

# SWAP: Space weather networking in Austria

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United Nations Workshop on the International Space  
Weather Initiative: The Way Forward  
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# GeoSphere Austria: Conrad Observatory



- **A new name for an old institute!**  
**Formerly ZAMG**
  - Federal Institut for Geology, Geophysics, Climatology and Meteorology
  - We are the Austrian meteorological and geophysical service
- **The *Conrad Observatory* is an underground geophysical observatory in the Austrian mountains near Vienna**
  - We study the ground geomagnetic field variations
  - Also look at geomagnetically induced currents in power grids!
- **The *Austrian Space Weather Office* was founded in Sept 2022!**

# SWAP is a collaborative project

- “Space Weather: the Austrian Platform (SWAP)” was funded in 2021 by the FFG
- **Aim 1: Improve communication between researchers, and between researchers and industry**
  - We want to make sure that everyone working in space weather knows each other!
  - Many companies and federal departments are not aware of how space weather can affect their industries
- **Aim 2: Better recognition of space weather at a national level**
  - At the moment there is a low level of awareness, but this is improving
- **Aim 3: Plan future space weather efforts within Austria**
  - Coordinated efforts will lead to more synergies

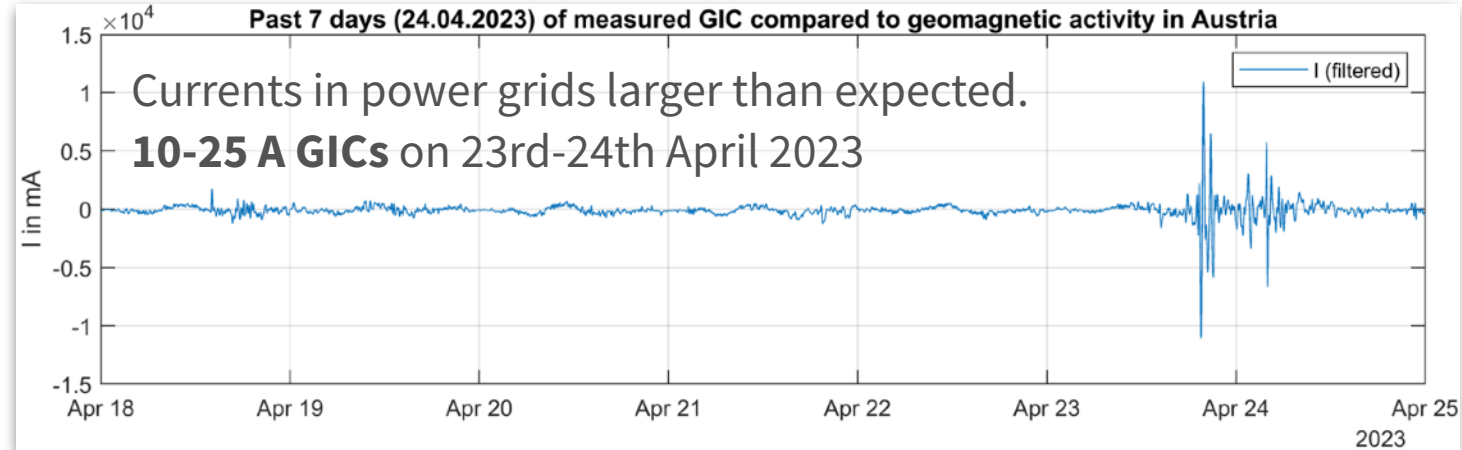




# Why Austria?

## UNOOSA Guidelines for the Long-term Sustainability of Outer Space Activities, 2017

(Guideline 16.1) “States and international intergovernmental organizations should support and promote the collection, archiving, sharing, intercalibration, long-term continuity and dissemination of critical space weather data and space weather model outputs and forecasts, where appropriate in real time, as a means of enhancing the long-term sustainability of outer space activities.”



