10th Anniversary of the Huygens Probe Landing on Titan and the Creation of the International Planetary Probe Workshop

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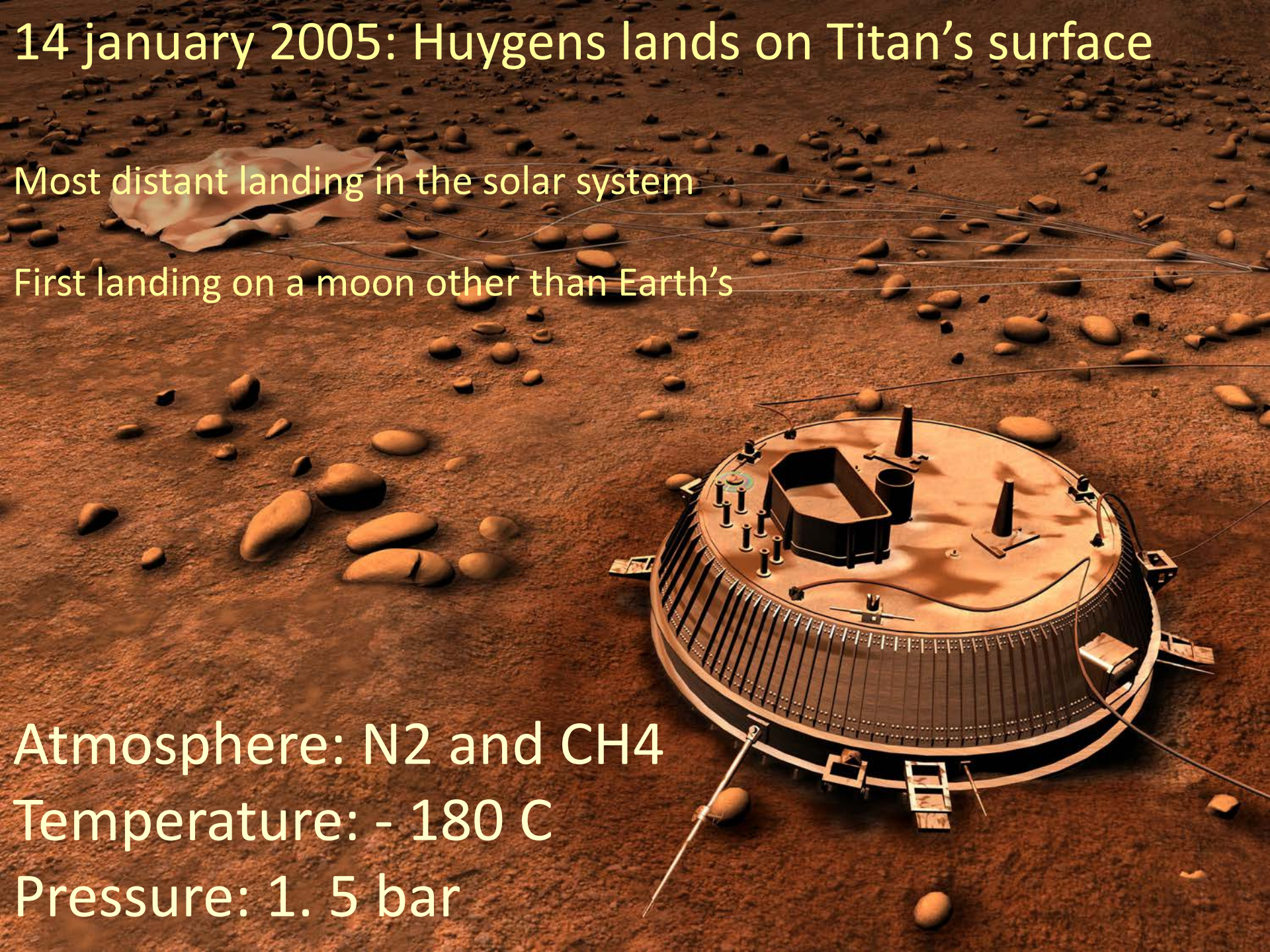
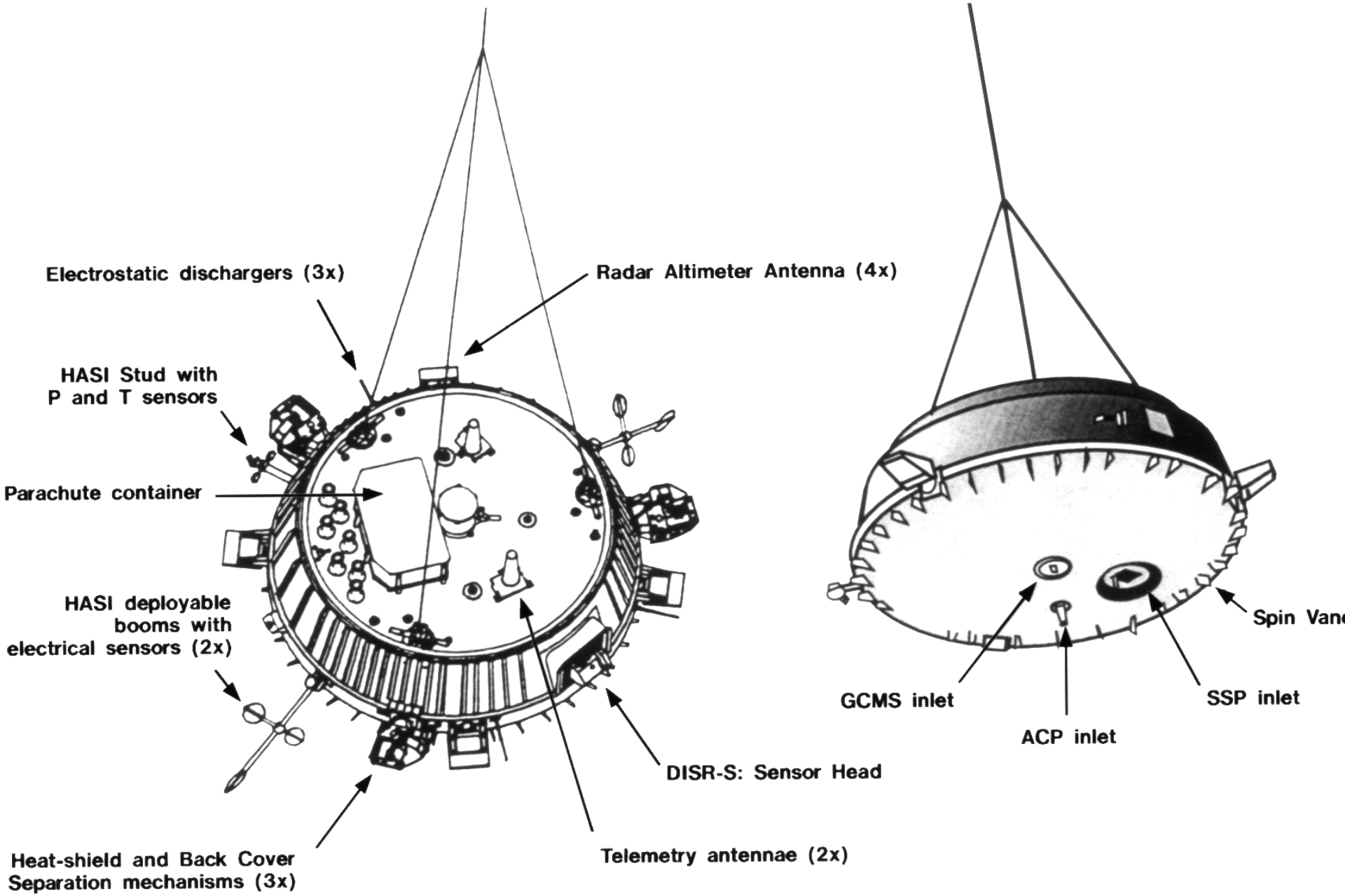
14 january 2005: Huygens lands on Titan's surface

