Reliable Jovian Composition, Structure, and Dynamics Measurements from Multiple Deep Entry Probes

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For the foreseeable future, atmospheric entry probes are the most reliable means for measuring the deep compositions and dynamics of giant planets. But sampling temporally and spatially varying planetary atmospheres with an entry probe carries a risk demonstrated by the Galileo Probe: sampling a distinctly non-representative region. Employing multiple probes is one technique that mitigates this risk, and it can also provide information about spatial variability. Technological advances since the Galileo Probe development promise smaller, lighter, less costly jovian entry probes appropriate for multiple-probe missions: recent design studies by JPL's Advanced Projects Design Team ("Team X") suggest probes of less than half the Galileo Probe's mass, yet able to reach the 100 bar level, with only modest technology investments. Possible mission architectures range from a simple flyby mission that only delivers and supports the probes, to expanded orbital missions that perform other investigations, some in support of the probes' science objectives. The paper will discuss the science objectives of a Jupiter deep probes mission, instrumentation to achieve those objectives, and the Team X conceptual design for the probes. Examples of some of the candidate mission architectures will be shown.

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