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Modelling of submesoscale dynamics in the Gulf of Finland (Baltic Sea)

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Submesoscale eddies and filaments generated by baroclinic instability of fronts in upper layers of the sea play an important role in heterogeneity of spatial distribution of parameters (temperature, nutrients, phytoplankton). Moreover, submesoscale processes can change vertical stratification of the mixed layer on a time scale of days. Although resolving submesoscale structures in numerical models is challenging, it is important to take them into account. To study these processes in the Gulf of Finland the three-dimensional hydrodynamic model OAAS (Andrejev et al, 2004) has been applied. The modelling domain (400 km $\times$ 130 km $\times$ 110 m) is approximated with different horizontal grid resolutions (1.852 km, 0.926 km, and 0.463 km) and with 1 m resolution in vertical direction. Meteorological forces are used from ERA-40 reanalysis data downscaled by the Swedish Meteorological and Hydrological Institute (SMHI) as well as data from the HIRLAM forecasting system provided by Finnish Meteorological Institute (FMI). Well-studied upwelling of 2003 (Uiboupin & Laanemets, 2009) and the thermocline development during summer time of 2011 have been modelled and the comparisons of the results obtained with different horizontal grid resolutions are discussed.

References:
Andrejev, O., Myrberg, K., and Lundberg, P. A. (2004). Age and renewal time of water masses in a semi-enclosed basin – Application to the Gulf of Finland. Tellus, 56A, 548–558.
Uiboupin, R., & Laanemets, J. (2009). Upwelling characteristics derived from satellite sea surface temperature data in the Gulf of Finland, Baltic Sea. Boreal Environment Research, 14(2), 297–304.