------#
  A halo or partial-halo CME was detected with the following
characteristics:

           t0      | dt0| pa | da |  v   |  dv | minv| maxv|
005|2016/11/05 04:24| 03 | 338| 178| 0297| 0048| 0200| 0452

Details can be found here:
http://www.sidc.oma.be/cactus/out/latestCMEs.html

      t0: onset time, earliest indication of liftoff
     dt0: duration of liftoff (hours)
      pa: principal angle, counterclockwise from North (degrees)
      da: angular width of the CME (degrees),
       v: median velocity (km/s)
      dv: variation (1 sigma) of velocity over the width of the CME
   minv: lowest velocity detected within the CME
   maxv: highest velocity detected within the CME


  This message is sent whenever a CME wider than 150 degrees is detected by
cactus.
+-----------------------------------------------------------------------+
```


PRESTO alert: 1. Criteria

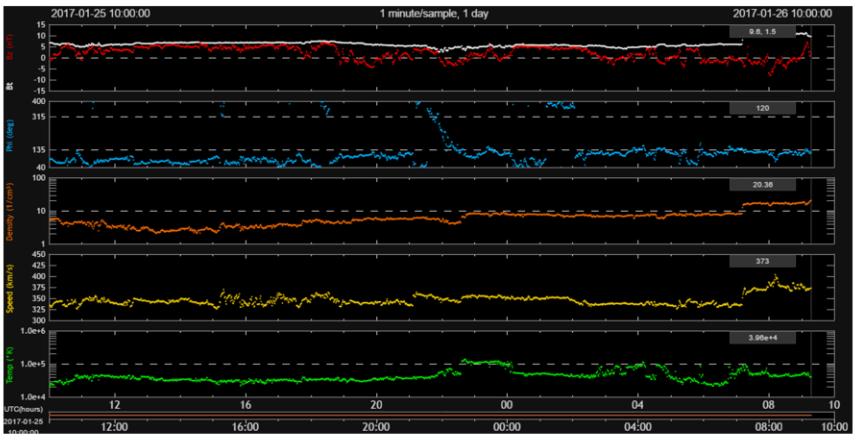


A shock is considered to have the following criteria, calculated using a 10 min average before and after the shock:

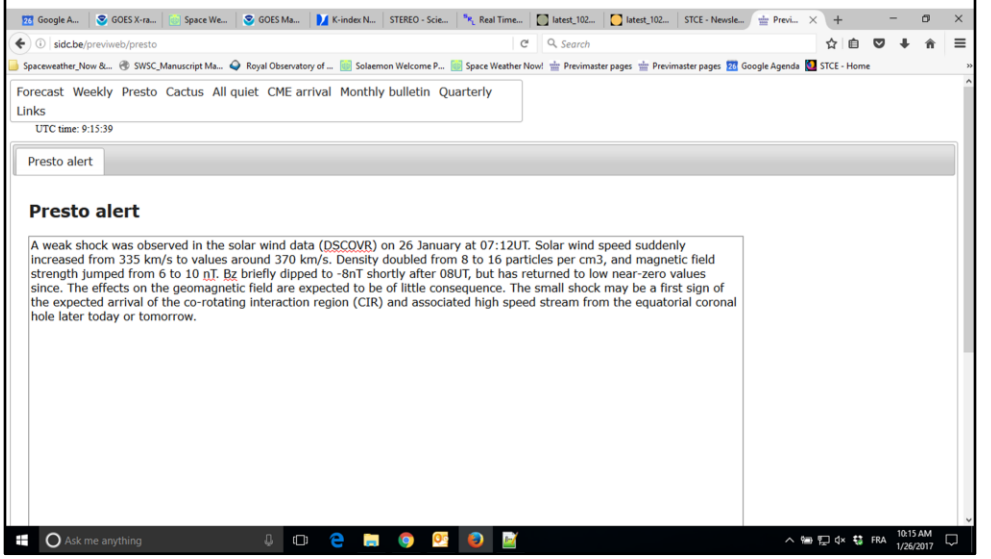
- A 20+ % increase in B, N (density), and T
- A 20+ km/s increase in V (speed)

From: Interplanetary shock database (S. Nikbakhsh, PhD thesis)
https://helda.helsinki.fi/bitstream/handle/10138/45227/Thesis.pdf

PRESTO alert: 2. Detection



PRESTO alert: 3. Composition



PRESTO alert: 4. Send

PRESTO ALERT

Solar Influences Data analysis Center <sidc@oma.be>

Sent: Thu 1/26/2017 10:18 AM

To: jan.janssens@oma.be

:Issued: 2017 Jan 26 0917 UTC
:Product: documentation at http://www.sidc.be/products/presto
#---#
FAST WARNING 'PRESTO' MESSAGE from the SIDC (RWC-Belgium)
#---#
A weak shock was observed in the solar wind data (DSCOVR) on 26 January at 07:12UT. Solar wind speed suddenly increased from 335 km/s to values around 370 km/s. Density doubled from 8 to 16 particles per cm3, and magnetic field strength jumped from 6 to 10 nT. Bz briefly dipped to -8nT shortly after 08UT, but has returned to low near-zero values since. The effects on the geomagnetic field are expected to be of little consequence. The small shock may be a first sign of the expected arrival of the co-rotating interaction region (CIR) and associated high speed stream from the equatorial coronal hole later today or tomorrow.
