Large-scale SST anomalies associated with subtropical fronts in the western North Atlantic during FASINEX

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ABSTRACT

We describe the large-scale variability of sea surface temperature (T_s) and fronts in the western North Atlantic Subtropical Convergence Zone from January-June 1986 within an approximately 11° longitude by 10° latitude domain. Fronts were primarily found within interconnected bands separated by <500 km that tended to be located on the periphery of anisotropic T_s spatial anomaly features that propagated westward at about 3 km day^{-1}. Relatively weak and strong (small or large $|\nabla T_s|$) segments of the dominant zonally-oriented frontal band (the Subtropical Frontal Zone, or SFZ) shifted westward with these anomaly features, which had characteristic peak-to-peak space scales of up to ≈800 km in the minor axis direction (NW-SE) and time scales of up to ≈275 days, both larger than the scales of mesoscale eddies observed during earlier experiments. Both the main and seasonal thermoclines tended to be elevated (depressed) by several tens of meters beneath cold (warm) anomaly features, suggesting that the influence of eddies on T_s and fronts extends to larger space and longer time scales than those resolved in earlier studies. Because of the very limited spatial and temporal coverage of available subsurface data, however, this relationship could not be verified conclusively. Properties of the anomaly features were consistent with the dispersion of lowest-mode internal Rossby waves, and they were apparently not generated or significantly influenced by wind-driven Ekman transport. A much longer data set, including altimetry and subsurface data, will be required to verify that eddies influence T_s and fronts at these large scales, and if so, to determine the physical processes behind this influence.