



IMSAS audit: Met-Ocean Services at FMI

Safety and efficiency at the sea and along the coast



Team FMI



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Head of group
Oceanographic
Services

M.Sc. Oceanography, Helsinki University 2008
Scientist at Finnish Institute of Marine research
1997 – 2008
Scientist and Oceanographer, Oceanographic
Services
2009 – 2022
Head of group, Oceanographic Services
2023 –



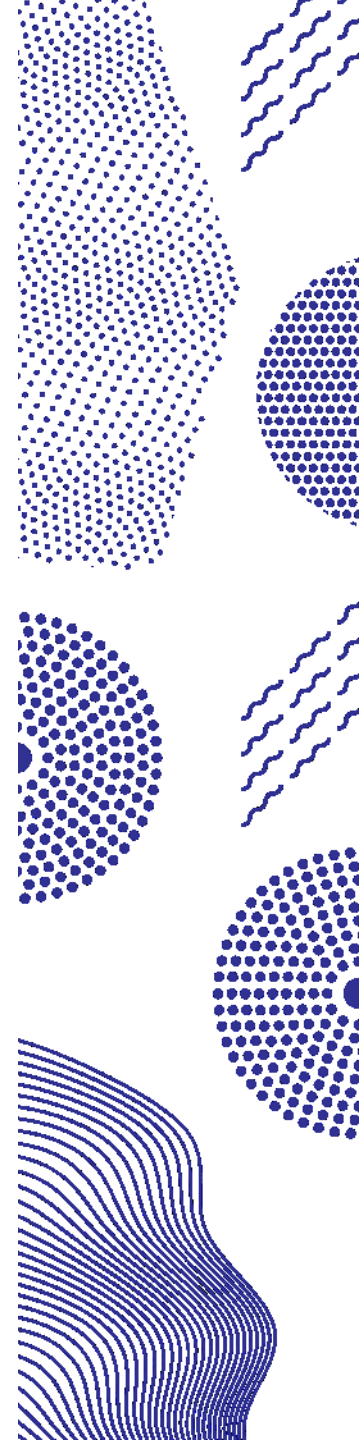
Sanna Mäkinen
Quality Manager

Quality Manager
Weather, Sea and Climate Service Centre



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Customer
Services, Safety

M.Sc. Oceanography, Helsinki University 2005
Scientist at Finnish Institute of Marine research
2005 – 2008
Head of group, Oceanographic Services
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2023 –



**FINNISH METEOROLOGICAL INSTITUTE
IS A RESEARCH AND SERVICE AGENCY
UNDER THE MINISTRY OF TRANSPORT
AND COMMUNICATIONS.**

We produce observation and research data on the atmosphere, the near space and the seas, as well as weather, sea, air quality and climate services for the needs of public safety, business life and citizens.

LAW ON FMI 212/2018

Organization

FMI in a nutshell

- Established 1838 (1880)
- Combined with physical oceanography in 2009
- 725 person-years (2023)
- Headquarter in Helsinki
- Weather and Safety Centre is responsible for producing operational services

**DIRECTOR
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AND MARINE RESEARCH
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Anders Lindfors

