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Detection, Structure, and Origin of Extreme Anomalies in a Western Atlantic Oceanographic Section

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ABSTRACT

Ten anomalous water parcels were detected in the water column of a western Atlantic oceanographic section (0–5550 m; 70°W; 23–33°N). The parcels had extreme properties lying either two standard deviations from historical mean values, or estimated origins lying 2000 km from the oceanographic section. Detection, structure, and origin of the parcels were determined from analyses

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on isobaric and isopycnal surfaces using eight kinds of measurements temperature, salinity, oxygen, light scattering, silicate, phosphate, nitrate, and tritium.

The parcels originated from seven of the major water masses comprising the North Atlantic Ocean. As observed along the oceanographic section the parcels had the following average (range) characteristics vertical pressure extent = 650 db (100–150 db); horizontal extent = 130 km (30–260 km); and distance to origin = 2300 km (400–5200 km). A population density equaling approximately one parcel per 100 km was obtained as the number of parcels (10) divided by the length of the cruise track (1080 km). This density suggests that 10^3 – 10^4 parcels may populate the North Atlantic Ocean. The population appears to be sufficiently large that geographic distributions of anomalous water parcels may eventually reveal general circulatory patterns.

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