

Roadmap Goal Structure

Agency Strategic Objective: Explore the Sun-Earth system to understand the Sun and its effects on the Earth, the solar system, and the space environmental conditions that will be experienced by human explorers, and demonstrate technologies that can improve future operational systems.

| <i>Expected Achievement</i> | Phase 1: 2005-2015 | Phase 2: 2015-2025 | Phase 3: 2025-beyond |
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| <p>Objective F: Open the Frontier to Space Environment Prediction</p> | <p>Measure magnetic reconnection at the Sun and Earth</p> <p>Determine the dominant processes of particle acceleration</p> <p>Set the critical scales over which cross-scale coupling occurs</p> | <p>Model the magnetic processes that drive space weather*</p> <p>Quantify particle acceleration for the key regions of Exploration*</p> | <p>Predict solar magnetic activity and energy release</p> <p>Predict high energy particle flux throughout the solar system.</p> <p>Understand the coupling of disparate astrophysical systems</p> |
| <p>Objective H: Understand the nature of our home in space</p> | <p>Understand how solar disturbances propagate to Earth</p> <p>Determine quantitative drivers of the geospace environment</p> <p>Identify the impacts of solar variability on Earth's atmosphere</p> <p>Describe how space plasmas and planetary atmospheres interact</p> | <p>Identify precursors of important solar disturbances and predict the Earth's response</p> <p>Integrate solar variability effects into Earth climate models</p> <p>Determine the habitability of solar system bodies</p> | <p>Continuously forecast conditions throughout the heliosphere</p> <p>Predict climate change*</p> <p>Determine how the habitability of planets evolves in time</p> <p>Image activity on other stars</p> |
| <p>Objective J: Safeguard our outbound journey</p> | <p>Determine extremes of the variable radiation and space environments at Earth, Moon, & Mars</p> <p>Nowcast solar and space weather and forecast "All-Clear" periods for space explorers near Earth</p> <p>Develop technologies, data, and</p> | <p>Characterize the near-Sun source region of the space environment</p> <p>Reliably forecast space weather for the Earth-Moon system; make the first SW nowcasts at Mars</p> <p>Determine Mars atmospheric variability relevant to aerocapture entry, descent, landing, surface navigation and communications*</p> <p>and knowledge systems to improve</p> | <p>Provide situational awareness of the space environment throughout the inner Solar System</p> <p>Reliably predict atmospheric and radiation conditions at Mars to ensure safe surface operations*</p> <p>Analyze the first direct samples of the interstellar medium</p> <p>future operational systems</p> |