NUMERICAL SIMULATIONS OF SEDIMENT TRANSPORT PROCESSES CAUSED BY CURRENTS AND WAVES IN THE WESTERN BALTIC SEA

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Sediment transport processes in shallow marginal seas are steered by windinduced currents and surface waves. Case studies on the relation between thehydrographic regime and the sediment distribution pattern were carried out forthe basins and sills in the western Baltic Sea using methods of mesoscalenumerical simulation. As a tool a high resolution 3-dimensional circulation model iscoupled with a wave model based on the 2-dimensional momentum balance equationwhich is solved assuming a JONSWAP-shape of wave spectrum. The circulation modelis based on an implementation of the GFDL Modular Ocean Model. Numericalexperiments were carried out with a space resolution of 1 nautical mile horizontally, 2-4 meter vertically and a time step of 1 minute. The model wasdriven by meteorological fields (wind, airpressureand air temperature) takenfrom reanalyzed weather forecasts.A special program module steers the simulation of resuspension and deposition ofsediment particles depending on critical shear stress at different sedimenttypes, sinking velocities of particles and hydrodynamic conditions andhydrodynamic conditions. The critical shear stress depends on the sedimentproperties as grain size distribution, cohesion and biological features.These parameters are assigned to the cells at the model grid by regionalizedclassification. The results explain the general sediment distribution patterns in the westernBaltic Sea. The model can also be used for the prediction of drift of dumpedmaterial in near coast areas.