Geophysical Research Abstracts
Vol. 15, EGU2013-8930, 2013
EGU General Assembly 2013

Space climate characterization via geomagnetic indices. An attempt of integrating solar, heliospheric, and geomagnetic indices at various time-scales

Crisan Demetrescu and Venera Dobrica
Institute of Geodynamics, Bucharest, Romania (crisan@geodin.ro)

The so-called space climate concerns the long-term change in the Sun and its effects in the heliosphere and upon the Earth, including the atmosphere and climate. Annual means of measured and reconstructed solar, heliospheric, and magnetospheric parameters are used to infer solar activity signatures at the Hale and Gleissberg cycles timescales. Available open solar flux, modulation strength, cosmic ray flux, total solar irradiance data, reconstructed back to 1700, solar wind parameters (speed, density, dynamic pressure) and the magnitude of the heliospheric magnetic field at 1 AU, reconstructed back to 1870, as well as the time series of geomagnetic activity indices (aa, IDV, IHV), going back to 1870, have been considered. Also, shorter time series of some other geomagnetic indices, designed as proxies for specific current systems, such as the ring current and the auroral electrojet, that develop in the magnetosphere and ionosphere as a consequence of the interraction with the solar wind and heliosperic magnetic field (the Dst and, respectively, AE indices), as well as the merging electric field and convection in the polar ionosphere (the PC index) have been taken into account. Simple filtering procedures (successive 11-, 22-, and 88-year running averages and differences between them) and scaling by the standard deviation from the average value for the common interval covered by the data show that the long-discussed variation in the 20th century (a pronounced increase since $\sim$1900, followed by a depression in the ‘60s and a new, slower, increase), seen in the 11-year averages of parameters such as geomagnetic activity indices and reconstructed heliospheric magnetic field strength, solar wind speed, open solar flux etc., is a result of the superposition in data of solar activity signatures at Hale and Gleissberg cycles timescales. The Hale and Gleissberg signals were characterized and similarities and differences in the temporal behavior of the analyzed parameters at these timescales are discussed. The similarities in the studied parameters point to the common pacing source, the solar dynamo.