Most distant landing in the solar system

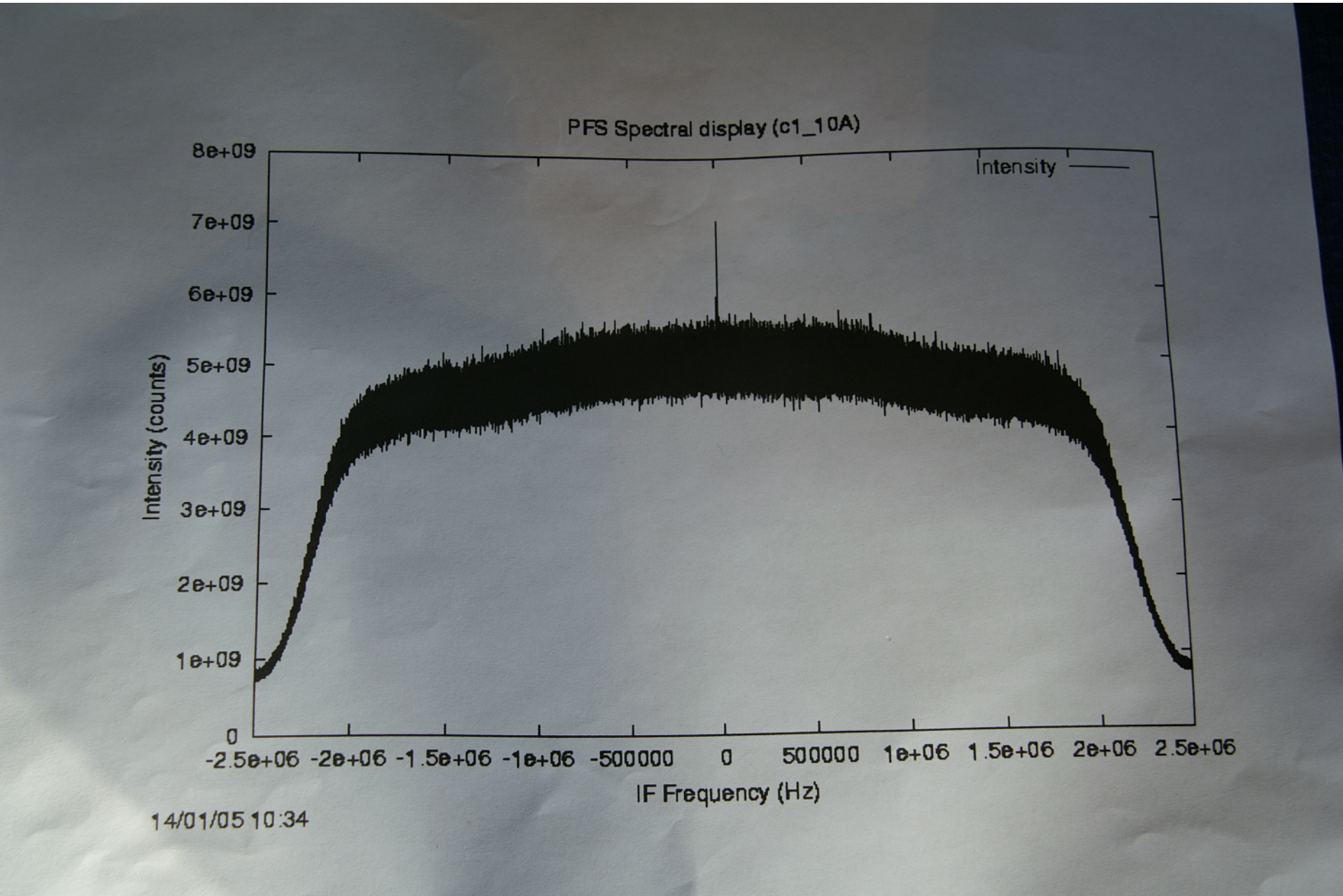
First landing on a moon other than Earth's



