NOOS annual report 2014

Member report – MET Norway

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Country	Norway
Institution	Meteorologisk institutt/Norwegian Meteorological Institute (MET Norway)

Observations
 Status and new initiatives
	Status:
	
	 • MET Norway operates the Norwegian national network of synoptic weather observations, both on land and on offshore installations in the North and Norwegian Seas.
	 • Limited *in situ* ocean observations are collected in real-time at offshore sites in the North and Norwegian Seas and archived at MET Norway.
	    1. Waves: NRT datafeeds from 4 North Sea platforms (Sleipner A, Oseberg A, Heimdal, Gullfaks C, Troll A) to the NOOS data exchange have been implemented. Ekofisk NRT data are not freely available.
	    2. Water level: Ekofisk (NRT data not freely available)
	    3. Temperature (near-surface): Heimdal (bundled with wave data)
	 • Hosts EUMETSAT OSI-SAF high latitude centre. Provides satellite sea ice, SST and radiative flux observations.
	 • Provides NRT river data for all major Norwegian rivers to NOOS repository. Also included in the data provision are HBV model data for Swedish rivers from SMHI.
	 • Relays NRT Norwegian tide gauge data to NOOS. To be replaced by direct delivery by Norw. Mapping Agency.
	
	 New Initiatives:
	 • MET Norway has acquired three medium-range CODAR SeaSonde HF radars from ENI, which will be deployed in northern Norway. Three old SeaSondes from Fedje have been donated to MET and may be refurbished; possible deployment in NOOS area.

Modelling **Status and new initiatives**	*Status:* <u>Operational physical:</u> • *Regional – North Atlantic and Arctic Oceans*: TOPAZ (with NERSC, IMR); HYCOM coupled ocean-ice code; ~12 km curvilnear grid; climatological OBC; weekly analysis with daily updated 10-day forecast; assimilation of SST, altimeter SLA, T/S profiles, ice concentration and ice drift using EnKF. One-way coupled ecosystem model NORWECOM, no specific data assimilation. MyOcean Arctic MFC product. • *Regional – North Atlantic and Arctic Oceans*: Arctic.20KM; ROMS coupled ocean-ice code; 20 km polar-stereographic grid; nested in FOAM global; daily updated 9-day forecast; assimilation of ice concentration. Free output: daily means, 17 depths; hourly, 2 depths (0,3). • *Regional – Nordic Seas*: Nordic.4KM; ROMS coupled ocean-ice code; 4 km polar-stereographic grid; OBC from Arctic.20KM; 8 tidal constituents; twice daily updated 5-day forecast. Free output: daily mean, 17 depths; hourly, 2 depths (0,3). Basis for MyOcean NWS ensemble product. • *Coastal – Norwegian coast*: NorKyst.800M: ROMS coupled ocean-ice code; 800 m polar-stereographic grid; OBC from Nordic.4KM; daily updated 66-hour forecast; no assimilation. Free output: daily mean, 17 depths; hourly, 10 depths. • See Figure 1. <u>Operational wave:</u> • Regional – Northern hemisphere: WAM code; 50 km rotated geographic grid; daily updated 60-hr forecasts. To be retired Oct 2014. • Regional – Nordic Seas: WAM code; 10 km polar-stereographic grid; twice daily updated 66-hr forecasts. Upgrade to MyWave WAM code (HZG repository), Oct 2014. Increase resolution to ~5 km in 2015. • Regional – Norwegian coastal waters: WAM code; 4 km polar-stereographic grid; twice daily updated 66-hr forecasts. To be retired Oct 2014. • Coastal – Mid-Norway: Trondheimsleia SWAN; 500m polar-stereographic grid; daily updated 24 hr forecast.

