# High resolution atmosphereąVseaąVwater ecosystem model suite: the general architecture and the role of turbulence

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Coupled atmosphere-marine 3D modelling suite FRESCO (Finnish-Russian-Estonian COoperation) is used to simulate the influence of the boundary layer dynamics change on the hydro-ecological dynamics in the coastal area of the sea. FRESCO integrates several sub-models as: meso-scale non-hydrostatic atmosphere model, meso-scale non-hydrostatic marine circulation model, narrow-directional approximation wind wave model, two-equation (k-Čç) turbulence model, marine plankton community model. Meso-scale atmosphere model is the part of the well-known HIRLAM model. Though computational resources have quickly increased, it is still advantageous to pursue cost effective methods for high resolution calculations in the modelling of the coastal dynamics. We take the computational advantage of using nested domains calculations, online-offline modelling, splitting-up method and size-dependent parameterization of the biochemical reactions. Horizontal grid step in atmosphere model is 3.3 km. Horizontal grid step used in marine models vary from two nautical miles for the first domain to 1/20 nautical miles for the last nested domain. Offline modelling with 3 hour time-averaged flow for water temperature, light conditions and eddy viscosity fields is used for water ecosystem simulations with up to one hour time step for all nested domains. Splitting-up method with size-dependent parameterization enables us to solve problem implicitly in exact form with a stable schemes. Simulations have shown different dynamics of autotrophs under different atmospheric conditions.