#---#
Solar Influences Data analysis Center - RWC Belgium
Royal Observatory of Belgium
Fax : 32 (0) 2 373 0 224
Tel.: 32 (0) 2 373 0 491
# #
For more information, see http://www.sidc.be. Please do not reply
directly to this message, but send comments and suggestions to
'sidctech@oma.be'. If you are unable to use that address, use
'rvdlinden@spd.aas.org' instead.
To unsubscribe, visit http://sidc.be/registration/unsub.php

All quiet alert

Start/End of all quiet alert from the SIDC/RWC Belgium

Solar Influences Data analysis Center <sidc@oma.be>

Extra line breaks in this message were removed.

Sent: Mon 7/4/2016 1:33 PM

To: jan.janssens@oma.be

:Issued: 2016 Jul 04 1132 UTC
:Product: documentation at http://www.sidc.be/products/quieta
#---#
From the SIDC (RWC-Belgium): "ALL QUIET" ALERT
#---#
START OF ALL QUIET ALERT
.....
The SIDC - RWC Belgium expects quiet Space Weather conditions for the next 48 hours or until further notice.
This implies that:
* the solar X-ray output is expected to remain below C-class level,
* the K_p index is expected to remain below 5,
* the high-energy proton fluxes are expected to remain below the event threshold.
#---#
Solar Influences Data analysis Center - RWC Belgium
Royal Observatory of Belgium
Fax : 32 (0) 2 373 0 224
Tel.: 32 (0) 2 373 0 491
# #
For more information, see http://www.sidc.be. Please do not reply

Start/End of all quiet alert from the SIDC/RWC Belgium

Solar Influences Data analysis Center <sidc@oma.be>

Sent: Wed 7/6/2016 12:11 AM

To: jan.janssens@oma.be

:Issued: 2016 Jul 05 2210 UTC
:Product: documentation at http://www.sidc.be/products/quieta
#---#
From the SIDC (RWC-Belgium): "ALL QUIET" ALERT
#---#
END OF ALL QUIET ALERT
.....
The SIDC - RWC Belgium expects solar or geomagnetic activity to increase. This may end quiet Space Weather conditions.
#---#
Solar Influences Data analysis Center - RWC Belgium
Royal Observatory of Belgium
Fax : 32 (0) 2 373 0 224
Tel.: 32 (0) 2 373 0 491
# #
For more information, see http://www.sidc.be. Please do not reply
directly to this message, but send comments and suggestions to
'sidctech@oma.be'. If you are unable to use that address, use
'rvdlinden@spd.aas.org' instead.
To unsubscribe, visit http://sidc.be/registration/unsub.php
# #
Legal notices:

SWIC - Collaboration between STCE, Koninklijke Luchtmacht, KNMI 35

This message is of the fast alert type. It is sent when quiet Space Weather conditions are expected for the next 48 hours or until further notice. This implies that:

- * the solar X-ray output is expected to remain below C-class level,
- * the K_p index is expected to remain below 5,
- * the high-energy proton fluxes are expected to remain below the event threshold.

All quiet alerts are send by the SWx forecaster, both to begin and to end the period.

The all quiet period is seldomly send during the solar cycle maximum, as new groups may quickly develop on disk or may round the east limb, or there may be filaments on disk that may result in flare/proton events.
The all quiet alert is also seldomly send during the ascending and declining phase as in view of the persistent high speed streams from coronal holes, as well as transients in the solar wind.

The criteria for the all quiet alerts are under debate.

Exercise: URSIgram

- Which of the following topics is usually <u>not</u> mentioned in the daily URSIgram?
  - ✓ Visibility of the aurora
  - ✓ The flux of high energetic (≥ 2 MeV) electrons
  - ✓ Ionospheric scintillation

Latest issue

```
:Issued: 2018 May 22 1304 UTC
:Product: documentation at http://www.sidc.be/products/meu
#-----------------------------------------------------------------------------#
# DAILY BULLETIN ON SOLAR AND GEOMAGNETIC ACTIVITY from the SIDC              #
# (RWC Belgium)                                                               #
#-----------------------------------------------------------------------------#
SIDC URSIGRAM 80522
SIDC SOLAR BULLETIN 22 May 2018, 1303UT
SIDC FORECAST (valid from 1230UT, 22 May 2018 until 24 May 2018)
SOLAR FLARES  : Quiet conditions (<50% probability of C-class flares)
GEOMAGNETISM  : Active conditions expected (A>=20 or K=4)
SOLAR PROTONS : Quiet
PREDICTIONS FOR 22 May 2018  10CM FLUX: 070 / AP: 005
PREDICTIONS FOR 23 May 2018  10CM FLUX: 071 / AP: 014
PREDICTIONS FOR 24 May 2018  10CM FLUX: 072 / AP: 008
COMMENT: Solar activity was at low levels. Catania sunspot group 82 (NOAA
AR 2710) produced one B2.8 flare peaking at 05:07 UT today. No earth-
directed coronal mass ejections (CMEs) were observed in available
coronagraphic imagery. The greater than 10 MeV proton flux was at nominal
levels. Solar activity is expected to be at low levels with some
probability for C-class flares.
