

# Space Weather Activities in Germany

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Space Weather Observations

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Knowledge for Tomorrow



# Space weather related institutions in Germany

## Universities

- Extraterrestrial Physics at Kiel University (CAU)
- Institute of Physics, University of Rostock
- Centre of Astronomy and Astrophysics (ZAA), TU Berlin (TUB)
- Institute of Physics & Astronomy, University of Potsdam
- Institute of Astrophysics at the University of Goettingen (IAG)
- Institute of Geophysics and Meteorology at the University of Cologne
- Faculty for Physics and Astronomy at Ruhr University Bochum (RUB)
- Institute for Meteorology, University of Leipzig
- Institute of Geophysics and extraterrestrial Physics, TU Braunschweig (IGEP)
- German Geodätic Research Institute at Technical University of Munich (DGFI-TUM)

## Societies

- Working Group Extraterrestrial Research e.V. (AEF e.V.)
- German Physical Society e.V. (DPG e.V.)
- German Geophysical Society e.V. (DGG e.V.)
- Vereinigung Cockpit e.V.

## Research Institutes

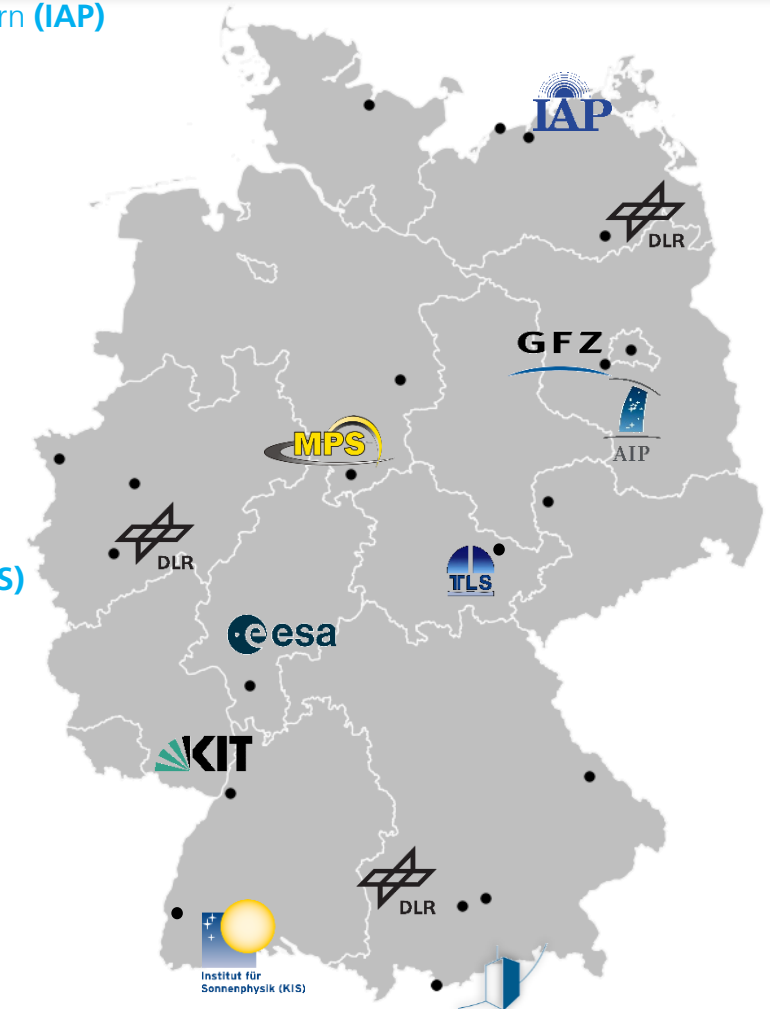
- Leibniz Institute of Atmospheric Physics in Kühlungsborn (IAP)
- German Aerospace Center (DLR):  
Institute for Solar-Terrestrial Physics,  
Earth Observation Center,  
Institute of Atmospheric Physics,  
Institute of Aerospace Medicine
- German Research Center for Geosciences (GFZ)
- Leibniz Institute for Astrophysics Potsdam (AIP)
- Max Planck Institute for Solar System Research (MPS)
- Thuringian State Observatory (TLS)
- Institute of Meteorology and Climate Research at Karlsruhe Institute of Technology (KIT)
- Leibniz Institute for Solar Physics (KIS)
- Environmental Research Station Schneefernerhaus (UFS)

## Federal Government & Industry

- Geodetic Observatory Wettzell at the Federal Agency for Cartography and Geodesy (BKG)
- Weltraumlagezentrum (WRLageZ) at the German Armed Forces
- European Space Operations Centre (ESOC) at ESA
- Airbus Defence and Space (ADS)