Marine Research
Laura Tuomi

**Weather and Climate
Change Impact Research**
Hilppa Gregow

**CLIMATE RESEARCH
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HANNELE KORHONEN

Climate System Research
Annalea Lohila

**Atmospheric
Composition**
Antti Hyvärinen

**Atmospheric Research
Centre of Eastern Finland**
Sami Romakkaniemi

**SPACE AND EARTH
OBSERVATION CENTRE**
JOUNI PULLIAINEN

**Earth Observation
Research**
Johanna Tamminen

**Space Research and
Observation Technologies**
Ari-Matti Harri

Arctic Space Centre
Jyri Heilimo

**OBSERVING AND
INFORMATION SYSTEMS
CENTRE**
TARJA RIIHISAARI

Observation Services
Vesa Kurki

**ICT and Data
Production**
Matti Keränen

Service Development
Mikko Visa

**WEATHER, SEA AND
CLIMATE SERVICE CENTRE**
JUHANA HYRKKÄNEN

**Weather and
Safety Centre**
Anssi Vähämäki

Customer Services
Jaakko Nuottokari

Expert Services
Harri Pietarila

ADMINISTRATION
MARKO VILJANEN

Financial
Janna Karasjärvi

Personnel
Minna Laatikainen

**Administrative
Services**
Jaana Palmunoksa

Quality Manager
Sanna Mäkinen

Risk Management Manager
Sanna Matikainen

Chief Architect
Mikko Rauhala

Production Manager
Anu Petäjä

Information Security Manager
Simo Poskiparta

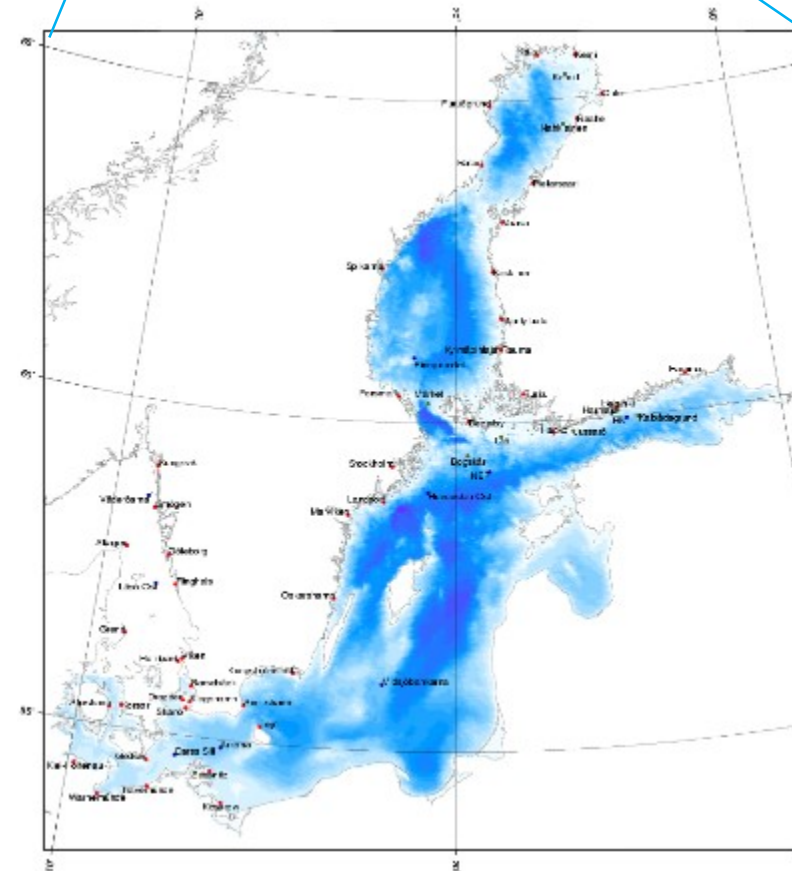
Security Manager
Ari-Juhani Punkka

Preparedness Manager
Ari-Juhani Punkka

Baltic Sea

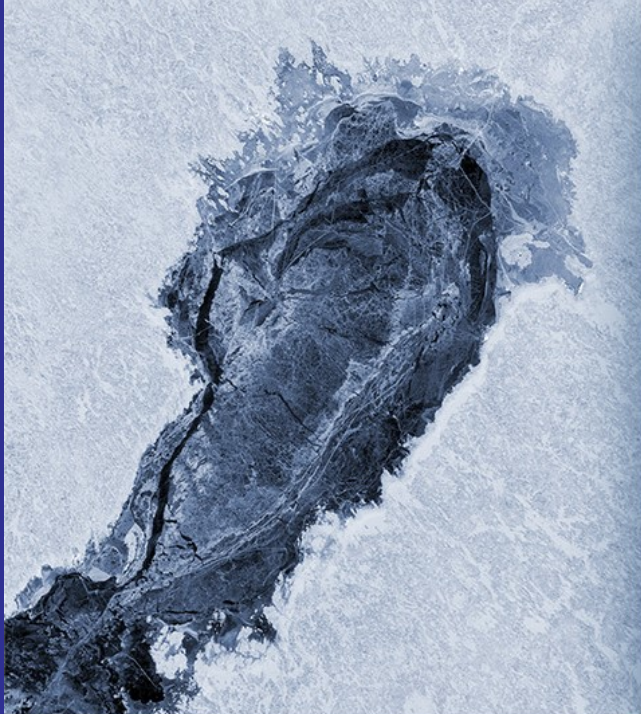
- Nearly closed sea
- Shallow, bottom topography plays important role
- Max depth 450 m
- Average 55 m
- Brackish water, salinity 0-22 ppt
- Partly ice-covered during winter

- Vulnerable to pollution due to shallow bathymetry
- High traffic intensity area
- About 85 million people live in the Baltic drainage basin area.



