U.S. NAVAL RESEARCH LABORATORY

COAMPS-TC Tropical Cyclone Prediction System

AT A GLANCE

What is it?

COAMPS-TC is one of the leading tropical cyclone prediction models in the world!

How does it work?

The complete system utilizes data quality control, analysis, initialization, and atmosphere and ocean model components to predict tropical cyclone track, intensity, and structure.

What will it accomplish?

COAMPS-TC model predictions are relied on heavily by forecasters at the DoD Joint Typhoon Warning Center and NOAA National Hurricane Center. Utilizing the technology helps ensure our warfighters and their families, as well as the public are made aware of an impending tropical cyclone at the earliest possible moment. Early detection and tracking of a tropical cyclone enables a swift, proactive response to threats, minimizing its potentially catastrophic impact.

R&D Sponsor(s)

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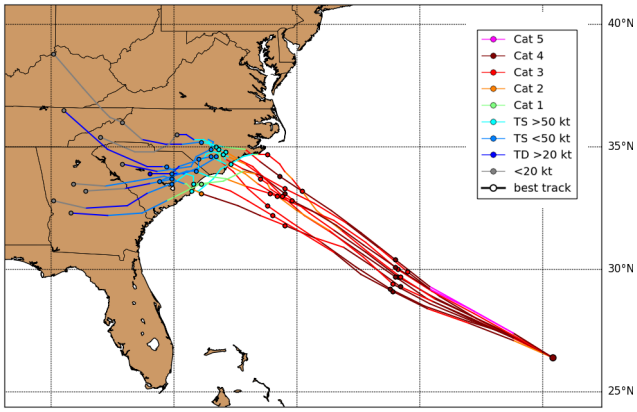

Tropical cyclones remain the most significant peacetime environmental threat to the safety of the U.S. Navy. Reliable prediction of TC intensity remains one of the greatest challenges in meteorology today.

The Coupled Ocean/Atmosphere Mesoscale Prediction System for Tropical Cyclones (COAMPS-TC) was developed by the Marine Meteorology Division at the Naval Research Laboratory and is one of the leading tropical cyclone prediction models in the world. COAMPS-TC is the Navy's operational regional NWP tropical cyclone model run at the Fleet Numerical Meteorology and Oceanography Center (FNMOC).

Innovative technology offers early detection and unprecedented accuracy, when every moment counts

An evaluation of a large sample of forecasts in the Atlantic and Western Pacific basins reveals that the COAMPS-TC track and intensity predictions are competitive with, and in some regards more accurate than, the other leading dynamical models.

Features include a globally relocatable grid, user-defined grid resolutions and dimensions, nested grids that follow the storm center, and code that allows for portability between supercomputers and workstations. Unique aspects of the COAMPS-TC system include a specialized vortex initialization, physical parameterizations to represent the TC boundary layer, air-ocean fluxes at high wind speeds, and coupling with a three-dimensional ocean model.

The atmospheric model is coupled to the NRL Coastal Ocean Model (NCOM), which is a hydrostatic ocean circulation model developed by NRL. COAMPS-TC also includes wave models, Wave Watch III (WWIII), and the Simulating WAves Nearshore (SWAN). The NCOM, SWAN and WWIII are coupled using the Earth System Modeling Framework (ESMF), which is a community developed software framework for models. The coupled system development has been carried out jointly with the NRL Oceanography Division.

COAMPS-TC includes an ensemble prediction capability to provide probabilistic products for tropical cyclone track, structure, and intensity.