NorKyst-800 and the Norwegian Current Information System

by

Bjørn Ådlandsvik, Jon Albretsen, Lars Asplin, and Kjetil Fjellheim

Bjørn Ådlandsvik
bjørn@imr.no

Institute of Marine Research
P.O.Box 1870 Nordnes
N-5817 Bergen, Norway

Background

- Norway has the longest coastline in Europe
  - rank 7 worldwide
  - length estimates from 25 to 100 thousand km
  - with 240 thousand islands.
- Increasing pressure on use of coastal areas
  - Aquaculture, Fisheries, Transport, Infrastructure, Mining, Energy production, ...
  - Recreation, Tourism
- Knowledge on coastal/fjord circulation is important for all these areas

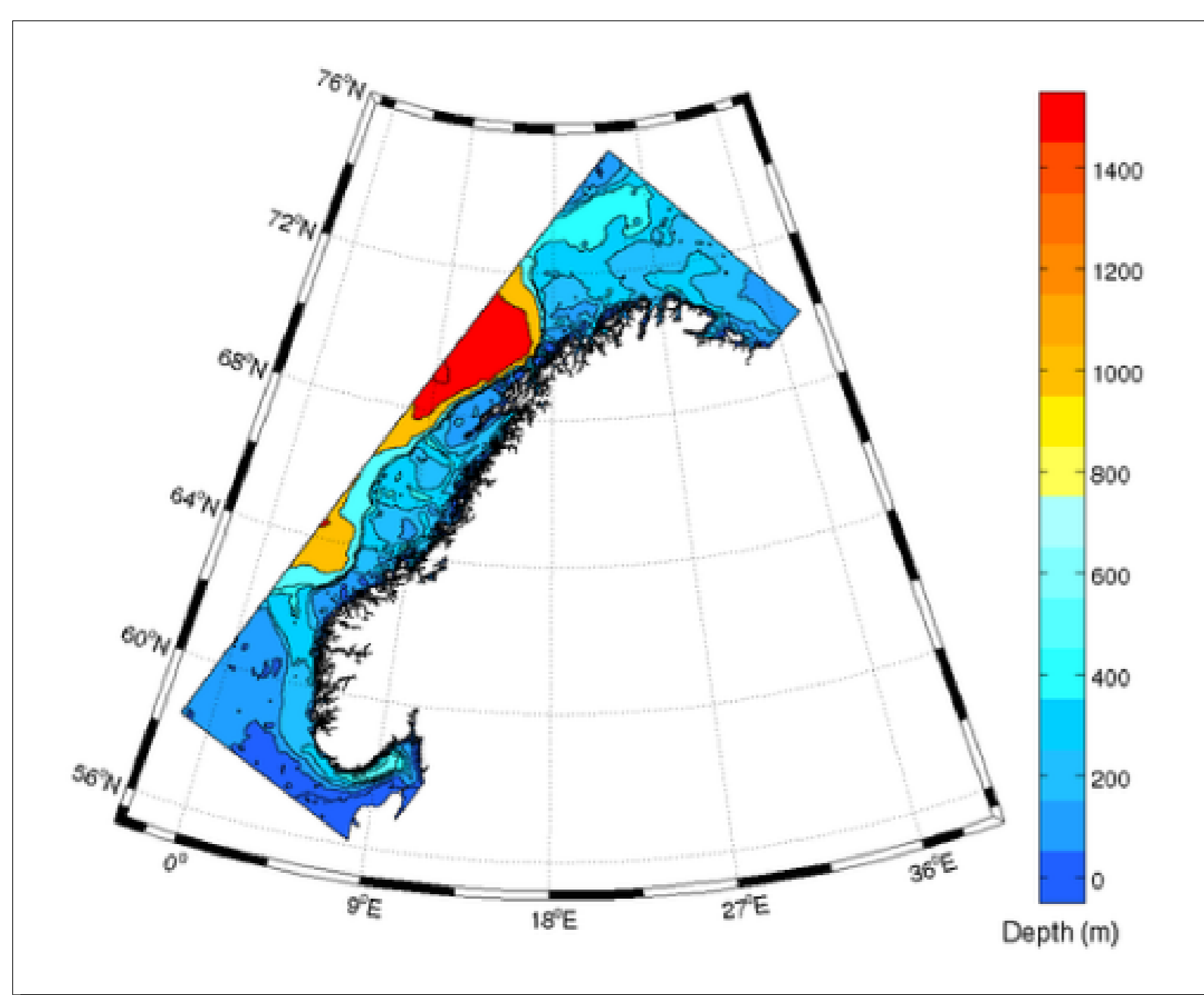## NorKyst-800 model domain