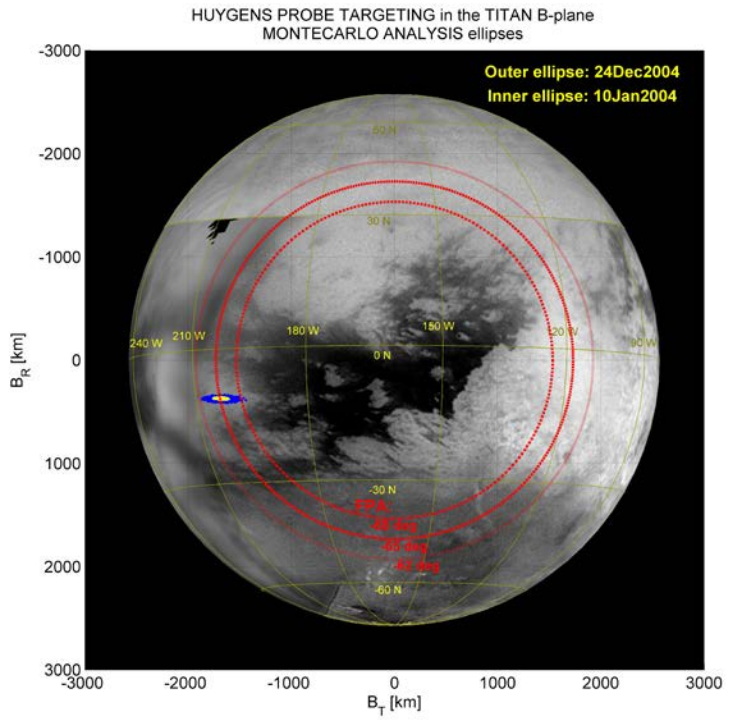
Atmosphere: N2 and CH4
Temperature: - 180 C
Pressure: 1. 5 bar

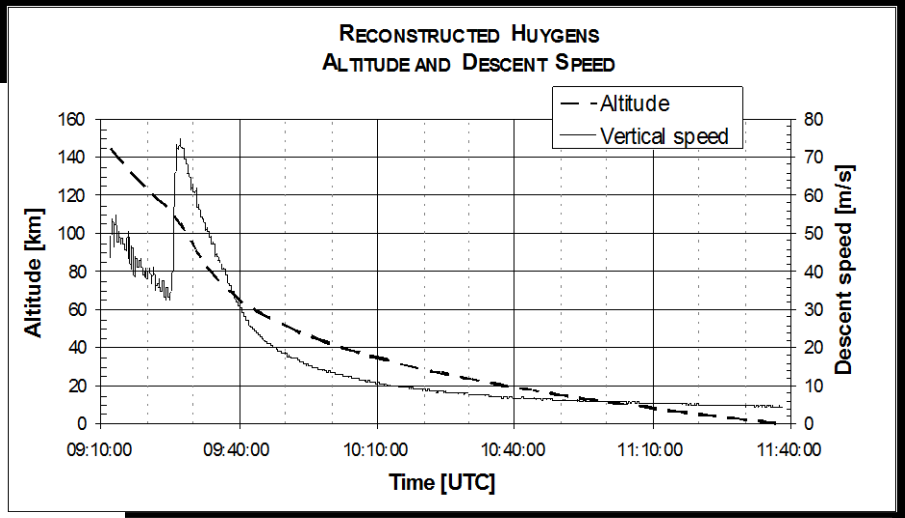

Electrostatic dischargers (3x)
Radar Altimeter Antenna (4x)
HASI Stud with
P and T sensors
Parachute container
HASI deployable
booms with
electrical sensors (2x)
DISR-S: Sensor Head
Heat-shield and Back Cover
Separation mechanisms (3x)
Telemetry antennae (2x)
GCMS inlet
ACP inlet
SSP inlet
Spin Vane

