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Title

Implementation of Dual-Polarization on an Airborne Scatterometer and Preliminary Data Quality

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Abstract

The Imaging Wind and RAIN Profiler (IWRAP) is an airborne scatterometer system built and operated by University of Massachusetts Amherst's Microwave Remote Sensing Laboratory (MIRSL). The radar is seasonally deployed aboard one of the two National Oceanic and Atmospheric Administration (NOAA) WP-3D Orion "Hurricane Hunter" aircraft based out of MacDill AFB in Tampa, Florida. IWRAP is a dual-frequency, Ku- and C-band, scatterometer that uses two conically scanning antennas to estimate the ocean surface wind vectors as well as intervening rain profiles. Data that is gathered with IWRAP is used to improve current Geophysical Model Functions (GMF) or to help derive new GMFs for other undocumented incidence angles. This thesis outlines the improvements and changes made to the IWRAP system from 2009-2011. Chapter Two describes the IWRAP instrument including a description of the instrument status as of Fall 2009, and a summary of instrument operations in 2010 and 2011. Chapter Three describes hardware and software modifications to support dual-polarization. It also describes hardware-based and flight-based attempts to observe at large incidence angles. Chapter Four is an analysis of the stability of the internal calibration both during flights and over a season. System documentation is consolidated into a single technical manual in Appendix A.

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