Figure 1: The NorKyst-800 model domain with topography

NorKyst-800 characteristics

- Horizontally Cartesian grid
  - in a polar stereographic map projection
  - 800 meter resolution
  - 2600×900 grid cells
- Flexible setup vertically
  - Typically 35 s-levels.
- Flexible automatic generation of model set-up with grid file, start fields and forcing
  - Whole domain or subdomain
  - Start and boundary input from 4km ROMS model for the Nordic Seas
  - Choice of atmospheric forcing:
    * ERA Interim
    * Higher resolution WRF downscaling (2009-2013)
- Trying to be model agnostic
  - Reference implementation in ROMS
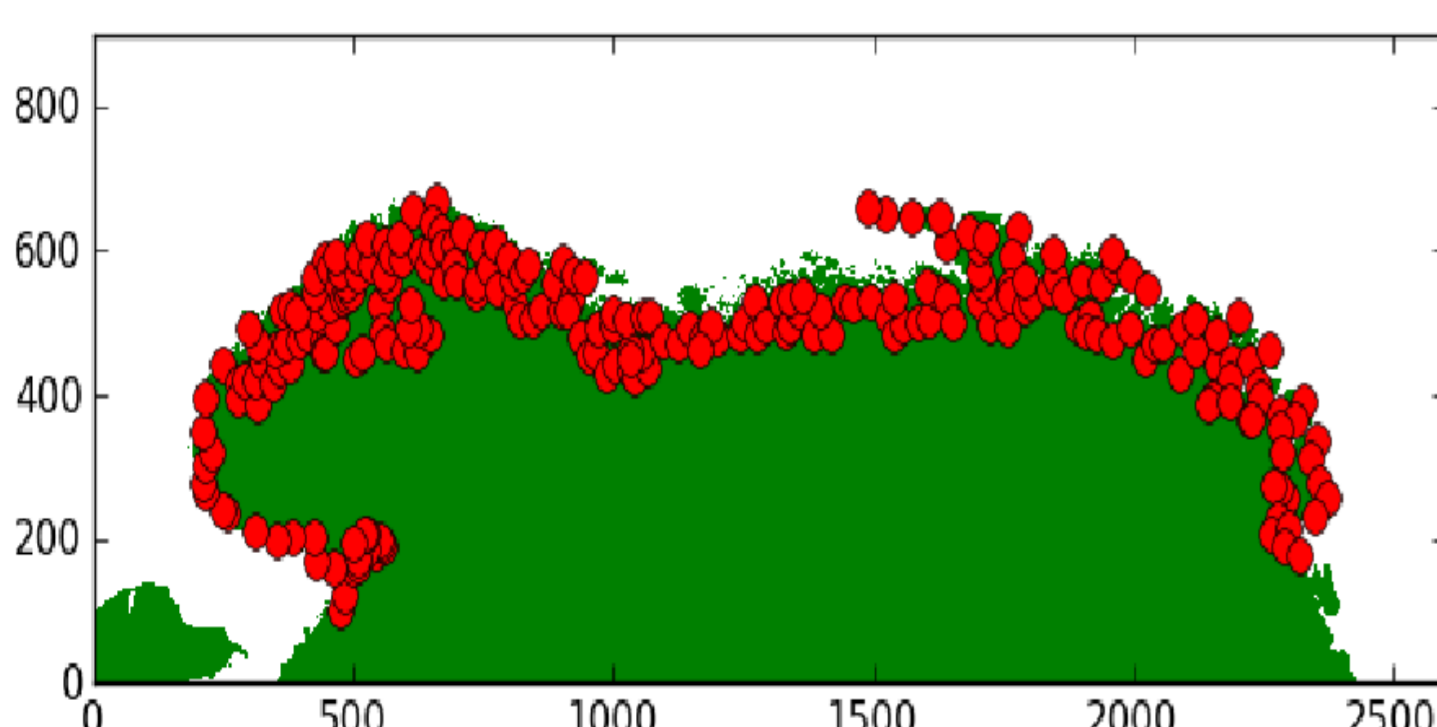 - Easily adaptable to other models using orthogonal horizontal coordinates

