

TITLE

Observation of Horizontal Variations in the Diurnal Surface Heating Layer, Convective Processes, and Internal Waves during DYNAMO Leg IV

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ABSTRACT

In Leg IV of the DYNAMO campaign, we deployed two arrays of wirewalkers (wave powered vertical profilers) with horizontal spacing ranging from 100 m to 20 km. The shallow array was a set of 5 mini-wirewalkers equipped with SBE-39 Temperature-Pressure recorders that profiled 0.5 - 25 meters every 3 minutes and the deep array was a set of 5 macro-wirewalkers equipped with SBE49 CTDs that profiled 180 meters every 20 minutes.

Horizontal variations in the diurnal heating layer were observed during weak and strong wind events. Nightly cooling resulted in convective cells with variable depths in the lateral directions and in time. The variability was observed across at different horizontal scales.

Beyond the mixed layer dynamic, we observed spatial fluctuation in the internal wave field in the pycnocline and the layer below. The variance in isopycnal slope versus separating distances between macro-wirewalkers was used to examine the horizontal de-correlation scale of internal waves. The relationship between isopycnal slope, s , versus separating distance, Δr , is $s \sim A(\Delta r)^{-p}$. p ranges from 1 - 1.7, which is dependence on shear and stratification.