The solar wind speed remained below 400 km/s over the past 24 hrs.
Interplanetary magnetic field magnitude remained below 5 nT till 11:00 UT
today (recorded by ACE). Later interplanetray magnetic filed magnitude
gradually increased till 9 nT, simutaniously Bz component decreased from -2
nT till -5 nT. Solar wind parameters variations may increase from now due
to the expected influence of the recurrent positive polarity northern polar
coronal hole. Solar wind speeds may increase till about 500 km/s later
today or tomorrow (accodring to STEREO data). Geomagnetic conditions have
been quiet over the past 24 hrs. Unsettled geomagnetic conditions can be
expected today and tomorrow. Isolated episodes of active conditions are
also not excluded.
TODAY'S ESTIMATED ISN  : 012, BASED ON 22 STATIONS.

SOLAR INDICES FOR 21 May 2018
WOLF NUMBER CATANIA    : 012
10CM SOLAR FLUX        : 070
AK CHAMBON LA FORET    : 007
AK WINGST              : 003
ESTIMATED AP           : 003
ESTIMATED ISN          : 011, BASED ON 28 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX  END  LOC    XRAY OP  10CM Catania/NOAA RADIO_BURST_TYPES
NONE
END
```

Space Weather into practice – URSIgram exercises

Jan Janssens

SIDC URSIGRAM 30515
SIDC SOLAR BULLETIN 15 May 2013, 1205UT
SIDC FORECAST (valid from 1230UT, 15 May 2013 until 17 May 2013)
SOLAR FLARES : Major flares expected (X-class flares expected, probability >=50%)
GEOMAGNETISM : Active conditions expected (A>=20 or K=4)
SOLAR PROTONS : Proton event expected (10 pfu at >10 MeV)
PREDICTIONS FOR 15 May 2013 10CM FLUX: 150 / AP: 017
PREDICTIONS FOR 16 May 2013 10CM FLUX: 152 / AP: 014
PREDICTIONS FOR 17 May 2013 10CM FLUX: 153 / AP: 011

COMMENT:A class X1.2 solar flare occurred today with peak time 01:48 UT, from NOAA AR 1748 which has a beta-gamma-delta magnetic configuration. It was associated with radio bursts and an increase of GOES proton flux levels, now at 5 protons/cm2-s-sr, the threshold of 10 protons/cm2-s-sr will likely be reached soon (at >=10 MeV). The increases in proton flux likely come from the CME driven shock. If the strong flares from this AR continue, the proton increases will likely be more abrupt when the magnetic connection between the flare site and the Earth is better (i.e. when the AR is in the western hemisphere). A CME was associated with the event, a shock and glancing blow can probably be expected at the Earth late on May 16 (CME speed 1700 km/s in LASCO C2).

Geomagnetic conditions are quiet, but ACE data shows a disturbance starting this morning, with currently magnetic intensity close to 15 nT (northwards, so no geomagnetic effect). There is not enough data yet to discern clearly its cause, but it is likely related to the CME on May 12 (and possibly those from the two previous days related to X-flares from NOAA AR 1748). Geomagnetic conditions are expected to be unsettled to active, with possible isolated minor storm periods.

TODAY'S ESTIMATED ISN : 099, BASED ON 11 STATIONS.

SOLAR INDICES FOR 14 May 2013
WOLF NUMBER CATANIA : 176
10CM SOLAR FLUX : 148
AK CHAMBON LA FORET : 012
AK WINGST : 009
ESTIMATED AP : 008
ESTIMATED ISN : 102, BASED ON 14 STATIONS.

NOTICEABLE EVENTS SUMMARY

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	RADIO BURST TYPES	Catania	NOAA	NOTE
15	0125	0148	0158	N12E64	X1.2	2N		IV/2II/1		1748	

END

URSIgram – Exercise 1

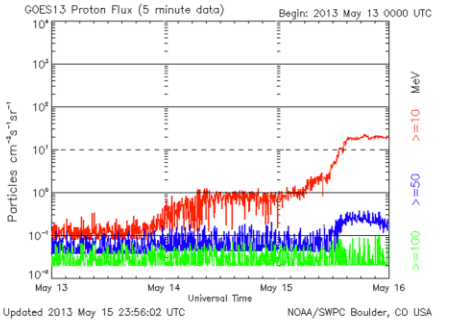
- **Setting**
  - You have received the above URSIgram. It is now 18:00UT on 15 May 2013. You have to brief the SWx operational personnel.
