KARL-FRANZENS-UNIVERSITÄT GRAZ
UNIVERSITY OF GRAZ

SCOSTEP
Scientific Committee on Solar-Terrestrial Physics

Progress report from WG MiniMax24

UNIGRAZ-KSO Team: K. Dissauer, M. Dumbovic, M. Temmer, J. Thalmann, + KSO (weekends, holidays) - D. Baumgartner, H. Freislich, W. Pötzi, H. Strutzmann

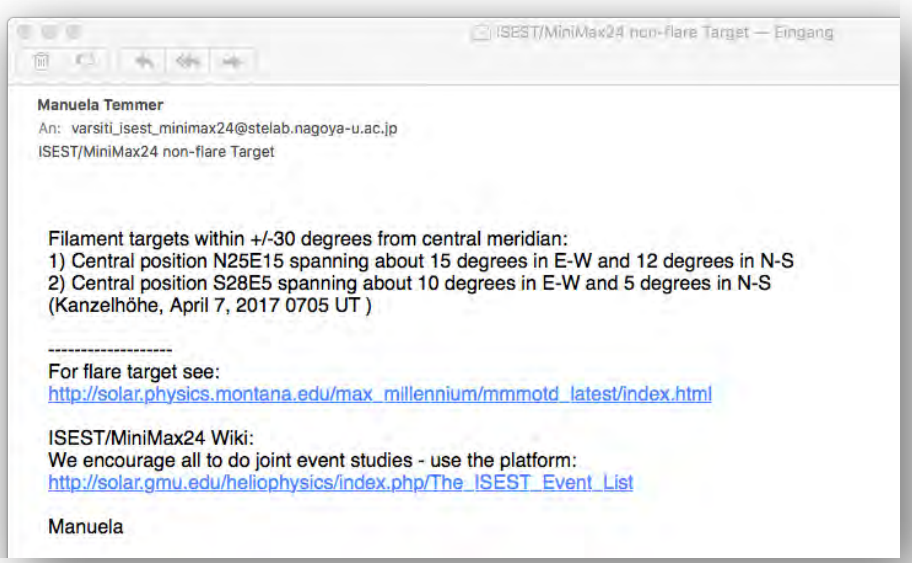
XVIth Hvar Astrophysical Colloquium and ISEST Workshop, September 24 – 28, 2018

Diversity of VARSITI

- The MiniMax24 email list reaches more than 600 participants from more than 60 countries.
- Huge platform of experts in different fields of solar and heliospheric physics – we communicate daily!
- Daily emails (around 10UT) are sent by the MiniMax team
- Increases visibility of young researchers
- Subscribe and be part of it!
  varsiti_isest_minimax24@stelab.nagoya-u.ac.jp

Daily email from MiniMax24

- 1. Non-flare Target – selected by the MiniMax24 campaign team (large coronal holes close to central meridian, large filaments within +/- 30° of central meridian likely to erupt)
- 2. Information on current flare activity (MaxMillenium)
- 3. We encourage the community to initiate joint event studies*


ISEST/MiniMax24 non-flare Target — Eingang

Manuela Temmer
An: varsiti_isest_minimax24@stelab.nagoya-u.ac.jp
ISEST/MiniMax24 non-flare Target

Filament targets within +/-30 degrees from central meridian:
1) Central position N25E15 spanning about 15 degrees in E-W and 12 degrees in N-S
2) Central position S28E5 spanning about 10 degrees in E-W and 5 degrees in N-S
(Kanzelhöhe, April 7, 2017 0705 UT)

For flare target see:
http://solar.physics.montana.edu/max_millennium/mmmotd_latest/index.html

