**FINLAND**

27 February 2017 Revision

1. **Organization**

The Finnish Meteorological Institute (FMI) is responsible for the sea-ice information service in Finland. The operational Ice Service started in 1915. The service is intended to meet the needs of national and international shipping as well as other activities where sea-ice information is required, in particular fisheries, coastal and harbour activities, forecasting and climatology. The ice season in the Baltic normally begins at the middle of November, when ice starts to form in the northernmost archipelagoes of the Bay of Bothnia and lasts until the end of May. Sea surface temperature (SST) charts are published from beginning of November to the end of ice season.

2. **Data acquisition**

(*a*) Sea ice

Ground truth observations: Finnish and Swedish icebreaker reports several times a day in plain language; daily or weekly coastal station reports from 15-20 stations; ice and snow thickness profiles; daily or weekly reports from ships in plain language.

Space-borne: Data received from satellites is the main source for spatial analysis. The operationally used satellite data is MODIS Aqua and Terra, VIIRS, Sentinel-1A and B, Radarsat-2, CosmoSkyMed and TerraSAR-X data. Sentinel-2 in experimental use.

(*b*) Sea surface temperatures

Ground truth input data: 14 automatic coastal stations, 5-10 buoys, once a week measurements from 5-10 coastal stations; icebreakers; five merchant vessels with hull thermometers measuring along tracks covering the Baltic Sea.

Space borne: Copernicus SST analysis that uses several satellite based radiometer instrument observations.

3. **Output production**

(*a*) Ice charts

About 170 Ice Charts are issued daily during the ice season. On Mondays and Thursdays SSTs are included with 30-year averages. Charts are e-mailed or available to users via dedicated service packages or internet (www.iceservice.fi).

Type of chart (scale, areas, others): Mercator projection, and since 1 January 2006, covering east of 9°00´E the Baltic Sea, Skagerrak and the Swedish Kattegat and Vanern and Malaren lakes. A simplified ice chart over the Baltic Sea is issued once a week and published on the internet.

(*b*) Bulletins on ice situation

Bulletins (ice reports) on ice situations in the Baltic Sea, including restrictions to navigation, operational areas of icebreakers and traffic information, are e-mailed, broadcasted in the radio and published in internet. The Finnish Ice Report in plain language in Finnish, Swedish and English is broadcast in GTS network and in coastal radio stations on a daily basis. Coded sea-ice information from 95 areas or fairways in Baltic Sea Ice Code is included on bulletins over GTS network.

(*c*) Other information products

Digital satellite images (SAR and visual bandwidth) sent to Finnish and Swedish icebreakers. High-resolution (500-m) ice thickness charts over the SAR images are available operationally at ice.fmi.fi.

A sample daily ice chart is shown in Appendix 1.

4. **Forecasts and forecasting methods**

(*a*) Forecast models: HELMI Northern Baltic Sea dynamic-thermodynamic ice model. HIGHTSI Thermodynamic sea ice model (Finnish-Chinese).

(*b*) HELMI forecasts are provided for the Baltic Sea, 48 hours in advance for ice concentration, level ice thickness, total ice thickness, ridged ice density, ridged ice height, ice motion (direction and velocity), and areas of ice compression. Ice forecasts with six parameters in 3-hour time intervals are available on a daily basis at ice.fmi.fi. Sample charts are given in figures V-2 and V-3, Appendix 2.

(*c*) Once a week 10-day ice thickness development and brief weather forecasts in plain language are provided to the Finnish Transport Agency the Winter Navigation department.

*(d)* Once a month seasonal outlook for the Baltic Sea ice conditions in plain text and monthly charts is are provided to the Finnish Transport Agency the Winter Navigation department.

(*e*) The Finnish Ice Service responds to enquiries from users and provides a range of specialized forecasting, consultation and advisory services on a best-effort, cost-recovered basis.

5. **Publications**

(*a*) Description of the ice conditions for each winter is published yearly basis in internet (<http://en.ilmatieteenlaitos.fi/baltic-sea-ice-winters>)

(*b*) Irregular. -

6. **Mailing and Internet addresses**

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