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Baroclinic instability in the West-Spitsbergen Current

Sigurd Teigen (1), Frank Nilsen (2), and Bjørn Gjevik (3)

(1) University Centre in Svalbard (UNIS), Longyearbyen, Norway (sigurdt@unis.no), (2) University Centre in Svalbard (UNIS), Longyearbyen, Norway, (3) Department of Mathematics, University of Oslo, Oslo, Norway

Baroclinic instability in the West Spitsbergen Current is investigated, based on data from an array of current meter moorings at 78.83°N, across the deeper (1000-2000m) part of the continental slope west of Svalbard. Numerical linear stability analyses are performed, based on a normal mode two-layer model and idealisations of the baroclinic velocity field and the cross-shelf bathymetry. The characteristic period, wave length and growth rate of unstable vorticity waves are revealed, with typical periods of 250-400h and wave lengths 50-80km. Time series analysis of the current meter data confirm that transient signals of similar periodicity and wave length as predicted by the linear stability analysis are present in the data record. Implications of the unstable eddy activity for the heat loss of the West Spitsbergen Current and mixing between Atlantic and polar waters is discussed and heat flux estimates are presented.