Figure 2: The 249 NorKyst-800 river locations

Validation – IMR Coastal stations

- 8 coastal stations
- Temperature/salinity profiles
- 1-3 profiles per month
- Data are freely available
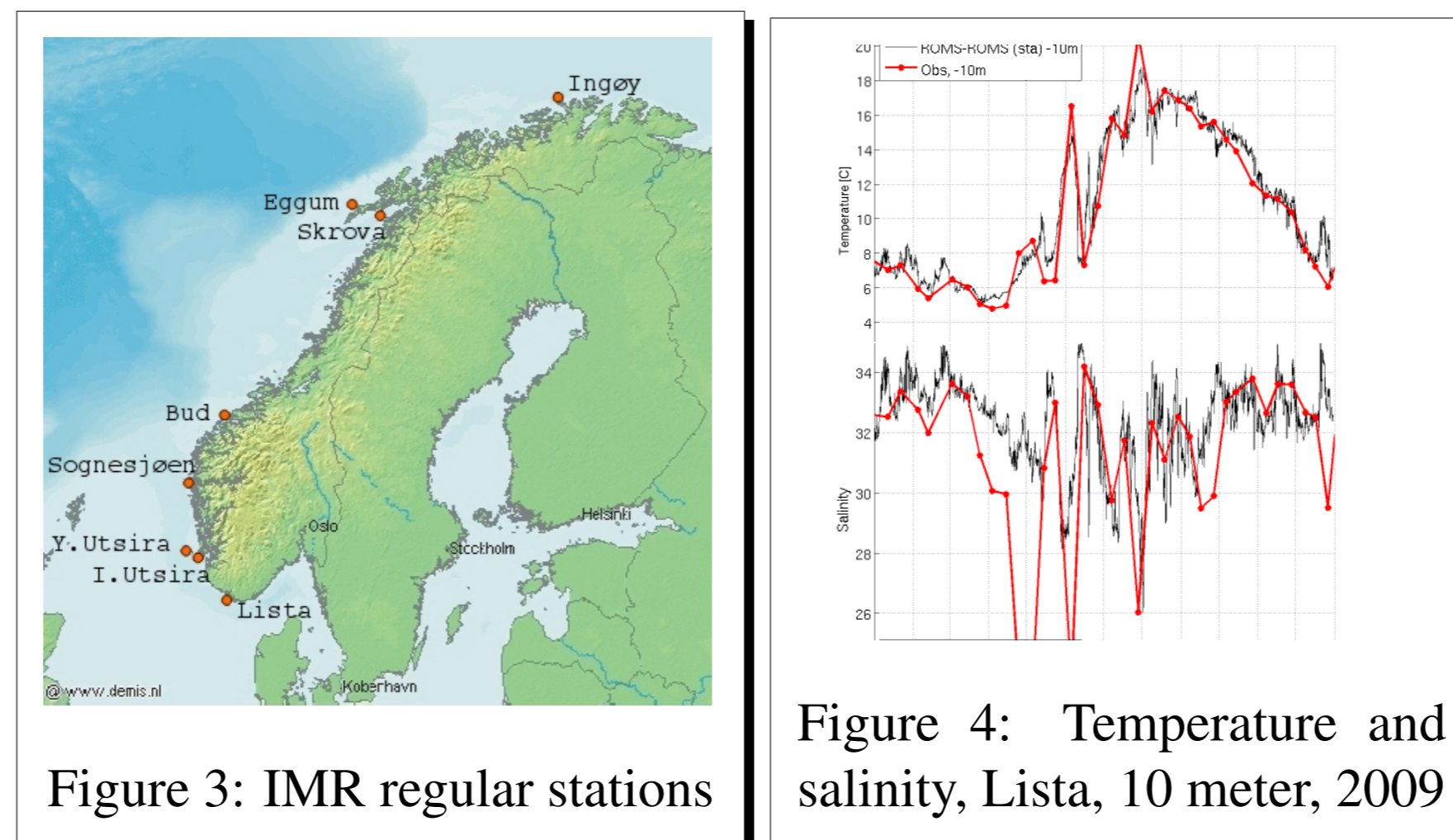- http://www.imr.no/forskning/forskningsdata/stasjoner

