



## **Using orbit determination to infer Saturn's atmospheric density profile during the final moments of Cassini's plunge**

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The Cassini-Huygens mission was a joint project between NASA, ESA (European Space Agency) and ASI (Italian Space Agency) that spent two decades in space. From its orbital insertion into the Saturn System in July, 2004, the spacecraft gathered and transmitted important scientific data (in S-band, X-band and Ka-band) about the gas giant, its moons, rings, and the planetary environment up until its deliberate plunge into Saturn's atmosphere on September 15, 2017.

Doppler measurements, together with an orbit determination code, allow us to estimate the spacecraft's position, velocity and dynamical model parameters that directly affect Cassini's trajectory, such as Saturn's gravity field coefficients or its atmospheric characteristics.

This work aims to estimate the density profile of Saturn's upper atmosphere, largely composed of hydrogen, during the final moments of Cassini's plunge by including different atmospheric models in the orbit determination process to determine which model best fits the data.