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Prediction of 11-year solar cycle strength with Hemispheric Sunspot Number

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The 11-Year solar cycle is driven by the sun's magnetic field. The sunspot number is the most-common long term index of solar activity and prediction of its amplitude can help to understand the effects of space weather & solar activity. Previous studies have shown that analyzing the solar activity of the two hemispheres separately instead of the full sun can provide more detailed information on the activity evolution. However, the existing Hemispheric Sunspot Number(HSN) series (1945 onwards) is too short for the purpose of solar cycle predictions. Based on a newly created HSN catalogue for the time range 1874-2020 (Veronig et al. 2021) that is compatible with the International Sunspot Number from WDC-SILSO, we investigate the evolution of the solar cycle for the two hemispheres, and demonstrate that empirical solar cycle prediction methods can be enhanced by investigating the solar cycle dynamics in terms of HSN. We develop a method for predicting the solar cycle amplitude based on the peak growth rate in the ascending phase of the cycle using HSN for cycles 12-24. We show that using this technique, the sum of the predictions (North + South) of the two hemisphere give better estimates of the cycle amplitude than the Total Sunspot Numbers. In addition, we estimate the cycle peaks with 1st order and 3rd order regressions and find that the HSN provide better estimates of cycle peak than total sunspot numbers with the obtained correlations lying in the range $r = 0.8-0.9$ depending on the applied smoothing window

Primary authors: Mr JAIN, Shantanu (Skolkovo Institute of Science and Technology); Dr PODLADCHIKOVA, Tatiana (Skolkovo Institute of Science and Technology); Dr VERONIG, Astrid M. (University of Graz); Ms SUTYRINA, Olga (Skolkovo Institute of Science and Technology); Dr DUMBOVIĆ, Mateja (University of Zagreb); Dr CLETTE, Frédéric (World Data Center SILSO, Royal Observatory of Belgium); Dr PÖTZI, Werner (University of Graz)

Presenter: Mr JAIN, Shantanu (Skolkovo Institute of Science and Technology)

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