



## Abstract View

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# The Interaction of Tides with the Sill of a Tidally Energetic Inlet

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### ABSTRACT

The interaction of the tides with the sill of a tidally energetic inlet, Observatory Inlet, British Columbia, is studied. Because of temporal variations in the stratification of the inlet, a substantial seasonal variation is observed in the power withdrawn from the barotropic tide. Vigorous, nonlinear, internal motions occur in the region of the sill, but most of the withdrawn tidal power is fed into a progressive, linear internal tide. The first two modes, which contain almost all of the energy, respond very differently to changes in stratification. The energy flux of the first mode is insensitive to changes in surface stratification but increases dramatically as a result of deep water renewal. The energy flux of the second mode exhibits the reverse behavior, being insensitive to the occurrence of deep water renewal but being a strong positive function of the surface stratification. Even though the inlet has a distinct surface layer in summer and appears to be a two-layer system, the second mode contains almost as much power as the first, a characteristic not indicative of simple two-layer flows.

The nonlinear sill processes induce a significant baroclinic flow at the beat frequency of the  $M_2$  and  $S_2$  tides. This flow is most vigorous near the surface of the inlet where it is greater in magnitude than the  $M_2$  barotropic current.

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