

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Systems (1)

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RESULTS OF THE OPTICAL LINK BETWEEN THE OPTICAL COMMUNICATIONS TELESCOPE
LABORATORY AND THE OPTICAL INTER-SATELLITE COMMUNICATIONS ENGINEERING
TEST SATELLITE

Abstract

During the period May 21, to June 11, 2009 JPL conducted a series of optical links between its Optical Communications Telescope Laboratory (OCTL) at the Table Mountain Facility Wrightwood California and JAXA's Optical Inter-Satellite Communications Engineering Test Satellite (OICETS).^{1,2,3} The data rates were 50 Mb/s down and 2Mb/s up. This paper describes the experiment between the OICETS and the OCTL ground station and the preparatory precursor experiments with the Ajsai, Stella and Starlette retro-reflecting satellites. Scintillation mitigation on the uplink was achieved by a multi-beam design of three milliwatt-level communications beams and four beacon beams totaling less than 2 watts transmitted power. Measured uplink and downlink bit error rates were 10^{-4} and 10^{-6} , respectively indicating signal to noise at the spacecraft and ground receivers of 10-dB to 16-dB. Experiment results show robust links under a variety of atmospheric conditions including sustained winds of up to 23 km/hr with gusts up to 40 km/hr with downlink signal strengths validating our propagation models. The work described here was performed at the Jet Propulsion Laboratory (JPL), California Institute of Technology under contract with the National Aeronautics and Space Administration (NASA).

References

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