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Heliospheric Exploration: Obstacles to Overcome

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Missions to other planets (robotic and manned), colonies on other planets, mining on other (planets, moons, asteroids), space tourism, terra-forming, transportation technology development, the opportunities are many. However, there are scientific, technical, biological, environmental, as well as financial issues that must be considered for all these application scenarios. Phenomena such as UV, X and γ-radiation, energetic charged particles, plasmas and not to forget neutrals (space debris and meteoroids) populate the "roads" that we will use to reach our destinations and all contribute to the weather in the heliosphere. This presentation will look at the various opportunities that heliospheric exploration offers while in parallel evaluating the obstacles that must be overcome to realize these scenarios considering the feasibility to use and integrate existing systems (e.g. forecasting), as well as presenting innovative mitigation techniques.

Spacecraft have to survive very hostile environments which can severely limit space missions as well as pose threats to humans. Be it on Mars or a different planet, once we reach our target the local space weather conditions will be a function of the planet's location in the solar system and whether it has a magnetosphere and/or atmosphere around it. Spacecraft shielding requirements, including space storm shelters, both on the spacecraft as well as radiation protection facilities on the target, need to be taken into consideration with respect to travel time, local target space weather conditions and the phase of the solar cycle.