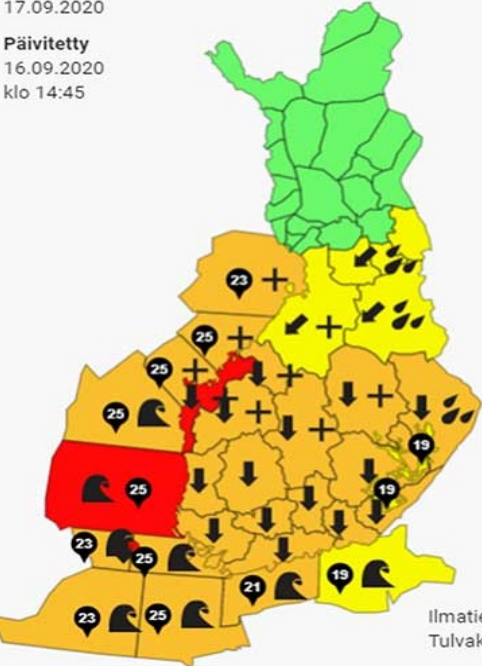
Ilmatieteenlaitos
METSÄLÄN KATU 1
00560 HELSINKI
Puhelin: 09 2534 2100
Faksi: 09 2534 2101
www.ilmatieteenlaitos.fi

Services to ensure safe sea traffic in all conditions



Varoitukset
17.09.2020

Päivitetty
16.09.2020
klo 14:45



FMI tasks described in the law

(Background in SOLAS V/5 reg 5 Meteorological services and warnings)

LAW OF METEOROLOGICAL INSTITUTE: <https://www.finlex.fi/fi/laki/alkup/2018/20180212>

2 § Duties

1) **provide weather and physical maritime services for the needs of the country's public safety, transport, business life and citizens;**

2) **obtain and maintain reliable information on the physical state and chemical composition of the atmosphere and seas, climate and their effects in different sectors of Finnish society and internationally;**

... the Finnish Meteorological Institute shall in particular:

1) **warns of dangerous changes in the weather and the physical state of the sea;**

2) **is responsible for forecasting and warning of harmful substances in the atmosphere when this is not the responsibility of another authority;**

...

4) **is responsible for maintaining and continuously providing weather and marine data, as well as flow and drift forecasts for rescue and sea rescue operations;**

5) **supports the actions of other authorities in the event of disruptive natural phenomena and natural disasters;**

6) **develop and maintain new measurement and model methods for the use of weather, marine, climate and space services and scientific research;**

...



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

Helsingissä 6 päivänä huhtikuuta 2018

Laki Ilmatieteen laitoksesta

Eduskunnan päätöksen mukaisesti säädetään:

1 §

Asema ja toiminta-ajatus

Ilmatieteen laitos on liikenne- ja viestintäministeriön hallinnonalalle kuuluva palvelu- ja tutkimuslaitos, joka tuottaa havainto- ja tutkimustietoa ilmakehästä ja meristä sekä sää-, meri- ja ilmastopalveluita yleisen turvallisuuden, elinkeinoelämän ja kansalaisten tarpeisiin.

2 §

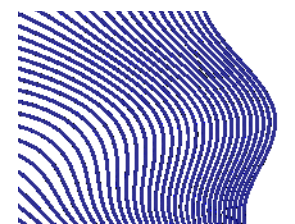
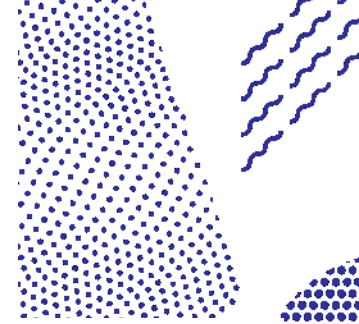
Tehtävät

Ilmatieteen laitoksen tehtävänä on:

- 1) tuottaa sääpalveluita ja fysikaalisia meripalveluita maan yleisen turvallisuuden, liikenteen, elinkeinoelämän ja kansalaisten tarpeisiin;
- 2) hankkia ja ylläpitää luotettavaa tietoa ilmakehän ja merien fysikaalisesta tilasta ja kemiallisesta koostumuksesta, ilmastosta sekä niiden vaikutuksista suomalaisen yhteiskunnan eri osa-alueilla ja kansainvälisesti; sekä
- 3) tehdä ja edistää ilmatieteellistä tutkimusta, fysikaalista merentutkimusta, polaarialueiden ja avaruuden tutkimusta sekä muuta alaan läheisesti liittyvää tutkimusta.

Edellä 1 momentissa tarkoitettuja tehtäviä suorittaessaan Ilmatieteen laitos erityisesti:

- 1) varoittaa vaaraa aiheuttavista säätilan ja meren fysikaalisen tilan muutoksista;
- 2) vastaa ilmakehässä kulkeutuvia haitallisia aineita koskevista ennusteista ja niihin liittyvistä varoituksista silloin, kun se ei kuulu muun viranomaisen tehtäviin;
- 3) tuottaa toimialansa palvelut, erityisesti lentosääpalvelut, maanpuolustuksen turvaamiseksi ja puolustusvoimien muun toiminnan varmistamiseksi sekä normaalioloissa että normaaliolojen häiriötilanteissa ja poikkeusoloissa;



FMI tasks described in the law

...Continued...

