

Pressure-based determination of Titan's temperature profile using the Huygens HASI/PPI instrument

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We introduce a new method for analyzing atmospheric sounding observations: the reconstruction of the vertical temperature profile from in situ pressure measurements accompanied with rough knowledge of the atmospheric composition and the aerodynamical response properties of the descent vehicle. This method can be useful to construct the temperature profiles when no reliable temperature sensors are available, as well as to verify the consistency of the data from redundant independent instruments. We applied the method to the measurements of Titan's atmosphere made by the Huygens probe, obtaining the relevant aerodynamical properties using the measurements of the radar altimeter. We discovered that the temperature profile computed in this manner differs significantly, although not dramatically, from the data from the temperature sensor (TEM) of the probe, with an apparent tropopause altitude above 50 km and a surface temperature of about 98 K.