The Istituto Nazionale di Geofisica e Vulcanologia (INGV) has a long history in acquiring space weather data through all the instruments installed and managed by the Upper Atmosphere Physics group and the Geomagnetism group in different regions including the Arctic and Antarctic one. Ground observations can give an important and independent support to satellite-based dataset for a better definition of possible risks due to the Earth-Sun interaction. The electronic Space Weather upper atmosphere (eSWua) and the Geomagnetic data portal are the hardware-software infrastructures designed for data management and developed to address the needs of the space weather community and the scientific users. The systems are currently being upgraded to standardize historical and real-time observations and to integrate the data for data management and developed to address the needs of the space weather community and the scientific users. Such infrastructures will also support the INGV contribution to the Italian National Antarctic Data Center (NADC), the ICT infrastructure designed to gather and manage the metadata from several scientific projects in the framework of the Italian National Antarctic Research Program (PNRA).

### ABSTRACT

The INGV Space Weather Data Management System in the Italian NADC

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#### DATA MANAGEMENT INFRASTRUCTURE

- Real-time data management system
- Automatic procedures for data ingestion
- Multi-instrument standardization
- Highly interoperable and maintainable system
- Easily scalable system (new instruments and data sources)
- Open data platform (RESTful Web Service and downloading tools are under development)
- Dynamic, real-time visualization tools
- New website available soon

#### ANTARCTICA

- **Location**: Concordia Station (Latitude: 74° 42' S; Longitude: 164° 6' E)
- **Instrument Code Year Sensor**: M200P 2017- Present: Multi-GNSS IONOSPHERIC SCINTILLATION AND TEC
- **Location**: SANAE IV Station (Latitude: 71° 40' S; Longitude: 2° 50' W)
- **Instrument Code Year Sensor**: DMCD 2009- Present: OVERHAUSER MAGNETOMETER VERTICAL MAGNETOMETER

#### ARCTIC AND ANTARCTIC OBSERVATORIES

- **Location**: Ny-Ålesund - Dirigibile Italia Arctic Station (Latitude: 78° 54' N; Longitude: 11° 55' E)
- **Instrument Code Year Sensor**: DMC 2005: OVERHAUSER MAGNETOMETER VERTICAL MAGNETOMETER

#### SPACE WEATHER PRODUCTS

- **Space Weather effects**:
  - Impacts on HF radio communications
  - Signals degradation and lack of reliability in navigation services and GNSS positioning
  - Prediction for Scintillation indices
  - High radiation exposure for civil flights in northern polar routes

#### INGV Space Weather services:

- Nowcasting, Short-Term Forecasting and Long-Term Prediction for TEC
- Nowcasting, Short-Term Forecasting and Long-Term Prediction for Scintillation indices
- Real-time geomagnetic indices
- Partner of the PECUS consortium (http://pecus.eu/)

**INGV Space Weather products**:

- www.ingv.it/it/prodotti-per-lo-space-weather
- Geomagnetic data portal: geomag.rm.ingv.it
- eSWua website: eswuax.rm.ingv.it

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