

Annual report of Interdivision B and E WG on Coordination of Synoptic Observations of the Sun.

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Report for the period Jan to Dec 2021

Current WG page: <https://gonewithsolarwind.com/index.php/iau-wg/>

As the COVID-19 pandemic continued, the WG activities were again limited in 2021, in particular because of the cancellation of most conferences, and also due to the reduced mobility which prevented on-site visits to archives.

The main ongoing funded project that this IAU WG is supporting is the development of SOLARNET-SPRING (ground-based network for solar synoptic observations). On the US side, several members of the group participated in a “sister” project - a next generation Ground-based solar Observing Network (provisionally named ngGONG). Other global network that this IAU WG supported is the Solar Activity Monitor Network – SAMNet. The WG members facilitated establishing communications between the SAMNet project and potential partners in South Africa and Uzbekistan.

The importance of long-term synoptic observations of the Sun and the activities related to SOLARNET-SPRING and ngGONG were publicized in several meetings including the European Space Weather Week (ESWW17, Glasgow, U.K.), SEASONS 2021 (Laurel, MD, USA), international conference on “Magnetism and Activity of the Sun and Stars” (Crimean Astrophysical Observatory), and at an international meeting on “Advances in Observation and Modelling of Solar Magnetism and Variability” celebrating the Golden Jubilee year of the Indian Institute of Astrophysics.

WG members are also taking part in several white papers in preparation for incoming 2024 Decadal Survey on Heliophysics by the National Research Council of the US National Academy of Sciences, Engineering, and Medicine.

One of the activities supported by the WG is related to recovery of sunspot number (SN) records. The data recovery work continued with the recovery of individual data sets in the 18th and 19th century. The members of the group also took part in digitizing the sunspot records from the Sacramento Peak observatory, including the names of all observers from 1949 till early 2000. The construction of the SN database of all past Zurich data has greatly progressed, with several important papers published. The encoding of the ~300 000 data in the 1945-1980 Waldmeier archives, which were recovered in 2019, will still last several more years, given the minimal means available for this huge task. Scientists and PhD students at SILSO (the World Data Center for the production, preservation and dissemination of the international sunspot number) continue the investigations of important links in the overall SN homogeneity, exploiting modern SILSO observers for probing in-homogeneity factors, and investigating the critical 1894 Wolf-Wolfer and 1849 Schwabe-Wolf transitions. Also investigated are the properties and calibration of the F10.7cm time series, settling the persisting disagreements on the value of the quiet-Sun background flux, and finding a 10% calibration jump in 1980.

Finally, the WG provided feedback on the request for information on the interferences by satellite constellations on solar observations. It was noted that the observations with large aperture (e.g., 4-meter, DKIST) solar telescopes could be impacted depending on a frequency of the transits. For daily operations of large aperture solar telescopes, it could be necessary to calculate the sky location of orbits to determine if/when they cross the solar disk. The orbital parameters and the size of satellites also need to be made public. Starlink satellites operate in Ku-/Ka- bands, and thus, may have an impact of data downlink from scientific satellites using this wavelength range (e.g. Solar Dynamics Observatory).