Electromagnetics is one of the principal classes of geophysical methods for probing solid-body interiors. It has provided important information on the interiors of the Moon and the Galilean satellites, including temperature structure, composition of solid phases, and the presence of discontinuities and fluids. New opportunities can expand both the diversity and quality of the investigations.

Europa and the other Galilean satellites were probed using the magnetic transfer function (MTF) between the known Jovian source field and the field measured by the Galileo spacecraft. This approach will be repeated by Europa Clipper. While additional constraints on the subsurface ocean will be obtained, the bandwidth is insufficient to probe the interior of the icy shell itself. A landed Europa Magnetotelluric (MT) Sounder could assess the closest intrashell water to the site. A prototype featured a mast-deployed magnetometer and ballistically deployed electric-field probes.

The interior of the Moon was also investigated using MTF between the orbiting Explorer 35 and the Apollo 12 surface station. The bandwidth was limited due to incomplete knowledge of the multipole geometry introduced by the solar-wind plasma. The MT method is largely insensitive to these effects. A Lunar Magnetotelluric Sounder has been selected for landings in Mare Crisium and Schrodinger basin.

The solar wind can also serve as a source at Ceres, to probe the interior using either MTF or MT. A subsurface ocean or mud layer can be detected with the former, whereas the latter can also detect water bodies within the ice-rock shell that may be sources of crovolcanism.

Subionospheric EM signals on Mars are poorly constrained, so active-source methods are desireable for guaranteed soundings. A Transient EM system with a ballistically deployed loop can detect groundwater at depths of several km. Efforts are nonetheless ongoing to exploit natural energy using geometric constraints or orbital data.