

# Process Breakout (1)

- Development of process studies
  - Strategies: Incremental enhancement mode or full-blown process study - likely want to use both (use the incremental to develop the strategy for the full blown effort), but should not constrain our thinking
- Process studies needed:
  - Double eyewall cycle: initiation, timing, role in intensification process - possible hypothesis is that the process is totally due to convective/inertial stability processes and is not a process related to coupled air-sea interaction (would not need full ocean, air-sea interface processes to understand) - good to have competing hypotheses (is there a cartoon or schematic that describes the life cycle changes in hurricanes that could be tested?)
  - Role of storm interaction (including ocean response) with mesoscale ocean features (Loop Current, WCE/CCE) - importance of advection (time and space scales) to the storm interaction
  - Energy fluxes (mass (rain, spray), momentum and enthalpy) between flow, waves, and turbulence in extreme wind environment:

# Process Breakout (2)

- Process studies needed (continued):
  - Vorticity mixing and role in intensity and structure change
  - Role of the SAL (dry air, aerosol) in intensity and structure change: how does mixture of aerosol in 3-D effect latent heating
  - What is the minimal ocean model to provide the ocean impact to TCs - do a model comparison of impacts on TC using a simple 1-D MOM type model to compare with a full 3-D ocean model
  - Dynamic interaction of storm on upper ocean through vorticity interaction with inertial gravity wave and current interaction
  - Role of coherent structures (non-local transport) in energy flux in the mixed layer and the ABL

# Process Breakout (3)

- Process studies needed (continued):
  - Correlation between intensity/structure and aerosol and lightning intensity, frequency and type
  - Current/wave interaction in the presence WCE or Loop
  - Effect of bottom boundary layer dissipation in shallow water (<100 m) on the currents, surge and waves
  - Role of waves and spray on bulk coefficients and surrounding environment in high wind regime
  - Effect of land surface on TC decay
  - Impact of upper troposphere/lower stratosphere processes on intensity/ structure changes
  - Effect of large-scale ocean response (topographically induced upwelling) on the mixed layer structure and evolution

# Process Breakout (4)

- Prioritizing and grouping process studies:
  - Need to examine existing data sets (and model output) to see what we can milk out of them and to identify needed observations
  - Use NOAA IFEX to demonstrate new observing capabilities to address HiFi objectives
  - Need to accelerate the analysis of data to speed up the understanding of the processes (integrate better with analysis and evaluation of model output) - critical to success - need modelers on the process study development teams
  - Develop a multi-phase model and framework to study the air-sea interface processes
  - Need improved surface wind analyses that removes as much uncertainty in our surface wind estimates
  - How can we augment existing field efforts (NOAA IFEX, OGP floats and GOM CI coastal water instrumentation - UM discuss buoy deployment - UW/Scripps float deployments - other coastal buoy and platforms of opportunity)
  - Desperately need to pull together a list of ongoing research and operational observing programs that we can leverage upon.