Ulysses at High Latitudes

The joint ESA-NASA Ulysses mission, launched in 1990 to make the first-ever exploration of the heliosphere far from the plane of the ecliptic, has fundamentally changed the way we view the Sun's threedimensional environment. From its unique vantage point above the solar poles, the Ulysses spacecraft has provided scientists with a wealth of results that provide important new insights into a wide variety of phenomena related to the solar wind and the fields and particles which populate it.

Ulysses made its initial climb to high latitudes during the descending phase of the solar cycle, passing over the south and north poles of the Sun in 1994 and 1995, respectively. The timing of the polar passes wass fortuitous in that it enabled scientists to explore the high latitude regions of the heliosphere when the Sun was at its least active, exhibiting relatively stable coronal structure. The polar coronal holes were well-developed and the current sheet only slightly inclined. Because of this, Ulysses spent many months immersed in fast, rather uniform solar wind, an environment previously inaccessible to spacecraft, most of which have been confined to the ecliptic.

One of the strengths of the Ulysses mission, clearly illustrated by the diversity of results presented in the papers comprising this special issue, is its highly interdisciplinary nature. The investigations performed by the nine hardware experiments carried on board the spacecraft address topics ranging from detailed measurements of the solar wind and its magnetic field to the properties of interstellar gas and the isotopic composition of cosmic ray nuclei. The unique contribution of Ulysses is the set of very specific constraints these observations are placing on our physical models of a heliosphere in which most of these phenomena co-exist.

Based on its unqualified success to date, the mission, now in its seventh year, will continue to be operated at least until 2001, permitting comprehensive observations to be made of the three-dimensional heliosphere during the rise of the next solar activity maximum.

Richard G. Marsden
Ulysses Project Scientist