Solar Polar Magnetic Flux Variation During Cycle 23

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The long and weak solar minimum at the end of Solar Cycle 23 is associated with an unusually weak polar magnetic field compared with the previous cycles. In this paper, we present the observational data of the polar magnetic flux from the Michaelson Doppler Imager (MDI), Wilcox Solar Observatory (WSO) and other observatories. We study its temporal and spatial variations over different phases and compare them with those from the previous three solar cycles. Using the potential field source surface (PFSS) model and the Wang-Sheeley-Arge (WSA) model tuned for MDI, we also link the polar magnetic flux to the coronal and solar wind structure variations, in the hope of explaining some of its unique characteristics.

Keywords: polar field; variations; solar cycle 23.