

Satellite Based Sea Ice Products

Patrick Eriksson Ice Analyst / Product Manager FMI Ice Service

20 October 2014 Copernicus User Forum Workshop Helsinki





FROM RESEARCH TO SERVICES

FMI – ENSURING PUBLIC SAFETY	FMI – MAKING BETTER USE OF SCIENTIFIC INFORMATION	
WEATHER AND SAFETY	RESEARCH AND DEVELOPMENT	
Weather and Safety Centre	Climate Change	
Customer Services	Air Quality	
Development of Services	Meteorology	
ICT Management Services	Marine Research	
Observation Services	Earth Observation	
	Arctic Research	
	Kuopio Unit	
	Consulting Services	

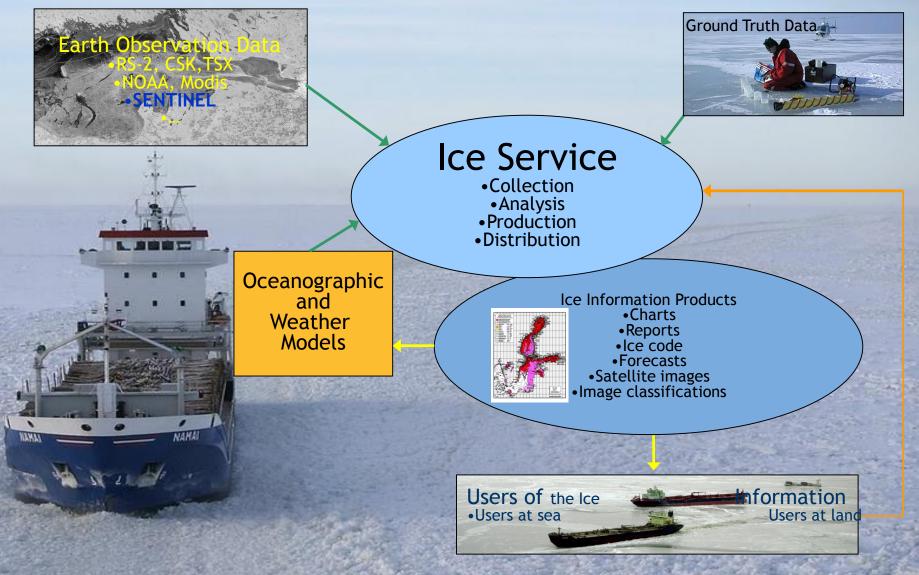


FINNISH METEOROLOGICAL INSTITUTE

- » fmi.fi
- » climateguide.fi

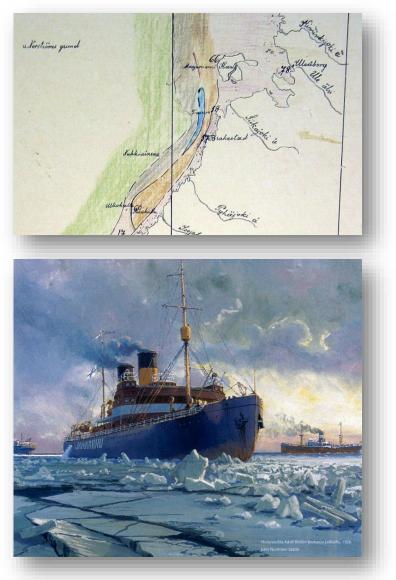


Finnish Ice Service





Finnish Ice Service



- The Baltic sea freezes every winter
- Finland has long experience in ice monitoring – first done in 1846
- Systematically since 1897
- First icebreakers in 1890's
- Ice chart published once a week starting in 1915
- Ice report published in newspapers once a week starting January 1918
- All major harbours kept open since 1971
- Nowadays ice chat published daily during winter months



Past to Present - satellite information



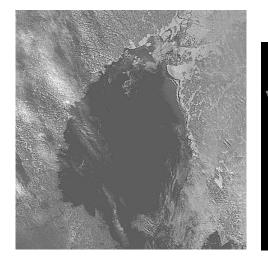
ESSA, February 14th 1968. Resolution >5 km.

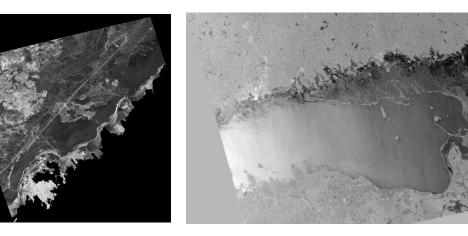
1968: ESSA data into operational use.