- **Questions – Part 1 of 2: Reading-Comprehension questions**
  - Was the X1.2 flare: a) a strong flare (which class)? b) a long duration event (LDE)?
  - What kind of radio burst (SRB) is type «IV/2II/1 »?
  - 'Active geomagnetic conditions' correspond to which NOAA scale?
  - ' protons/cm2-s-sr ' : This is the unit for which parameter? What is the short notation for this unit?
  - Despite the relatively strong magnetic field strength of 15 nT, no strong geomagnetic effects were recorded from this CME. Why?
  - ' Beta-Gamma-Delta ': What's the name of the corresponding active region classification scheme? What is the simplest type possible?
  - For the geomagnetic prediction of 15 May, why is A >= 20 while Ap=17?
  - What is being evaluated under the column « OP »?

URSIgram – Exercise 1

- **Setting**
  - You have received the above URSIgram. It is now 18:00UT on 15 May 2013. You have to brief the SWx operational personnel.
- **Questions – Part 2 of 2: SWx impact questions**
  - Has the >10MeV proton event threshold been reached? If yes, what would be your communications advice concerning a Dutch fregate operating north of Iceland?
  - You received a report from Gilze-Rijen Air Base (The Netherlands) about HF radio communication problems around 01:45UT. Do you think they were related to the X1.2 flare?
  - With the LASCO/C2 data now fully available, do you agree (part of) the CME is headed for Earth? Why (not)?
  - Was the X1.2 event a Tenflare? Do you think the 10.7 cm radio flux of 20:00UT will be affected?
  - « … possible isolated minor storm periods. » Do you expect important satellite communications problems?

URSIgram – Exercise 1

- Question 1:
  - Has the >10MeV proton event threshold been reached? If yes, what would be your communications advice concerning a Dutch submarine operating north of Iceland?



S 4	Severe	**Biological:** Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. **Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.
S 3	Strong	**Biological:** Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. **Other systems:** Degraded HF radio propagation through the polar regions and navigation position errors likely.
S 2	Moderate	**Biological:** Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. **Satellite operations:** Infrequent single-event upsets possible. **Other systems:** Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.
S 1	Minor	**Biological:** None. **Satellite operations:** None. **Other systems:** Minor impacts on HF radio in the polar regions.

SWIC - Collaboration between STCE, Koninklijke Luchtm

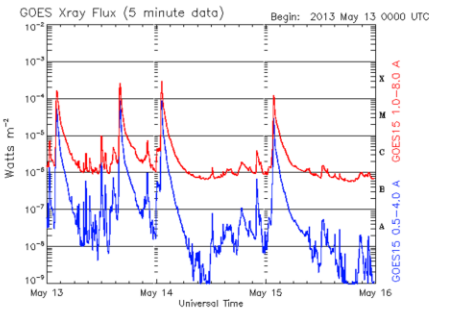
Real-time: https://www.swpc.noaa.gov/products/goes-proton-flux

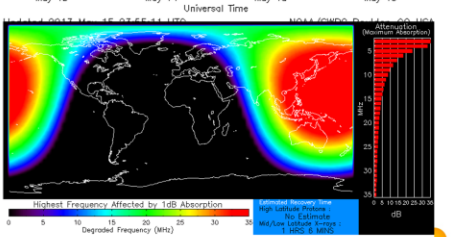
Nowcast e.g. COMESEP: http://www.comesep.eu/alert/
Nowcast e.g. D-RAP: https://www.swpc.noaa.gov/products/d-region-absorption-predictions-d-rap

Archive at ftp://ftp.swpc.noaa.gov/pub/warehouse/

URSIgram – Exercise 1

- Question 2:
  - You received a report from Soesterberg Air Base (The Netherlands) about HF radio communication problems on 15 May around 01:45UT. Do you think they were related to the X1.2 flare?





SWIC - Collaboration between STCE, Koninklijke Luchtmacht, KNMI

Strong X-ray flux
Product Valid At : 2013-05-15 01:49 UTC

Normal Proton Background
NOAA/SWPC Boulder, CO USA

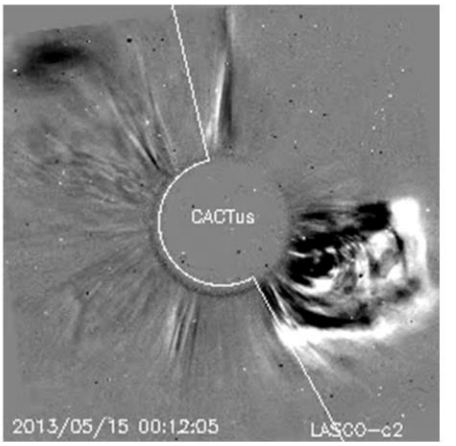
Real-time: https://www.swpc.noaa.gov/products/goes-x-ray-flux

Nowcast e.g. D-RAP: https://www.swpc.noaa.gov/products/d-region-absorption-predictions-d-rap

Archive at ftp://ftp.swpc.noaa.gov/pub/warehouse/

URSIgram – Exercise 1

- Question 3:
  - With the LASCO/C2 data now fully available, do you agree (part of) the CME is headed for Earth? Why (not)?



