



Solar polar fields during cycle 24: An unusual polar field reversal

S. K. Bisoi^{*(1)} and P. Janardhan⁽²⁾

(1) National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012, China; e-mail: susanta@nao.cas.cn

(2) Astronomy & Astrophysics Division, Physical Research Laboratory, Ahmedabad 380009, India; e-mail: jerry@prl.res.in

The polarity of the Sun's magnetic field reverses around the maximum of each 11-year solar cycle. This is known as polar field reversal. Here we report an investigation of a prolonged and unusual hemispheric asymmetry in the polar field reversal pattern in solar cycle 24, which was carried out using measurements of solar magnetic fields in the latitude range 55° – 90° and 78° – 90° for the period between February 1975 and October 2017, covering solar cycles 21–24. While this study compliments a similar study carried out using microwave brightness measurements which claimed that the field reversal process in cycle 24 was completed by the end of 2015, our results show that the field reversal in cycle 24 was completed earlier that is, in late 2014. We show that the southern solar hemisphere unambiguously reversed polarity in mid-2013 while the reversal in the field in the northern solar hemisphere started as early as June 2012, was followed by a sustained period of near-zero field strength lasting until the end of 2014, after which the field began to show a clear rise from its near-zero value. Signatures of this unusual field reversal pattern were also clearly identifiable in the solar wind using our observations of interplanetary scintillation at 327 MHz which supported our magnetic field observations and confirmed that the field reversal process was completed at the end of 2014.