1981: NOAA receiving station in use 1992: ERS-1 SAR data into experimental operational use

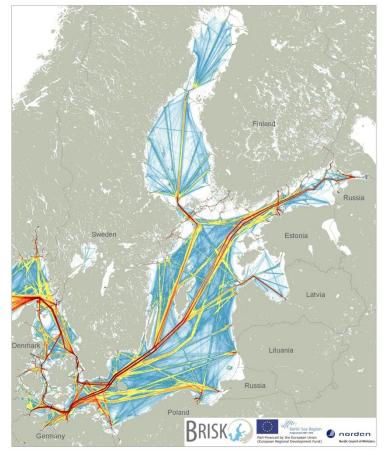
1994: Acquiring of ~100+ ERS SAR scenes/winter 1997: RADARSAT in experimental use 1998: Purchasing of 100+ RADARSAT images a winter 2002-12: ENVISAT ASAR

2015> : Sentinel-1

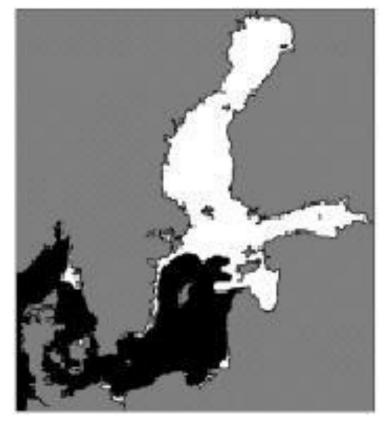








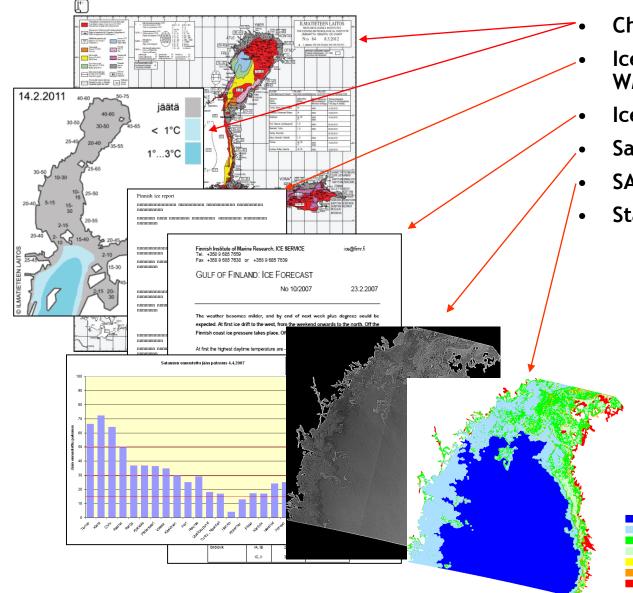
Ship traffic intensity in the Baltic Sea 2008-2009



Example of an average winter: 1994, maximum ice extent 206,000 km2



Routine Products

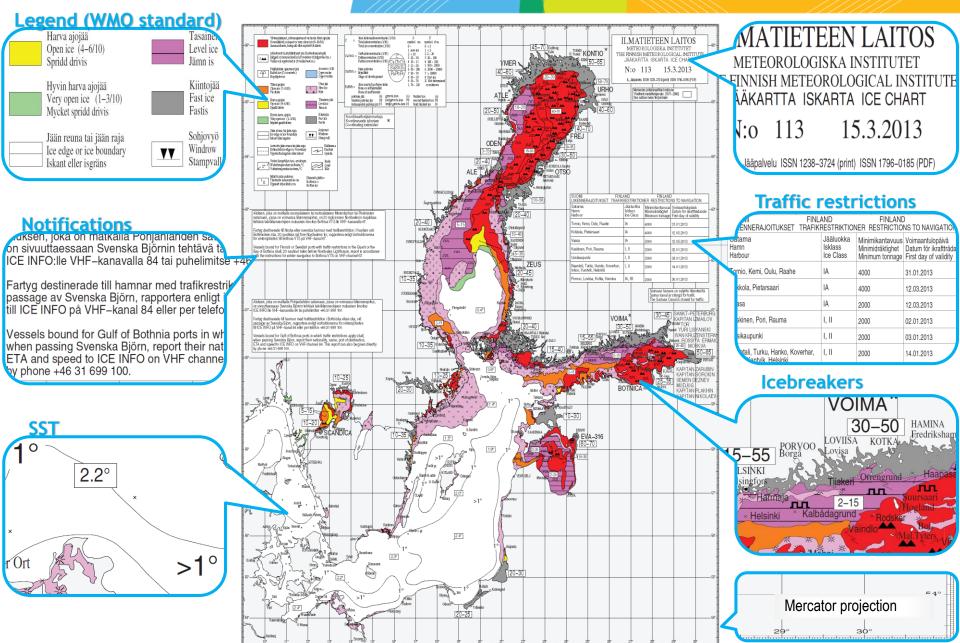


- Charts (WMO code + general)
- Ice reports (Fin, Swe, Eng), WMO Ice codes
- Ice forecasts
- Satellite images
- SAR classifications
- Statements