	- Coastal – West-Norway: Karmøy SWAN; 200m polar-stereographic grid; daily updated 24 hr forecast. - Coastal – North-Norway: Sørøya SWAN; 100m polar-stereographic grid; daily updated 24 hr forecast. - See Figure 2. Emergency response: *Oil spill fate:* OSCAR code operational; real-time forcing data (wind, wave, currents, temperature, salinity) from MET Norway. *Drifting objects (search and rescue):* LEEWAY code; real-time forcing data (wind, wave, currents, temperature, salinity) from MET Norway. *Ship drift:* SHIP code; real-time forcing data (wind, wave, currents, temperature, salinity) from MET Norway. Pre-operational, experimental and other: 50-year (1959-2008) hindcast of ROMS on extended Nordic.4KM grid completed (SVIM project). Available by ftp. - ROMS.eps: Ensemble waterlevel forecasting. ROMS on subdomain of Nordic.4KM. Forcing by ECMWF EPS (11 members). See Figure 1. - Implementation of 4DVar for ROMS: satellite SST and ice concentration, in situ profile data, **HF Radar**. Ongoing internal project with PhD student. - Participating in national Center of Excellence program on radioactivity impacts on the environment; development of models for transport of radioactivity in the ocean. *New initiatives:* - E-HYPE hindcast river data implemented in ROMS and run in multidecade hindcast production; E-HYPE real-time forecast data ready for implementation in ROMS for operational forecasting, delayed. - Upgrade of OD3D oil spill fate code nearing completion; alternative to OSCAR, basis for ensemble prediction system. Operational mid-2015. - Reinstate basic ecosystem forecasting (collab. IMR). Offline coupling of NORWECOM to ROMS. Operational early 2015. - Replace operational Arctic.20KM and Nordic.4KM with Arctic.4KM. Target for operations: late 2015. - Extend ROMS.eps domain to cover NWS. Target for operations: late 2015. - Deterministic run with 4DVar. Target for operations: early 2016.
Dissemination Status and new initiatives	*Status:* - Some MET Norway operational ocean products available for viewing and download (grib) at http://www.yr.no/hav_og_kyst/. - Core forecast products freely available by OpeNDAP and WMS at http://thredds.met.no/thredds/fou-hi/fou-hi.html. Currently contains data from NorKyst.800M coastal ocean model, Nordic.4KM regional ocean mode, Arctic.20KM basin ocean model, WAM.10KM wave model and HIRLAM.10KM atmospheric model. - MyOcean ocean products are offered through MyOcean dissemination service at MET Norway (user-authentication required): SUBSETTER, DirectGetFile **and MFTP** at www.myocean.eu. Includes: NWS physics forecast (MET Norway) and physics/bio **reanalysis (IMR)**, both on AMM7 grid; Arctic (TOPAZ) biogeochemical forecasts, as well as satellite sea ice products (also from DMI, FMI, DTU, NERSC, BAS) and SST products (Arctic hi-res analysis). - Routine validation of MyOcean ARC forecast products are published at http://myocean.met.no/ARC-MFC/V2Validation/index.html. *New initiatives* - Common portal for dissemination of all freely available ocean and sea ice products from MET Norway. Uses catalogue, OpeNDAP, http and WMS services for discovery, viewing and download. Implementation started with http://normap.met.no/metamod.
Relevant national projects	Norwegian Research Council: **OilWave** (improved surface fluxes from wave models) Norwegian Research Council: **NORMAP** (national archive of satellite data)

