# 62esima sessione COPUOS Scientific and Technical Subcommittee (STSC) Vienna, Austria 03-14 Febbraio 2025

### **Statement Item 8: Space Wheater**

Honourable Chair, Distinguished Delegates,

It is an honour for me to report the Italian activities on the Space Weather.

Space Weather is a global concern due to its potential impact on space systems, human spaceflight, and both ground- and space-based infrastructures. Addressing these challenges requires international cooperation and coordination to improve predictive capabilities and mitigate potential risks. Italy has played an active role in the former STSC Space Weather Expert Group, supports the UNOOSA International Space Weather Initiative (ISWI), and participates in multiple collaborative projects aimed at strengthening global resilience against space weather hazards.

National efforts rely on a wide scientific community, technological advancement, and international cooperation.

During past years, as member of the European Space Agency, the Italian Space Agency has participated in the scientific missions that have brought to maturity the Space Weather sciences in Europe, starting from SOHO, through Solar Orbiter and BepiColombo.

ASI is currently supporting a large project involving all major Italian Research Institutes on the "Protection Of Critical Infrastructures And Space Weather" focusing on enabling science, innovative space architectures, advanced applications for nowcasting and forecasting, low-TRL breadboarding of critical instrumentation for coronography and polarimetry.

Within its nanosatellite programme, ASI is developing two cubesat missions for Space Weather science. ASI is also supporting Missions providing key scientific data for Space Weather science, such as Solar-C, Muse, M-Matisse, Henon.

Important experiments on the ISS, such as LIDAL and AMS-02, are key to understand the Space Weather-driven radiation environment where astronauts operate, characterizing the radiation risks and defining countermeasures. This is particularly important in view of the Artemis-related exploration programmes such as Gateway and MPH, the Multipurpose Habitat on the Moon that ASI is developing within Artemis.

Italian contributes have been provided to the European Space Agency Space Safety Programme. The National Institute for Astrophysics participates with a solar telescope to the Solar Weather Expert Service Centre, providing optical images of the Sun in white light and H-alpha. The INGV contributes in the frame of the ionospheric weather with several products.

Mr Chair,

Italian scientific and technological teams have consistently participated in the development of advanced instrumentation for future space missions and ground-based observations. Forecasting and

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nowcasting modeling efforts at national and international levels have significantly advanced Space Weather capabilities. In this context Italy actively collaborates with leading international organization including the International Space Weather Initiative (supported by UNOOSA), the Committee on Space Research (COSPAR), the International Union of Radio Science (URSI), the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP), the Scientific Committee on Antarctic Research (SCAR), the World Meteorological Organization (WMO).

Moreover, Italian scientists have strongly supported the European Space Weather and Space Climate Association (E-SWAN), an independent, bottom-up association fostering Space Weather and Space Climate research in Europe. E-SWAN organizes the European Space Weather Week, set to be hosted in Florence, Italy, in 2026, and oversees the Journal of Space Weather and Space Climate.

## Mr Chair,

The Istituto Nazionale di Geofisica e Vulcanologia (INGV) plays a key role in supporting the Ionospheric Weather Expert Service Centre, by providing various ionospheric products related to GNSS Total Electron Content (TEC) and HF radio propagation properties of the ionosphere.

INGV is also one of the providers for the PECASUS consortium, one of the four global centers selected by the International Civil Aviation Organization (ICAO) to deliver 24/7 Space Weather (SWX) services for civil aviation. Moreover, it contributes to the development of a prototype for an Italian Space Weather Service, thanks to an agreement with the Italian Air Force and the National Institute for Astrophysics.

A collaboration agreement between the Italian Space Agency and INGV has led to the establishment of the first ionospheric observatory in Eastern Africa, located at the "Luigi Broglio" Space Center in Malindi, Kenya. This partnership has also facilitated the organization of two major capacity-building workshops.

The first, the "Eastern Africa Capacity Building Workshop on Space Weather and the Low-Latitude Ionosphere" was hosted in Malindi Space Center on October 2023, while the second, the "African Capacity Building Workshop on Space Weather and Ionospheric Research," took place at International Center for Theoretical Physics, in Trieste, Italy, on October 2024.

Together, these initiatives trained over 100 students from developing countries, particularly from Eastern Africa, providing them with a comprehensive understanding of Space Weather and its impact on the ionosphere. The training covered key topics such as Sun-Earth coupling, Global Navigation Satellite Systems (GNSS), GNSS data analysis (including low-cost instruments), HF signal propagation, ionospheric measurements and monitoring, ionospheric modeling, and Space Weather impact forecasting.

## Mr Chair,

The Antarctic Geospace and ATmosphere reseArch (AGATA) is a new Scientific Research Program recently approved by the SCAR. AGATA is led by the Italian National Institute of Geophysics and Volcanology and the University of Oslo (Norway) and counts a core membership of about 30 Countries by the contribution from several research institutions. AGATA is a coordinated, worldwide effort to monitor, investigate and better understand the physics of the polar atmosphere and the impact of the Sun-Earth interactions on the polar regions. The participation in AGATA is completely open: polar space weather researchers and institutions are welcome to be part.

In the context of international collaboration, Italy is also engaged in the Pan-Arctic GNSS Infrastructure for Atmospheric Science and Space Weather (PAGINA project) project, in partnership with Canada and Finland, further strengthening global scientific cooperation.

Through these efforts, Italy has significantly enhanced scientific expertise and technological capabilities in space weather and ionospheric research, while simultaneously combining advanced knowledge with capacity-building initiatives. This fosters the growth of sustainable and knowledgeable research communities in developing regions.

Thank you for your attention.