The Heliospheric interface: theory and multi-spacecraft observations

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The Sun is moving through a warm ($\sim$6500 K) and partly ionized local interstellar cloud (LIC) with velocity $\sim$26 km/s. The charged component of the interstellar medium interacts with the solar wind (SW), forming the heliospheric interface - the SW/LIC interaction region. Both the solar wind and interstellar gas have a multi-component nature that creates a complex behavior in the interaction region. The current state of art in the modeling of the heliospheric interface is reviewed in this paper. Modern models of the interface take into account the solar wind and interstellar plasma components (protons, electrons, pickup ions, interstellar helium ions, and solar wind alpha particles), the interstellar neutral component (H atoms), interstellar and heliospheric magnetic fields, galactic and anomalous cosmic rays, and latitudinal and solar cycle variations of the solar wind. Predictions of self-consistent, time-dependent, kinetic/gasdynamic modeling of the heliospheric interface are compared with available remote diagnostics of the heliospheric interface - backscattered solar Lyman-alpha radiation, pickup ions, the deceleration of the solar wind at large heliocentric distances measured by Voyager 2, heliospheric absorption of stellar light, anomalous cosmic rays (ACRs), and heliospheric neutral atoms (ENAs).