



## Abstract View

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# Winter Circulation in the Western Gulf of Maine: Part 2. Current and Pressure Observations

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### ABSTRACT

The wintertime circulation in the western Gulf of Maine has been studied with a moored current, temperature and pressure array which was deployed from November 1974 to January 1975. These observations have been interpreted with three additional data sets: coastal sea level records, *Portland Lightship* meteorological data, and offshore hydrographic transect data which describe the evolution of the density field on weekly time scales. The observed mean currents are consistent with the idea of a cyclonic Gulf of Maine gyre. The subtidal current fluctuations were coherent in the vertical at each mooring but incoherent between the moorings which were separated by about 50 km in both the alongshore and offshore direction. Furthermore, the currents showed only weak coherence with the winds.

The pressure field was highly coherent over the whole Gulf of Maine. Therefore, estimates of the pressure gradient vector inside and outside the 100 m isobath were made using coastal subsurface and bottom pressure records. The alongshore pressure gradient for the deeper water was found to be quite coherent with the winds for periods between 35 and 200 h. The relation of the pressure gradients and the winds in the shallower water suggests the development of a transient coastal boundary layer.

The incoherence between the observed current and pressure gradient fields is due in part to the existence of geostrophic currents associated with a highly variable density field. The density field variability is caused by incomplete mixing of three water masses: advected Scotian shelf water, deeper more saline slope water, and local winter water which is formed in the region of the experiment.

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