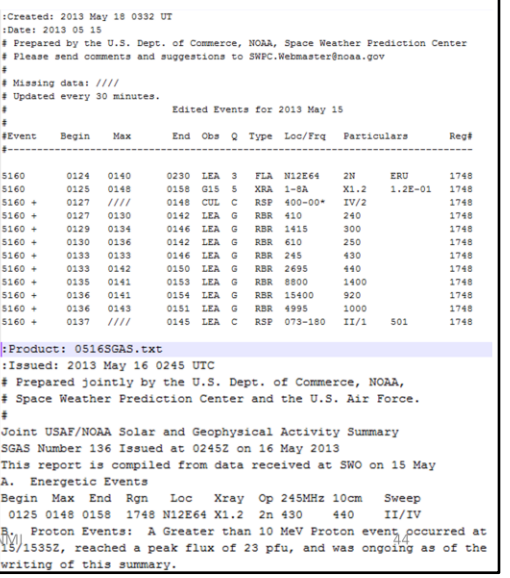
Real-time data at http://www.sidc.oma.be/cactus/out/latestCMEs.html

Archive at http://sidc.oma.be/cactus/catalog.php

Movie of this event at http://sidc.oma.be/cactus/catalog/LASCO/2_5_0/2013/05/CME0079/CME.html

URSIgram – Exercise 1

- Question 4:
  - Was the X1.2 event a Tenflare? Do you think the 10.7 cm radio flux of 20:00UT will be affected?



```
:Created: 2013 May 18 0332 UT
:Date: 2013 05 15
# Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center
# Please send comments and suggestions to SWPC.Webmaster@noaa.gov
#
# Missing data: ////
# Updated every 30 minutes.
#                          Edited Events for 2013 May 15
#
#Event    Begin    Max      End  Obs  Q  Type  Loc/Frq   Particulars      Reg#
#-------------------------------------------------------------------------------

5160       0124   0140      0230  LEA  3   FLA  N12E64    2N      ERU      1748
5160       0125   0148      0158  G15  5   XRA  1-8A      X1.2    1.2E-01  1748
5160 +     0127   ////      0148  CUL  C   RSP  400-00*   IV/2             1748
5160 +     0127   0130      0142  LEA  G   RBR  410       240              1748
5160 +     0129   0134      0146  LEA  G   RBR  1415      300              1748
5160 +     0130   0136      0142  LEA  G   RBR  610       250              1748
5160 +     0133   0133      0146  LEA  G   RBR  245       430              1748
5160 +     0133   0142      0150  LEA  G   RBR  2695      440              1748
5160 +     0135   0141      0153  LEA  G   RBR  8800      1400             1748
5160 +     0136   0141      0154  LEA  G   RBR  15400     920              1748
5160 +     0136   0143      0151  LEA  G   RBR  4995      1000             1748
5160 +     0137   ////      0145  LEA  C   RSP  073-180   II/1    501      1748

:Product: 0516SGAS.txt
:Issued: 2013 May 16 0245 UTC
# Prepared jointly by the U.S. Dept. of Commerce, NOAA,
# Space Weather Prediction Center and the U.S. Air Force.
#
Joint USAF/NOAA Solar and Geophysical Activity Summary
SGAS Number 136 Issued at 0245Z on 16 May 2013
This report is compiled from data received at SWO on 15 May
A.  Energetic Events
Begin  Max  End  Rgn   Loc   Xray  Op 245MHz 10cm   Sweep
 0125 0148 0158  1748 N12E64 X1.2  2n 430    440    II/IV
B.  Proton Events:  A Greater than 10 MeV Proton event occurred at
15/1535Z, reached a peak flux of 23 pfu, and was ongoing as of the
writing of this summary.
