



Universidad
de Alcalá

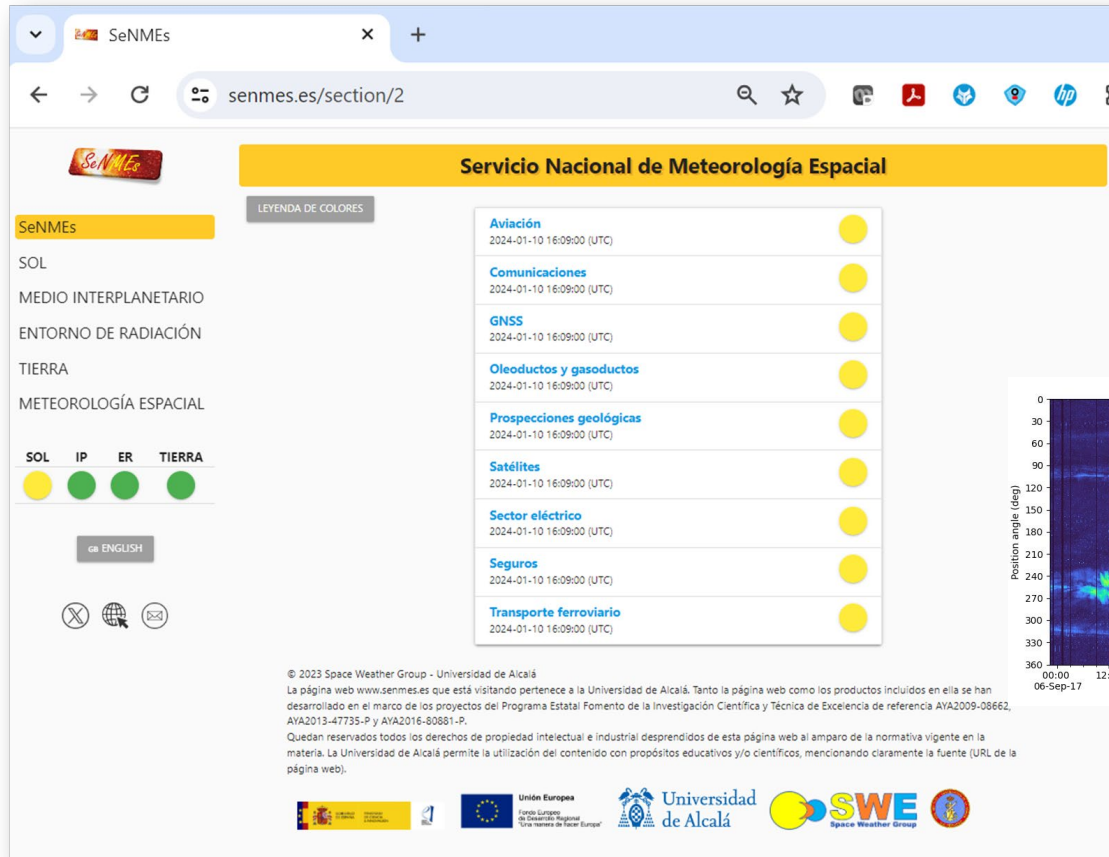


Space Weather activities in Spain

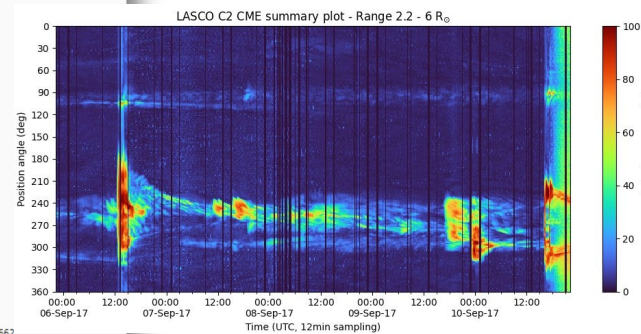
Presenter: Consuelo Cid (on behalf of the Spanish Space Weather Community)

