



Space Weather activities in Austria

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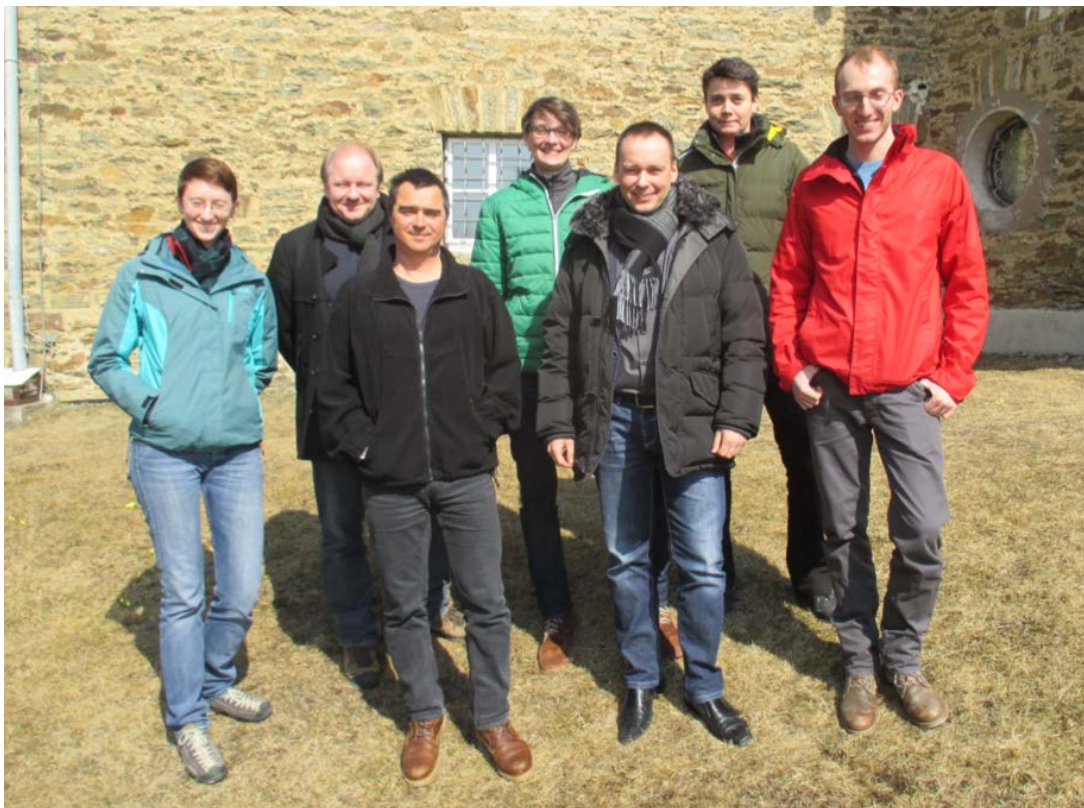
*ISWI national coordinator



Space Weather services „made“ in Austria

Space Weather is an important issue of global matter, but needs coordinated efforts – as there are common needs: national level. The University of Graz in Austria coordinates the different institutions dealing with research and forecasting services on Space Weather.

This includes the **University of Graz** with its **Institute of Physics** that gives a real-time solar wind forecasting and provides CME forecasting tools, and its **Kanzelhöhe Observatory** which gives real-time warnings of solar flares.



Together with the **Seibersdorf Laboratories** they are part of ESA's Space Situational Awareness program for Heliospheric Weather, Solar Weather and Space Radiation (<http://swe.ssa.esa.int>). The **Conrad Observatory** is specialized on ground-induced currents and local magnetic field variations as consequences of solar activity and part of the national weather service ZAMG. The **Space Research Institute in Graz** is involved in satellite missions dedicated to Space Weather.

