Dear Readers,

The view of the stars, the movements of the planets through the constellations, even the ability to determine days of special importance through the position of the Sun and the stars above the horizon: all of these phenomena are closely connected with the cultural history of mankind and have been the subject of speculation and scientific inquiry for millennia. Today, we know that our solar system is part of the Milky Way, one of the billions of galaxies that make up the universe. Seen against the vastness of space, our home seems very small. Our Sun, as the central star in the solar system, is orbited by planets that, in turn, have their own satellite moons. There are also planetoids and comets – the latter look like visitors from foreign worlds. It is only in recent years that we have learned where they come from and what they are made of. Collisions with such cosmic rocks have helped shape the fate of the Earth and left their mark on its surface.

When the Earth's orbit intersects with clusters of meteoroids, they are visible on clear summer nights as shooting stars. We interpret their glow as a harbinger of good fortune, but if the Earth were to be struck by a large asteroid or comet, the consequences would be fatal. Such a scenario has been the subject of more than one Hollywood horror film.

So it comes as no surprise that science is asking a few questions: What kind of structure, internal composition and stability do these heavenly bodies possess? Can modern satellite and rocket technology enable us to approach them and possibly land on them? We would very much like to take samples and analyze their composition, for their origins date back to the time when our solar system was created out of cosmic dust. What might such analysis tell us about the origin of the Earth and its siblings? Why does the Earth differ so dramatically from Venus and Mars? Why is there water on Earth and an atmosphere that has allowed life to begin and to evolve? Is the Earth alone in supporting life in our solar system, and if so, under what circumstances did it originate?

Questions like these have long been asked and answered with speculation. And so it is the desire for concrete data and facts that justifies the high cost of revealing the true nature of our solar system beyond all speculation. Missions to other planets and their moons can be financed only through international cooperation; the costs are far beyond the means of national research organizations.

For decades, the Max Planck Society has accepted a commitment to act as the German partner in such multinational projects. The Society's institutes also coordinate the roles played by German universities in major interplanetary missions. This issue of MaxPlanckResearch offers you insight into some exciting projects, including the search for water on Mars and Saturn's moon Enceladus, the exploration of Venus's stormy atmosphere, and investigations of planetoids and comets.

Interplanetary missions are protracted affairs. Designing and building the instruments can take up to ten years. The journey to the target destination can often take many years more. Then it is a question of collecting and analyzing the data. The successful completion of a mission requires a stable organization, oriented toward long-term objectives – the kind of organization the Max Planck Society guarantees in Germany. That is why the Society is valued as a reliable partner in the international competition to participate in exploring the solar system. The public interest in the results of such missions justifies the necessary efforts and resources.

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Photo: MPI for Polymer Research – C. Costard