

Operational Oceanographic Products Supporting the e-Navigation in the Baltic Sea

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Operational measurement data at sea areas gets more importance as navigation aids is becoming a natural component in e-Navigation systems. Such measurements started in operational mode mainly in coastal stations measuring parameters such as sea level and wind properties and limited number of offshore stations with wave and currents measurements. As in past, data transfer methods were resource demanding, real time oceanographic data were not very well spread among navigational community. Possibilities of nowadays wireless networks and satellite communication form excellent basis for real time data exchange. There is no common standard how operational data are presented and for example in case of the Baltic Sea it's quite hard to find one and universal data portal for mariner sailing in waters of several countries. We develop such an open web based systems, in the frame of the EfficientSea project – integrating, processing and visualizing real time oceanographic data from variety of measurement systems in Estonian waters as a dedicated web-service for e-Navigation.

Wave height in particular sea area is the most critical parameter to be considered for safe navigation. However, it exists comparably limited number of offshore on-line wave gauges. Therefore a pilot study was made in 2010, as part of the EfficientSea project, using navigation buoys as wave measurement instruments. Measurement idea is based on feature, that navigation buoys are in continuous monitoring regime, in same time equipped with motion sensors, reporting about ships collating the buoy. Navigation buoys are located in close vicinity of fairways, this is where actually the wave information is most needed. First aim of our pilot study was to develop automated wave calculation algorithm using acceleration of the buoy (motion) as input and wave height as output. Comparative wave measurements with pressure gauges in vicinity of some sample navigation buoys were made in order to develop and tune wave calculation algorithm. Results of data comparison allowed to conclude that the method is promising and that the automatic wave calculation software prototype WHAPAS (Wave Height and Period Software) gives wave height information for particulate sea area. The software is running on a shore side server, getting input motion data from navigation buoys. Wave data are intended to be broadcasted directly to mariner well AIS channels, together with other coastal station data. In order to guarantee sustainability of the developed real time data systems, low running costs are essential. Existing communication channels and protocols are used in case of navigation buoys, which ensure low power consumption, optimised data transfer etc. Wave height hind cast network based on navigational buoys, consisting of over twenty buoys, showed good stability during the run, also user feedback was positive, which draw perspectives for further development of such systems.

Operational oceanographic data systems are widely used for decision support by users, like mariners, search and rescue, etc. Most frequent user needs ask for straight forward, easy, and one-stop-shop systems giving right parcel of information in area of interest in right time, when it's actually needed. Recent developments of e-Navigation tools in the Baltic Sea area and particularly in Estonian coastal sea give some hints on how such user oriented navigation support systems could look, pilot solutions

are designed and launched. Within the framework of the Baltic Sea Region project EfficienSea, a pilot study was made to harvest available hydro-meteorological on-line information and data and utilise these for navigation aid via AIS (Automatic Identification System) system networks. The data of the closest stations to the ship momentary position meteo- or oceanographic are transmitted to ships AIS receiver automatically as attachment to AIS M8 message. Data package is formed in AIS shore servers and currently it handles successfully with 12 station data on Estonian coast since Nov 2010 as a pilot version of the system, major upgrade made in 2018. METOC portal <http://on-line.msi.ttu.ee/metoc/> contain over 50 real time data sources run by different organisations in Estonian coastal sea, more than 1200 active users of the system recorded so far, with over 120 000 clicks over three years.

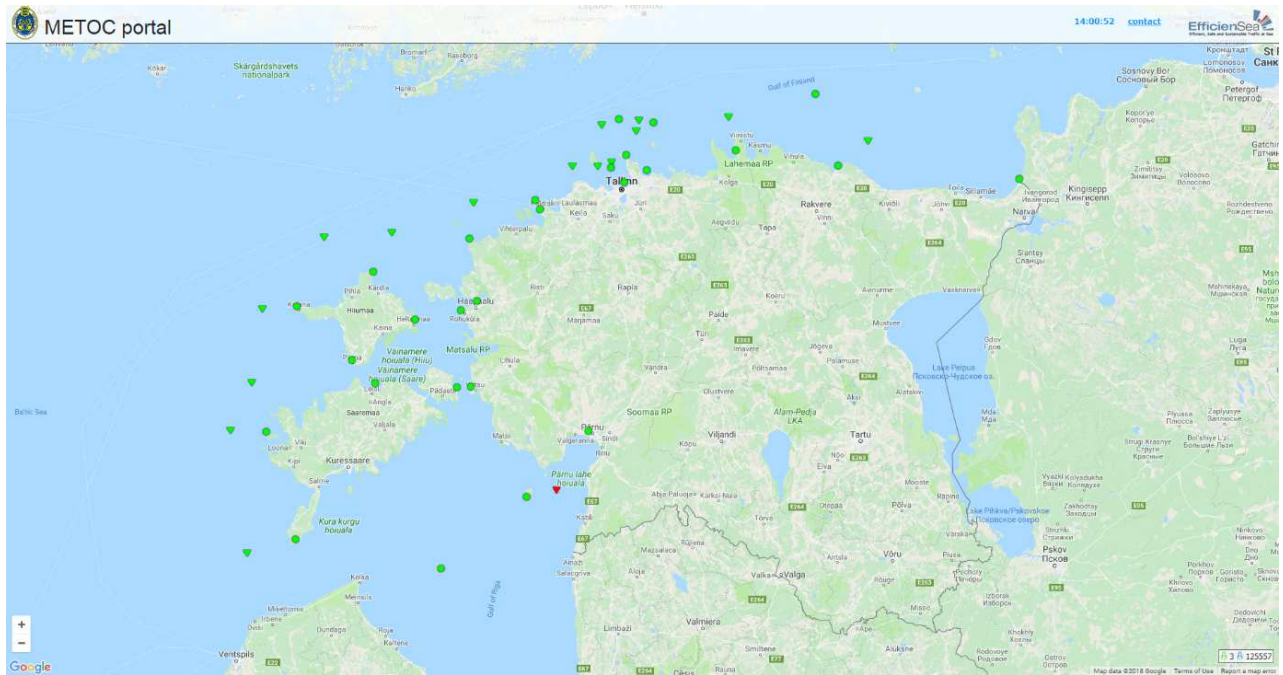


Figure 1: Screen view of METOC portal <http://on-line.msi.ttu.ee/metoc/>