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0.1 Internal wave generation and their influence on thermocline structure in the shelf zone of sea

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Towed and moored measurements of internal waves have been carried out during several years in the shelf zone of the Sea of Japan, Peter the Great Bay. Internal-wave oscillations observed in the Bay can be more regular in time or packets of soliton-like internal waves can be recognized.

Generation of internal tides and short, high-frequency internal waves was detected near the shelf break. Multiple splitting of the thermocline that leads to the fine structure formation was also observed during the warm seasons on the continental slope and on the shelf of the Sea of Japan (East Sea). Depending on variation in stratification and external forcing either quasi-linear waves that exhibit spectral continuum or nonlinear soliton-like waves were observed.

The enhancement of mixing associated with propagation of internal waves in a horizontally-inhomogeneous thermocline can be estimated using theoretical results of Navrotsky (1999) and numeric modeling of internal wave generation with parameters corresponding to their typical values in the explored shelf zone of the Sea of Japan. This internal wave induced mixing, non-uniform with depth, leads to the thermohalocline splitting and layering near the shelf break and over the shelf. The corresponding vertical diffusivity K_z is about (4-5)$\times 10^{-4}$ m^2/s. The enhanced mixing and layering of density vertical structure can explain high bioproductivity of shelf waters even in the presence of very stable stratification.

REFERENCES

Navrotsky V.V., 1999. Mixing caused by internal waves and turbulence: a comparative analysis. Journal of Marine Systems, 21, 1-4, 131-145.