	Norwegian Research Council: **ModOIE** (develop & validate Arctic 4km, 17 year hindcast) Norwegian Navy: **GEOMETOC** (development of services for naval applications) Foreign Min.: **BarentsWatch** (national portal for the "greater" Barents Sea. Opened 30 May 2012 at http://www.barentswatch.no)
Relevant International projects	EU-FP7: **MyOcean2/Follow-on**: Prototype Copernicus Marine Service (MET Norway hosts ARC-MFC and OSI-TAC). Ends March 2015 EU-FP7: **MyWave:** GMES wave supplement to MyOcean (MET Norway coordinator). Ends Dec 2014. NOAA: **Deep-C:** Development of community oil spill fate code.
Additional information	B. Hackett is member of JCOMM ETMSS (Expert Team on Maritime Safety Services).
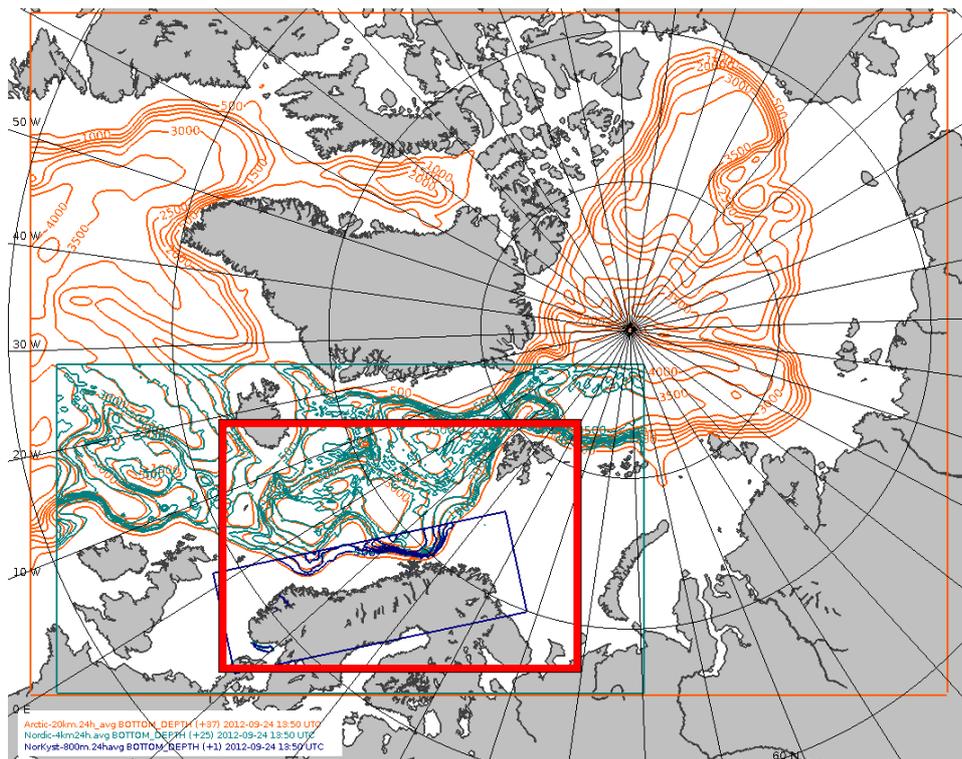
Figure 1: Nested operational hydrodynamical model system at MET Norway. Grid spacings: outer domain 20 km; intermediate domain 4 km; inner domain 800 m. Red box is domain of 4 km ensemble prediction system for water level. Outer model gets open boundary conditions from UK Met Office's global FOAM.
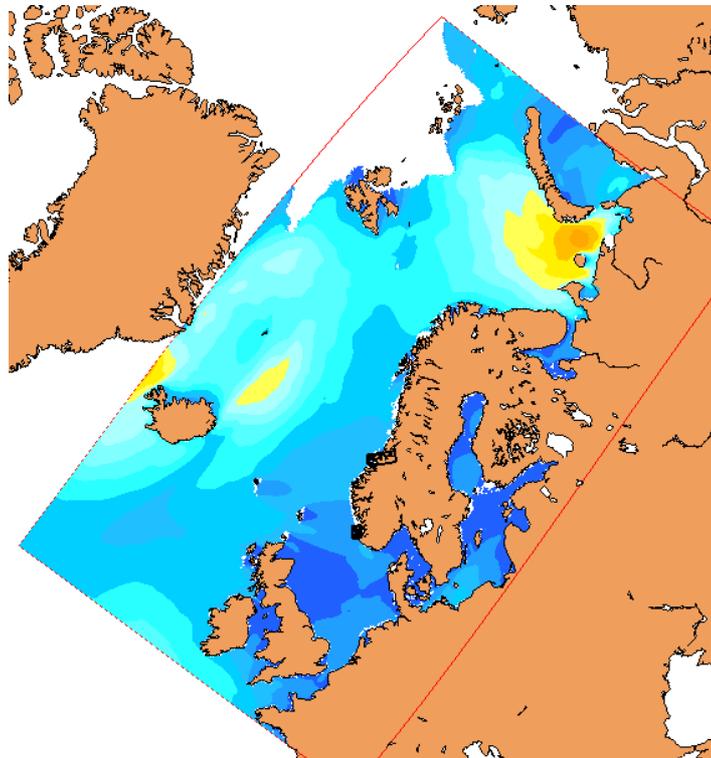
Figure 2: MET Norway wave model domains. Colored area is WAM 10 km (moving to 4 km). Small black boxes on coast are SWAN models.