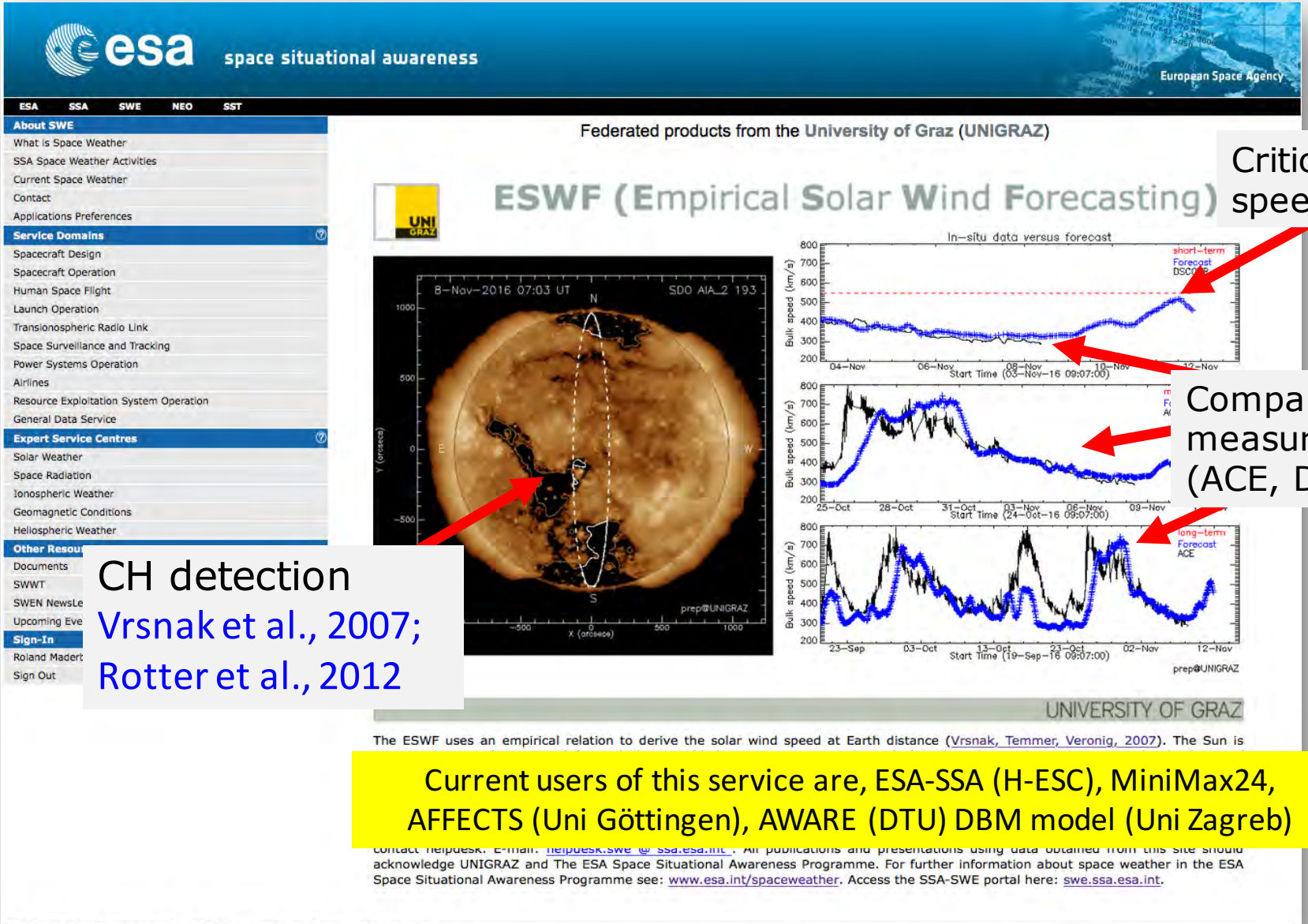
ISEST/MiniMax24 Wiki:
We encourage all to do joint event studies - use the platform:
http://solar.gmu.edu/heliophysics/index.php/The_ISEST_Event_List