Figure 3: IMR regular stations

Figure 4: Temperature and salinity, Lista, 10 meter, 2009
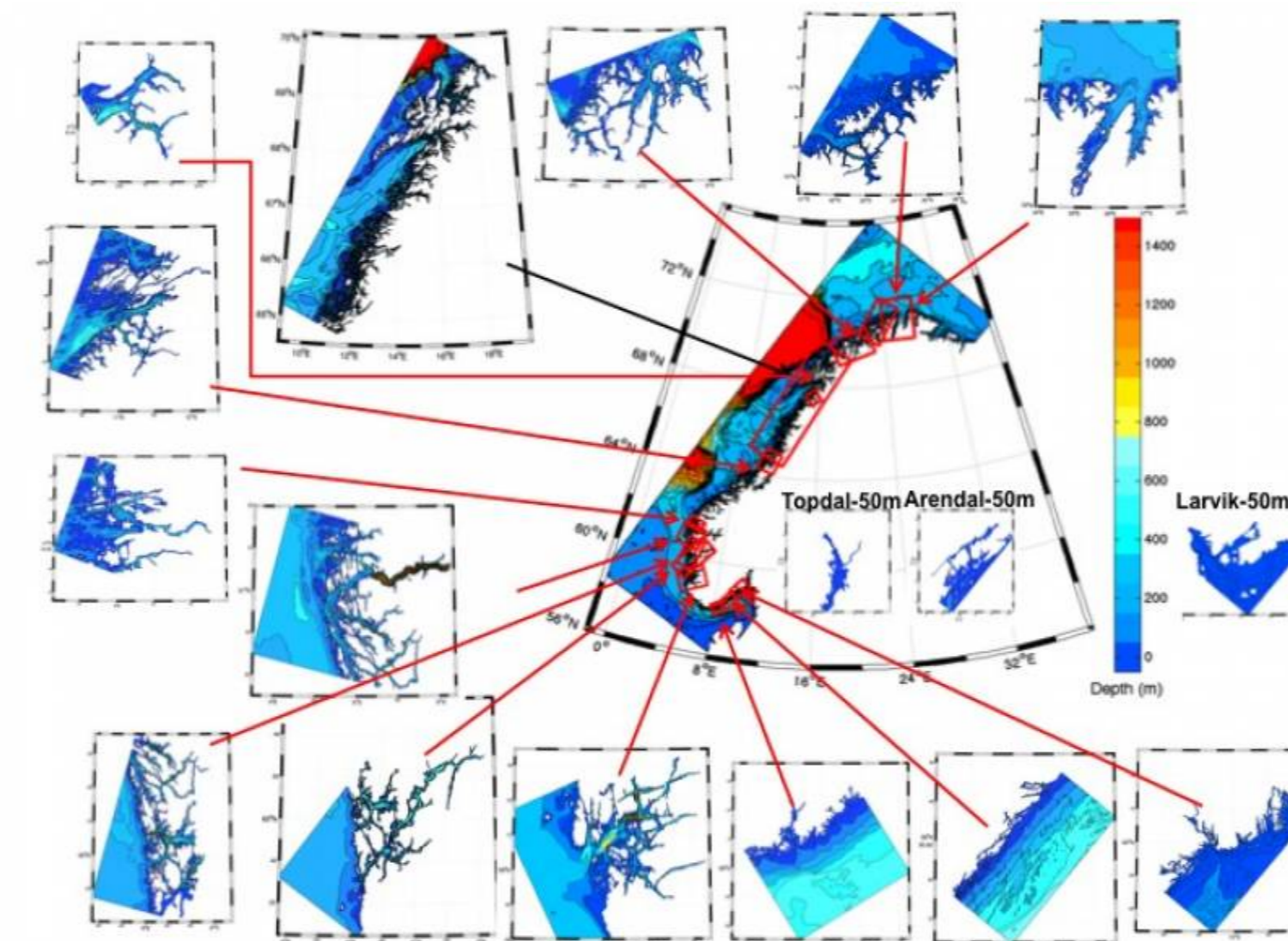
NorFjords - fjord models