1. Österr. Weltraumwetter Workshop at Kanzelhöhe Observatory

Weltraumwetter.at / Spaceweather.at

Kanzelhöhe Solar Observatory (UNI Graz) – ISES RWC for Austria

Public outreach

Alerts (based on automatic flare detection at KSO)

Space Weather (research, services, satellites) in Austria:

- University of Graz **1**
- Conrad Observatory **2**
- Seibersdorf Laboratories **3**
- IWF Graz / Space Research Institute
- [University of Zagreb] **1***

Conrad Observatory/ZAMG

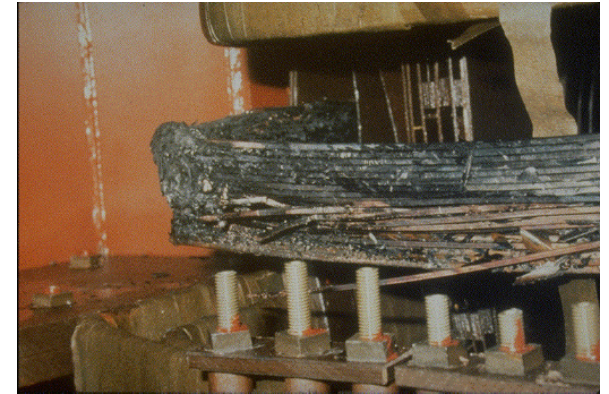
Geomagnetically induced Currents in Austria

GICs are **result of solar wind interaction** with Earth's magnetosphere

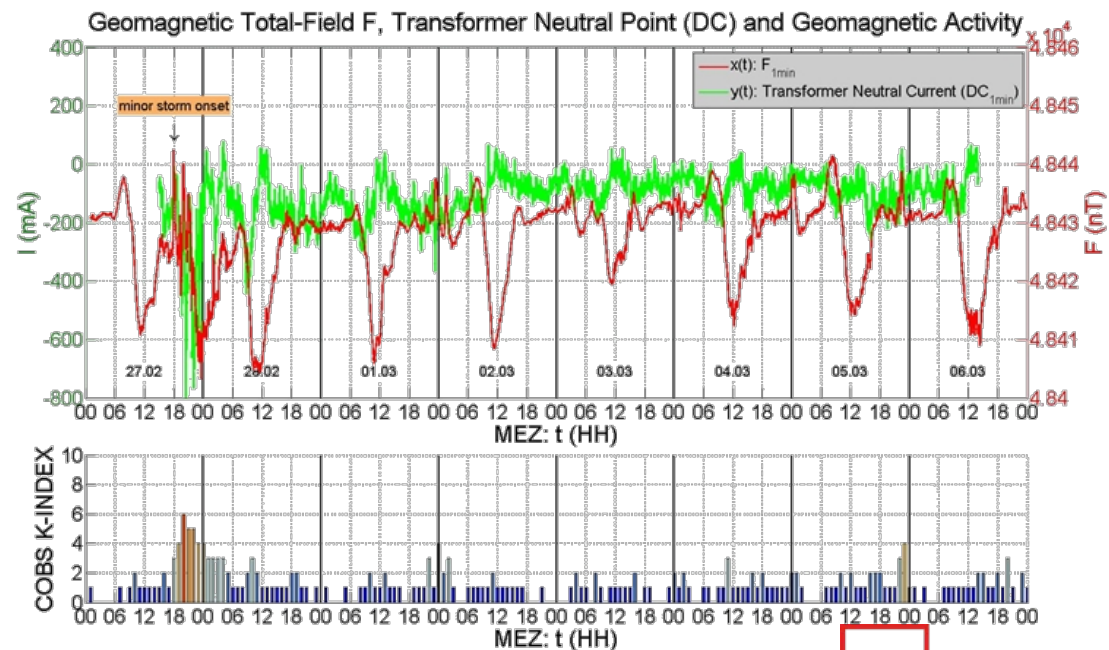
Can **cause damage to power grids**, e.g. March 1989 power outage (9h) in Quebec

Measurements by Austrian Power Grid (APG) already show **considerable DC currents** in transformers

FFG (Austrian funding agency) project **GEOMAGICA** looks at GIC in **Austria** and Central Europe



