First observation of mesosphere response to the geomagnetic forcing

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We present a first observation and analysis of 13.5, 9 and 6.75-day periodic oscillations observed in the neutral mesosphere density in the declining phase of solar cycle 23 and 24. Mesospheric densities near 90 km are derived using data from the Davis meteor radar (68.5˚S, 77.9˚E), Antarctica. Spectral analysis indicates that the pronounced periodicities of 13.5, 9 and 6.75 days observed in the mesosphere densities are associated with variations in solar wind high-speed streams and recurrent geomagnetic activities. A Morlet wavelet analysis shows that the time evolution of the 13.5, 9- and 6.75-day oscillations in the neutral mesosphere densities are similar to those in the solar wind and in planetary magnetic activity index, Kp. These results demonstrate a direct coupling between the upper atmosphere (corona) of the Sun and the Earth’ s mesosphere.

Keywords: meteor radar, mesospheric density, solar wind, solar wind high speed stream

