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Response of the interplanetary hydrogen population to global changes of solar activity: a quantitative analysis based on SOHO/SWAN and SOHO/LASCO-C2 data comparison.

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For more than two decades the SOHO/SWAN instrument has been monitoring the full-sky hydrogen backscattered Lyman-α emission, and the derived three-dimensional solar wind proton flux. We present a comparison of the time series of the latitude-integrated hydrogen ionization rates (β) derived from the inversion of the SWAN full-sky maps with the integrated coronal electron density derived from the inversion of SOHO/LASCO-C2 white light images. The analysis shows a variable time lag of the SWAN β of a few Carrington rotations, correlated with the solar cycle phase (larger delay during solar maxima compared to minima). This is a direct consequence of the variation of the size of the hydrogen ionization cavity and the time it takes for hydrogen atoms to propagate in the inner heliosphere. This effect should be taken into account in studies of the interstellar neutral populations in interplanetary space.