Credit: PSE&G



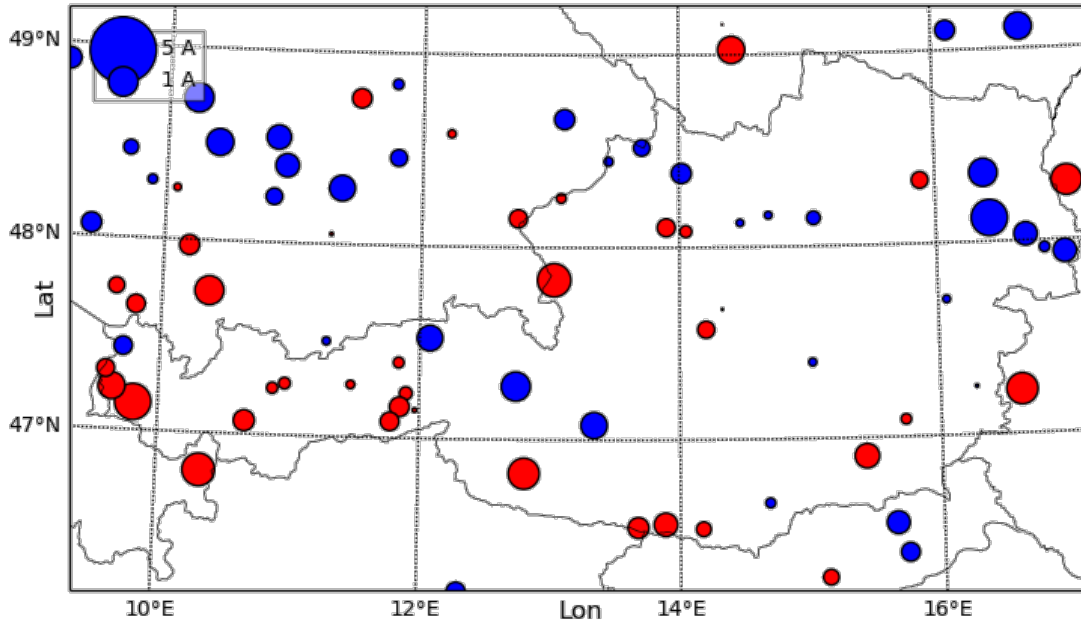
Credit: APG

Conrad Observatory/ZAMG

Geomagnetically induced Currents in Austria



GIC in Austria on 2014-10-15

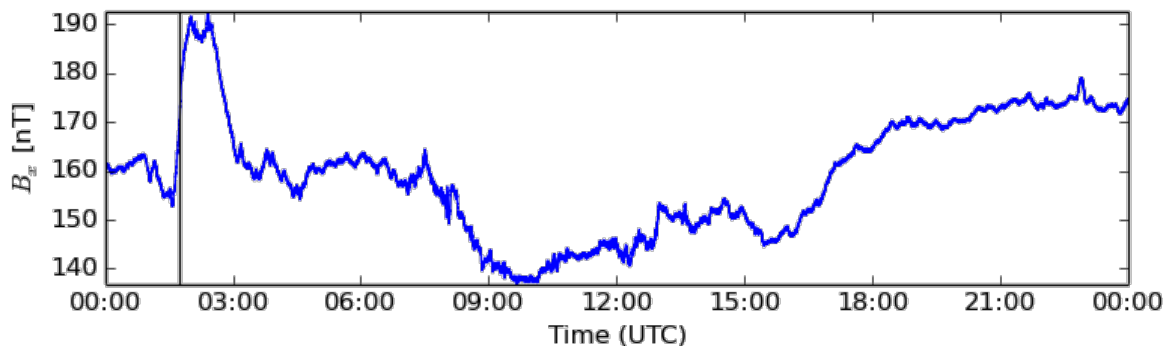


Geomagnetic Observatory part of the „Zentralanstalt für Meteorologie und Geodynamik“

Real-time H measurements

Research on GICs in Austria, which could be larger than in nearby countries due to highly resistive alps.

FFG Project partners: Austrian Power Grid, British Geological Survey, TU Graz, ...

