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The ocean small scale (from the mesoscale to the submesoscale) creates is susceptible to create specific air-sea interaction patterns that might have an integral effect on the large scale atmosphere and ocean dynamics. Recent advances in the state of the art of these processes has been predominately obtained from modeling efforts, but only very few observational studies exist, and they are all located in the extra-tropics. In January-February 2020, when the EUREC4A-OA/ATOMIC experiment took place in the Northwest Tropical Atlantic Ocean with the overall objective of understanding the role of fine scale processes in the internal ocean dynamics and air-sea interaction.
Four oceanographic vessels, the French Atalante, the German Maria S Merian and Meteor, and the American Ron Brown, closely coordinated with air-borne observations and autonomous ocean platforms (gliders, saildrones, and drifters) to simultaneously measure the ocean and atmosphere east of the island of Barbados and the coast of Guyana in the western tropical Atlantic. A whole battery of instruments measuring the thermohaline and dynamic characteristics of the region was launched. The fixed CTD stations, reaching great depths while measuring salinity, temperature, and oxygen Chl, Turbidity, and Nitrate concentrations), serve as a reference to calibrate and validate other devices, in particular, shallower uCTD, TSG, gliders, Saildrones, Argo floats and MVP, acquired during ship transits. Combined, these datasets increase the horizontal resolution and thus the description of structures ranging from mesoscale to fine scale.
The Northwest Tropical Atlantic Ocean is a dynamical region filled with mesoscale eddies of different origins and moving at different depths, transporting various water masses across the region. These eddies have rich and diverse characteristics ranging from shallow cyclonic and anticyclonic eddies to the deep reaching structures. Some of these eddies, and in particular North Brazil Rings, have been previously observed and described in dedicated oceanographic experiments. Nonetheless, the EUREC4A-OA/ATOMIC campaign brings in new details in the structuration and dynamics of these mesoscale features and their imprint on the regional ocean dynamics and air-sea interactions.
Moreover, the large number and diversity (ship-mounted or autonomous) of observing platforms implemented in the project made it possible to innovatively sample the upper-ocean frontal scales and stratification.
The ongoing analyses focus on the ocean dynamics regional structuration and role in air-sea exchanges. It make uses of the whole set of observations and parallel efforts in ocean and ocean-atmosphere modelling.
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