open sea thin ice thick ice 1 thick ice 2

def ice 1 def ice 2 fast ice





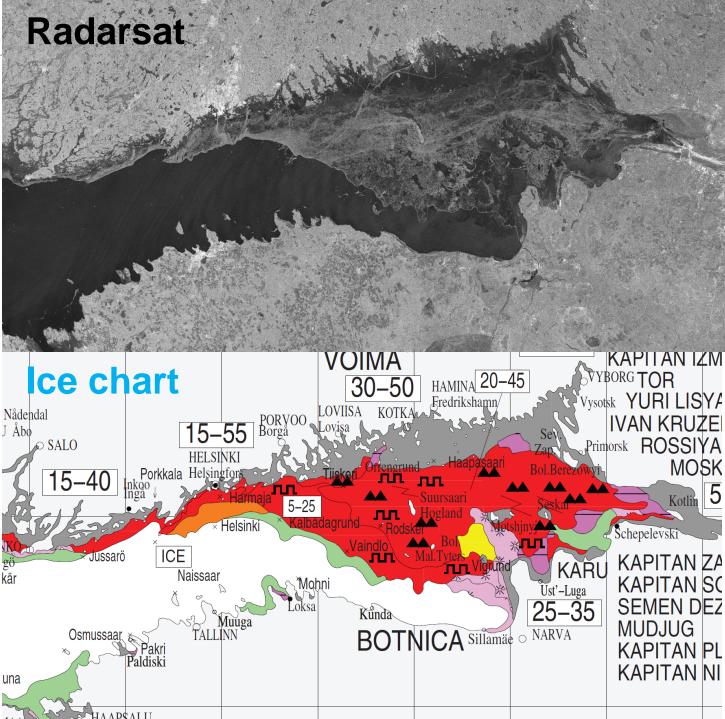


Ice charting:

from SAR image

to

Ice Chart







Internal ice forecast results



more info..

Variable

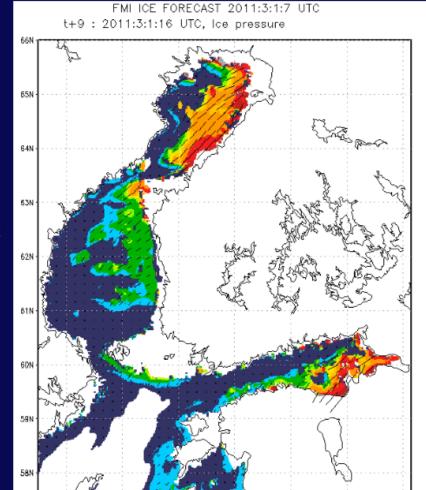
Ice motion and concentration Mean ice thickness Ridged ice thickness Ridged ice concentration Compressive region Deformed ice fraction **Pressure in ice**

Area

Northern Baltic Sea Bay of Bothnia Gulf of Finland Helsinki-Tallinn line Hanko-Paldiski

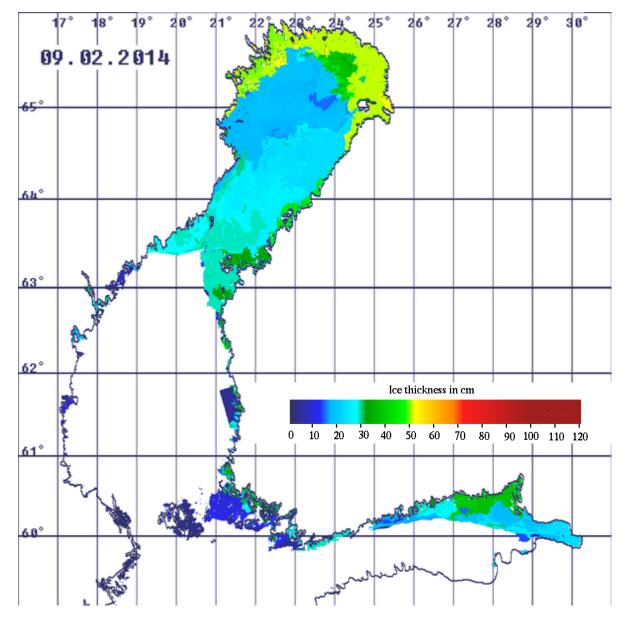
Timestep

<u>0 h</u>	<u>3 h</u>	<u>6 h</u>	<u>9 h</u>
12 h	15 h	18 h	21
24 h	27 h	30 h	33 I
36 h	39 h	42 h	45 I





