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The Huygens Doppler Wind Experiment: Ten Years Ago

Michael Bird (1), Robin Dutta-Roy (1), Yvonne Dzierma (1), David Atkinson (2), Michael Allison (3), Sami Asmar (4), William Folkner (4), Robert Preston (4), Dirk Plettemeier (5), Len Tyler (6), and Peter Edenhofer (7)

(1) Univ. Bonn, Radio Astronomy Inst., Bonn, Germany (mbird@astro.uni-bonn.de), (2) Dept. of Electrical & Computer Engineering, Univ. of Idaho, Moscow, ID, USA, (3) NASA Goddard Inst. for Space Studies, New York, NY, USA, (4) Jet Propulsion Lab., California Inst. of Technology, Pasadena, CA, USA, (5) Inst. fuer Nachrichtentechnik, Tech. Univ. Dresden, Dresden, Germany, (6) Center for Radar Astronomy, Stanford University, Stanford, CA, USA, (7) Inst. fuer HF-Technik, Univ. Bochum, Bochum, Germany

The Huygens Doppler Wind Experiment (DWE) achieved its primary scientific goal: the derivation of Titan's vertical wind profile from the start of Probe descent to the surface. The carrier frequency of the ultra-stable Huygens radio signal at 2040 MHz was recorded using special narrow-band receivers at two large radio telescopes on Earth: the Green Bank Telescope in West Virginia and the Parkes Radio Telescope in Australia. Huygens drifted predominantly eastward during the parachute descent, providing the first in situ confirmation of Titan's prograde super-rotational zonal winds. A region of surprisingly weak wind with associated strong vertical shear reversal was discovered within the range of altitudes from 65 to 100 km. Below this level, the zonal wind subsided monotonically from 35 m/s to about 7 km, at which point it reversed direction. The vertical profile of the near-surface winds implies the existence of a planetary boundary layer. Recent results on Titan atmospheric circulation within the context of the DWE will be reviewed.