Retrieving the solar wind mass flux latitude and cycle dependence with SWAN/SOHO data

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We present results of the total hydrogen ionization rate obtained from the inversion of almost ten years of full-sky maps of the interplanetary Lyman α background measured by the SWAN instrument on SOHO.

Thanks to a new estimate of the absolute calibration of the SWAN instrument and its variation during the ten years of operation of SOHO, we are able to derive absolute values of the ionization rate as well as its latitudinal dependence.

We show how the anisotropy of the ionization rate changes from solar minimum to solar maximum. At solar maximum, the so-called ionization groove has completely disappeared and the ionizing fluxes are the same at all heliographic latitudes.

We find that the hydrogen ionization cavity which surrounds the sun increases in size with solar activity. This is evidenced by the low IP intensities measured during and after the solar maximum. Our model calculation show also that the increased radiation pressure is not sufficient to explain the larger cavity observed at solar maximum.

We find also that ionization rates derived from in-situ solar wind mesurements do agree with the SWAN results at solar minimum but are significantly smaller at solar maximum. In-situ derived ionization rates do not show the solar cycle dependence we see from the SWAN data. In conclusion, we discuss possible explanations for this discrepancy.