# National partners

- Space weather and geomagnetism
- Navigation systems (geodesy) and power transmission systems (electr. eng.)
- Solar and heliophysics
- Military and power grid operation



- Magnetic fields and solar system science
- Radiation exposure in flights
- Satellite communication
- Flight traffic control

# Timeline

## GOAL #1

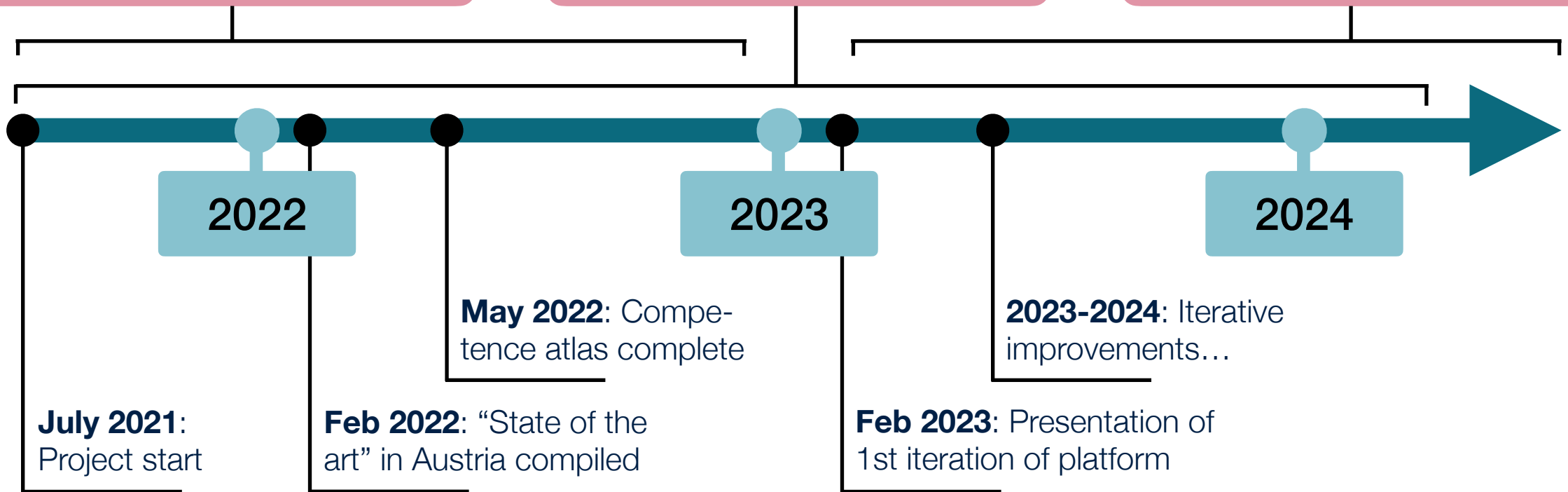
Network space weather experts in Austria to create a **national competence group**

## GOAL #2

**Build an Austrian space weather platform** with a website as an entry point

## GOAL #3

**Prepare a road map** for future Austrian space weather initiatives



# First Step: German-language glossary

## Glossary

Translations between the English terms commonly used in research and German phrasing are often not easy to find.

Here we have a **list of terms** used to describe space weather, which also lead to **also more detailed pages on the topics written by experts.**



<https://swap.zamg.ac.at>

The screenshot shows a dark blue navigation bar with the following items: Home, SW-Live (with a downward arrow), Media-Center (with a downward arrow), Glossar (with an upward arrow), Über uns (with a downward arrow), and Ko. Below the navigation bar, a white dropdown menu is open, listing the following categories in blue text: Weltraumwetter, Alle Begriffe, Sonne, Heliosphäre, Erdmagnetfeld, Atmosphäre & Ionosphäre, Stürme & Auswirkungen, and FAQ. The background of the page shows a blurred article snippet in German, mentioning 'Conrad Observatorium' and 'Heliosphäre'.



