

MID-TERM PERIODICITIES IN SOLAR WIND AND IMF AT 1AU AND OUTER HELIOSPHERE

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Intermittent occurrences of mid-term (1-2 years) periodicities have recently been reported in several heliospheric parameters. Richardson et al. found on a strong 1.3-year periodicity in solar wind (SW) speed at 1 AU. Subsequently, Gazis et al. showed that this periodicity was dominating the low-latitude heliosphere after 1987. More recently, Howe et al. found a 1.3-year periodicity in the variation of the solar rotation speed at the bottom of the convection layer, suggesting that the mid-term periodicities are a fundamental property related to the solar dynamo. A slightly longer periodicity of about 1.7 years was observed in cosmic rays during cycle 21 by Valdes-Galicia et al. Mursula and Zieger demonstrated the persistency and concurrency of mid-term periodicities in several heliospheric variables (solar wind, IMF, cosmic rays, geomagnetic activity) at 1 AU. Here we study the occurrence of these mid-term periodicities in SW and IMF at 1AU using OMNI data, as well as in the outer heliosphere using data from Pioneer 10 and 11 and Voyager 1 and 2 spacecraft. We construct dynamic wavelet spectra for all related SW and IMF parameters. We find that the mid-term periodicity structure in the outer heliosphere mainly corresponds to that seen at 1AU. This further verifies the solar origin of these periodicities even in the outer heliosphere. We find both the Richardson periodicity and the Valdes-Galicia periodicity in SW speed at 1 AU and in the outer heliosphere. We also find that the IMF z-component depicts a clear Richardson periodicity while in the total field the Valdes-Galicia periodicity is stronger.