Manuela

*ISEST wiki platform

http://solar.gmu.edu/heliophysics/index.php/The_ISEST_Event_List

Solar wind forecasting using surface information from CH areas



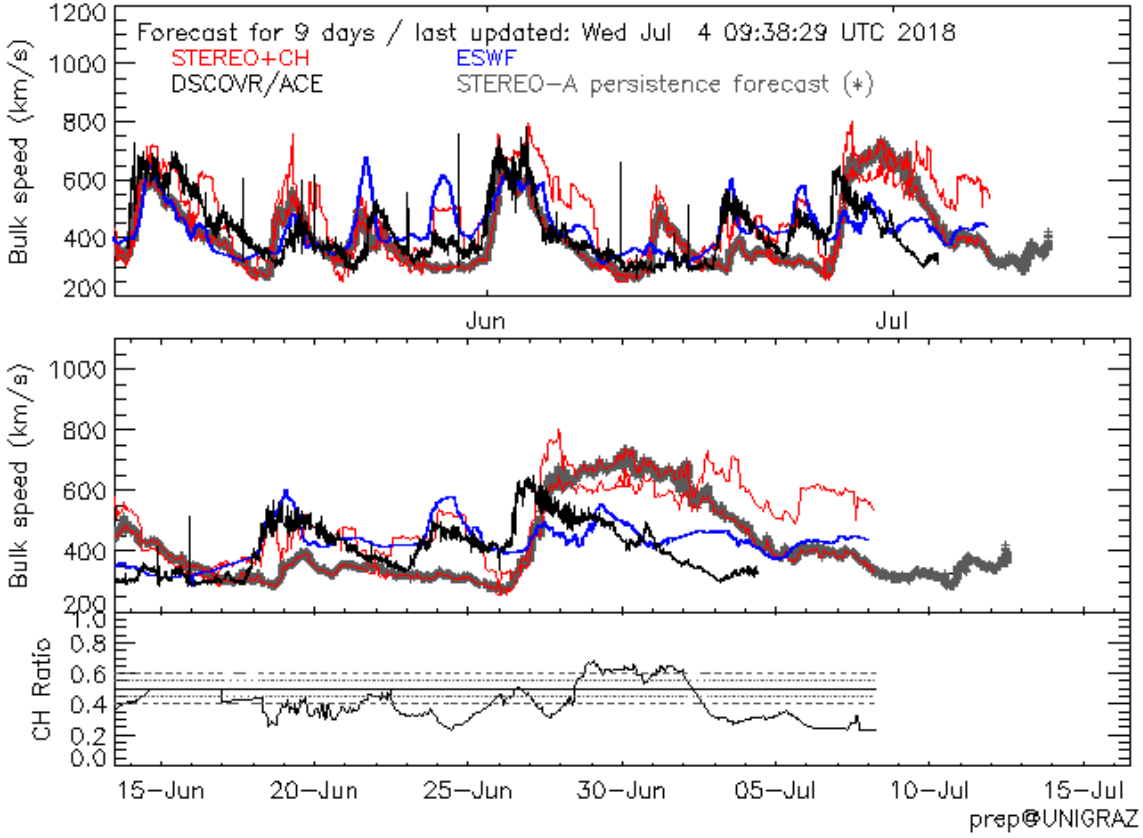
Critical SW speed

Comparison to measurements (ACE, DSCOVR)

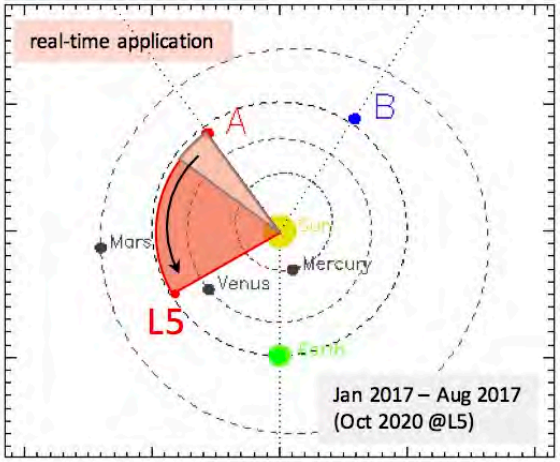
CH detection
Vrsnak et al., 2007;
Rotter et al., 2012

Current users of this service are, ESA-SSA (H-ESC), MiniMax24, AFFECTS (Uni Göttingen), AWARE (DTU) DBM model (Uni Zagreb)