```


Real-time at https://www.swpc.noaa.gov/products/solar-and-geophysical-event-reports

Summary at https://www.swpc.noaa.gov/products/solar-and-geophysical-activity-summary

Archive at ftp://ftp.swpc.noaa.gov/pub/warehouse/

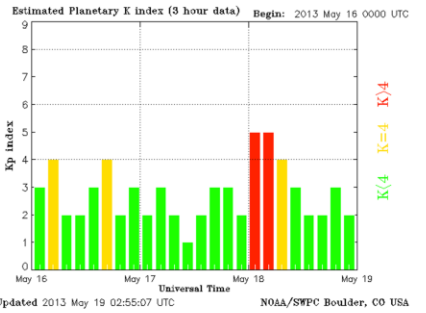
The daily values for the 10.7cm radio flux can be found at
Penticton: http://www.spaceweather.ca/solarflux/sx-4a-en.php
SWPC/NOAA: ftp://ftp.swpc.noaa.gov/pub/lists/radio/rad.txt

For 14 & 15 May, the Penticton values were as follows:

Date	Time	Julian day	Carr. Rot.	**Observed Flux**	Adjusted Flux	URSI Flux
2013-05-14	17:00:00	2456427.197	2136.996	**148.1**	151.4	136.2
2013-05-14	20:00:00	2456427.322	2137.001	**147.9**	151.1	136.0
2013-05-14	23:00:00	2456427.447	2137.005	**147.8**	151.0	135.9
2013-05-15	17:00:00	2456428.197	2137.033	**141.8**	144.9	130.4
2013-05-15	20:00:00	2456428.322	2137.037	**145.6**	148.8	133.9
2013-05-15	23:00:00	2456428.447	2137.042	**148.7**	152.0	136.8

URSIgram – Exercise 1

- Question 5:
  - « … possible isolated minor storm periods. » Do you expect important satellite communications problems?



G 3	Strong	**Power systems:** Voltage corrections may be required, false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).
G 2	Moderate	**Power systems:** High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. **Spacecraft operations:** Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. **Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).
G 1	Minor	**Power systems:** Weak power grid fluctuations can occur. **Spacecraft operations:** Minor impact on satellite operations possible. **Other systems:** Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).

Real-time:

NOAA Kp:	https://www.swpc.noaa.gov/products/planetary-k-index
Dourbes K:	http://ionosphere.meteo.be/geomagnetism/ground_K_dourbes
Dst:	http://wdc.kugi.kyoto-u.ac.jp/dst_realtime/presentmonth/index.html
DSCOVR:	https://www.swpc.noaa.gov/products/real-time-solar-wind
TEC:	http://swaciweb.dlr.de/data-and-products/public/tec/tec-eu/?L=1

Archive at ftp://ftp.swpc.noaa.gov/pub/warehouse/

SIDC URSIGRAM 50623
SIDC SOLAR BULLETIN 23 Jun 2015, 1242UT
SIDC FORECAST (valid from 1230UT, 23 Jun 2015 until 25 Jun 2015)
SOLAR FLARES : M-class flares expected (probability >=50%)
GEOMAGNETISM : Major magstorm expected (A>=50 or K>=6)
SOLAR PROTONS : Proton event in progress (>10 MeV)
PREDICTIONS FOR 23 Jun 2015 10CM FLUX: 135 / AP: 038
PREDICTIONS FOR 24 Jun 2015 10CM FLUX: 130 / AP: 038
PREDICTIONS FOR 25 Jun 2015 10CM FLUX: 125 / AP: 018
COMMENT: NOAA active region 2371 produced an M6.5 flare, peaking at 18:23 UT on June 22. An associated full halo CME erupted, with first measurement in LASCO C2 at 18:36 UT on June 22 and has a projected speed around 1000 km/s . A few filament eruptions were recorded in the Northwest quadrant, first a small one around 22:00 UT and then an extended one starting near 4:24 UT. Coronagraphic data indicate the occurrence of (mainly westward) CMEs, but incomplete data currently prohibit full analysis.

Proton levels have descended from the peak of 1070 pfu (19UT), despite some smaller peaks and are around 30 pfu at the moment. NOAA AR 2367 is now close to the West limb and could, in case of further eruptions, elevate the proton levels again. The proton levels might also be enhanced at the expected June 22 CME arrival. Flares at the M-level are expected, with some chance (15%) for a flare at the X-level.

A shock arrived to the ACE spacecraft at 18:01 UT on June 22, marking the expected arrival of the June 21 CME. The interplanetary magnetic field (IMF) magnitude jumped to 42 nT, with long periods of negative Bz down to -39 nT. Solar wind speeds reached values between 600 and 780 km/s. The IMF magnitude has declined to a current value of 12 nT.

Minor to severe geomagnetic conditions were recorded, with severe levels between 18 and 21 UT (on June 22) and between 3 and 6 UT (on June 23). The local K at Dourbes reached K=8 at 22 UT (on June 22). A decline to unsettled levels is expected for the coming hours. Further minor to major storm levels are expected, following the expected arrival of June 22 CME around 12:00 UT on June 24.

TODAY'S ESTIMATED ISN : 042, BASED ON 14 STATIONS.

SOLAR INDICES FOR 22 Jun 2015
WOLF NUMBER CATANIA : 083
10CM SOLAR FLUX : 135
AK CHAMBON LA FORET : 108
AK WINGST : ///
ESTIMATED AP : 073
ESTIMATED ISN : 047, BASED ON 23 STATIONS.