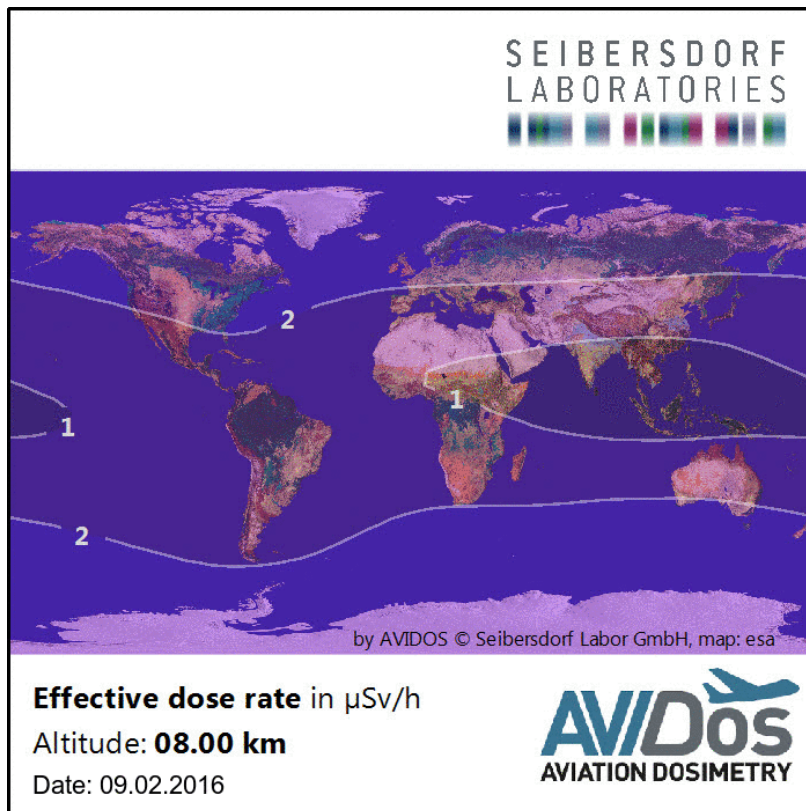


For more details see: <http://www.conrad-observatory.at/zamg/index.php/data-en/daily-magnetogram>

IWF/OEAW SPACE WEATHER ACTIVITIES

- Hardware & data analysis & theory contribution to ongoing and future space missions for studying effects and causes of space weather
- Reserach topics:
 - CME propagation
 - Solar wind- Earth's/planets' magnetosphere interaction
 - CME/flare induced atmospheric density disturbances
- Hardware contributions to future missions for space-weather sciences
 - SOSMAG (Service Oriented Spacecraft Magnetometer): a ready-to-use space weather monitoring system
 - ESA's Space Situational Awareness program finished in 2016
 - onboard Korean *GEO-KOMPSAT-2A* mission (Launch 2018)
 - DPU for Soft-X ray Imager onboard ESA/CAS Mission SMILE (Solar wind Magnetosphere Ionosphere Link Explorer) (Launch 2021)

Seibersdorf Laboratories – ESA Expert Service Center for Space Radiation



Seibersdorf Laboratories, shareholder: AIT - Austrian Institute of Technology (Ministry of Traffic, Innovation, Technology)

AVIDOS service gives radiation dosimetry for aviation. <http://avidos.seibersdorf-laboratories.at>

Real-time estimation of dose rates for aircrafts at different altitudes; Dose rates at any desired location; Applicable for any desired input spectrum.

UNI Graz – ESA Expert Service Center for Heliospheric Weather (ESWF/DBM + new products with 2018)

ESA space situational awareness

ESA SSA SWE NEO SST

About SWE

- What is Space Weather
- SSA Space Weather Activities
- Current Space Weather
- Contact
- Applications Preferences

Service Domains

- Spacecraft Design
- Spacecraft Operation
- Human Space Flight
- Launch Operation
- Transionospheric Radio Link
- Space Surveillance and Tracking
- Power Systems Operation
- Airlines
- Resource Exploitation System Operation
- General Data Service

Expert Service Centres

- Solar Weather
- Space Radiation
- Ionospheric Weather
- Geomagnetic Conditions
- Heliospheric Weather

Other Resources

- Documents
- SWWT
- SWEN Newsletter
- Upcoming Events

Sign-In

Roland Maderbacher is signed in
Sign Out

Federated products from the University of Graz (UNIGRAZ)

ESWF (Empirical Solar Wind Forecasting)

