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Unusual structure of sunspot cycle 24

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Smooth sunspot numbers (SSNs) for cycle 24 increased since onset in December 2008, developing a shoulder in 2012, a plateau in 2013 and a peak in October 2014 followed by a decay phase well after the solar polar magnetic fields reversed; polar field reversals usually occur near SSN maxima but the polarity in northern hemisphere reversed in June 2012 and again in February 2014 while that in southern hemisphere reversed in June 2013. Present status of cycle 24 is described in terms of both SSNs and 10.7 cm (2800 MHz) microwave flux (F10.7) from the Sun and its activity is compared to prior cycles (14-23) of the twentieth century and cycle 5 that led to the Dalton grand minimum; cycle 14 led to a shallow Gleissberg minimum. SSNs for cycle 24 declined at a faster rate than F10.7 starting near cycle 21 minimum and F10.7 peak occurred two months after SSN peak. There is also a conspicuous excess of SSNs in southern hemisphere for cycle 24. Decay phase for both has now set in. The physical cause(es) for these differences are not known calling into question several assumptions how a typical sunspot cycle may develop. The physical significance of our findings is discussed.

Collaboration

– not specified –

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Primary author: Prof. AHLUWALIA, H.S. (University of New Mexico)**Presenter:** Prof. AHLUWALIA, H.S. (University of New Mexico)**Session Classification:** Parallel SH 06 Cycle & AMS**Track Classification:** SH-EX