STEREO-A persistence modeling + CH information



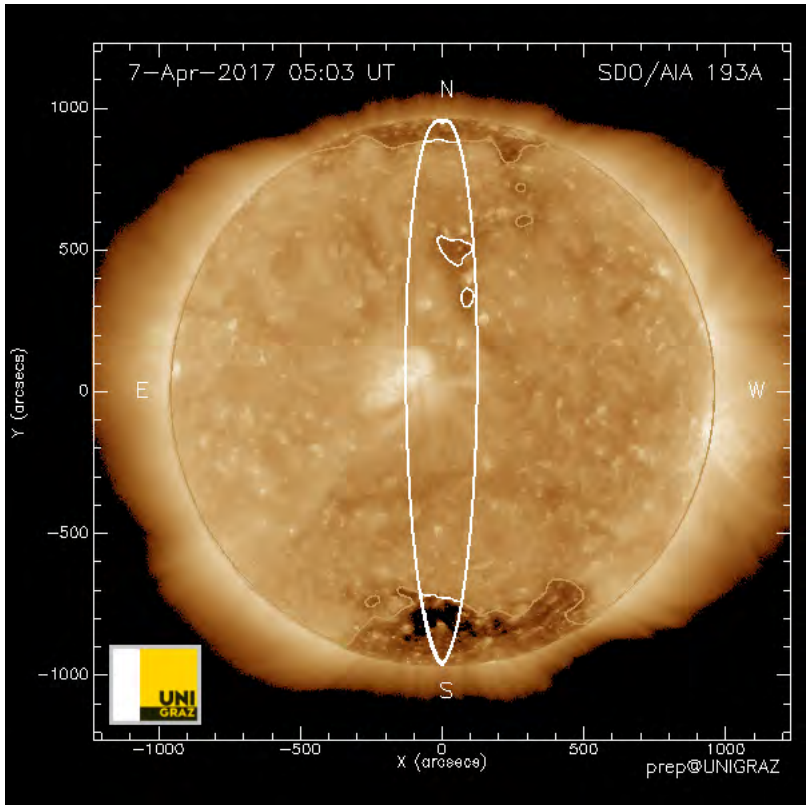
swe.uni-graz.at

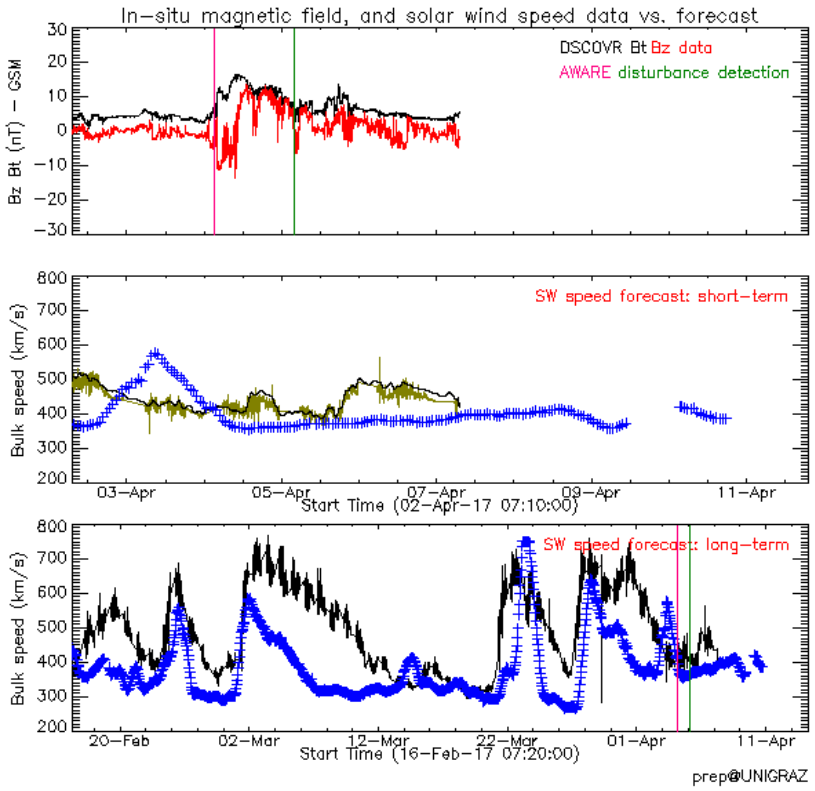


Temmer, Hinterreiter, Reiss 2018 (SWSC)

A persistence model based on STEREO-A data is used to forecast the solar wind at L1. The uncertainties in the speed forecast are estimated from observed changes in the CH areas (expansion/decay) causing an under-/overestimation of the persistence result. The STEREO+CH forecast has a lead time of 4 days. (upcoming ESA service)

