J3C: Sun-Solar System Connection Roadmap Targeted Outcome to Capabilities to Implementation

Targeted Outcome: Phase 3- 2025-2035, Safeguarding the Journey

Exploring the Boundary of the Heliosphere and the Interstellar Medium

Estimates of ionization state and composition of the interstellar medium

"Filtration" effects of the boundary region on the velocity and temperature of interstellar neutral atoms and molecules entering the heliosphere

Required Understanding

Global topology and time dependence of the termination shock (TS)

Effect of the local interstellar magnetic field on the boundary region

Structure of the heliosheath region outside the termination shock (TS)

Existence (?) of a heliospheric bow shock ~100 AU beyond the termination shock (TS)

Residual modulation of galactic cosmic rays in the

heliosheath

Imaging of the boundary region using UV and ENAs from both inside and outside the TS

Remote diagnostics of the direction and strength of the local interstellar field

Enabling Capabilities & Measurements

Radio probing (kHz) of the boundary region from the outer heliosphere

Variations in the outer heliosphere of magnetic field, plasma, interstellar pickup ions, and energetic particles (drivers of variations in the TS) In situ measurements of fields and particles in the heliosheath and beyond

Implementation Phase 3: 2025 - 2035

Interstellar Probe to fully characterize the boundary region and beyond

HIGO sampling 1-4 AUof interstellar neutral gas and pickup ions as well as ENA imaging

Outer heliosphere radio (2-5 kHz) direction finding

Telemachus

To characterize high latitude heliosphere for drivers of the TS and inner helisophere

Integrated empirical Theory/Modeling Program

To guide the interpretation of both in situ and remote imaging of the boundary region and beyond