Abstract View

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Mesoscale (50–100 km) Circulations Revealed by Inverse and Classical Analysis of the JASIN Hydrographic Data

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ABSTRACT

Inverse analysis (Wunsch, 1978) has been applied to two 10-day surveys of an area 15 km consisting of nearly 100 CTD stations, in order to determine the velocity field with a horizontal resolution of 45 km.

Reference levels above the main thermocline (1100 m) lead to physically implausible circulations below the thermocline. The preferred solution conserves mass with bottom velocities not significantly different from zero. All casts were repeated after 6 h, and the surveys were 20 days apart, allowing errors in the reference velocities due to internal waves, tides and changes of mass between surveys to be estimated at less than 1 cm s^{-1}.

Further spatial resolution is obtainable by classical geostrophic analysis, contouring dynamic heights with an assumed bottom level of no motion from casts 15 km apart forming triangles 45 km apart. Two regions of anticyclonic circulation are revealed, one a meander the other an eddy. The meander and eddy have different water properties, and interact as the eddy, whose diameter is 80–100 km, drifts northwestward at 2 cm s^{-1}. The circulations themselves have velocities of 10–20 cm s^{-1} and vary only weakly with depth from the surface to 1000 m, decreasing to near zero at 1500 m.

Observations from moored current meters are generally in good agreement with the geostrophic estimates, but reveal that there may be some times and places for which there is no level of no motion. sub-thermocline flows reaching 10 cm s^{-1} or more.

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