Figure 5: NorKyst-800 provides boundary conditions for finer resolution (50 – 200 m) fjord models
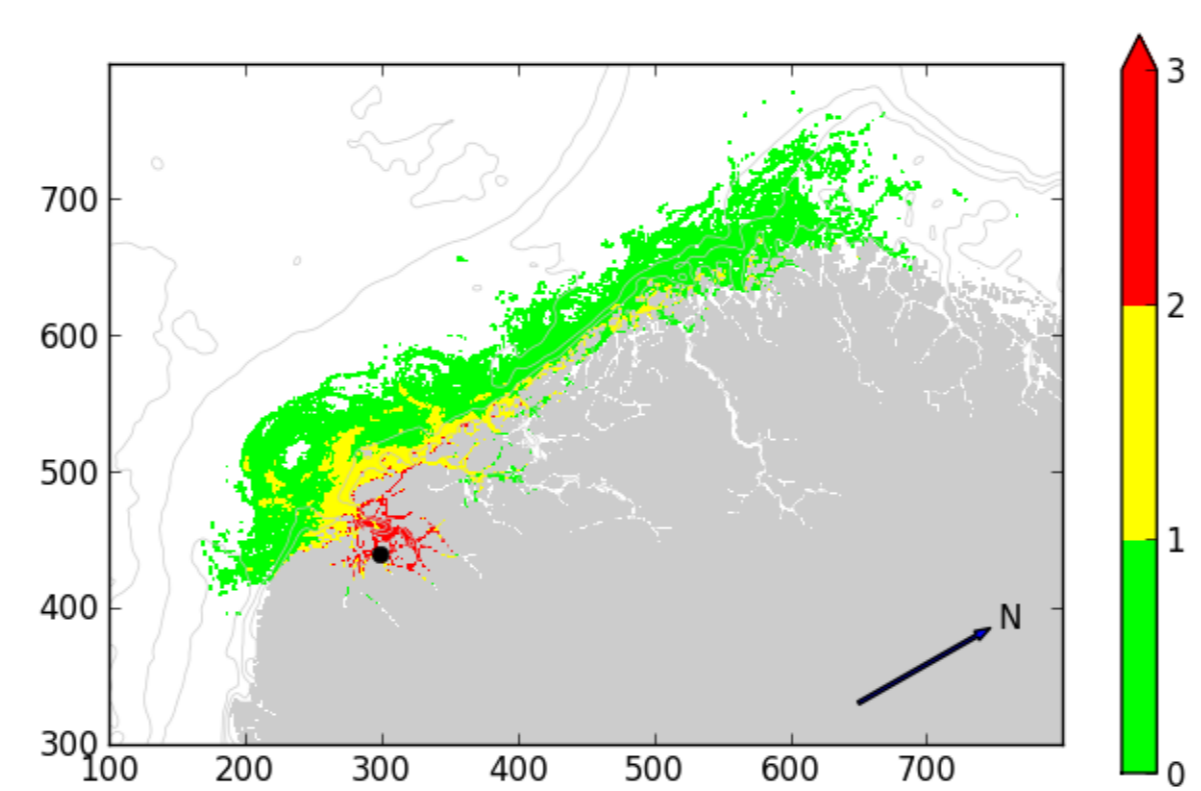
Transport studies

Figure 6: Spreading of salmon lice

- Off-line particle tracking model, LADIM, is used to study transport and spreading.
- Here particles representing salmon lice are released continuously from a location in Boknafjord.
- The plot shows 10-logarithm of aggregated concentration of particles between 50 and 150 day degrees.

National collaboration

NorKyst-800 is the result of a national collaboration. The Norwegian Meterorological Institute is running the whole domain operationally for short term forecasts.

INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET

Meteorologisk institutt

NIVA
Norsk institutt for vannforskning

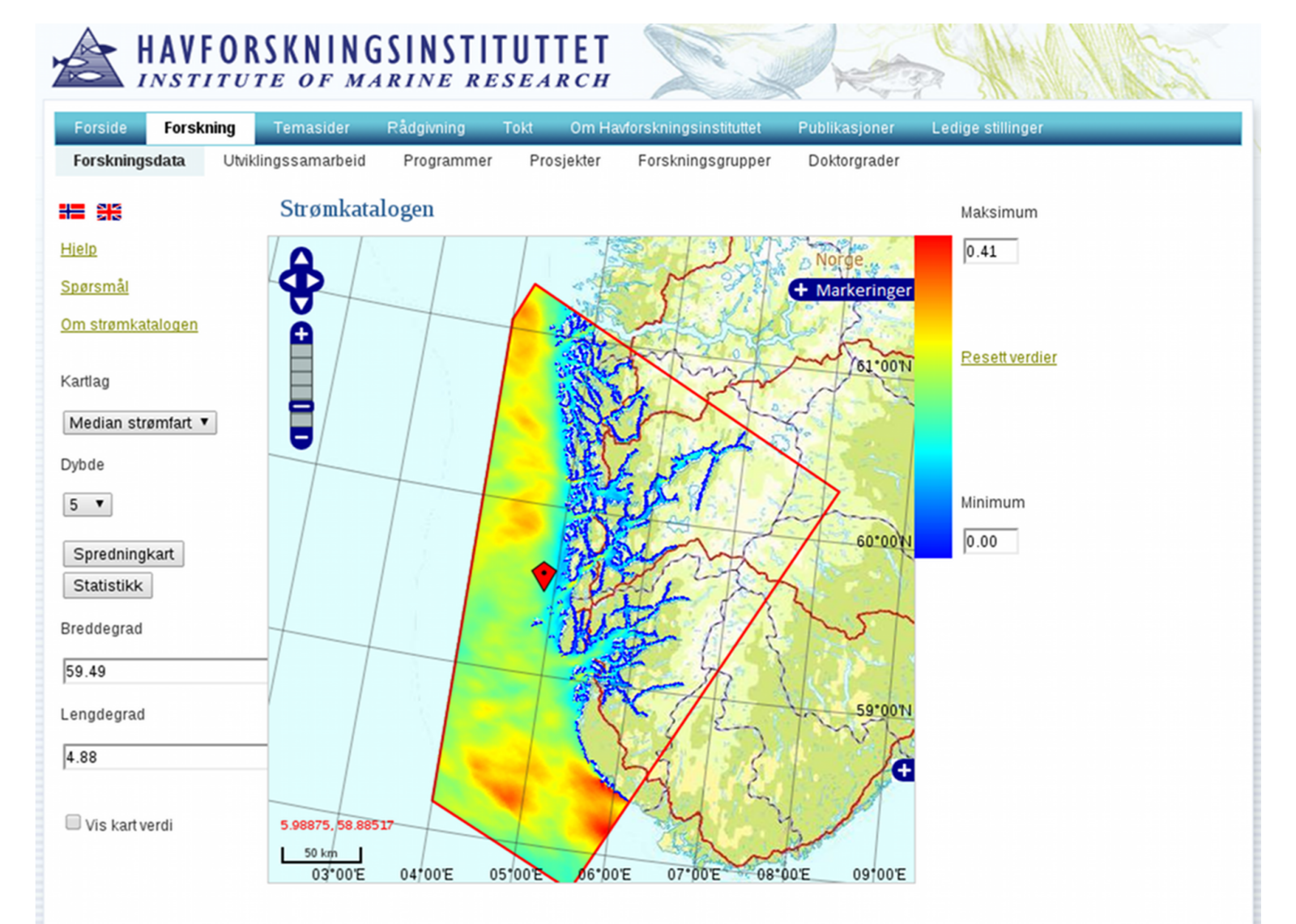## Norwegian Current Information System

Figure 7: Screen dump of the NCIS showing map of median current speed at 5 meter depth

