I. Tropical cyclone intensity controlled by Environmental influences and interactions

Midlatitude troughs
Upper-level closed cyclonic circulations
Pre-existing convective outflow

Hypothesized Processes

- Eddy angular momentum fluxes
- Spatial and temporal organization of outflow owing to environmental potential vorticity
- Feedback between the outflow and environment via secondary circulations

Observing Strategies

- Observations of outflow thermodynamic and kinematic characteristics
- Observations at interface between outflow and upper-level environmental features

II. Tropical cyclone intensity controlled by Internally driven outflow

Inner-core (symmetric) convection
Outer-core (asymmetric) convection

Hypothesized Processes

- Diurnal forcing of convection
- Diabatic forcing of outflow layer
- Outflow self stratification
- Cloud radiative interactions with outflow layer

Observing Strategies

- Observations of thermodynamic and kinematic properties of inflow and ascent branches of secondary circulation
- Observations of air-sea interface

III. Tropical cyclone predictability

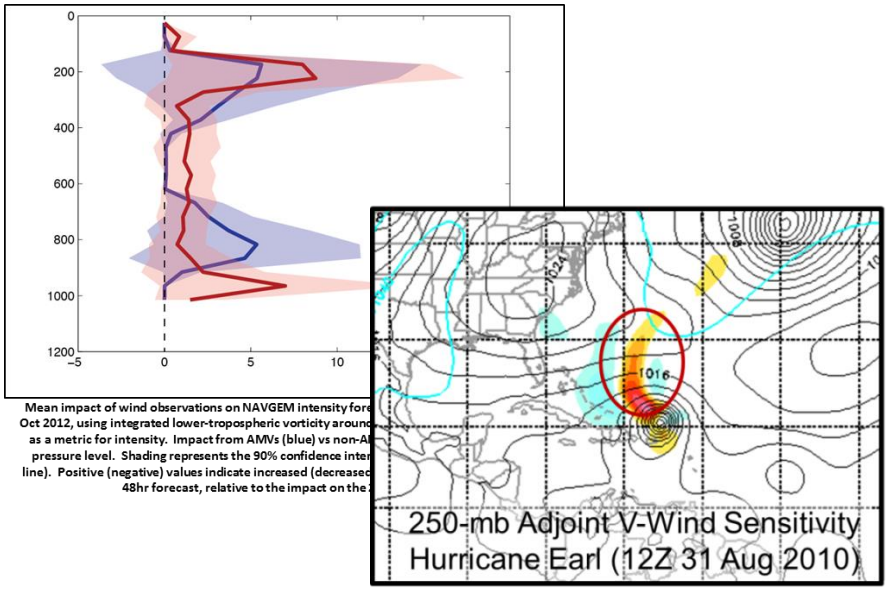
The predictability of tropical cyclone intensity, structure, and its outflow can be enhanced through assimilation of TCI observations in sensitive regions in the inner core, environment, and outflow regions.

Key Capabilities

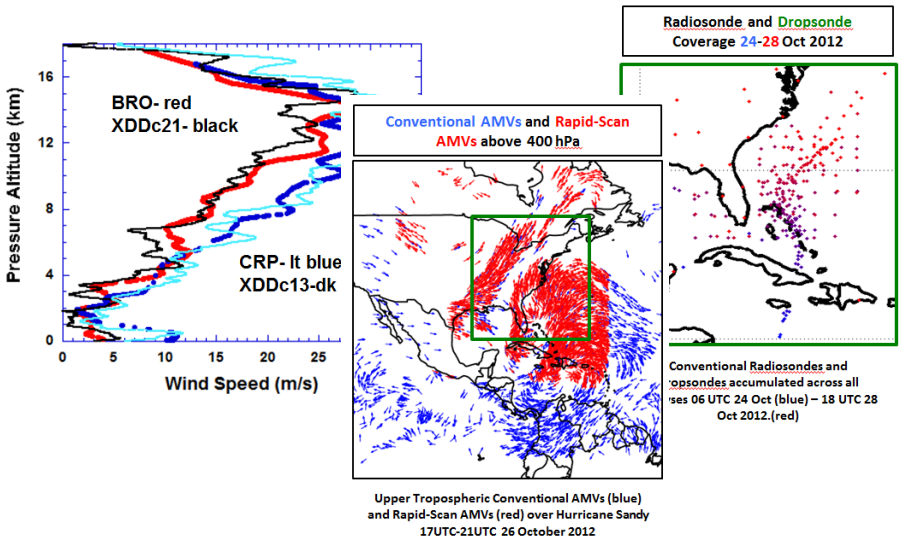
- Data assimilation experiments using ensemble, variational, hybrid methods
- Data denial experiments
- Observation impact estimates
- Real time models (COAMPS-TC…), sensitivity products (adjoint, ensemble)

TCI Observations and Strategies

- Observe in and outside of sensitive regions
- TCI WB57 XDD dropsondes
- NOAA (SHOUT/IFEX) sondes, flight level obs
- NOAA remote sensing platforms
- Atmospheric motion vectors (AMVs), rapid scan winds, satellite observations
- Conventional (routine) observational network



Mean impact of wind observations on NAVGEM intensity fore
Oct 2012, using integrated lower-tropospheric vorticity aroun
as a metric for intensity. Impact from AMVs (blue) vs non-A
pressure level. Shading represents the 90% confidence inte
line). Positive (negative) values indicate increased (decreased
48hr forecast, relative to the impact on the



Upper Tropospheric Conventional AMVs (blue)
and Rapid-Scan AMVs (red) over Hurricane Sandy
17UTC-21UTC 26 October 2012