## Color Legend

- Astrophysics
- Sun and Heliosphere
- Space Radiation
- Ionospheric Weather
- Atmospheric Physics
- Geomagnetic Conditions



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openPetition

PETITION STARTEN

PETITIONEN SERVICE ÜBER UNS HELFEN

Region: Freiburg im Breisgau

Wissenschaft

**Petition against discontinuing the funding for the Leibniz Institute for Solar Physics (KIS)**

Prof. Dr. Markus Roth

Petition richtet sich an

Leibniz-Gemeinschaft (Leibniz Association), Ministerium für Wissenschaft, Forschung und Kunst Baden-Württemberg, Bundesministerium für Bildung und Forschung BMBF, Gemeinsame Wissenschaftskonferenz des Bundes und der Länder GWK

3.324 Unterstützende

Sammlung beendet



# AEF e.V. – Working Group Extraterrestrial Research e.V.

## Director

**Dr. Miriam Sinnhuber**

Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology (KIT)

## Deputies

**Dr. Thomas Wiegelmann**

**Dr. Alexander Warmuth**

Max Planck Institute for Solar System Research Leibniz Institute for Astrophysics Potsdam

### Astrophysics

Chair

**Dr. Michaela Kraus**  
Astronomical  
Institute, Academy of  
Sciences of the Czech  
Republic

Vice Chair

#### Topics

Massive stars,  
galaxies, galaxy  
evolution, structure of  
the interstellar  
medium

### Geospace

Chair

**Dr. Stefan Bender**  
Department of  
Physics, Norwegian  
University of Science  
and Technology

Vice Chair

**Dr. Daniela Banyš**  
Institute for Solar-  
Terrestrial Physics,  
DLR Neustrelitz

#### Topics

Upper atmosphere,  
ionosphere,  
magnetosphere, space  
weather and  
remote sensing from  
space

### Exoplanets and Astrobiology

Chair

**Dr. Lee Grenfell**

Vice Chair

**Dr. Konstantin Herbst**  
Institute for  
Experimental and  
Applied Physics, Kiel  
University

#### Topics

Exoplanets: diversity  
and habitability

### Planets and Small Bodies

Chair

**Dr. Daniel Heyner**  
Institute of Geophysics  
and extraterrestrial  
Physics, TU  
Braunschweig

Vice Chair

**Dr. Miriam Rengel**  
Max Planck Institute  
for Solar System  
Research

#### Topics

Solar system planets  
and moons, asteroids  
and comets

### Sun and Heliosphere

Chair

**Dr. Bernhard Kliem**  
Institute of Physics  
and Astronomy,  
University of Potsdam

Vice Chair

**Dr. Alexander  
Warmuth**  
Leibniz Institute for  
Astrophysics Potsdam  
(AIP)

#### Topics:

Cosmic rays, corona,  
solar wind, global  
heliosphere, inner  
sun, photosphere  
chromosphere

Annual AEF meeting at  
DPG spring meeting

→ Greifswald, 20-24 March 2024

[https://smuk23.dpg-  
tagungen.de/](https://smuk23.dpg-tagungen.de/)



<http://aef-ev.de/>

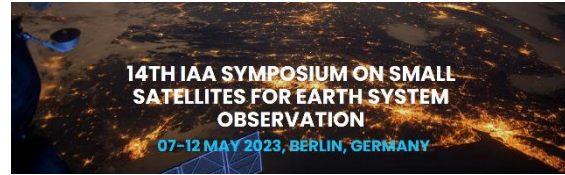


# Space weather activities in Germany

## Symposium on Small Satellites for Earth System Observation

→ Berlin 7-12 May 2023

<https://iaaspace.org/event/14th-iaa-symposium-on-small-satellites-for-earth-system-observation-2023/>



## IRS: International Radar Symposium

→ Berlin 24-26 May 2023

<https://www.dgon-irs.org/home/>



## General Assembly of IUGG

→ Berlin 11-20 July 2023

(Abstracts until 14 Feb 2023)

<https://www.iugg2023berlin.org/>

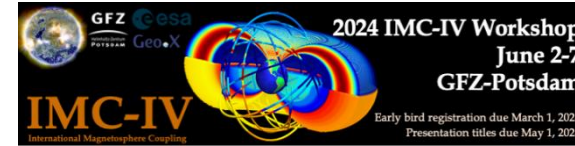


## URSI Germany: Kleinheubacher Tagung

→ Miltenberg 26-28 Sep 2023

<https://www.kh2022.de/>

→ Miltenberg 2024 TBD



## IMC-IV: International Magnetosphere Coupling IV workshop

→ Potsdam 2-7 June 2024

<https://events.hifis.net/event/1154/>



## UN/Germany ISWI Workshop:

Neustrelitz 10-14 June 2024

<https://www.unoosa.org/oosa/en/ourwork/psa/bssi/iswi.html>



## ISWC: International Space Weather Camp

A partnership between the [UAH Alabama](#), [SANSA](#) and [DLR Neustrelitz](#)

