

Sea level variations in shelf waters off the coast of British Columbia: from sub-synoptic to interannual time scales

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This study examines sea level variations beyond monthly time scales during 2008-2016 in the northeast Pacific, using the solution of the 1/36-deg NE Pacific regional model combined with tide gauge and gridded altimeter data, and surface atmospheric forcing. Main results are:

- (1) Along a zonal section extending westward from the Tofino tide gauge on Vancouver Island, sea level variations are mostly accounted for by the steric height calculated using density variations from surface to 1000 m depth in deep waters, and using the “bottom density” method (Helland-Hansen 1934) in regions shallower than 1000 m.
- (2) Sea level variations on the shelf, represented by that at Tofino, are dominated by the halosteric height, with the seasonal maxima occurring in winter that can be explained by the downwelling wind driving the downward transport of low salinity water.
- (3) The de-seasonalized anomalies of both the halosteric and thermosteric heights are correlated with winds over a zone stretching from offshore at mid-latitude to the coast at time scales of less than 20 months, and in the tropical Pacific Ocean at time scales of 5-20 months.
- (4) Over the continental slope, the sea levels show minimum seasonal amplitude and standard deviation of de-seasonalized anomalies due to weaker salinity variations at depths of 100-200 m.

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