- Freely available through web-based user interface (in Norwegian) http://www.imr.no/stromkatalogen.
- *Archives* of model-based currents for coastal/fjord areas
- *Statistics*: Horizontal maps, user selected locations
- Automatic generation of *spreading maps* (influence areas) from user selected locations.
- Intended users: Coastal managers, coastal developers, fish farmers, general public.
- Presently based on NorKyst-800, soon finer resolution for selected fjord systems.
- Presently uses ROMS' data structure, custom station file (station number as record variable) for rapid extraction of time series.
- *Not* an operational system for oil accidents, search and rescue or similar. Provides statistics. The Norwegian Met. Inst. is responsible in acute situations.
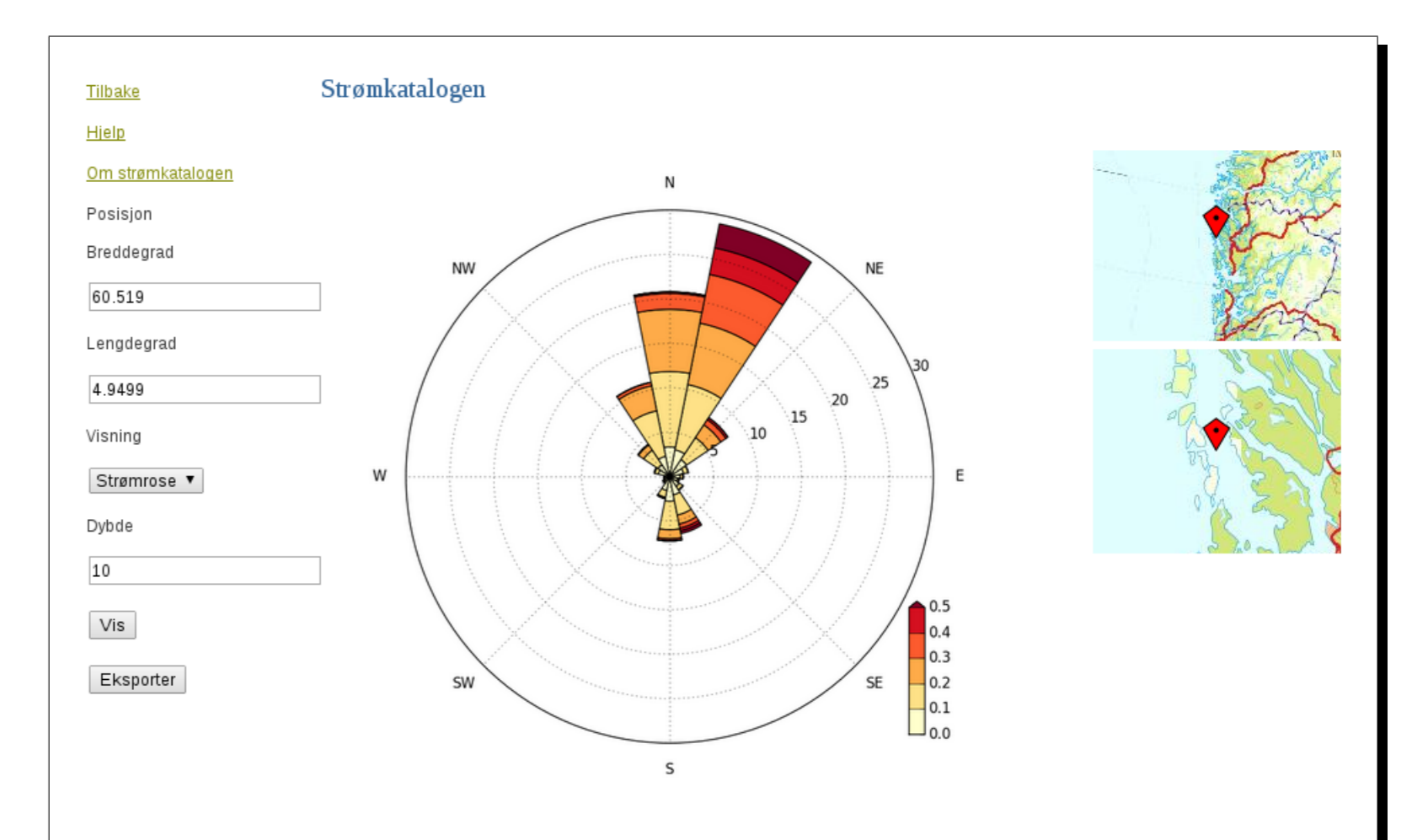
NCIS – Examples

