Abstract View

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Wind–Induced Baroclinic Motions at the Edge of the Continental Shelf

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ABSTRACT

In a two-layer model of stratified fluid flow, motions in the internal mode are governed by the distribution of an *equivalent* depth h_e. For a typical continental shelf, the distribution of h_e with distance from shore may be closely approximated by two straight-line distributions patched at the shelf break, one of constant slope and one of constant (equivalent) depth. For such a simple model the *forced* response to a suddenly imposed wind stress (in the internal mode) is easily calculated. The component of the wind stress perpendicular to shore produces a step-like feature of the thermocline at the shelf, and a longshore Ekman drift gradually reducing to zero at the coast from the infinite ocean value far offshore. Wind stress parallel to the shore produces a thermocline step and a longshore jet at the shelf break, both of linearly increasing amplitude (in time), and an onshore or offshore Ekman drift, again reducing to zero at the coast but having the infinite-ocean magnitude far offshore.