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Y.P. Singh, Badruddin



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Short- and mid-term oscillations of solar, geomagnetic activity and cosmic-ray intensity during the last two solar magnetic cycles

Y. P. Singh¹, Badruddin²

¹ IAS, Mangalayatan University, Aligarh-202145, India

²Astronomy Department, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia

yatendrapalsingh@gmail.com

Abstract

Short-and mid-term oscillations of the solar activity (sunspot number and 10.7 cm solar flux), geomagnetic activity (Ap index) and cosmic-ray intensity (neutron monitor count rate) are analysed during the past two solar-magnetic cycles (1968 – 1989 and 1989 – 2014). We have implemented the wavelet analysis on the daily time resolution data of sunspot number (SSN), 10.7 cm solar flux, geomagnetic Ap index and Oulu neutron monitor count rate. Results suggest that few quasi and intermittent oscillations are observed with remarkable power density in addition to fundamental periods, like 27 day (synodic period), 154 day (Rieger period), semi-annual, annual, 1.3 year, and 1.7 year. We have consistently observed first (27 day), second (13.5 day) and third (9.0 day) solar-rotation harmonics in the geomagnetic Ap-index during both the magnetic cycles. Rieger period is more pronounced in SSN and solar flux during 1980-82 and 1990-92. Semi-annual variation of Ap-index is consistently observed during both the magnetic cycles. The annual and ~1.85 year variation are also observed in all the considered parameters with good signatures in CRI.

Keywords Solar periodicity • Solar activity • Geomagnetic activity • Cosmic rays • Wavelet analysis

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