ESWF and AWARE – CME/HSS detection in real-time :: testing phase



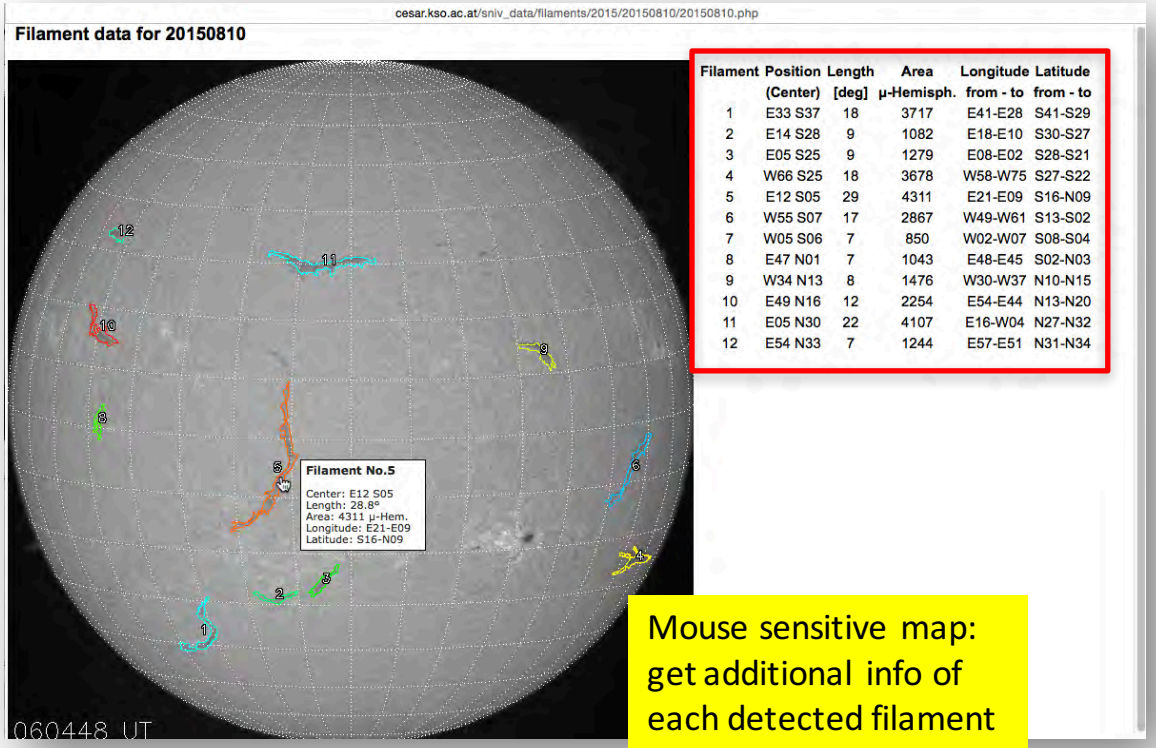


Combination of real-time solar wind forecasting and automatic CME and HSS arrival warnings, using AWARE developed by Susanne Vennerstroem from DTU (Denmark).

Testing can be viewed under: **swe.uni-graz.at**

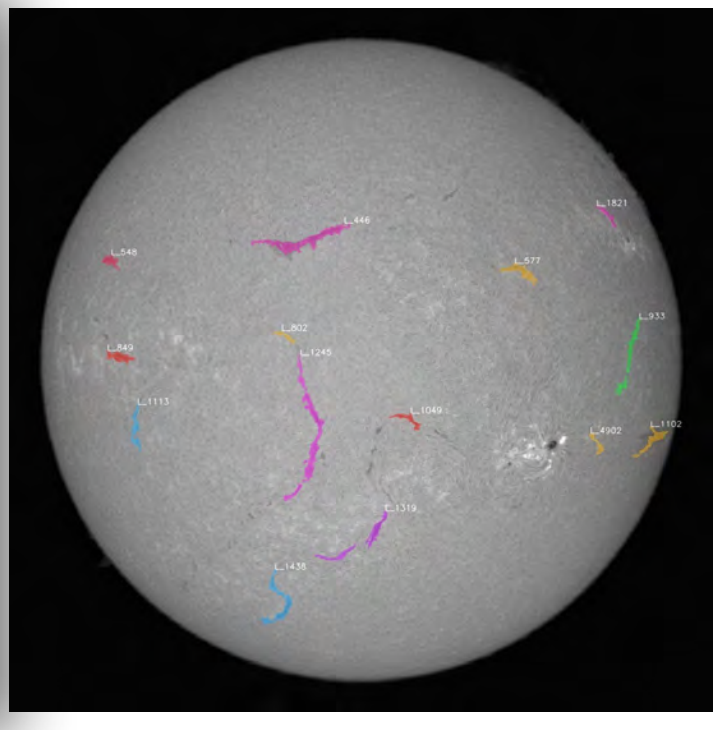
Automatic filament detection at KSO: in operation for MiniMax24 since summer 2015

The filament detection algorithm established at Kanzelhöhe Observatory (Pötzi et al., 2015) automatically gives the position and size of filaments that is used for the MiniMax24 forecasting.



Filament	Position (Center)	Length [deg]	Area µ-Hemisph.	Longitude from - to	Latitude from - to
1	E33 S37	18	3717	E41-E28	S41-S29
2	E14 S28	9	1082	E18-E10	S30-S27
3	E05 S25	9	1279	E08-E02	S28-S21
4	W66 S25	18	3678	W58-W75	S27-S22
5	E12 S05	29	4311	E21-E09	S16-N09
6	W55 S07	17	2867	W49-W61	S13-S02
7	W05 S06	7	850	W02-W07	S08-S04
8	E47 N01	7	1043	E48-E45	S02-N03
9	W34 N13	8	1476	W30-W37	N10-N15
10	E49 N16	12	2254	E54-E44	N13-N20
11	E05 N30	22	4107	E16-W04	N27-N32
12	E54 N33	7	1244	E57-E51	N31-N34

Mouse sensitive map: get additional info of each detected filament



http://cesar.kso.ac.at/sniv/filaments.php

Service: support of observing campaigns

Our service for supporting observing campaigns is not very often used – we therefore encourage observing campaign teams to make use of it!

We provide daily target locations especially for Hinode HOPs that requires target coordinates with + 48h and +72h in advance

Filament target within ±30 degrees from central meridian.

