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A New Climate Data Record of the Ocean Surface Winds and Stress: Focus on the Dynamically-Significant Derivatives and Investigating their Role in Convective Development

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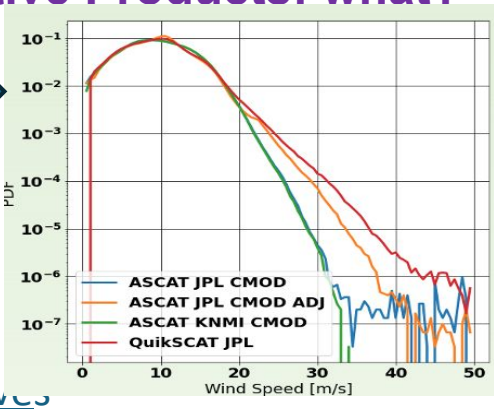
GOALS of our MEaSUREs Project

1. **Creation of a consistent long-term Earth Science Data Record (ESDR)** that includes observations from QuikSCAT, ASCAT-A/B and ScatSat.
2. **Development of the dynamically-significant derived products: the surface wind stress; the curl and divergence of the wind and the stress.**
3. **Development of scatterometer-only user-friendly gridded products (Level 3 products)**

Derivative Products: what?

- **Will be produced from:**
  - **Harmonized wind** retrievals using QuikSCAT, ASCAT-A/B and ScatSat observations
  - space-time collocated **ERA-I** winds
- **Will contain the following derivatives:**
  - Curl and divergence **of the EN wind**;
  - Curl and divergence **of the stress**;
- **Will be produced by:**
  - **two methods** for computing derivatives
  - **at several effective resolutions**, for each

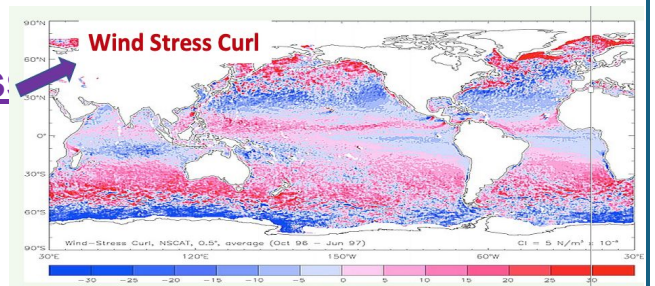


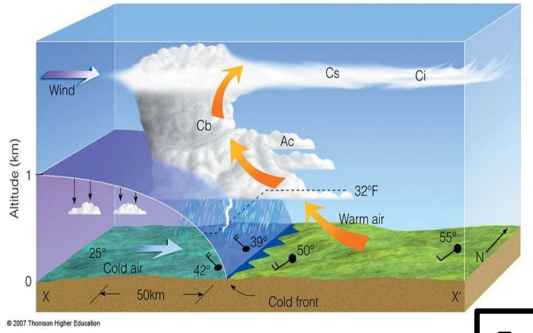
Why focus on the derivatives?

Ocean surface winds - a major driver of

- **ocean circulation**
  - **curl of surface stress**
- **air-sea interactions**
  - **fluxes and mixing**
- **atmospheric convection**
  - **surface wind convergence**

- Understanding is critical for improving ocean and atmospheric forecasting





Schematic of the interactions between mature convection, the cold pool beneath, and the convergence it generates on its leading edge that forces the development of new convection.

Relationship of SURFACE FORCING and CONVECTIVE DEVELOPMENT

A novel technique that allows the detection of deep and shallow convection based on analyses of surface convergence and vertically-integrated condensed mass.

Each regime represents a known precipitation *mode*:
- **mostly clear air**
- **developing convection**
- **stratiform**
- **mature convection**