

# HiFi Science Strategy

Today's Foci

# HiFi Process

- **Improvements in understanding and models for, research, forecasting and impact projections;**
- **Testing and development of new observing platforms and instruments, together with targeting and data assimilation techniques to maximize the utilization of observing systems;**
- **Transition of research results into operational use.**

# HiFi Major Goals

- **To make substantial and continuing improvements to the ocean and atmospheric models used to simulate hurricanes on both forecast and longer time scales.**
- **To reduce the error in 48-hour intensity forecasts for hurricane-strength storms by at least 10 kt (approximately one half of a Saffir-Simpson category) within the next five years, with an emphasis on improved forecasting of rapid intensification and decay, and decay and reintensification cycles.**

# Workshop Outcomes

- Two major areas have emerged:
  - Processes and approaches aimed at improving hurricane intensity and structure forecasting;
  - Processes and approaches aimed at improving the definition of impacts and consequences of a hurricane.

# Today's Focus

- **Processes and approaches aimed at improving hurricane intensity and structure forecasting.**

# Priority Areas

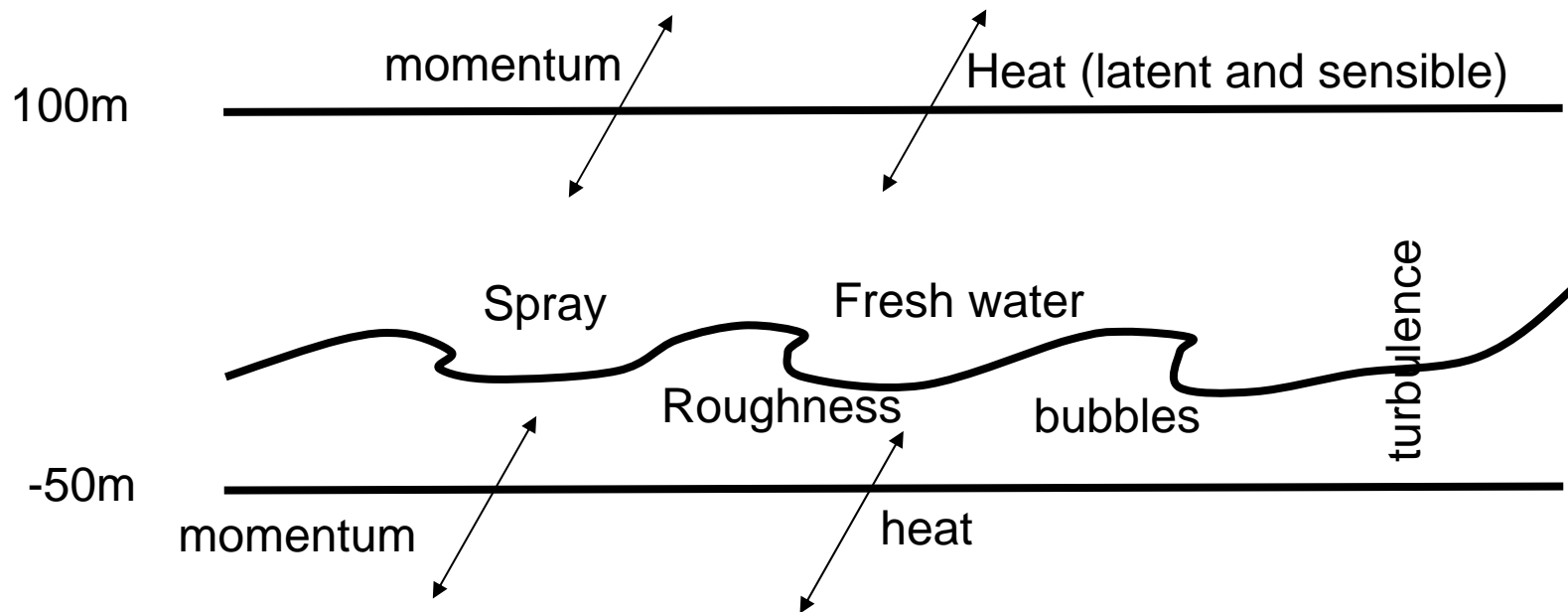
- Microphysical processes in clouds (including aerosol effects) and their parameterization in numerical models.
- The transfer of energy (heat and momentum) across the air-sea interface and its inclusion in numerical models.
- Determining the limits of predictability

# Microphysical Processes

- Rationale:
  - Microphysics are the critical process determining the latent heating (and thus the potential vorticity) distribution in the inner core and the rainband structure;
- Key Requirements
  - Structure and distribution of microphysical elements;
  - Impact of aerosols, dry air ingestion, vertical shear;
  - Parameterization approaches, requirements and level of sophistication;
  - Impact of cloud microphysical uncertainties on hurricane predictability

# The Air-Sea Interface

boundary-layer structure and processes  
(relevance of logarithmic profile,  
role of roll vortices, rainfall, storm asymmetries)



ocean thermal capacity and processes  
(role of currents, upwelling, thermocline, ring vortices,  
vertical shear, shallow-deep water)

# Predictability

- Rationale:
  - A knowledge of deterministic and probabilistic predictability limits is key to determining the best research and development approach.
- Key Requirements:
  - Testing of predictability hypothesis;
  - Assessing deterministic limits;
  - Recommending probabilistic research avenues.

# Breakout Groups

- **Process Study Group (Conf 254):** Chair Cort Cooper, Rapp Russ Elsberry
  - Consider observations and modeling work needed to understand the processes that are hypothesized to limit intensity prediction and impacts projection;
  - Can some process studies be combined?
  - Which are most ready to be conducted?
- **Experimental Prediction Group (Conf 354):** Chair Stan Stroud, Rapp Frank Marks
  - Consider the observations, parameterizations, and modeling work needed to improve and understand the limits to intensity prediction;
  - Define appropriate model configurations;
  - Address priorities for improvements to physics and better initialization.