Space Weather Group. University of Alcalá

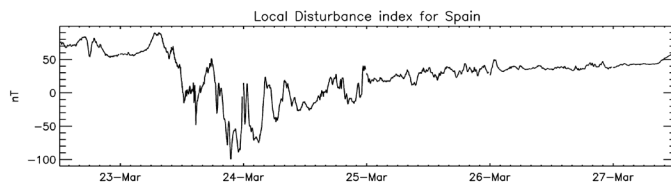
Spanish Space Weather portal (www.senmes.es)



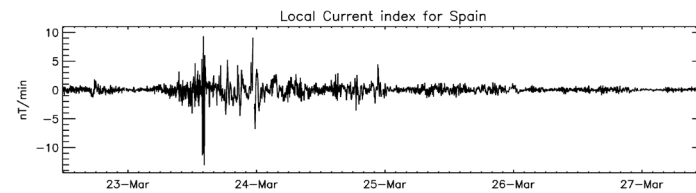
- It is a showcase of products based on national research
- In Spanish and in English
- Customized for different users
- Includes outreach on what Space Weather is



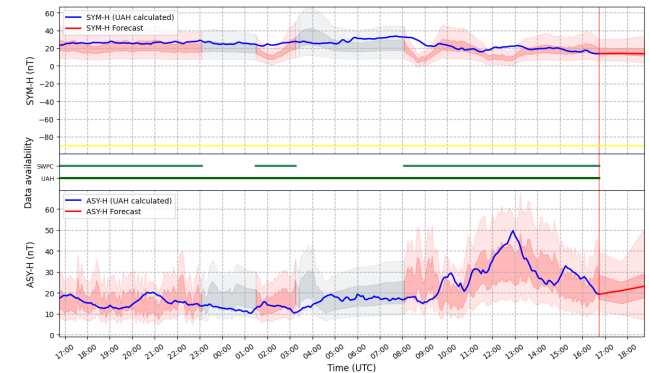
Spain is also contributing to the ESA SWE Portal with different products from several institutions



Last data: 2023-Mar-27 12:00 UT
Updated: 2023-Mar-27 12:10 UT



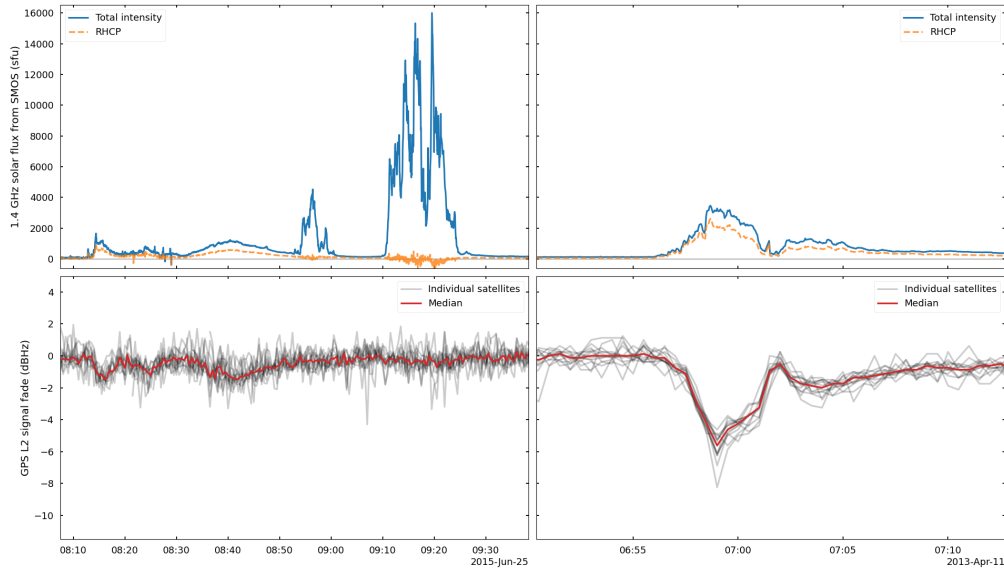
Last data: 2023-Mar-27 12:00 UT
Updated: 2023-Mar-27 12:10 UT



