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Future observations of planets with HERSCHEL and ALMA

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Millimeter/submillimeter spectroscopy is a powerful tool for probing the atmospheres of terrestrial and giant planets. Previous ground-based observations have led, in particular, to the study of CO and H_2O on Mars and Venus, to the discovery of a stable atmosphere around Io, to the monitoring of stratospheric species in Jupiter after the SL9 collision, and to the detection of CO and HCN in Neptune's stratosphere. ESA's satellite HERSCHEL, to be launched in 2007, is well suited to the study of solar-system objects, thanks to the complementarity of its three instruments. A few years later, the large millimeter/submillimeter array ALMA (64 antennae of 12m diameter each) is expected to be in operation. Several general science themes will be addressed by these two facilities: (1) the origin of giant planets, from measurements of deuterium and helium; (2) the water cycle on Mars, the water abundance on Venus, the source of water in outer planets and the measurements of isotopic ratios in water; (3) the search for minor species in planetary atmospheres; (4) the size distribution in the Kuiper Belt. We will review some of the most important open issues in these fields and describe the relevant observations to be performed by HERSCHEL and ALMA.