8-Nov-2016 07:03 UT SDO AIA_2 193

CH detection

In-situ data versus forecast

short-term Forecast DSCOVR

medium-term Forecast ACE/DSCOVR

long-term Forecast ACE

Real-time forecast

Comparison to measurements (ACE, DSCOVR)

+ DBM service: Drag based model for CME forecasting
– impact speed/arrival time at various targets
(in collaboration with University of Zagreb, Croatia)

Kanzelhöhe Observatory – ESA Expert Service Center for Solar Weather (real-time flare alerts)

swe.uni-graz.at

The screenshot shows the website interface for the Kanzelhöhe Observatory. At the top, there is an ESA logo with the text "space situational awareness" and a navigation menu with links for ESA, SSA, SWE, NEO, and SST. Below this is a banner for "SOTERIA SOLAR-TERRESTRIAL INVESTIGATIONS AND ARCHIVES" featuring images of the sun and Earth. The main content area is titled "Kanzelhöhe H α , Whitelight and CaIIK Data Archive" and contains three columns of solar images:

- H α Archive:** Shows a red solar image with a sunspot labeled "19629". The timestamp is "2017-01-30 07:46:14 UT".
- Whitelight Archive:** Shows a grayscale solar image with the same sunspot labeled "19629". The timestamp is "2017-01-30 07:46:11 UT".
- CaIIK Archive:** Shows a blue solar image with the same sunspot labeled "19629". The timestamp is "2017-01-30 07:46:09 UT".

Each image includes a compass rose with North (N) and West (W) markers. Below each image is a caption: "(latest H α image from KSO)", "(latest Whitelight image from KSO)", and "(latest C...)" respectively. Below each caption is a button labeled "» Archive...".

At the bottom of the page, there is a navigation bar with links: "Start Page", "Kanzelhöhe Archive", "Kanzelhöhe Homepage", "ESA SSA KSO", and "Data Policy".

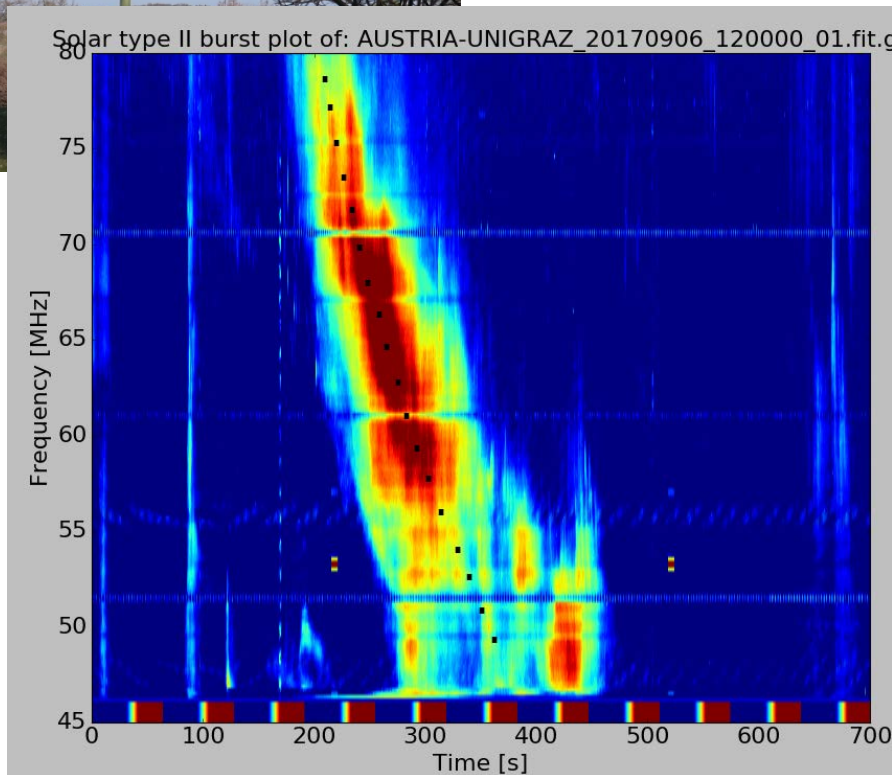
data download:
kanzelhohe.uni-graz.at

AUSTRIA-UNIGRAZ: new e-CALLISTO solar radio network station (operational since 05/2017)

