THE CYGNSS MICROSATELLITE CONSTELLATION EARTH VENTURE MISSION'

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ABSTRACT

NASA's Earth science mission, the Cyclone Global Navigation Satellite System (CYGNSS) is being designed to address present tropical cyclone intensity forecasting deficiencies. While tropical storm track forecasts have improved in accuracy by ~50% since 1990, there has been essentially no improvement in the accuracy of the storm's intensity prediction. The mission will combine all-weather performance of GNSS bi-static ocean surface scatterometry with the sampling properties of a satellite constellation to provide science measurements never before available to the tropical cyclone research community.

Principle deficiencies of current tropical cyclone intensity forecasts lie primarily with inadequate observations and modeling of the inner core. The inadequacy in observations results from two causes: 1) Much of the inner core ocean surface is obscured from conventional remote sensing instruments by the storm's intense precipitation. 2) The rapidly evolving (genesis and intensification) stages of the TC life cycle are poorly sampled temporally by conventional polar-orbiting, wide-swath surface wind imagers.

CYGNSS was selected as part of NASA's Earth Venture program. The mission cost cap dictates that the CYGNSS flight segment of 8 Observatories, each carrying a single GPS-based scatterometer all be launched on a single launch vehicle. The mission will demonstrate how recent developments in nano- and micro-satellite technology can be applied to provide low cost solutions to fill capability voids in existing large-scale observatories. It will also demonstrate

how to safely deploy a constellation from a single launch vehicle without collision and distribute them into a controlled Walker-type configuration.

The CYGNSS IGARSS 2014 paper will provide an overview of the mission system, compare and contrast the CYGNSS science measurement with existing Observatories, describe orbital configuration control plans, and discuss performance aspects of both the CYGNSS instrument and microsat platform.

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