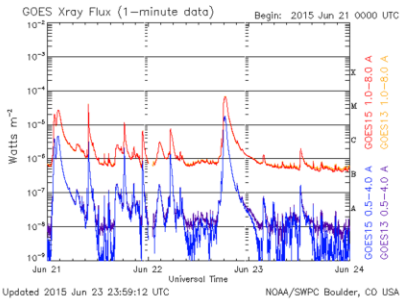
NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
22 1739 1823 1851 N12W08 M6.5 2B 1000 92/2371 II/1
END

URSIgram – Exercise 2

- **Setting**
  - You have received the above URSIgram (23 June 2015 – 12:42UT). You have to brief the SWx operational personnel.
- **Questions**
  - Where on the solar surface did the M6 flare take place?
  - How would you characterize the solar activity level (very low, … , very high) over the last 24 hours?
  - Did the M6 flare affect the daily 10.7cm radio flux of 22 June?
  - A proton event is in progress.
    - Do you (still) expect a GLE?
    - What would you recommend concerning arctic polar flights?
  - In terms of Dst, how strong would you expect this event to be (Quiet, … , Extreme)?
  - Based on the description of the geomagnetic storm:
    - Would you expect major satellite problems from deep di-electric charging?
    - Would you expect degradation of GNSS applications (WAAS,…)?

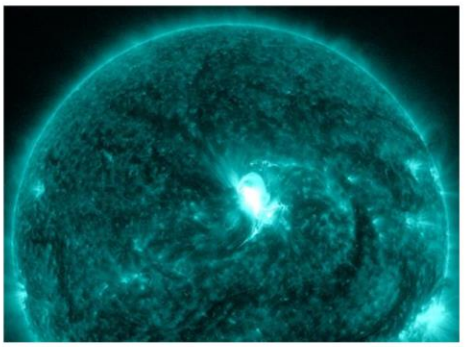
URSIgram – Exercise 2

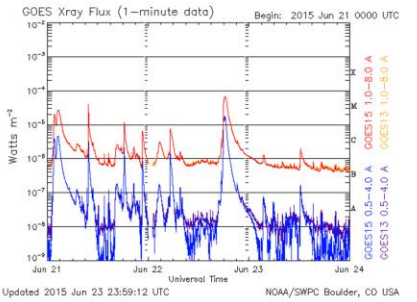
- Where on the solar surface did the M6 flare take place?

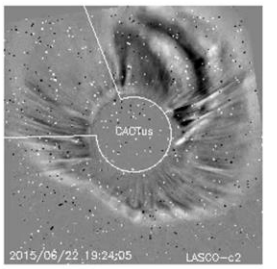


URSIgram – Exercise 2

- How would you characterize the solar activity level (very low, … , very high) over the last 24 hours?







URSIgram – Exercise 2

- Did the M6 flare affect the daily 10.7cm radio flux of 22 June?

TODAY'S ESTIMATED ISN : 042, BASED ON 14 STATIONS.

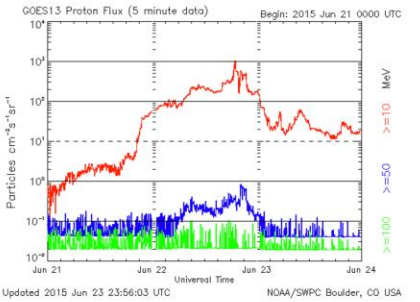
SOLAR INDICES FOR 22 Jun 2015
WOLF NUMBER CATANIA : 083
10CM SOLAR FLUX : 135
AK CHAMBON LA FORET : 108
AK WINGST : ///
ESTIMATED AP : 073
ESTIMATED ISN : 047, BASED ON 23 STATIONS.

NOTICEABLE EVENTS SUMMARY
DAY BEGIN MAX END LOC XRAY OP 10CM Catania/NOAA RADIO_BURST_TYPES
22 1739 1823 1851 N12W08 M6.5 2B 1000 92/2371 II/1

Date	Time	Julian day	Carrington rotation	Observed Flux	Adjusted Flux	URSI Flux
2015-06-20	17:00:00	2457194.197	2165.117	134.4	138.8	124.9
2015-06-20	20:00:00	2457194.322	2165.121	135.4	139.8	125.8
2015-06-20	23:00:00	2457194.447	2165.126	134.0	138.4	124.5
2015-06-21	17:00:00	2457195.197	2165.153	133.0	137.4	123.6
2015-06-21	20:00:00	2457195.322	2165.158	131.7	136.0	122.4
2015-06-21	23:00:00	2457195.447	2165.163	128.6	132.8	119.5
2015-06-22	17:00:00	2457196.197	2165.190	130.1	134.3	120.9
2015-06-22	20:00:00	2457196.322	2165.195	246.9	255.0	229.5
2015-06-22	23:00:00	2457196.447	2165.199	127.2	131.3	118.2
2015-06-23	17:00:00	2457197.197	2165.227	116.5	120.3	108.3
2015-06-23	20:00:00	2457197.322	2165.231	116.1	119.9	107.9
2015-06-23	23:00:00	2457197.447	2165.236	116.6	120.4	108.4

URSIgram – Exercise 2

- A proton event is in progress.
