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Time dependent, three-dimesnional behavior of the heliosphere from solar minimum to solar maximum

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The distribution of plasma and neutral particles in the heliosphere is analyzed for the solar minimum conditions derived from the Ulysses data. Analysis is performed on the basis of the 3D, multi-fluid (Riverside) model of the heliosphere for conditions of non-aligned magnetic and rotation axes of the Sun. The direction of the interstellar magnetic field is chosen such that the plane it forms with the interstellar medium velocity coincides with the hydrogen deflection plane determined in the SOHO SWAN experiment. The solar minimum conditions are further used as initial data for a time-dependent calculation of the solar wind–interstellar medium interaction with the boundary between the sectors of slow and fast solar wind and the angle between the Sun's rotation and magnetic axes varying over time in agreement with the heliospheric current sheet observations. This allows us to compare the steady-state solar minimum solution with the solutions at different solar minima. Asymmetries of the termination shock are analyzed over a few solar cycles in order to relate them to transverse streaming anisotropy of energetic charged particles ahead of the termination shock observed by the Voyager spacecraft.