→ Huntsville: 15 – 30 June 2024

Neustrelitz: 1 – 14 July 2024

→ Application deadline: Mid February 2024



## 6th NWWW

## National Space Weather Workshop

→ 24.-26. September 2024



# Project Highlights



## PECASUS for ICAO Pan-European Consortium for Aviation Space weather User Services

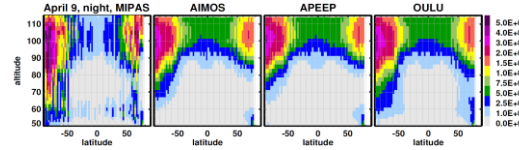
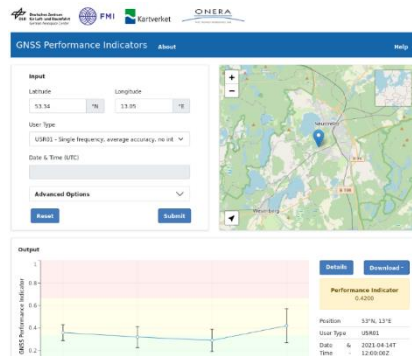
The consortium has been operating an **ICAO** global space weather center in which DLR-SO develops GNSS user services.

<https://pecasus.eu/>

## ESA Space Safety Programme

actively addresses user communities that are sensitive to space weather, such as spacecraft operations, power systems operations or airlines.

The **ESA SWE Service Portal** provides access to a total of 29 user-tailored services that build on more than 300 individual products and tools! <https://swesnet.busoc.be/>



**HEPPA IV** aims to assess the ability to reproduce the impact of **High-Energetic Particle Precipitation** into the Atmosphere with state-of-the-art chemistry-climate models by comparison against satellite observations.

## MoNEWIC Monitoring Network for Evil Waveform and Ionospheric Characterization

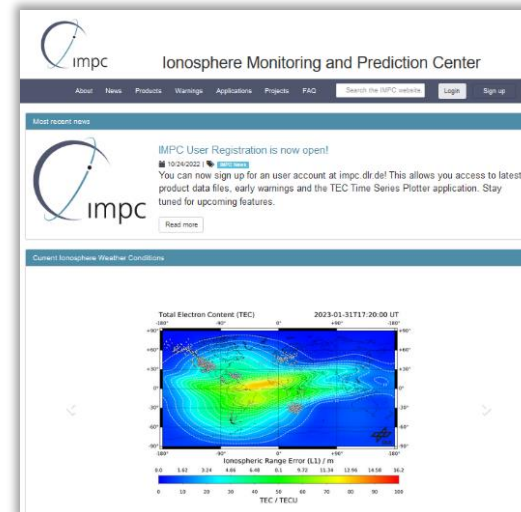
Particular attention is paid to extreme scintillation events, and additional emphasis is placed on monitoring the Evil Wave Form, as technical distortions of GNSS signals are particularly important for **Safety-of-Life** applications



## PITHIA-NRF Plasmasphere Ionosphere Thermosphere Integrated Research Environment and Access services: a Network of Research Facilities

<https://pithia-nrf.eu/>

PITHIA-NRF consortium involves 12 **nodes** providing organized access to experimental facilities, FAIR data, standardized data products, training and innovation services.



DLR Institute for Solar-Terrestrial Physics provides SW data via IMPC and is **ISES member** since April 2023:

<https://impc.dlr.de/>



# Solar Orbiter: a European heliospheric mission with major German contributions



**Solar Orbiter** is dedicated to study the influence of the Sun on the heliosphere and will thus be highly relevant for a better understanding of the physical causes of space weather.

Funded through DLR, German institutes are involved in several payloads:



