태양활동주기에 따른 행성간 충격파의 발생 빈도 및 충격파 세기 변화

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WIND 위성은 태양과 지구사이에 지구로부터 220 Re 떨어진 라그란지안 L1점에서 1994년 말에서 2001년 현재까지 지속적인 태양풍 관측을 해오고 있다. 이 관측자료는 NASA NSSDC(국립우주과학자료센타)에 공개자료로 보관되어 있다. 본 연구는 이 자료에서 태양활동 극소기에 해당하는 1995년과 극대기에 해당하는 2000년 태양풍 플라즈마 자료를 분석하여 행성간 충격파의 관측자료를 찾아내고, 태양활동주기에 따른 이들 행성간 충격파의 발생 빈도 및 충격파 세기 변화를 조사하였다.

The Formation of a Prominence in Active Region NOAA 8668: I. SOHO/MDI Observations of Magnetic Field Evolution

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We have studied the evolution of the photospheric magnetic field in active region NOAA 8668 for three days while the formation of a backwards S-shaped filament proceeded. From a set of full-disk line-of-sight magnetograms taken by the Michelson Doppler Imager (MDI) on board Solar and Heliospheric Observatory (SOHO), we have found a large cancelling magnetic feature that was closely associated with the formation of the filament. The positive flux of the magnetic feature was initially 2×10^{21} Mx, and exponentially decreased with an e-folding time of 24 hours throughout the period of observations. We also have determined the transverse velocities of the magnetic flux concentrations in the active region by applying local correlation tracking. As a result, a persistent pattern of shear motion was identified in the neighborhood of the filament. The shear motion had a speed of 0.2 to 0.5 km s^{-1} and fed negative magnetic helicity of -6×10^{42} Mx^2 into the coronal volume, at an average rate of -9×10^{40} $Mx^2\,h^{-1}$. This rate is an order of magnitude higher than the rate of helicity change due to the solar differential rotation. The physical implications of the observed magnetic evolution are discussed in relation to the formation of the filament.