ShipSensorNet – using ships as sensors in winter navigation

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Information about prevailing ice and weather conditions is important for all operations in ice-infested sea areas. Frequent observations about the ice field are valuable to enhance and update the latest view based on satellite imagery and model results.

In the ShipSensorNet project a prototype system of using ships and coastal stations as a sensor network was designed and tests conducted during the winters 2008 and 2009. The system collects automatically near real-time information about the ice field, processes, analyzes and combines the information with other data sources on server-side, and delivers enhanced information back to ships and other users, like ice services and maritime authorities (Figure 1). The collected information includes ship performance observations and terrestrial marine radar images. Ships going in ice are affected by the resistance of the ice field, so their performance, i.e. the speed vs. used machine power, can be used as an indicator of ice resistance. On the other hand, radars on board and on coastal stations provide an additional source of information to derive ice field properties.

The radar image collection prototype system was tested at the Raahe coastal station in 2008 and on board rv Aranda and the icebreaker OTSO in 2009. Different visualization techniques were tried during the project. Algorithms to build larger mosaics from the limited area radar images were also implemented. An important processing element was to derive ice drift from a sequence of radar images.

The experiences of the prototype system give valuable information about the possibilities to acquire real-time information about the ice field in areas with frequent ship traffic and how to use this information in ice routing.
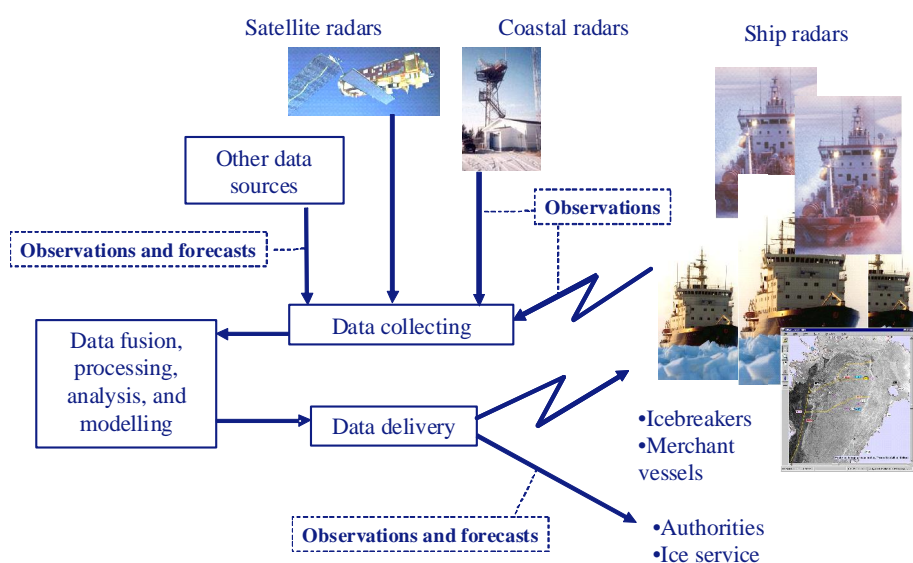
Figure 1. The concept of ships as a sensor network to observe ice field properties.