Central position N09W08 spanning about 10 degrees in E-W and 5 degrees in N-S
(Udaipur Observatory, May 21 2014 0700UT)

Central position S37W21 spanning about 10 degrees in E-W and 5 degrees in N-S
(Udaipur Observatory, May 21 2014 0700UT)

Central position S23E30 spanning about 10 degrees in E-W and 10 degrees in N-S
(Udaipur Observatory, May 21 2014 0700UT)

Support for THEMIS-IHOP campaign on prominences (N.Labrosse, B.Schmieder):
Derotated filament target (central part) for
+24h (May 22 07:00 UT): N09W22 (solar x=370", solar y=150")
S37W35 (solar x=-540", solar y=-520")
S22E19 (solar x=-280", solar y=-330")
+48h (May 23 07:00 UT): N09W35 (solar x=540", solar y=150")
S37W45 (solar x=550", solar y=-560")
S22E05 (solar x=90", solar y=-330")
+72h (May 24 07:00 UT): N09W50 (solar x=710", solar y=140")
S37W59 (solar x=650", solar y=-550")
S22W08 (solar x=100", solar y=-350")

For flare target see:
http://solar.physics.montana.edu/max_millennium/mmmotd_latest/index.html

ISEST/MiniMax24 Wiki:
We encourage all to do joint event studies - use the platform:
http://igam07ws.uni-graz.at/mediawiki/index.php?title=Main_Page:Event_Studies

Cheers,
Kamalam

Promoting young scientists

I simulate sferics with Long Wave Propagation Capability (LWPC) code using the Wait and Spies parameterization of the D-region [4] (h',b) interpreting the best match as the average along the source-receiver path.

Because this technique doesn't depend on specific sferic features or geometries, I am able to expand our measurement to global scales. Currently I am working on using the large available dataset of path-averaged measurements to recover a 2D ionospheric map with imaging and tomographic techniques with early approach and results shown below.

References:

[1] S. A. Cummer, U. S. Inan, and T. F. Bell, "Ionospheric d region remote sensing using vlf radio atmospherics", Radio Science, vol. 33, no. 6, pp. 1781-1792, 1998.

[2] N. C. Gross, M. B. Cohen, R. K. Said, M. Golkowski (2018), "Polarization Measurements of VLF Transmitters as an Ionospheric Diagnostic", manuscript in review with J. of Geophys. Research Space Physics, 2018.

[3] J. C. McCormick, M. B. Cohen, R. K. Said, N. C. Gross, "Spatial and temporal ionospheric monitoring using broadband sferic measurements", manuscript in review with Journal of Geophysical Research Space Physics, 2018.

[4] J. R. Wait, and K. P. Spies, "Characteristics of the earth-ionosphere waveguide for vlf radio waves", Technical Note 300, National Bureau of Standards, 1964.

Highlight on Young Scientists

Project ISEST

Highlight on Young Scientists 2:

Forbush decrease model for expanding CMEs (ForbMod)

Mateja Dumbović
Institute of Physics, University of Graz, Graz, Austria

Mateja Dumbović

Forbush decreases (FDs) are depressions in the galactic cosmic ray flux observed around the passage of enhanced magnetic field structures from, e.g., coronal mass ejections (CMEs). Understanding FDs can help us to better understand magnetic structures causing Space Weather. For this, we developed an analytical diffusion-expansion FD model ForbMod [6], which is constrained by remote CME measurements taking into account different types of CME expansion (Figure 1).

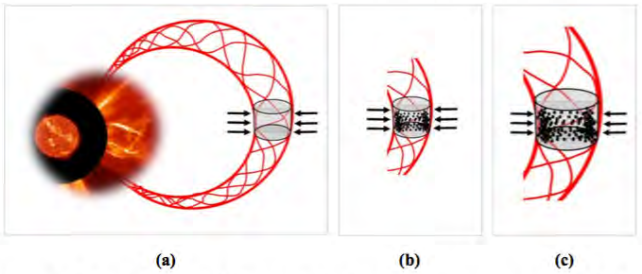


Figure 1. a) A sketch of the initial CME for both diffusion-only and diffusion–expansion model: CME is a closed magnetic structure locally of the cylindrical form, rooted at the Sun and initially empty of GCRs; b) A sketch of the diffusion-only model after time t: CME does not vary in shape or size; c) A sketch of the diffusion-expansion model after time t: CME expands self-similarly. In both cases particles enter CME by perpendicular diffusion.

Mateja Dumbovic, University of Graz

Mateja, one of our MiniMax forecasters is working on an EU project (Marie Curie) about Forbush decreases (FDs) – depressions in the galactic cosmic ray flux observed around the passage of enhanced magnetic field structures from, e.g., coronal mass ejections (CMEs).

Congratulations!