EO SAR classification





EO SAR classification

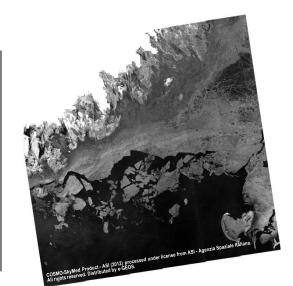
COSMO-SkyMed 3

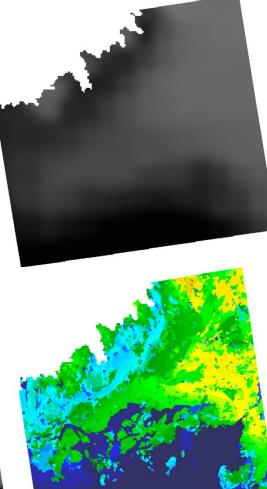
ScanSAR Huge Region Acquisition Mode - 100m resol.

23rd March 2012, 02:36 (UTC)

Ascending Orbit, Right Looking

HH Pol.

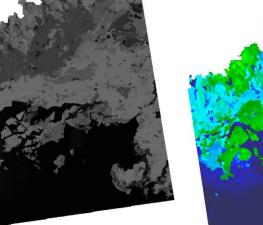




0 10 20 30 40 50 60 70 80 90 100 110 120

HIGHTSI ice thickness

Segment wise texture value

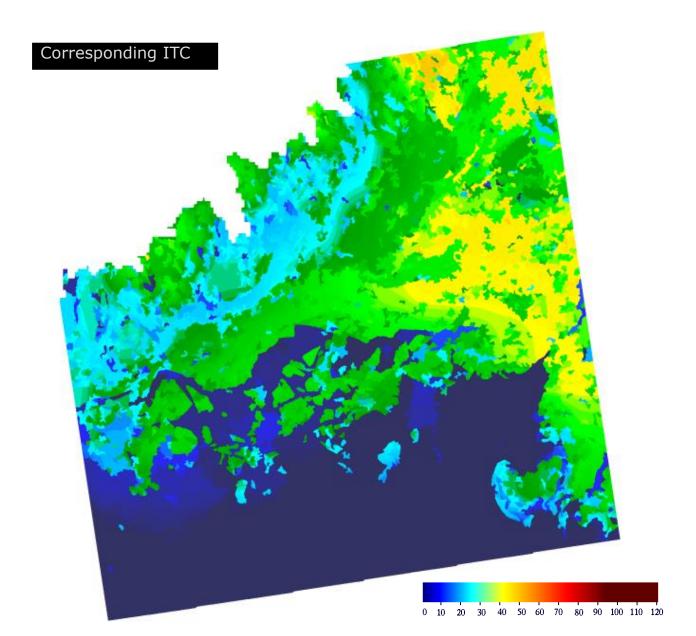


Corresponding ITC



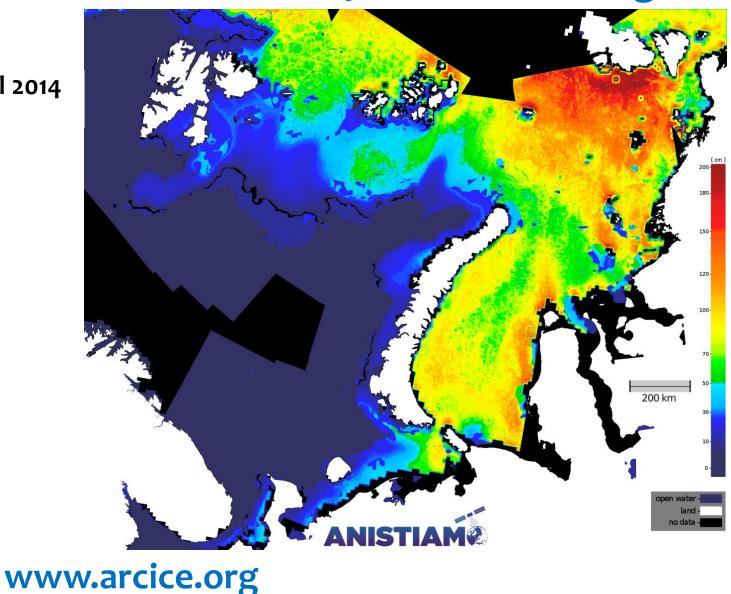
ILMATIETEEN LAITOS Meteorologiska institutet Finnish meteorological institute