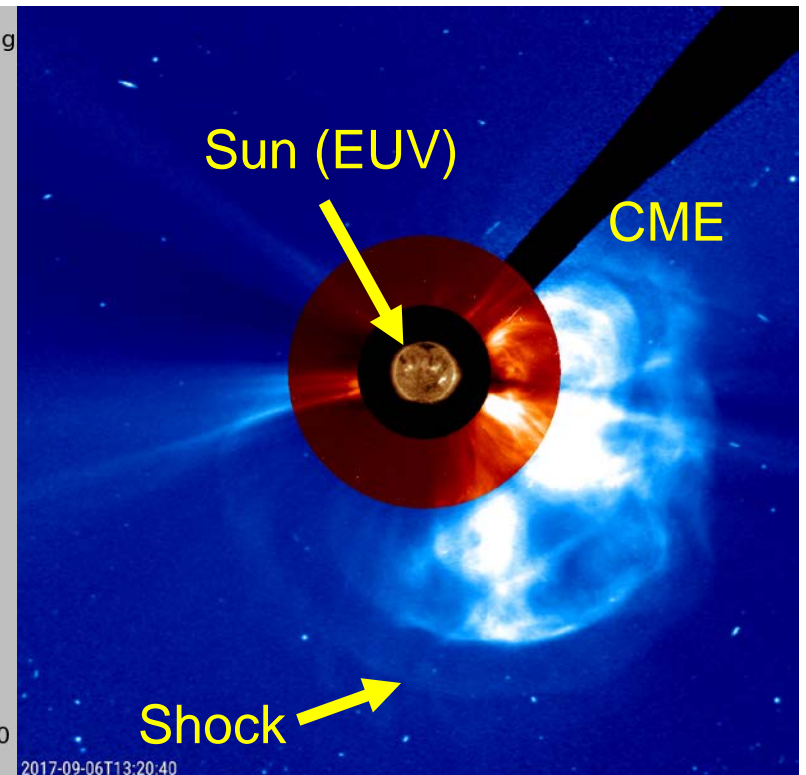
@Observatory Lustbühel Graz (OLG)
swe.uni-graz.at (see „Projects“)



Frequency ranges CH1:
45 - 80 MHz
CH2: 100 - 800 MHz



(courtesy: C. Monstein)