# First Step: German-language glossary

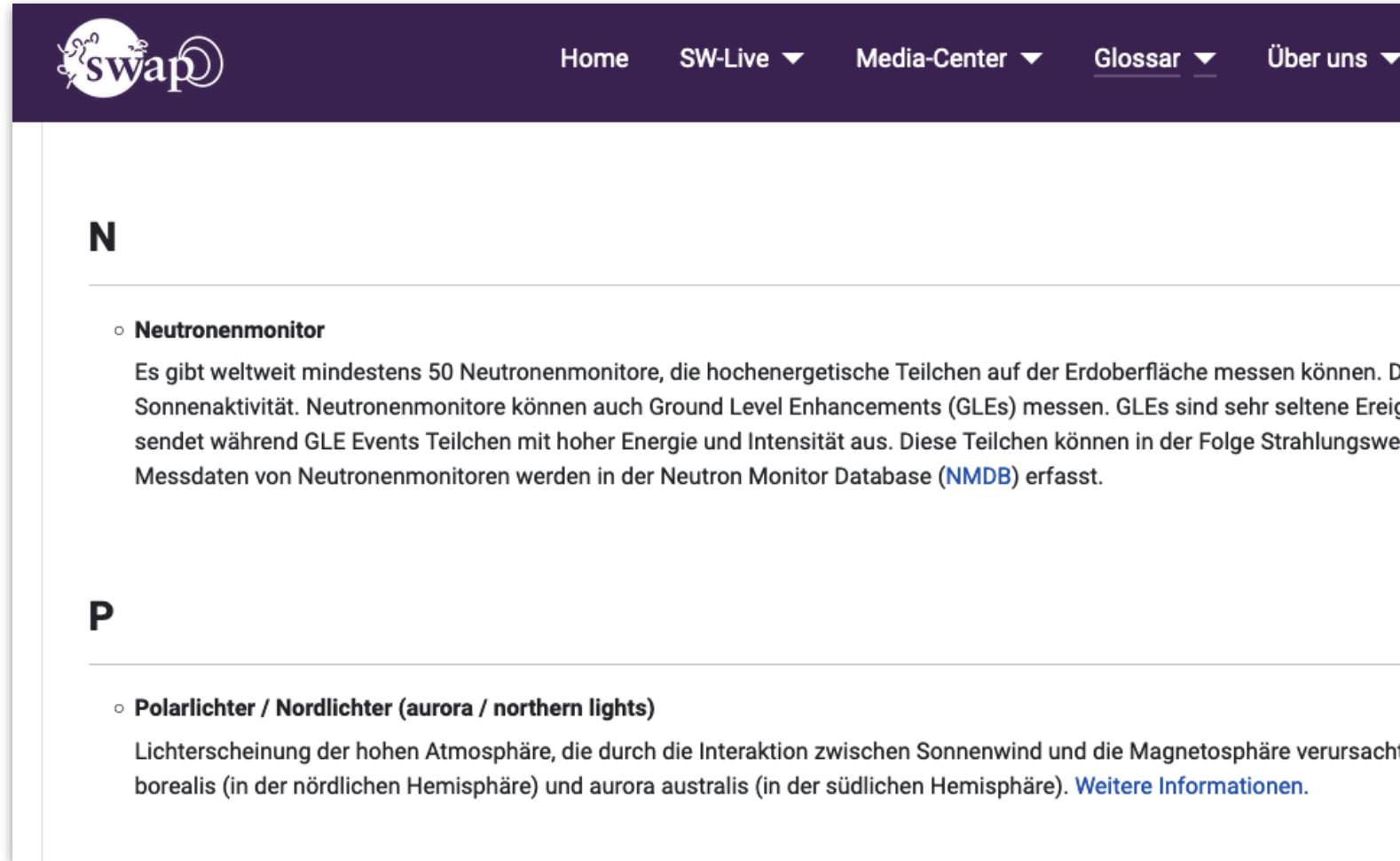
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The screenshot shows the SWAP website's glossary page. The header is dark purple with the SWAP logo on the left and navigation links: Home, SW-Live, Media-Center, Glossar, and Über uns. The main content area is white and features a section for the letter 'N'. Under 'N', there is a sub-section for 'Neutronenmonitor' with a description in German. Below this, there is a section for the letter 'P', with a sub-section for 'Polarlichter / Nordlichter (aurora / northern lights)' and its description in German. The text is in a clean, sans-serif font.