Project ISEST

Short News 1:

"MiniMax" Julia K. Thalmann received EGU Arne Richter Award

Julia K. Thalmann
Institute of Physics,
University of Graz,
Graz, Austria

Julia K. Thalmann
(Foto: Sissi Furgler)

Figure 1. EGU Arne Richter medal ceremony at the Vienna convention center. From left to right: Hans Thybo (EGU president), Julia Thalmann, Jonathan Bamber (EGU vice-president), Manuela Temmer (ISEST Co-chair). Photo courtesy: Franz Hasewend.

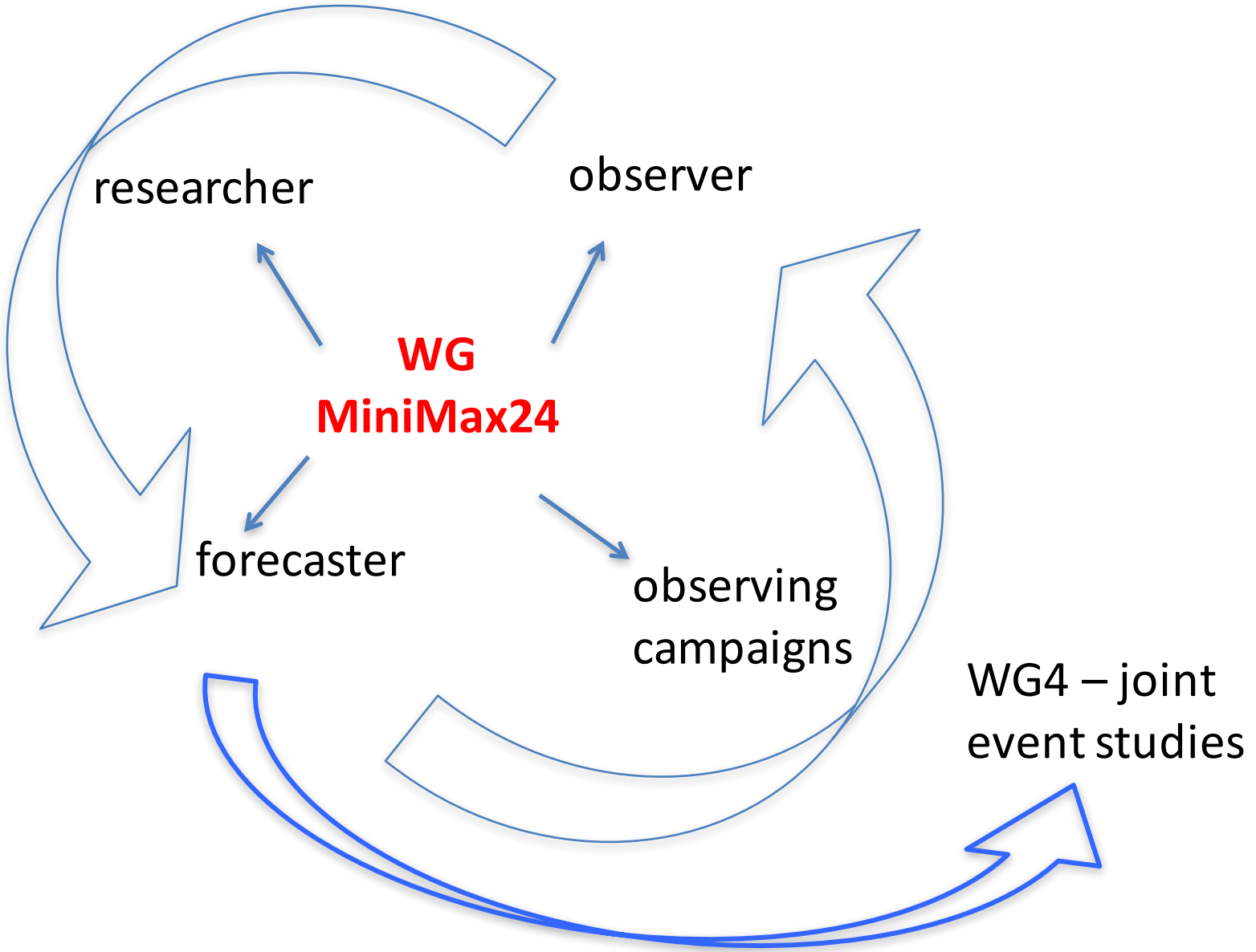
Short News

As a project scientist at the University of Graz, Julia Thalmann's scientific research is focused on the properties and characteristics of the solar magnetic field. In particular, she is concerned with the flare-associated time development of the coronal magnetic field, ever since her PhD at the Max Planck Institute for Solar System Research in Göttingen. Her research attracts high recognition within the international scientific community as it represents a valuable contribution to the understanding of solar flare processes, as well as their interplanetary (possibly geo-effective) consequences such as CMEs. For this reason, Julia Thalmann has been awarded with the Arne Richter Award for Outstanding Early Career Scientists of the European Geosciences Union (EGU). The highly prestigious award was given to Julia during the General Assembly 2017 in Vienna, for recognizing her contribution within the solar-terrestrial physics division.