Last data: 2024-Jan-10 16:45 UTC
Last updated: 2024-Jan-10 17:30 UTC

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Data source: NOAA/SWPC/UAH

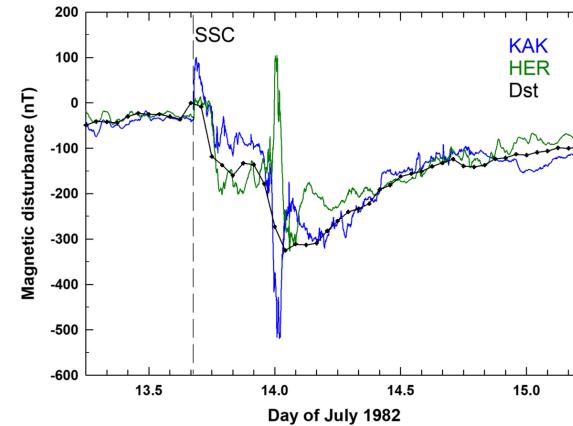
HIGHLIGHTED RESEARCH & DEVELOPMENT



Solar flux at 1.4 GHz has been obtained from SMOS mission with circular polarimetry (ESA project)

Polarization information is crucial for space weather purposes as GNSS are only affected by radio burst with right-handed circular polarization.

<https://doi.org/10.1029/2020SW002649>

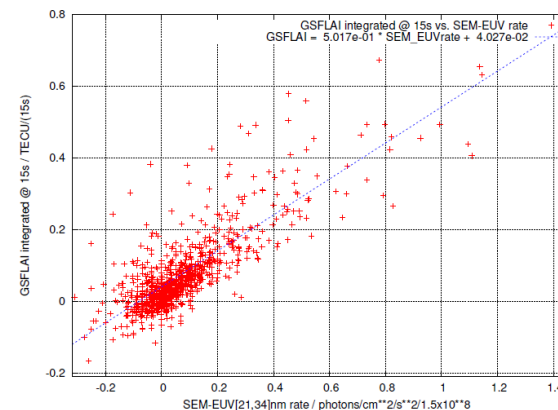


A new Hazard: double H-spikes

Double H-spikes last about 2 h and pose a potential hazardous effect for users affected by space weather. They are missed by the commonly used indices and therefore local/regional indices are a must for accurate nowcasting/warnings.

<https://doi.org/10.1029/2023SW003453>

<https://doi.org/10.1051/swsc/2021018>



GNSS ionosphere can be used as a solar EUV photometer

VTEC rate at Earth ionosphere due to a solar flare can be related to Solar EUV flux rate -> Real time solar flare warnings at UPC-IonSAT (unaffected by relativistic electrons)

