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Time-Variability in the Interstellar Boundary Conditions of the Heliosphere

Mueller, Hans[1]
[1]Dartmouth College and UAH

In its galactic orbit, the Sun has encountered a variety of different interstellar environments because of the dynamic nature of the interstellar medium (ISM). As the solar wind interacts with the surrounding ISM to form a heliosphere, different heliosphere shapes, sizes, and particle contents result from the different environments. The current heliosphere is embedded in a moderately dense ISM, whereas a large fraction of time is likely spent in low-density ISM, associated with a much larger heliosphere. The contribution discusses these interstellar boundary conditions of the heliosphere and their various time scales, accompanies them with numerical models of the resulting heliospheres, and details as well recent research into relatively short-term changes of the ISM during 40 years of space-borne neutral helium measurements.