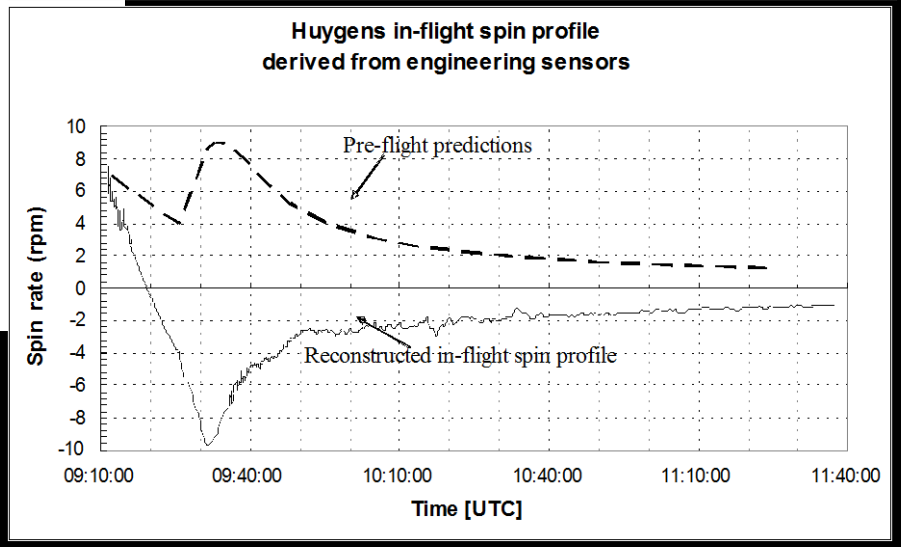
Huygens radio signal detected at Green Bank



An early reconstruction of the Trajectory







Landing site: 192.3º W; 10.3º S

Huygens Descent Trajectory Working Group (DTWG)

Motivation

Early in the Huygens mission and system design, it was recognized that an accurate reconstruction of probe entry and descent trajectory would be needed…

- For consistent interpretation and correlation of results from all the Huygens probe science experiments,
- To provide for ground-truth calibrations of orbiter remote sensing measurements, and
- To provide data required for experiment interpretation and data analysis.

DTWG Charter

To implement an organizational framework and develop retrieval techniques by which the Huygens probe entry and descent trajectory could be reconstructed from the 1270km interface altitude to the surface.

In 1996 the Huygens Descent Trajectory Working Group (DTWG) was created as a subgroup of the Huygens Science Working Team.

DTWG Purpose and Goals

- **To develop a framework** between experiment teams and Project Scientist Team for sharing and exchanging data relevant to the descent trajectory analysis and modeling;
- **To develop methodologies** by which the probe entry and descent trajectory can be accurately reconstructed from the probe and orbiter science and engineering data.
- **To provide a common trajectory** for all experiment teams to use when interpreting their respective data sets, thereby providing a common basis for interpretation and correlation of data from different experiments.
- **To provide the Huygens entry and descent trajectory** (including location of landing site) for ground-truth calibration of orbiter remote sensing instruments and to provide local context for global observations of Titan by the Cassini orbiter.
- **To provide precise measurements** of the probe position and velocity throughout descent, required for retrieval of the zonal winds by Doppler tracking of the Huygens probe.

International Planetary Probe Workshops

To support goals of the Huygens Descent Trajectory Working Group and future planetary entry probe missions, a workshop on planetary probe entry and descent trajectory reconstructions was first proposed by J.-P. Lebreton and D.H. Atkinson in 1998.

Originally intended to be a one-time meeting dedicated to entry probe entry / descent trajectory analysis and reconstruction.