  - Do you (still) expect a GLE?
  - What would you recommend concerning arctic polar flights?

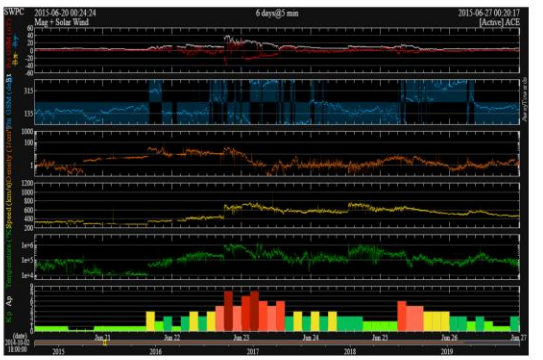


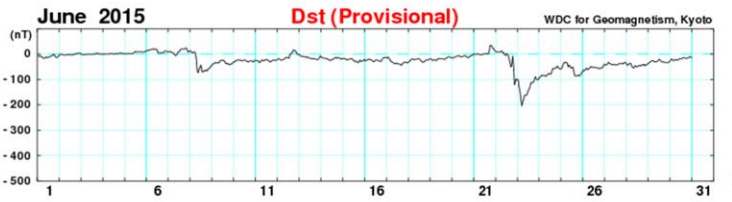
S 4	Severe	**Biological:** Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. **Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.
S 3	Strong	**Biological:** Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. **Other systems:** Degraded HF radio propagation through the polar regions and navigation position errors likely.
S 2	Moderate	**Biological:** Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. **Satellite operations:** Infrequent single-event upsets possible. **Other systems:** Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.
S 1	Minor	**Biological:** None. **Satellite operations:** None. **Other systems:** Minor impacts on HF radio in the polar regions.

SWIC - Collaboration between STCE, Koninl

URSIgram – Exercise 2

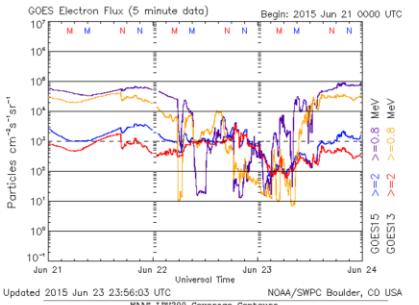
- In terms of Dst, how strong would you expect this event to be (Quiet, … , Extreme)?

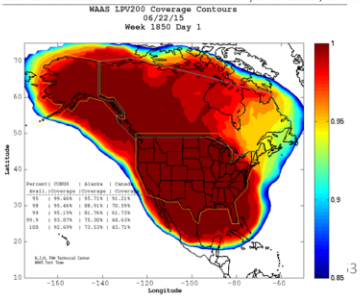




URSIgram – Exercise 2

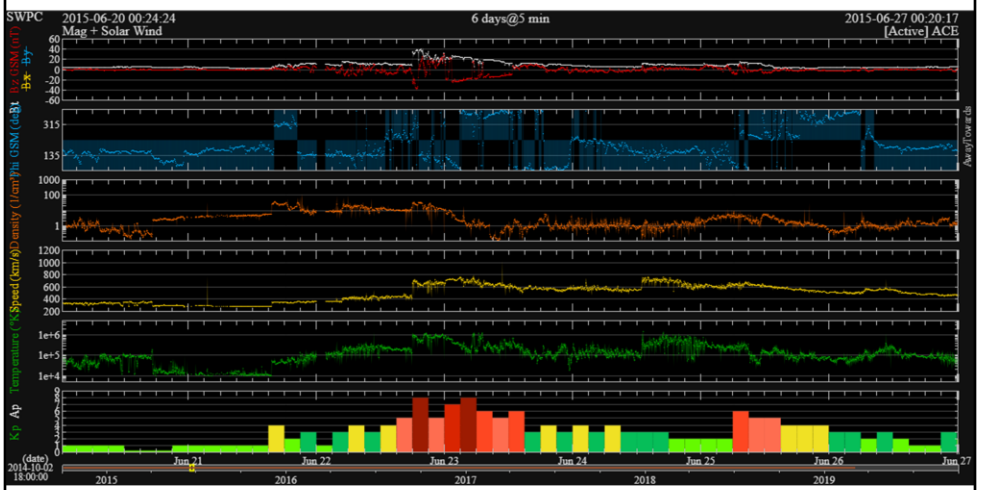
- Based on the description of the geomagnetic storm:
  - Would you expect major satellite problems from deep di-electric charging?
  - Would you expect degradation of GNSS applications (WAAS,…)?





SWIC - Collaboration between STCE, Koninklijke Luchtmacht, KNMI

URSIgram – Exercise 2



SIDC/RWC & URSIgram - Summary

- SIDC/RWC
- Overview contents of the URSIgram
- SWx alerts issued by the SIDC
- Exercises