



Baltic Sea cold intermediate layer: contribution of horizontal and intra-layer convection

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Seasonal cascades down the coastal slopes and intra-layer convection are considered as the two mechanisms significantly contributing to the Baltic Sea cold intermediate layer (CIL) formation. Field measurements performed over the slope of the Gulf of Gdansk in October 2006 are presented, showing specific features of denser water formation in sea environment as a result of coastal cooling and horizontal supply of salty open-sea water in intermediate layer. Rough estimations for the Baltic sea bathymetry and typical buoyancy fluxes suggest that such mechanism is able to generate a 1 m – thick intermediate layer within one week. Physically, such cascades should also be formed during early spring heating, when (in February-March) the Baltic surface waters are still below the temperature of maximum density (T_{md}). Hinrichsen et al. (2007) demonstrated a strong correlation between SST during winter months and the CIL temperatures until autumn months, with the maximum correlation exactly for the second half of February and March. In addition, analysis of the data of the IOW long-term observation programme shows, that (typically) from March till July waters of the CIL are below the T_{md} . TS-diagrams, mean-annual and real-time temperature profiles are analyzed to show that conditions within the CIL are favorable for intra-layer convection due to the presence of waters with the T_{md} in intermediate layer. This explains an increase of its salinity and gradual deepening with spring-summer time. The work is supported by grant of RFBR 07-05-00850.

References:

Hinrichsen, H.-H., Lehmann, A., Petereit, C., Schmidt, J. (2007). Correlation analysis of Baltic Sea winter water mass formation and its impact on secondary and tertiary production. *Oceanologia*, 49(3): 1-15.

IOW data base. <http://www.io-warnemuende.de/>