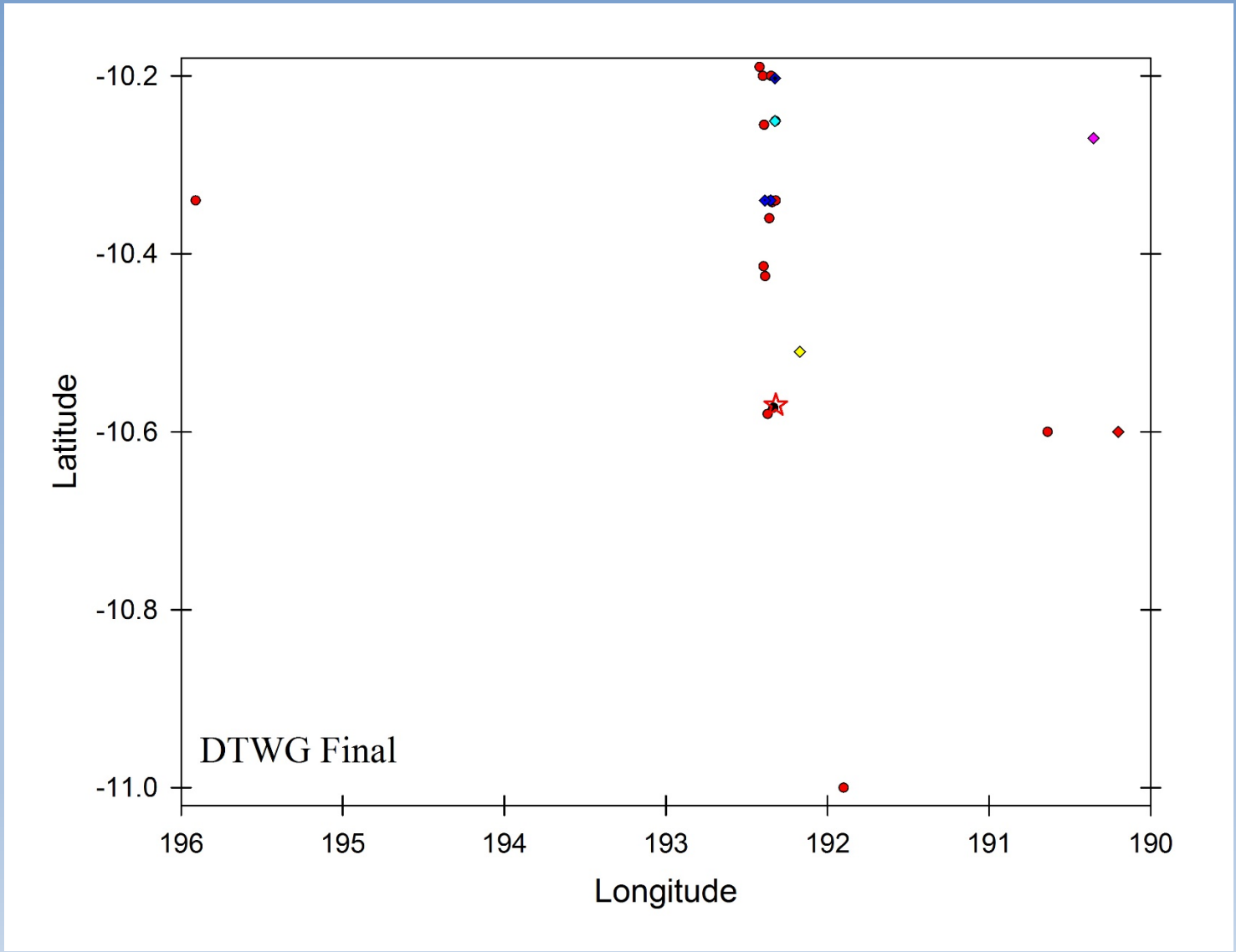
IPPW Goals

- **To Review** state-of-the-art in science, mission design, and technologies for *in situ* robotic exploration of Solar System;
- **To Serve** as forum for discussions of innovative methodologies and techniques;
- **To Share** ideas, mission opportunities, and emerging technologies;
- **To Attract** early career scientists and engineers; and
- **To Foster** international collaborations.

IPPW-1 Lisbon (2003)

An international workshop on the topic of **Planetary Probe Atmospheric Entry and Descent Trajectory Analysis and Science** will take place on **6 – 9 October, 2003 in Lisbon, Portugal**. The purpose of the workshop is to bring together the community of planetary scientists, spacecraft engineers, and mission designers and planners whose expertise, experience, and interests are in the area of entry probe trajectory and attitude determination, and aerodynamics and measurement of aerodynamical and aerothermo-dynamical properties of planetary entry vehicles.

Huygens Probe Landing Site Evolution



Conclusion

It has been

- 19 years since creation of Huygens DTWG
- 17 years since Planetary Probe Workshop first conceived
- 10 years since Huygens arrival at Titan

The International Planetary Probe Workshop is now in its 12th convening, and continues to promote and advocate for future planetary entry probe missions by engaging the international planetary probe community of engineers, scientists, technologists, policy makers, mission designers and planners, and students.