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On North Pacific Temperature, Salinity, Sound Velocity and Density Fronts and their Relation to the Wind and Energy Flux Fields

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ABSTRACT

The main oceanic fronts of the North Pacific are investigated and the principal frontogenetic processes described. Fronts are features of the upper ocean and occur near mass transport and energy flux convergence zones. Frontogenesis in the upper layers of the ocean is strongly dependent upon the configuration of the wind stress field. Temperature and salinity fronts in the upper ocean are not necessarily coincident, nor are they always accompanied by density fronts. During periods of strong and persistent winds, the upper and lower portions of the front may separate at pycnocline depth by as much as 200 km, suggesting Ekman-type displacement of the upper layer. Multiple temperature and salinity fronts, spaced 60–70 km apart and suggestive of baroclinic Rossby waves, are observed off northeastern Japan at the confluence of the Kuroshio with the Oyashio. Not all temperature and salinity fronts are accompanied by strong baroclinic flow and the maximum baroclinic flow often occurs several kilometers distant from the surface manifestation of these fronts.

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