



Numerical modelling of cooling water inputs into the Jade bay using the unstructured-mesh model FVCOM

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The 'Jade Bay' is a tidal bay located in the central part of the German North-Sea coast. In the northern part of the city of Wilhelmshaven, a coal power station takes cooling water out of the Jade bay and discharges in return water with increased temperature of about 10°C. At the moment, a second power station is build, and there is also space for two additional power plants.

The spreading of the cooling water plumes is investigated for two different scenarios. In scenario 1, the maximum number of four discharge locations is considered, which are located along the shore line. However, for scenario 2 the four discharge locations are placed more offshore towards the deeper parts of the tidal inlet to overcome potential shadowing effects of the intended Jade-Weser-Port.

To model the behavior of the cooling water plumes, the unstructured-mesh finite-volume model FVCOM (Chen et al., 2003) is used, which allows to cover the large area of the Jade bay and the nearby North Sea with a relatively high resolution near the points of discharge and a coarser resolution at the outer edges of the study site. For each scenario, cooling water with a temperature of 28°C is discharged into the Jade bay having a background water temperature of about 18°C (summer conditions). The tidal open boundary conditions, to simulate real time hydrodynamic conditions, were taken from the FES2004 tidal atlas (Lyard et al., 2006).