**N**

- **Neutronenmonitor**  
Es gibt weltweit mindestens 50 Neutronenmonitore, die hochenergetische Teilchen auf der Erdoberfläche messen können. Durch die Sonnenaktivität. Neutronenmonitore können auch Ground Level Enhancements (GLEs) messen. GLEs sind sehr seltene Ereignisse, die während GLE Events Teilchen mit hoher Energie und Intensität ausstrahlen. Diese Teilchen können in der Folge Strahlungswellen erzeugen. Messdaten von Neutronenmonitoren werden in der Neutron Monitor Database (NMDB) erfasst.

**P**

- **Polarlichter / Nordlichter (aurora / northern lights)**  
Lichterscheinung der hohen Atmosphäre, die durch die Interaktion zwischen Sonnenwind und der Magnetosphäre verursacht wird. Borealis (in der nördlichen Hemisphäre) und aurora australis (in der südlichen Hemisphäre). [Weitere Informationen.](#)



# Second Step: Compile an atlas of competences in Austria

## Competence Atlas

This “atlas” is an overview of fields of research in space weather expertise in Austria.



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Each field lists the **institutes doing research in the field** in Austria, their **specific expertise**, and links to **contact details** and more information on the topic (glossary).



<https://swap.zamg.ac.at>

The screenshot shows a web interface with a central panel titled "Sonnenwind und Heliosphäre". Above the panel are navigation tabs: "Sonnenflecken & Flares", "Kommunikations- & Satellitenstörungen", and "Ionosphäre & Thermosphäre". The central panel lists the following:

- Austrian Space Weather Office, GeoSphere Austria**
  - Laufende Vorhersagen des Sonnenwindes bei der Erde (PREDSTORM)
  - Vorhersage des Sonnenwindes bei der Erde anhand von Modellen des Sonnenmagnetfeldes
  - Katalog von CMEs gemessen in situ, seit 1995, grösster verfügbarer Katalog weltweit
- Observatorium Kanzelhöhe, UniGraz**
  - Automatisierte Vorhersage des Sonnenwindes mit ESWF und STEREO+CH
- Institut für Weltraumforschung, Österreichische Akademie der Wissenschaften (IWF/ÖAW)**
  - Sonnenwindbeobachtung und -datenanalyse (BepiColombo, Solar Orbiter)

Below the central panel is a link: [\[Mehr zum Thema\]](#)

At the bottom of the interface are four image-based navigation cards: "Sonnenzyklus", "CMEs - Koronale Massenauswürfe", "Sonnenwind & Heliosphäre", and "Magnetosphäre". On the right side, there is a vertical sidebar with more categories: "Geomagnet Stürme", "Luftfahrt & Strahlungsc", "Polarlichter", and "Geomagnet induzierte S".