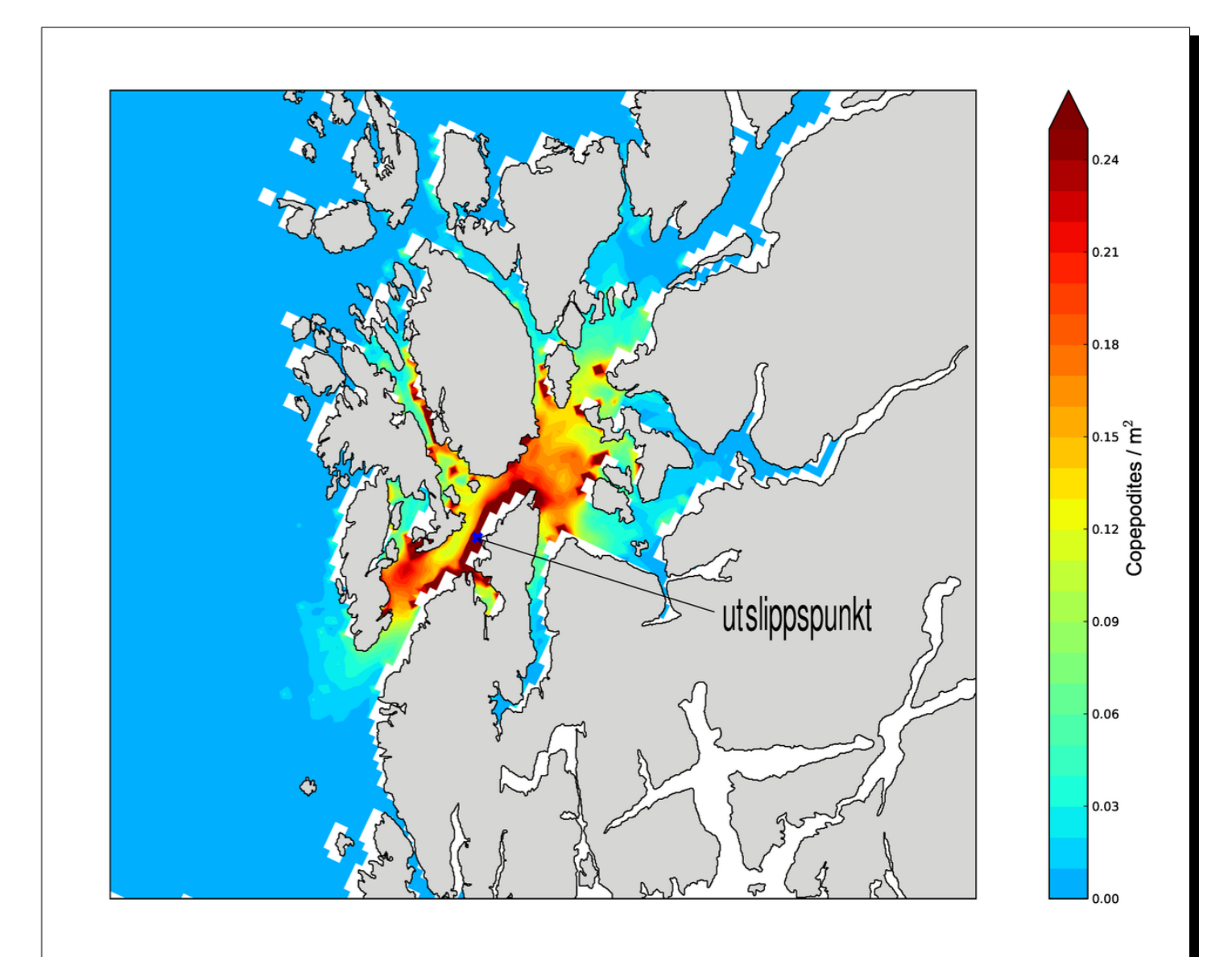Figure 8: Current rose from Hjeltefjorden

Figure 9: Influence area of salmon lice from a selected location

References

- J. Albretsen, A.K. Sperrevik, A. Staalstrøm, A.D. Sandvik, F. Vikebø, and L. Asplin, 2011, NorKyst-800 Report No. 1 User Manual and technical descriptions, Fisken og Havet, 2-2011