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# ICARUS mission, next step of coronal exploration after Solar Orbiter and Solar Probe Plus

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The primary scientific goal of ICARUS (Investigation of Coronal AcceleRation and heating Up to the Sun), a mother-daughter satellite mission, will be to determine how the magnetic _field and plasma dynamics in the outer solar atmosphere give rise to the corona, the solar wind and the entire heliosphere. Reaching this goal will be a Rosetta-stone step, with results broadly applicable within the fields of space plasma physics and astrophysics. Within ESA's Cosmic Vision roadmap, these science goals address Theme 2: How does the solar system work ?" by investigating basic processes occurring From the Sun to the edge of the Solar System". ICARUS will not only advance our understanding of the plasma environment around our the Sun, but also of the numerous magnetically active stars with hot plasma coronae. ICARUS I will perform the first-ever direct in situ measurements of electromagnetic fields, particle acceleration, wave activity, energy distribution and flows directly in the regions where the solar wind emerges from the coronal plasma. ICARUS I will have a perihelion at 1 Solar radius from its surface, it will cross the region where the major energy deposition occurs. The polar orbit of ICARUS I will enable crossing the regions where both the fast and slow wind are generated. It will probe local characteristics of the plasma and provide unique information about the physical processes involved in the creation of the solar wind. ICARUS II will observe this region using remote-sensing instruments, providing simultaneous information about regions crossed by ICARUS I and the solar atmosphere below as observed by solar telescopes. It will thus provide bridges for understanding the magnetic links between the heliosphere and the solar atmosphere. Such information is crucial to our understanding of the plasma physics and electrodynamics of the solar atmosphere. ICARUS II will also play a very important relay role, enabling the radio-link with ICARUS I. It will receive, collect and store information transmitted from ICARUS I during its closest approach to the Sun. It will also perform preliminary data processing before transmitting it to the Earth. Performing such unique in situ measurements in the region where presumably deadly solar energetic particles are energized, ICARUS will make fundamental contributions to our ability to monitor and forecast the space radiation environment. Such a knowledge is extremely important for future space explorations, especially for long-term manned space missions.