

A joint decision support system for effective water protection measures in the archipelagos of Turku, Åland and Stockholm

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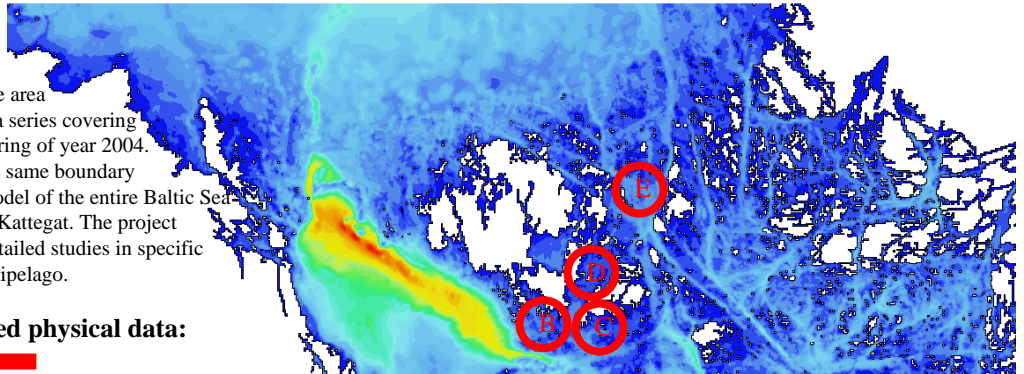
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Abstract Common protective measures for water quality are being created in a multinational study for the three archipelago areas of Turku, Åland and Stockholm. Effective protection plans are needed to achieve a good ecological status of EU waters by year 2015 as stated in the Water Framework Directive. Additionally, recent ecological concerns of the present state of the Baltic Proper also generate a need for new, more effective measures to stop the deterioration of the Baltic Sea waters. The results of recent studies show that severe adverse effects on the Baltic Sea ecosystem still continue regardless of a significant reduction of nutrient discharges during the past decades. The overall objective of this project is to facilitate the possibilities to evaluate in advance the consequences of different local water protection measures, ultimately making it possible to rank their cost effectiveness. The project will generate a decision support system that consists of different elements. An ecological water quality model will help to estimate the effectiveness of different water protection measures. The proposals for cost-effective actions to achieve a good ecological quality of coastal waters will help to fulfil the requirements of the EU Water Framework Directive. The proposed method to achieve this goal is to set up the area containing the three archipelagos in the form of a model domain grid delimited by the latitudes 59°50' and 60°46' with a resolution of one quarter of a nautical mile. An inventory of nutrient sources within this area has been made, and these data will be recorded as an emission database containing assessments of nutrient discharges from fish farms, sewage treatment plants and larger rivers. These data, together with less accurate data of atmospheric nutrient deposition and nutrient release from the bottom sediments as well as nutrients that enter into the domain through the vertical north and south borders, will be subjected to advective and diffusive processes by circulation models.

Two different 3D-models will be employed in parallel; their capacity to simulate the oceanographic features of the area will be validated against data series covering a full-year cycle since the spring of year 2004. Both of these models use the same boundary forcing provided by a 3D-model of the entire Baltic Sea with its boundary located at Kattegat. The project is also planned to involve detailed studies in specific areas of the inner Åland archipelago.

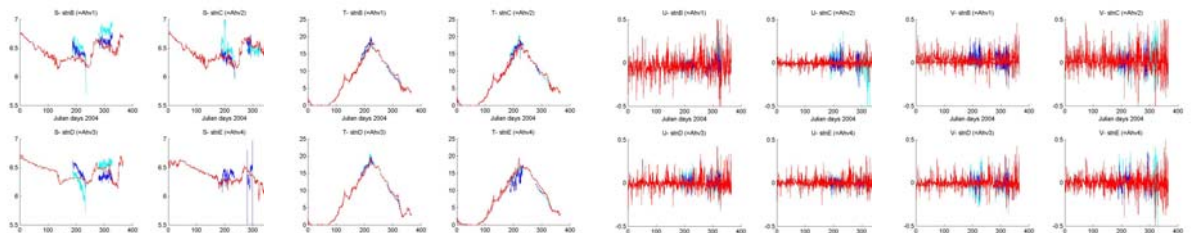


Validation of measured physical data:

Colour code: Model data

Upper instr. Deeper instr.

Measurements & simulated data



Correlations vs. modelled data

Colour code: Upper instr. Period 1 Deeper instr. Period 1 ; Deeper instr. Period 2 Period 2