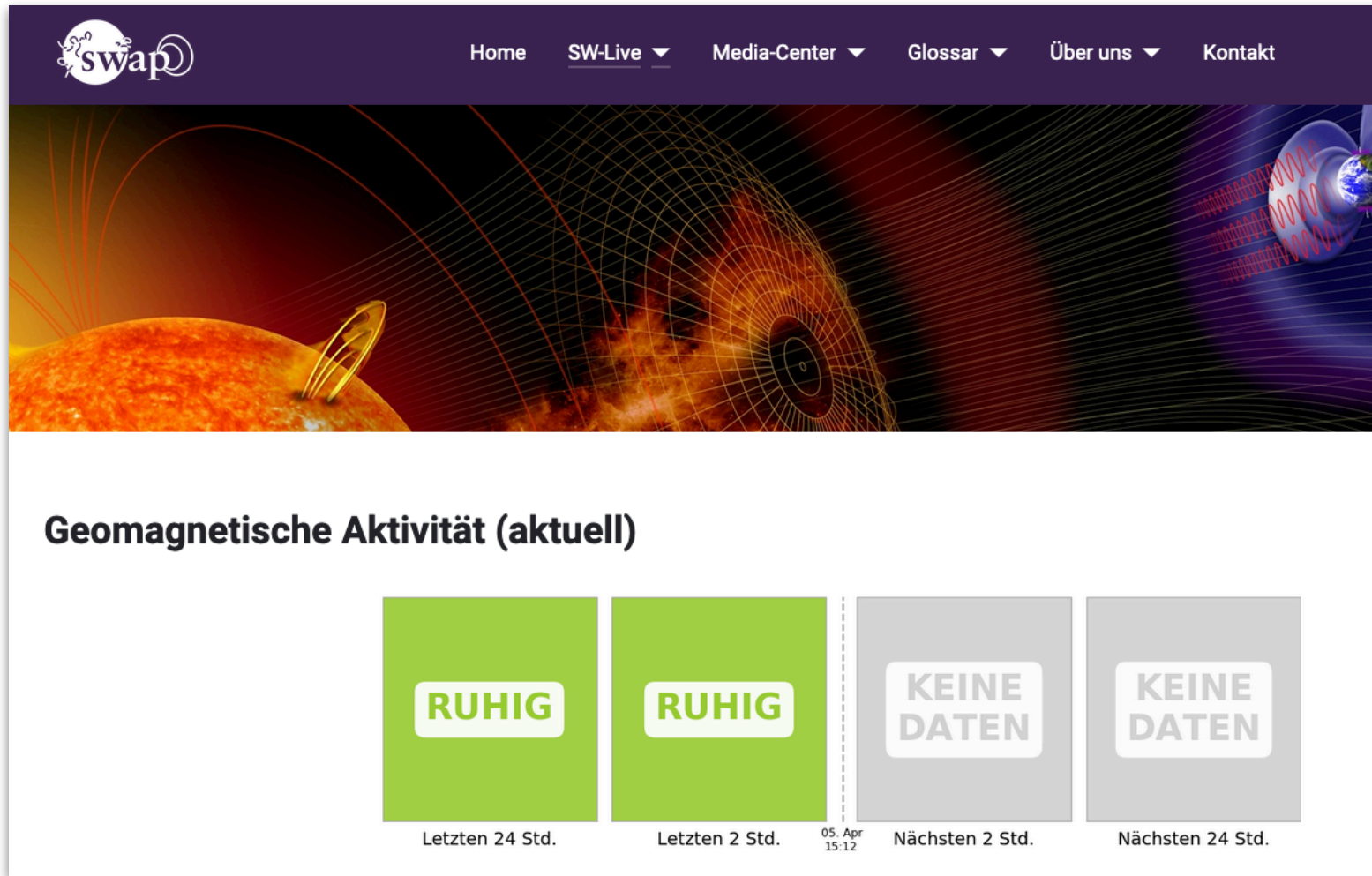
# Currently: Compiling user-defined real-time data

## Real-time resources

One of our objectives is to present space weather information in a format useful to non-expert users affected by space weather (power grids, the military, and other stakeholders) as well as the general public.

In some cases, we adapt results from Austrian research projects. In others, we direct stakeholders to outside resources.

 <https://swap.zamg.ac.at>



The screenshot shows the SWAP website interface. At the top, there is a navigation bar with the SWAP logo and menu items: Home, SW-Live (with a dropdown arrow), Media-Center (with a dropdown arrow), Glossar (with a dropdown arrow), Über uns (with a dropdown arrow), and Kontakt. Below the navigation bar is a large banner image featuring a stylized sun with magnetic field lines and a satellite in orbit. The main content area is titled "Geomagnetische Aktivität (aktuell)". Below this title, there are four data boxes representing different time intervals. The first two boxes, labeled "Letzten 24 Std." and "Letzten 2 Std.", are green and contain the word "RUHIG" in white. The last two boxes, labeled "Nächsten 2 Std." and "Nächsten 24 Std.", are grey and contain the text "KEINE DATEN" in white. A vertical dashed line is positioned between the second and third boxes, with the date and time "05. Apr 15:12" written next to it.

