2019 NOAA/AOML/HRD Hurricane Field Program - IFEX

MATURE STAGE EXPERIMENT
Science Goals & Observational Applications

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Goal: Improve our understanding of microwave scatterometer retrievals of the ocean surface wind field and to evaluate new remote sensing techniques/technologies. [*IFEX Goal 2*]. See the 2019 HRD HFP web page for additional details:
http://www.aoml.noaa.gov/hrd/HFP2019/index.html

Observational Applications: A primary application is to calibrate and validate satellite ocean wind products in extreme conditions found tropical and extratropical storms in support of the NWS marine analysis, warning and forecast mission. This experiment also tests of new remote sensing technologies for possible future satellite missions (risk reduction). The data collected can also be utilized to advance our understanding of broader scientific questions such as:

- Rain processes in tropical cyclones and severe storms: the coincident dual-polarized, dual-frequency, dual-incidence measurements would enable us to improve our understanding of precipitation processes in these moderate to extreme rainfall rate events.
- Atmospheric boundary layer (ABL) wind fields: the conical scanning sampling geometry and the Doppler capabilities of this system provide a unique source of measurements from which the ABL winds can be derived. The raw data system will enable us to use spectral techniques to retrieve the wind field all the way down to the surface.
- Analysis of boundary layer rolls: linearly organized coherent structures are prevalent in tropical cyclone boundary layers, consisting of an overturning "roll" circulation in the plane roughly perpendicular to the mean flow direction. IWRAP has been shown to resolve the kilometer-scale roll features, and the vast quantity of data this instrument has already collected offers a unique opportunity to study them.
- Drag coefficient, Cd: extending the range of wind speeds for which the drag coefficient is known is of paramount importance to further our understanding of the coupling between the wind and surface waves under strong wind forcing, and has many important implications for hurricane and climate modeling. The new raw data capability, which allows us to retrieve wind profiles closer to the ocean surface, can also be exploited to derive drag coefficients by extrapolating the derived wind profiles down to 0 m altitude.