<https://doi.org/10.1016/j.asr.2023.12.016>

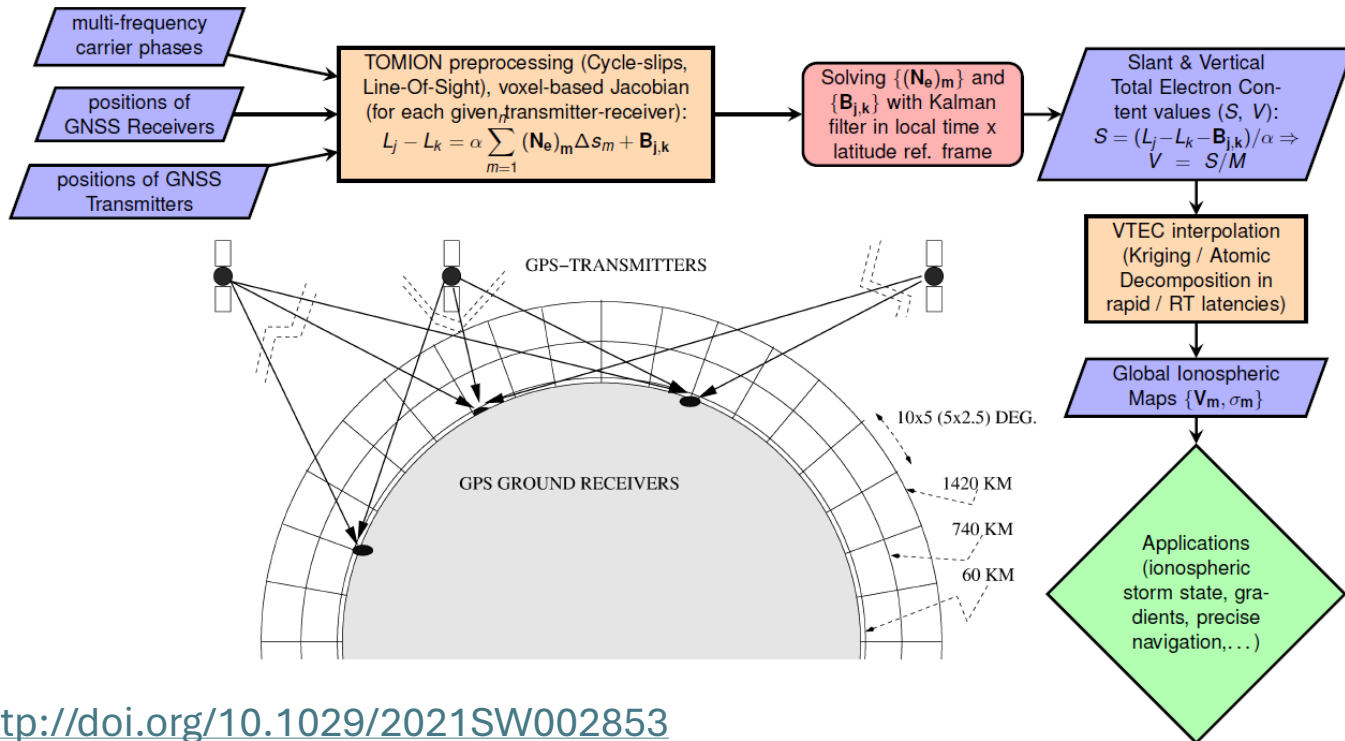
<https://doi.org/10.1029/2012SW000826>

HIGHLIGHTED RESEARCH & DEVELOPMENT

TOMION model: the UPC-IonSAT soft which generates VTEC GIMs for IGS, among the best behaving rapid/real-time ones, UQRG/UADG.

TOMION tomography can combine different data and geometries, in agreement with other data and models, also in polar regions. It estimates precise GNSS RT positioning faster and further away.

An Ionospheric Storm Scale Index, based on UPC-IonSAT GIMs, has been proposed at a regional level allowing semaphore values.



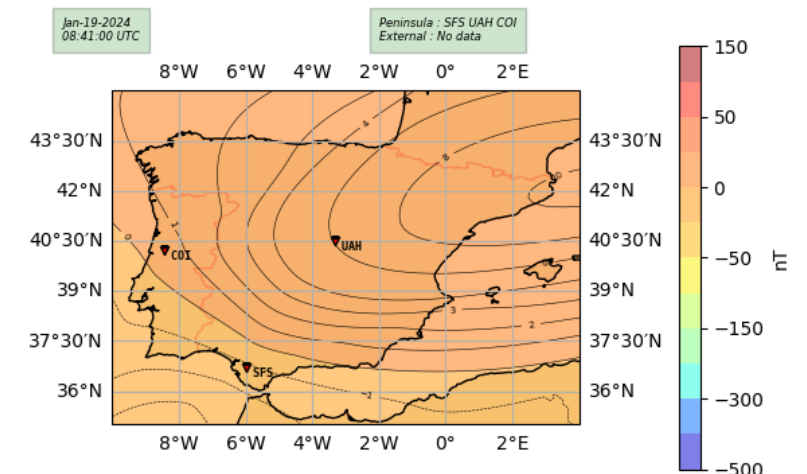
SWE Products for Southern Europe - Phase 1 (ESA Project)



Goal: To expand the SWE Services to enhance service capabilities targeting users located in Southern Europe

Results:

- New regional products on geomagnetic conditions have been developed and will be integrated into the SWE Service Network.
- A feasibility study on ionospheric regional products has been performed.



<http://doi.org/10.1029/2021SW002853>

<http://doi.org/10.1007/s00190-020-01397-1>, <http://doi.org/10.1029/97RS00431>

INSTRUMENTS

- LEMI-031 Magnetometer
- Home-made VLF antenna
- Septentrio PolaRx5S Ionospheric Monitoring GNSS Receiver + PolaNt Choke Ring B3/E6 (installed in December 2023)
- LDi meter prototype (UAH-GMV collaboration)
- SPIDER 300A advanced radio telescope (to be installed in February 2024)

