Geophysical Research Abstracts
Vol. 15, EGU2013-11461-1, 2013
EGU General Assembly 2013

Towards a first detailed reconstruction of sunspot information over the last 150 years

Laure Lefevre and Frédéric Clette
Royal Observatory of Belgium, Brussels, Belgium (laure.lefevre@oma.be)

With four centuries of solar evolution, the International Sunspot Number (SSN) forms the longest solar time series currently available. It provides an essential reference for understanding and quantifying how the solar output has varied over decades and centuries and thus for assessing the variations of the main natural forcing on the Earth climate.
For such a quantitative use, this unique time-series must be closely monitored for any possible biases and drifts. This is the main objective of the Sunspot Workshops organized jointly by the National Solar Observatory (NSO) and the Royal Observatory of Belgium (ROB) since 2010. Here, we will report about some recent outcomes of past workshops, like diagnostics of scaling errors and their proposed corrections, or the recent disagreement between the sunspot sumber and other solar indices like the 10.7cm radio flux. Our most recent analyses indicate that while part of this divergence may be due to a calibration drift in the SSN, it also results from an intrinsic change in the global magnetic parameters of sunspots and solar active regions, suggesting a possible transition to a new activity regime.

Going beyond the SSN series, in the framework of the SOTERIA, TOSCA and SOLID projects, we produced a survey of all existing catalogs providing detailed sunspot information and we also located different primary solar images and drawing collections that can be exploitable to complement the existing catalogs (COMESEP project). These are first steps towards the construction of a multi-parametric time series of multiple sunspot group properties over at least the last 150 years, allowing to reconstruct and extend the current 1-D SSN series. By bringing new spatial, morphological and evolutionary information, such a data set should bring major advances for the modeling of the solar dynamo and solar irradiance. We will present here the current status of this work. The catalog now extends over the last 3 cycles (Lefevre & Clette 2011,doi:10.1007/s11207-012-0184-5). A partially complete version extends back to 1965, and will soon reach 1940 thanks to the data from the Uccle Solar Equatorial Table (USET) operated by the ROB. We will also present initial applications derived from the present version of the catalog, such as new sunspot-based solar fluxes and proxies that should ultimately help refine our knowledge of the influence of the Sun on our environment, now and throughout the ages.

This work has received funding from the European Commission FP7 Project COMESEP (263252).