

Hurricane Imaging Radiometer (HIRAD) observations of brightness temperatures and ocean surface wind speed and rain rate during NASA's GRIP and HS3 campaigns

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HIRAD flew on high-altitude aircraft over Earl and Karl during NASA's GRIP (Genesis and Rapid Intensification Processes) campaign in August – September of 2010, and plans to fly over Atlantic tropical cyclones in September of 2012 as part of the Hurricane and Severe Storm Sentinel (HS3) mission. HIRAD is a new C-band radiometer using a synthetic thinned array radiometer (STAR) technology to obtain spatial resolution of approximately 2 km, out to roughly 30 km each side of nadir. By obtaining measurements of emissions at 4, 5, 6, and 6.6 GHz, observations of ocean surface wind speed and rain rate can be retrieved. The physical retrieval technique has been used for many years by precursor instruments, including the Stepped Frequency Microwave Radiometer (SFMR), which has been flying on the NOAA and USAF hurricane reconnaissance aircraft for several years to obtain observations within a single footprint at nadir angle.

Results from the flights during the GRIP and HS3 campaigns will be shown, including images of brightness temperatures, wind speed, and rain rate. Comparisons will be made with observations from other instruments on the campaigns, for which HIRAD observations are either directly comparable or are complementary. Features such as storm eye and eye-wall, location of storm wind and rain maxima, and indications of dynamical features such as the merging of a weaker outer wind/rain maximum with the main vortex may be seen in the data. Potential impacts on operational ocean surface wind analyses and on numerical weather forecasts will also be discussed.