**PHI:** MPS Göttingen, KIS Freiburg



**STIX:** AIP Potsdam



**EPD:** CAU Kiel, AIP Potsdam



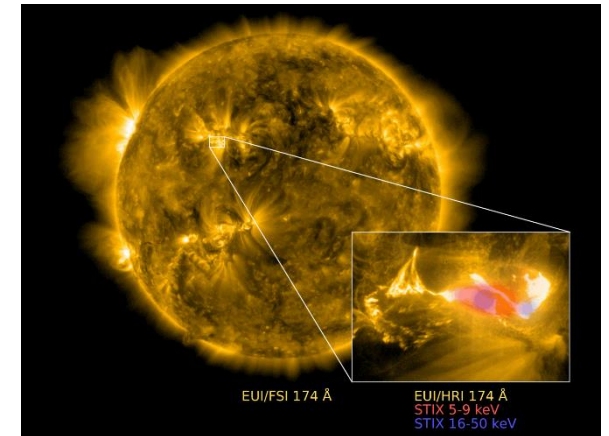
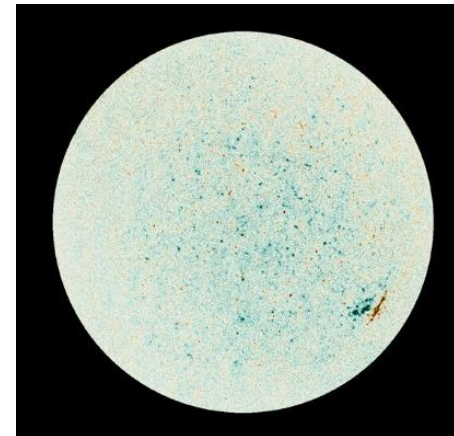
**EUI:** MPS Göttingen



**SPICE:** MPS Göttingen



**Metis:** MPS Göttingen



**Launched in 2020, Solar Orbiter is currently in its nominal science phase. All instruments are operational.**



# National space weather instruments

## CALLISTO spectrometer:

- HF (10-80 MHz): Neustrelitz
- VHF/UHF (100 – 800 MHz): Neustrelitz
- L-Band 1-1.6 GHz: Neustrelitz



## VLF receivers

- **GIFDS:** Neustrelitz, Boston, Stanford, Taiwan
- **SOFIE:** Neustrelitz, Berlin, Huntsville, Hermanus
- **SID Monitor:** Göttingen, Bergen



**Riometer:** Neustrelitz → Longyearbyen

**GNSS / Scintillation receiver:** EVnet, EUREF

**Bitgrabber:** Neustrelitz (mobil), Tromsø, Abuja

**Beacon receiver:** Neustrelitz

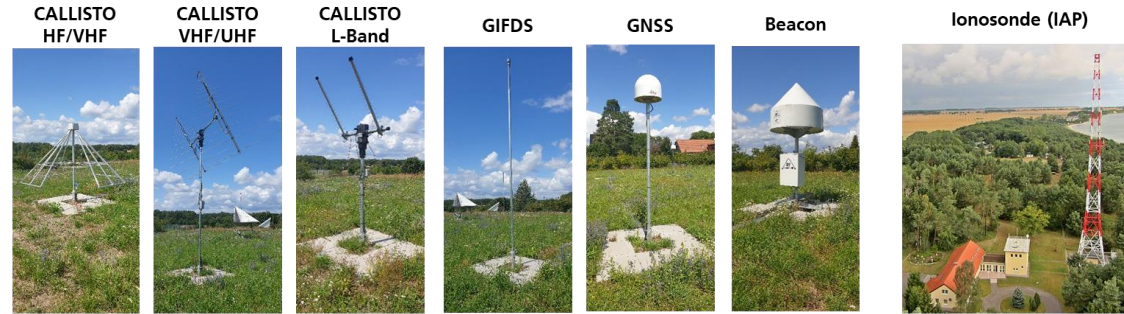
**Airglow Imager:** Neustrelitz

**Magnetometer:** Potsdam, Braunschweig

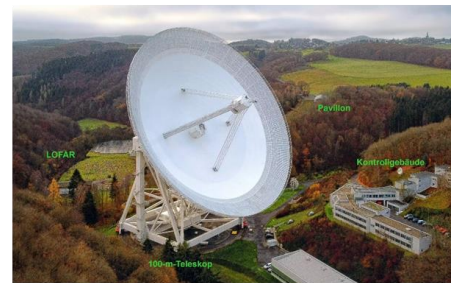
**Neutron monitors:** Kiel (NMDB)



DLR instruments on MIRA



Radioteleskop Effelsberg (MPIfR)



LOFAR in Potsdam (AIP)



OSWIN (IAP)



Teide Observatory on Tenerife (KIS, AIP, MPS)



**Radio telescopes:** Neustrelitz, Effelsberg, Stockert, Wetzell

**Solar telescope:** Tenerife

**LOFAR:** Effelsberg, Tautenburg, Garching, Potsdam, Jülich, Norderstedt

**Ionosonde:** Kühlungsborn

**MST radars:** MAARSY (Andøya), OSWIN (Kühlungsborn)

**Specular meteor radars:**

- **Monostatic meteor radars:** Juliusruh (32.55 MHz), Collm (36.2 MHz)
- **MMARIA multi-frequency receiving stations:** Neustrelitz, Potsdam, Juliusruh, Kühlungsborn, Straumen,
- **SIMONE:** Santa Cruz, Peru

**MF radars:** Juliusruh, Andenes, Saura

**indirect phase height measurements:** Juliusruh, Collm

