

NASA CYGNSS Satellite Constellation for Tropical Cyclone Observations

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The NASA Cyclone Global Navigation Satellite System (CYGNSS) is a constellation of eight satellite observatories that was launched into low Earth orbit on 15 December 2016. The orbit plane is in a low (tropical) inclination of 35° to maximize time spent over the most active hurricane latitudes. Each observatory carries a 4-channel bistatic radar receiver. The radars are tuned to receive L1 signals transmitted by GPS satellites, from which near-surface ocean wind speed is estimated in a manner similar to conventional wind scatterometers. The mission architecture is designed to maximize the temporal sampling of winds in tropical cyclones. The 32 receive channels of the complete CYGNSS constellation, combined with the ~30 GPS satellite transmitters, results in a revisit time of 2.8 hr (median) and 7.2 hr (mean) for all locations between 38° North and 38° South latitude. Use of the GPS L1 signal (frequency = 1575 MHz) significantly reduces sensitivity to precipitation and allows for wind measurements in the inner core of storms that would otherwise be obscured from space borne remote sensing instruments by the intense precipitation in the eye wall and inner rain bands.

A status report of early on-orbit commissioning and instrument performance will be presented, together with a summary of the planned science data products to be produced. Those products include instantaneous 10 meter reference winds, time and space gridded (1 hr x 25 km) 10 m winds, and derived hurricane products (intensity, radius of maximum winds, 34, 50 and 64 kt wind radii, and total-storm integrated kinetic energy).