JHelioviewer

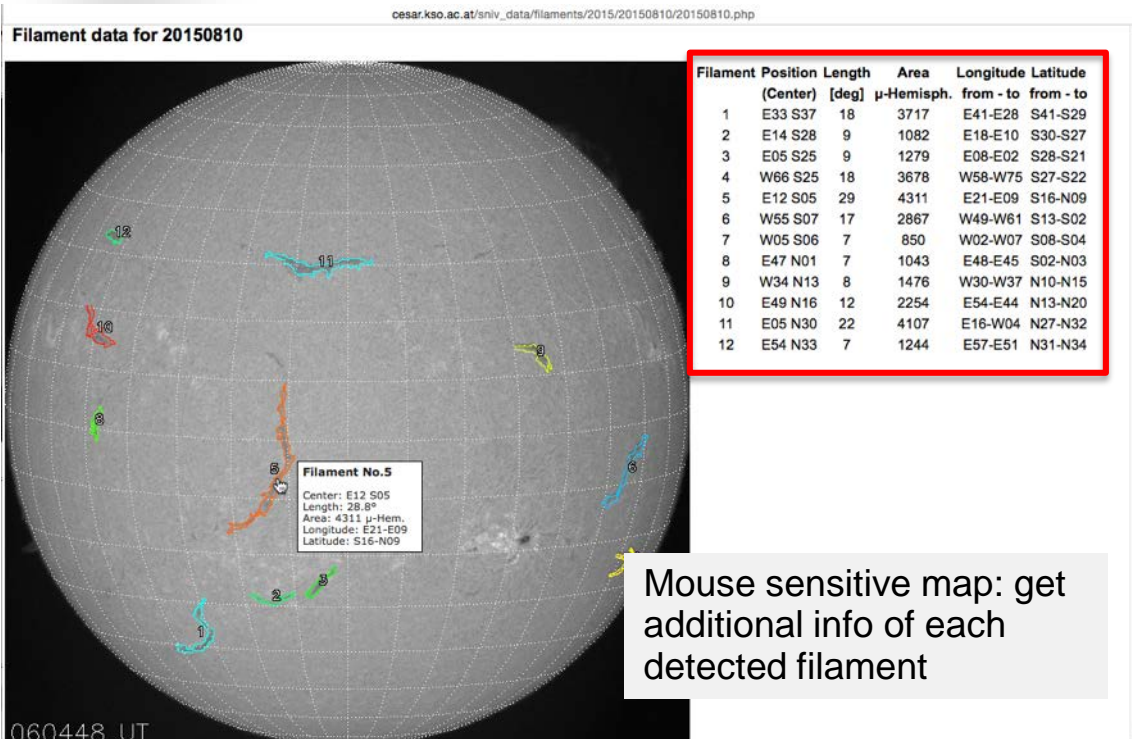
VarSITI – MiniMax daily email alerts

(forecasts of solar wind high speed streams and filament eruptions)

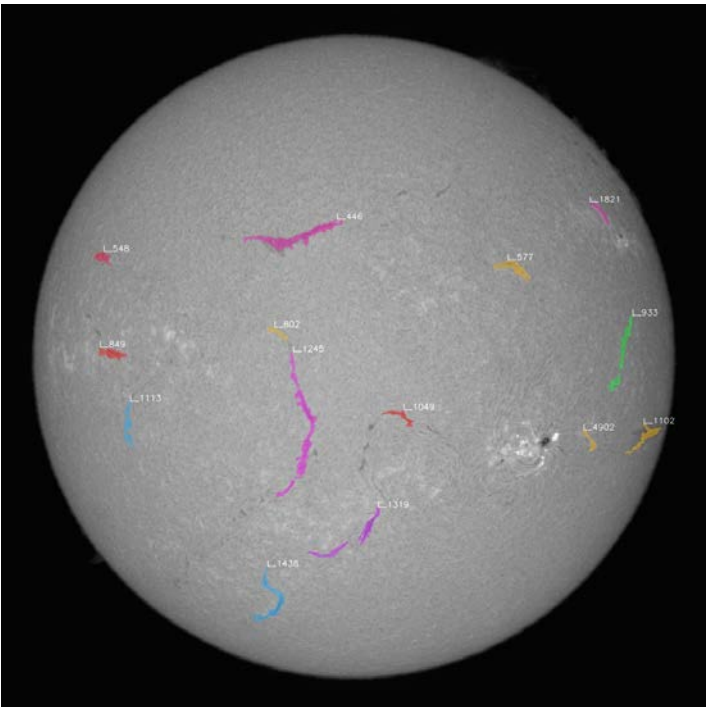


UNI Graz provides daily email service within the ISEST/MiniMax24 campaign (part of SCOSTEP 2014-2018), giving forecasts of solar wind high speed streams and filament eruptions.

Varsiti.org



Mouse sensitive map: get additional info of each detected filament



Summary

- The Institute of Physics at UNI Graz gives real-time solar wind forecasting and provides CME forecasting tools (ESA-SSA Heliospheric Weather);
- Kanzelhöhe Observatory of UNI Graz gives real-time warnings of solar flares and filament detection (ESA-SSA Solar Weather);
- Seibersdorf Laboratories provide radiation doses for aircraft passengers (ESA-SSA Space Radiation);
- The Conrad Observatory is specialized on ground-induced currents and local magnetic field variations as consequences of solar activity and part of the national weather service ZAMG;
- The Space Research Institute in Graz is involved in satellite missions dedicated to Space Weather;
- University of Graz with its Kanzelhöhe Observatory is Austrian's ISES regional warning center. Under the URL spaceweather.at or weltraumwetter.at we give an overview of Space Weather information and research performed in Austria. As the purpose is reaching public awareness, this site is only available in German language.
- Regular national network meetings are planned;