Web Map Services at CMR

Christian Michelsen Research AS (CMR) has been developing visualisation applications over the last 20 years. A key component in this work has been the visualisation of geographical data. We consider this field increasingly important, as real-time geographical information exchange is getting more widespread.

Web Map Service (WMS) defines a standardised way to use maps and other geo-referenced data from different services on the Internet, in order to create composite maps. A typical use will be to request a background map and one or more partly transparent maps, covering the same geographical area, from selected servers complying with the WMS standard. Each of these maps will be an image that constitutes a layer in the composed map. With such a standard protocol it is possible to compose any kind of maps, and the users of such systems are independent of the different map system vendors.

WMS is a standard defined by the Open Gis Consortium (OGC). Both the MetOc and AIS servers described below follow the WMS version 1.1.1 standard.
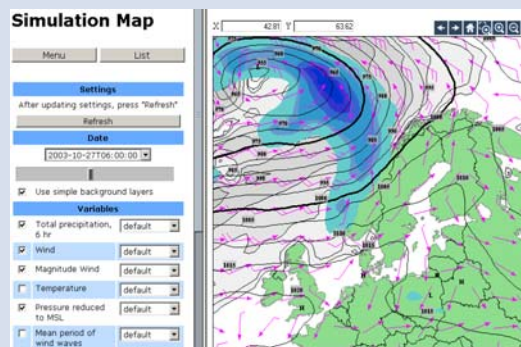
MetOc

MetOc is a system for storing and visualising map-related environmental information on the Internet. The system supports the WMS standard, and consists of several WMS web servers and clients. This enables the integration of MetOC and other external WMS-based applications, and data can be distributed among several MetOC servers.

MetOc has been developed on assignment from the Norwegian Defence Research Establishment (FFI) in cooperation with The Norwegian Meteorological Institute (MET). The data is provided by MET.

Clients

There are two types of clients: **Browser-based** (running in a web browser like Internet Explorer® or Mozilla®), and a **Java Webstart Client**, a more general WMS client that can combine maps and layers from multiple WMS servers, both MetOc and others.

The browser-based client presents all aspects of the MetOc servers as a rich web GUI. The user can select data, data time-step, layers, presentation style, and background map in an intuitive way, complete with standard zoom, pan, and region select functionality.

Application areas

MetOc can be used to visualise a wide range of environmental data:

- Weather forecast, based on data on standardised GRIB format, which is widely used for meteorological simulation data exchange.
- Satellite observations
- Ground observations: Temperature, precipitation, wind, etc
- 3D ocean data: Temperature and salinity are shown as function of depth and position.
- Oil drift simulations

AIS - Automatic Identification System

AIS (Automatic Identification System) is a shipboard broadcast system that acts like a continuous and autonomous transponder, operating in the VHF maritime band. It allows ships to easily track, identify, and exchange pertinent navigation information from one another or ashore, for collision avoidance, security and VTS reporting. The AIS information from the vessels can be gathered via base stations ashore, passing the information to dedicated AIS data collectors.

Our AIS server is a complete web-based solution for displaying such information. AIS data about individual vessels or defined groups of vessels can be shown in tabular form as lists, or graphically on maps using an integrated web map server. Data can also be exported to tab-separated text files. The server can connect to one or more AIS data collectors, and the system can be set up to enable background map selection from a set of map sources.

Customized "Smart links" enable linking to external vessel registers such as the NIS or Ship Info database.

The AIS Server has been developed in collaboration with the Norwegian Coastal Administration (Kystverket/ Kystdirektoratet).

Map features
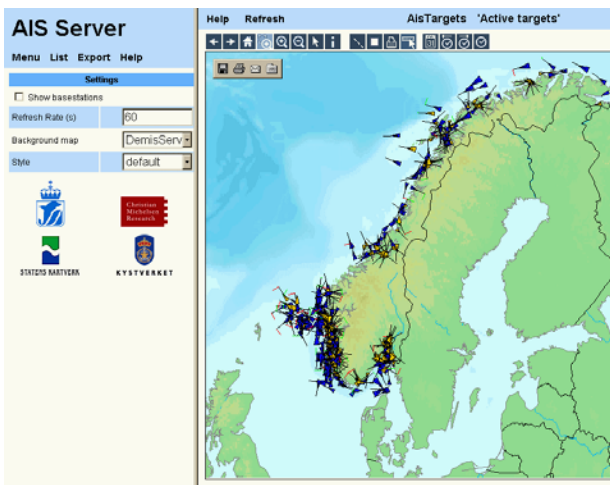
The user interface to the integrated map server has all the navigational functionality you will expect from a map system, such as zoom, pan, and region select. Pressing the Info button and clicking on a vessel will give you all information available for a vessel. It is also possible to take a snapshot of a map. The map image is then rendered with a higher quality and annotated with the time of the snapshot.

In addition one can track a specific vessel. The system will then follow the vessel and change the map region when necessary. You can also activate a functionality that shows some of the attributes for a vessel as a tool tip.

You can view historical data by selecting time and date from a calendar, or go backwards and forwards in time using time-step buttons.

Map presentation

The presentation of vessels on the map is adjusted to the scale of the map. The more you zoom in, the more details of the vessel will be visible. When the full details for a vessel are visible, you can see: Size of vessel coded as a size of a triangle with colour coded speed or status (moving/not moving/inactive), heading and rate of turn vectors, course over ground and speed over ground vector, vessel track, ship dimension, and ship name/call sign with speed or "time not moving", as a label.

The "smart" placement of the labels is optimised for minimal occlusion of other labels.
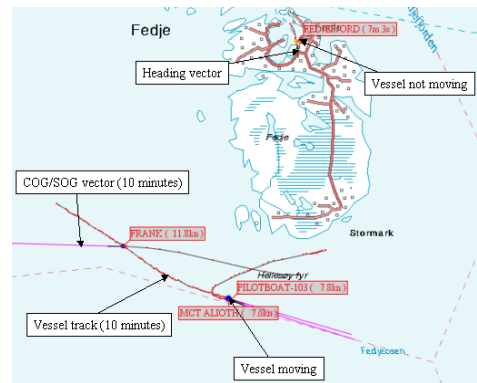
Application areas
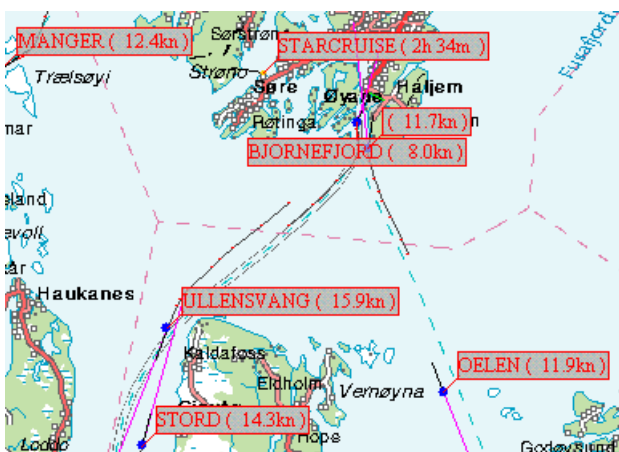
Rescue operations
- Rescue Coordination Centres (RCCs) can find and track vessels close to an incident, and use their resources optimally.
- AIS layers can be integrated with other map elements, and convey a complete up-to-date status.

Harbour authorities
- Estimated and real arrival time, mooring period, and display of current harbour situation.

Fleet management
- Ship owners can continuously track their individual vessels.

Incident investigation
- Historical AIS data can be used for documentation.