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# The coastal model NorKyst-800 – *a model of the currents along the whole Norwegian coast*

***The coastal model NorKyst-800 is a computer model that simulates variables such as currents, salinity and temperature along the whole Norwegian coast, at an 800 metre spatial resolution and at high temporal resolution. NorKyst-800 has been developed by the Institute of Marine Research, in collaboration with the Norwegian Meteorological Institute and NIVA.***

BY LARS ASPLIN, ANNE D. SANDVIK AND JON ALBRETSEN

Norway is facing a number of challenges in its coastal zone, and to deal with them we need detailed information about environmental conditions such as currents, salinity and temperature. We need real-time data on environmental conditions, as well as forecasts for the coming few days. We also require information about past conditions, preferably going back several decades. At an 800 metre spatial resolution, NorKyst-800 will be able to provide sufficiently detailed data relating to currents and environmental variables along the coast and in major fjord systems. Hourly data will be produced for past decades, the current day and approximately one week into the future. NorKyst-800 can also be used to quantify the consequences of regulatory measures relating to hydropower schemes or

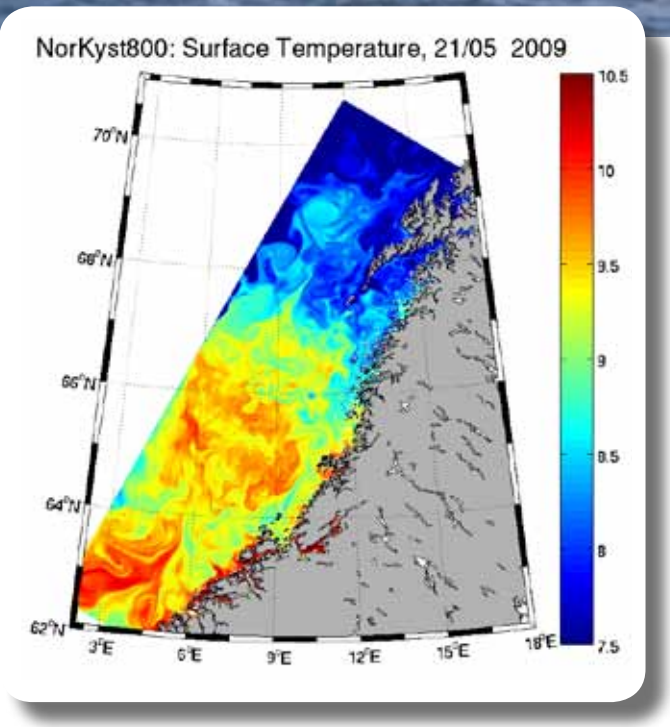


**Figure 1:** Sea surface temperature for 21 May 2009, modelled by NorKyst-800.

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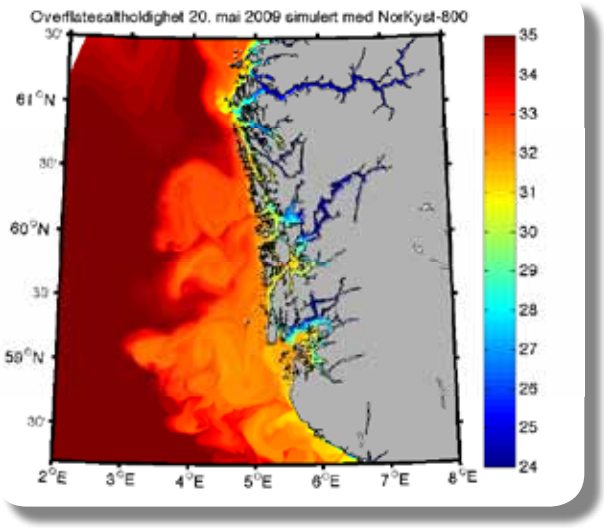


**Figure 2:** Sea surface salinity for 20 May 2009, modelled by NorKyst-800.

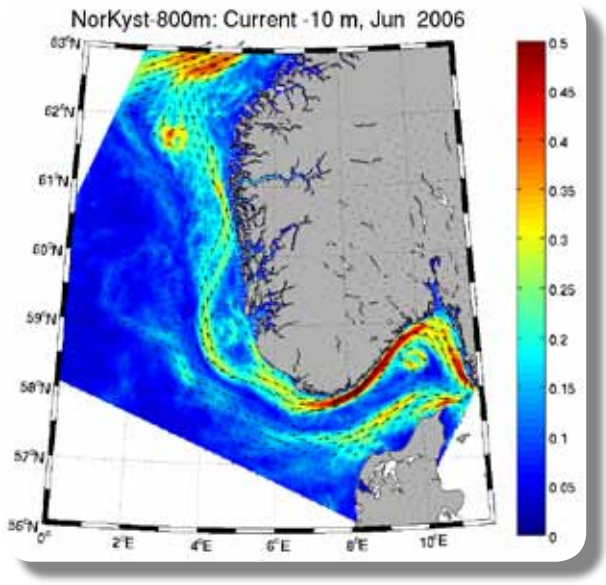


**Figure 3:** Mean speed and current vectors at 10 m depth for June 2006, modelled by NorKyst-800.

the impact of commercial activities such as the use of fertilizers and the spread of disease by the aquaculture industry.

## NORKYST-800 AND CONTINGENCY PLANNING

The information that NorKyst-800 provides about environmental conditions, and particularly currents, will be vital in the event of accidents in coastal waters. It will, for example, allow us to realistically model the spread of oil spills or floating objects close to the coast and within fjords. It will also be possible to realistically simulate the spread of harmful algae and sea lice from fish farms. Forecasts for approximately the coming week will be available through the Norwegian Meteorological Institute's operational routines.

## NORKYST-800 AND LARGER REGIONS

NorKyst-800 enables us to model environmental conditions across larger areas, and potentially along the whole Norwegian coast. There is a particular need to look at the overall picture across wider areas at this level of detail in order to quantify a sustainable level of aquaculture. This is also true for various types of habitat mapping and for assessments relating to the Water Framework Directive.

## HOW DOES NORKYST-800 WORK?

NorKyst-800 consists of databases with realistic forcing parameters as winds and freshwater runoff and the necessary tools to automatically set up and simulate conditions anywhere along the Norwegian coast. The database for sea bottom topography contains 2600 x 900 grid squares of size 800 m x 800 m. Vertically there are 35 levels. In principle the whole Norwegian coastline can be simulated at once, but in practice we will simulate smaller areas separately. We have to run the model on so-called super-computers, and it requires a lot of processing time and storage space.

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