Julia Thalmann completed her undergraduate studies at the University of Graz in 2006, when she obtained her Diploma in Physics. What followed was an extended research stay of more than six years at the Max Planck Institute for Solar System Research (MPS) in Katlenburg-Lindau (now located in Göttingen), during which she successfully completed her PhD (she obtained her doctoral degree in physics from the Technical University Braunschweig in 2010) and further scientifically matured during an extended post-doctoral research period. In 2013, Julia Thalmann returned to the University of Graz, where she is employed as a post-doctoral research scientist within the Solar and Heliospheric Physics research group ever since. In 2016 she has been awarded already with the international Alexander-Chizhevsky Medal for Space Weather and Space Climate.

MiniMax increases the visibility of young researchers.

MiniMax24 – come-into-contact-platform



Improvements on providing non-flare targets and future plans

The solar wind high-speed stream forecast algorithm, used by MiniMax24, is part of ESA's SSA programm. The MiniMax24 team is one of the Expert Service Groups for *Heliospheric Weather* (http://swe.uni-graz.at).

The MiniMax24 team is preparing a statistics for the forecasted filaments and high-speed streams.

The automatic algorithm from Kanzelhöhe Observatory for filament detection is actively running for MiniMax24. A statistical evaluation of the method will be given in the near future (Pötzi et al., 2018, in preparation). See http://cesar.kso.ac.at.

A great community effort to study and better understand solar-terrestrial processes

Lets continue!

Solar wind HSS forecast as part of ESA-SSA

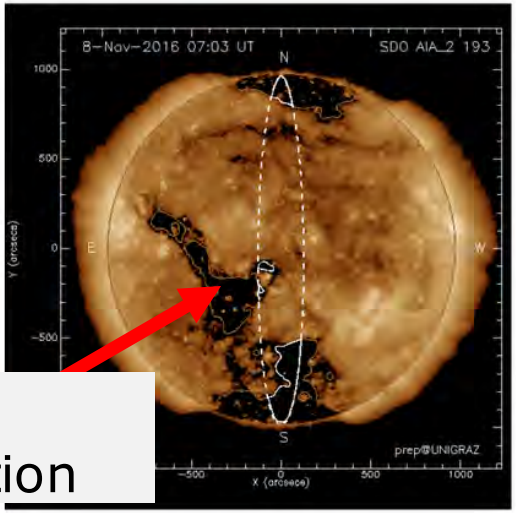
esa space situational awareness — European Space Agency

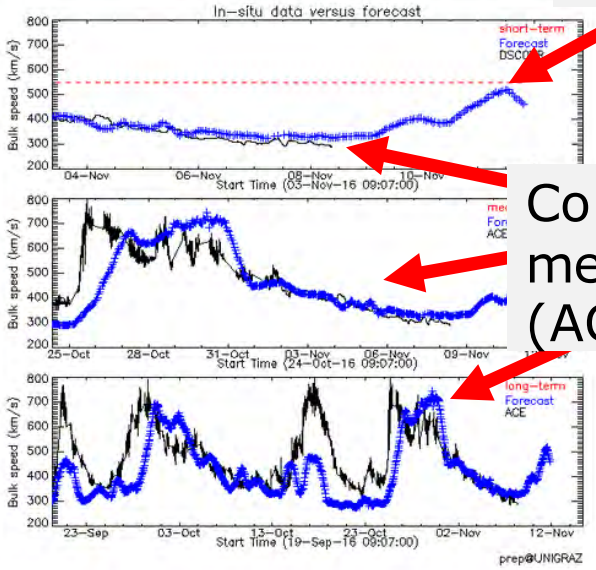
ESA SSA SWE NEO SST

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)





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The ESWF uses an empirical relation to derive the solar wind speed at Earth distance (Vrsnak, Temmer, Veronig, 2007). The Sun is monitored in EUV (NASA/SDO) from which coronal hole areas are extracted to calculate the solar wind speed at 1AU with a lead time of about 4 days (Reiss et al., 2016). We compare the forecast for three different time ranges to in-situ data (ACE/DSCOVR). The red das

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Critical SW speed

Comparison to measurements (ACE, DSCOVR)

CH detection

Current users of this service are, ESA-SSA (H-ESC), MiniMax24, AFFECTS (Uni Göttingen, V. Bothmer), AWARE (DTU, S. Vennerstroem) DBM model (Uni Zagreb, B. Vrsnak).