EO SAR classification



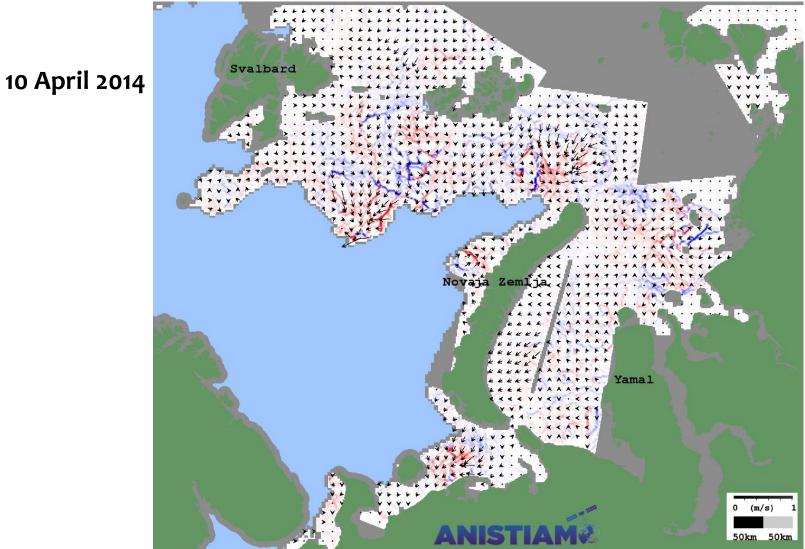


Sea ice identification by remote sensing methods



10 April 2014





www.arcice.org

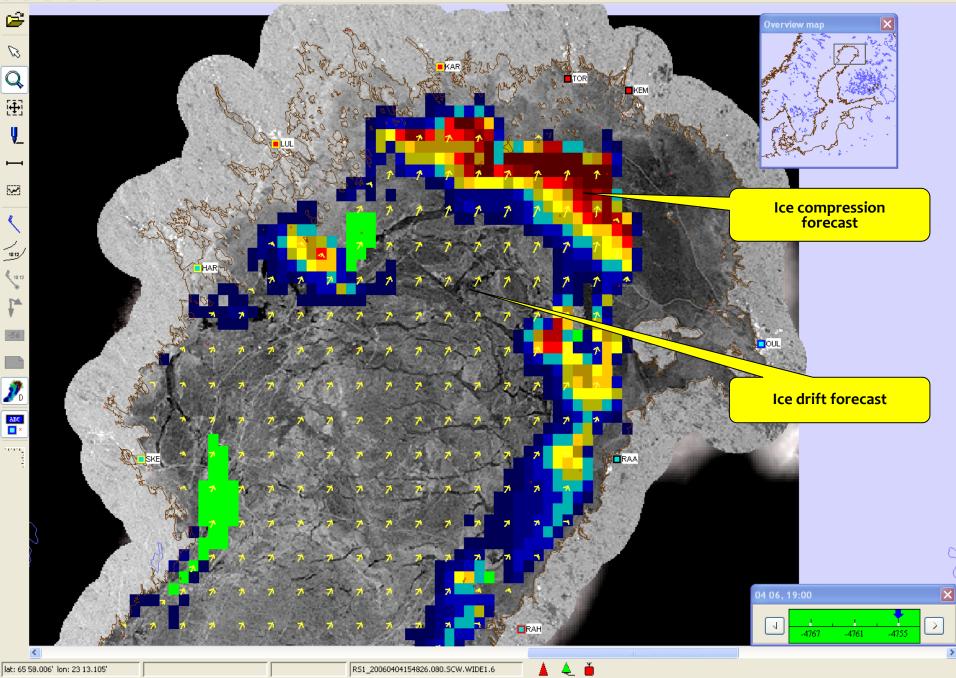
Editera Visa Verktyg <u>V</u>äljobjekt Hjälp

RDP OTS **IBPlott - main** symbols Port /ME Icebreakers OUL SIL DirWay RAA (KON Ships Thin ice VGB. Översiktskarta SOF BE RAH ALN KOK Thick ice

4

🐺 IBP lott v 1.9.8.0 (beta) KON (NON-REAL TIME 04 06, 19:00) DB read 6 mins ago

<u>File E</u>dit <u>V</u>iew <u>T</u>ools <u>H</u>elp AIS Trail





Sentinel-1 ©ESA-P. Carril

Thank you!