



A cylindrical current sheet over the South solar pole observed by Ulysses

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We provide the first evidence for the existence of a quasi-stable cylindrical current sheet over the South solar pole as observed by Ulysses in 2006, near the solar minimum, when it reached maximal heliolatitude of 79.7 degrees at 2.4 AU. It took place inside a fast speed stream from the coronal hole, and the tube was presumably crossed rather far from the center within two degrees of heliolatitude and ~ 10 degrees of heliolongitude. During the spacecraft passage throughout the structure, the solar wind velocity was approximately twice as little, the solar wind density was 20 times lower than the surrounded plasma values, but the temperature was twice as large in the point closest to the pole. The interplanetary magnetic field (IMF) strongly decreased due to sharp variations in the IMF radial component (RTN) that changed its sign twice, but other components did not show changes out of usual stochastic behavior. Both the behavior of the IMF, rotation of the plasma flow direction and other features indicate the occurrence of cylindrical current sheet. We discuss its solar origin and present modeling that can explain the observations.