

Resolution of the UN-Ecuador Workshop on the International Space Weather Initiative 2012 October 12, Quito, Ecuador

Space weather is important to our society, which increasingly relies on technology for education, business, transportation and communication. Storms from space can disrupt GNSS/GPS reception, and long distance radio transmission. Modern oil and gas drilling frequently involve directional drilling to tap oil and gas reservoirs deep in the Earth that depend on accurate positioning using GNSS systems. Energetic particles at the magnetic poles can force the re-routing of polar airline flights resulting in delays and increased fuel consumption. Ground induced currents generated by magnetic storms can cause extended power blackouts and increase corrosion in critical energy pipelines.

In the past space weather may have affected Earth's climate. For example, the 17th century Maunder minimum, a 70-year period almost devoid of sunspots, coincided with prolonged, very cold winters in the northern hemisphere.

Space weather is inherently an international enterprise. Solar and magnetic storms can affect large regions of the Earth simultaneously, and equatorial ionospheric disturbances occur routinely around the globe. It is, therefore, appropriate for the United Nations to promote improvement in space weather modeling and forecasting for the benefit of all nations.

Significant scientific progress has been made over the past decade in developing physics-based space weather models, and large-scale coupled (near real-time) space plasma simulations. However, these models are data starved in important spatial space-weather domains, limiting their accuracy. Guaranteed continuous space weather data streams are crucial.

The International Heliophysical Year (IHY) and International Space Weather Initiative (ISWI) have made significant progress in the installation of new instrumentation for the understanding of space weather impacts on Earth's upper atmosphere generating new data streams useful for space weather in regions unobserved before. With the support of the United Nations Office of Outer Space Affairs (OOSA) the ISWI has facilitated the operation of nearly 1000 instruments operating in about 100 of the UN member states. The data from these instrument arrays is a unique resource for the study of space weather influences on Earth's atmosphere. The IHY and ISWI schools have trained several hundred graduate students and young scientists, many of whom are becoming mature scientists as evidenced by their publications. The annual UN workshops on ISWI have facilitated instrument deployment and close international scientific collaboration. Thanks to ISWI, many scientists in developing countries are able to develop and sustain research efforts in their own countries. Finally, pursuant to the "Abuja ISWI Resolution" of the UN/Nigeria Workshop on ISWI, the International Center for Space Weather Science and Education (ICSWSE) was established in Japan on April 1st 2012.

The participants of the UN/Ecuador workshop, therefore, recommend that ISWI be continued as part of the Space Weather agenda item of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space.

Specifically:

1. It is recommended that the ISWI continue the operation and development of existing arrays and deployment of new instrument arrays as appropriate.
2. It is recommended that the ISWI undertake a process to examine data sets to determine data utility, to develop connections with virtual observatories to make data more readily available, and to facilitate collaborative modeling of regions of interest (e.g. the equatorial ionosphere) in collaboration with modeling centers of the ESA, JAXA, NASA, and others.
3. It is recommended that data from ISWI instrument arrays be combined with space-based and other ground-based data to advance space weather science leading to robust research output and scientific papers in international journals. It is recommended that ISWI and GNSS communities collaborate in terms of data sharing and space weather research.
4. It is recommended that the ISWI Space Science Schools and the annual UN workshops for ISWI continue indefinitely. UN/BSS workshops and Space Science Schools are an integral part of ISWI, to train early career and new researchers in instrument operation and the science of heliophysics. The partnerships already established with international scientific organizations need to be strengthened to assure that these capacity building activities are accomplished efficiently and for the benefit of all member states.
5. It is recommended that new knowledge generated by ISWI activities be effectively communicated to the public and the scientific community at large via Newsletters, ISWI web site, and other media.