CGD SEMINAR

NCAR

DATE: Tuesday, 24 January 2017

TIME: 11 a.m.

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: Boundary-layer induced frontogenesis in the ocean surface layer

SPEAKER: Peter Sullivan, NCAR/MMM

ABSTRACT:

The spatial and temporal state of the upper ocean boundary layer is determined by a set of complex interactions between submesoscale and small-scale boundary-layer turbulence. Of particular interest here is the life-cycle of a cold dense filament undergoing frontogenesis in the presence of wind and wave generated turbulence. Cold filaments generate secondary circulations in the boundary layer that are frontogenetic with super-exponential sharpening of the cross-filament buoyancy and horizontal velocity gradients. Within less than a day, the frontogenesis is arrested at a very small width, < 100 m, primarily by a barotropic instability associated with anisotropic turbulence and cross-front horizontal shear. The barotropic instability grows in scale and decays slowly over many hours. This phenomenon is examined in Large-Eddy Simulations (LESs) with resolved turbulent motions in large-horizontal domains using 10^9 gridpoints. Winds and waves are oriented in directions both perpendicular and parallel to the cold filaments in the LES. The LES solutions show that the boundary layer turbulence is strikingly inhomogeneous in relation to the submesoscale filamentary currents and density stratification. The spatial and temporal evolution of frontogenesis is dependent on the orientation of the winds and waves.

Live webcast: http://www.fin.ucar.edu/it/mms/ml-live.htm

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