Time Interval	Activity Status
Letzten 24 Std.	RUHIG
Letzten 2 Std.	RUHIG
Nächsten 2 Std.	KEINE DATEN
Nächsten 24 Std.	KEINE DATEN

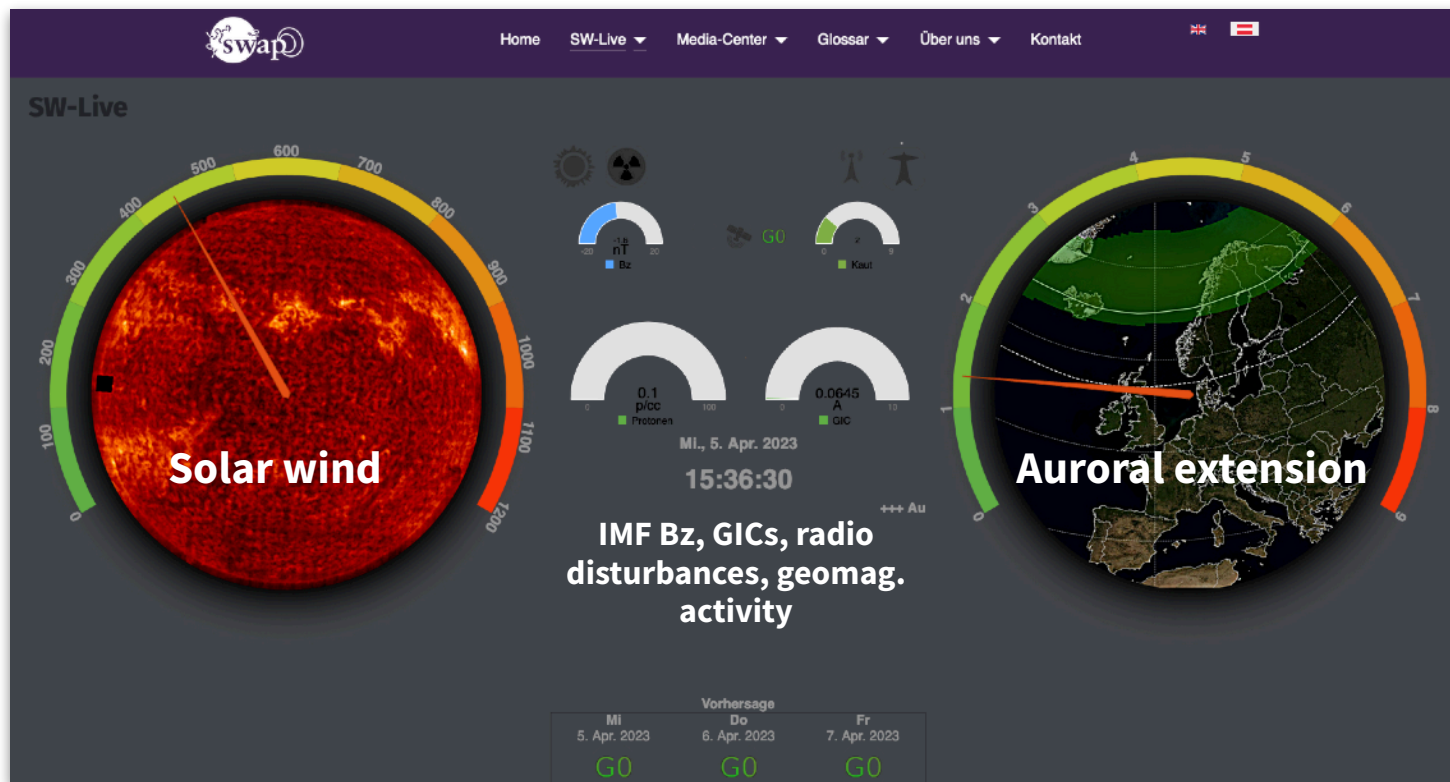


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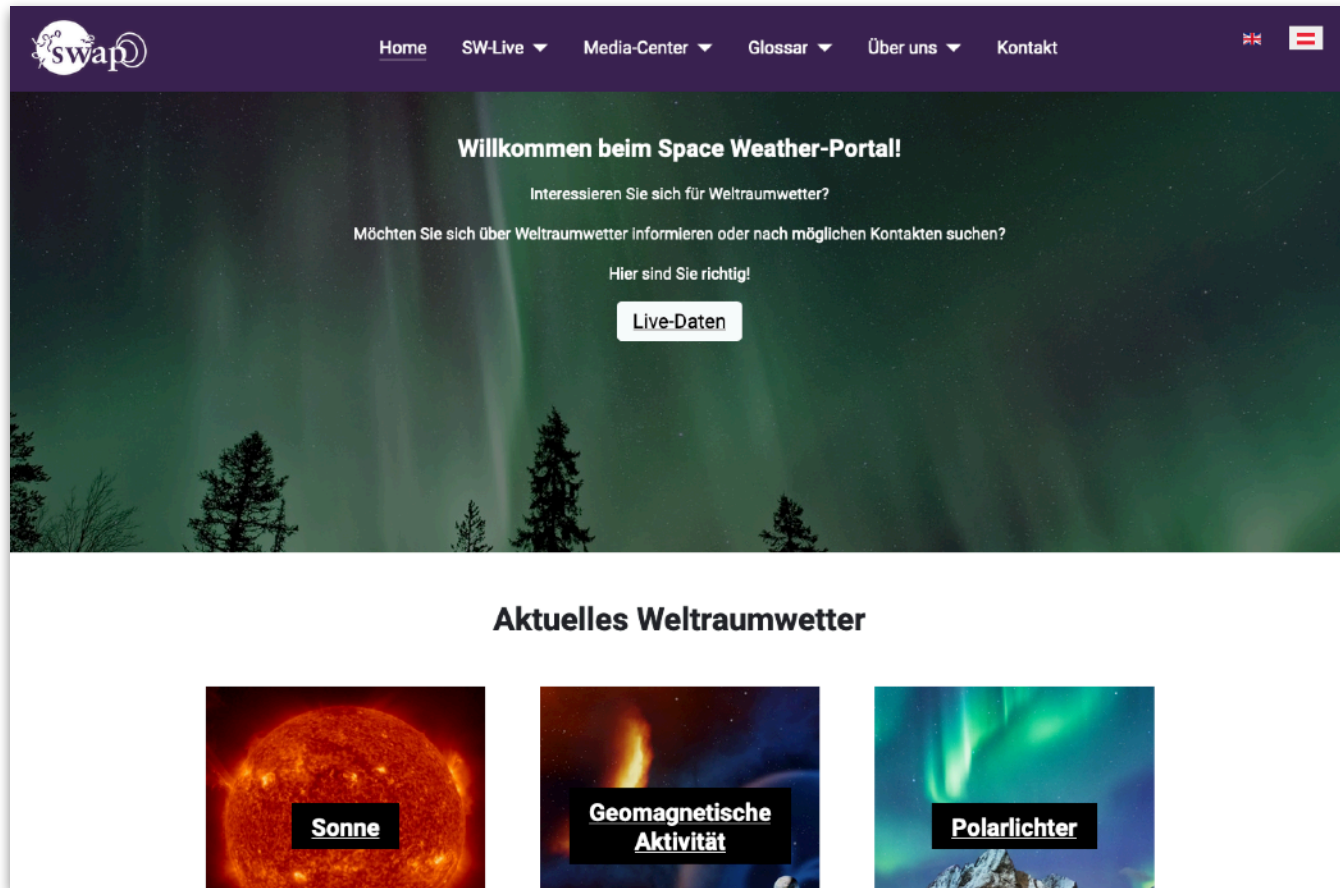


The space weather “dashboard”

 <https://swap.zamg.ac.at>



# Achievements so far



The web platform - a collaborative effort!

- Glossary of space weather terms
- Overview of space weather efforts in Austria
- First versions of real-time data catered to users



Two in-person meetings involving both researchers and stakeholders

# Achievements so far - new national partners



- Federal Office of Metrology and Surveying (interest in GPS positioning)
- Fernmeldebüro (= Federal Office for Telecommunications)
- National news outlets (Der Standard, ORF)

# What do we want to achieve next?

- **The platform is now undergoing refinement with individual partners (primarily users)**
  - We identify with companies and federal departments who may not know how space weather can affect their industries and seek their feedback
  - We collect feedback on the platform and improve iteratively
- **Once the platform has reached a good level of quality, we will publish it**
  - The website will then also be easily found on search engines
  - Once published, we will contact media representatives
- **Plan within Austria for future space weather efforts**
  - SWAP is identifying what we have → move on to what is needed
  - We will look into future funding to support more space weather networking efforts in Austria

# DANKE

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