Maritime Search and Rescue Act: <https://www.finlex.fi/en/laki/kaannokset/2001/en20011145>

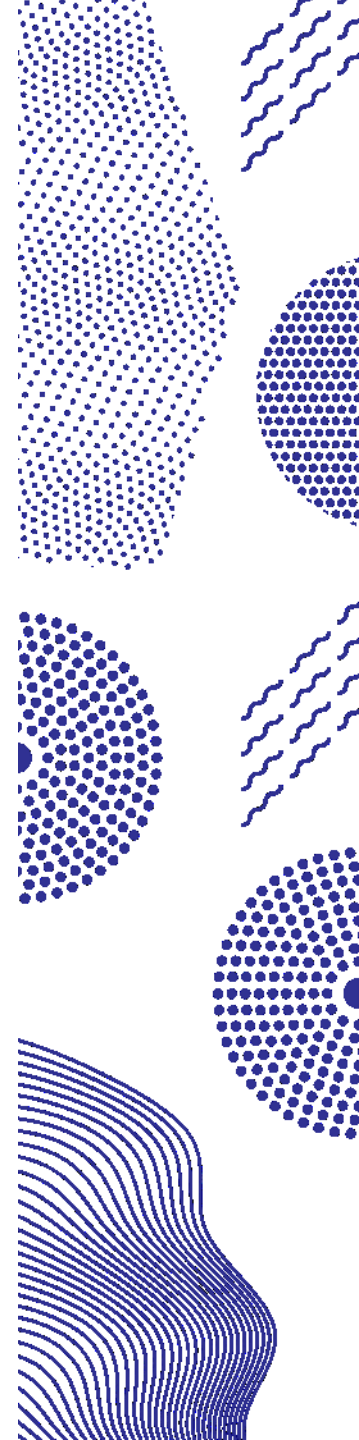
- *Section 4 Other authorities and actors participating in maritime SAR: In addition to the Border Guard ... the Finnish Meteorological Institute... are obliged to participate, free of charge, in maritime SAR duties*

Safety Investigation Act: <https://www.finlex.fi/fi/laki/kaannokset/2011/en20110525>

- *Section 24 – Reports and statements: The Safety Investigation Authority or the investigation team may order a report from another authority or from a private instance on an aspect requiring special expertise, and request a statement from such an authority or private instance regarding a specific issue.*
- *Section 42 – Cooperation and executive assistance: On the request of the Safety Investigation Authority or of the investigation team referred to in chapter 5 an authority shall prepare the reports and conduct the studies that fall within its competence and that are essential for the purpose of the investigation and that the Authority or the investigation team itself cannot conduct, and provide the Authority also with other executive assistance that it requires.*

Act on Oil Pollution Response: <https://www.finlex.fi/fi/laki/kaannokset/2009/en20091673>

- *No direct reference to FMI, but the Act of Meteorological Institute §2 Task 4: shall be responsible for maintaining and continuously providing weather and marine data, as well as flow and drift forecasts for rescue and rescue operations at sea*



Weather Services at FMI

Our key services for navigation are

- Warnings
 - According to [WMO guidelines \(WMO-No. 55\)](#)
- Weather forecasts for shipping
- Weather observations from 51 coastal stations: wind speed, air pressure, visibility, temperature
- Weather radars
- Oceanographic observations
 - Sea level 14 stations
 - Waves 5 wave buoys
- Analyzed sea-ice chart, ice bulletins
- Oil spill and chemical release forecasting



FMI's marine products

Wind and
air pressure



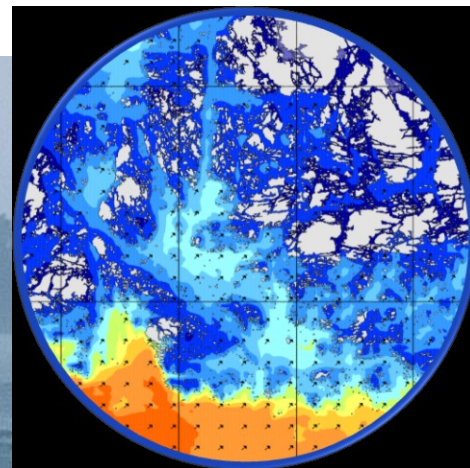
Visibility



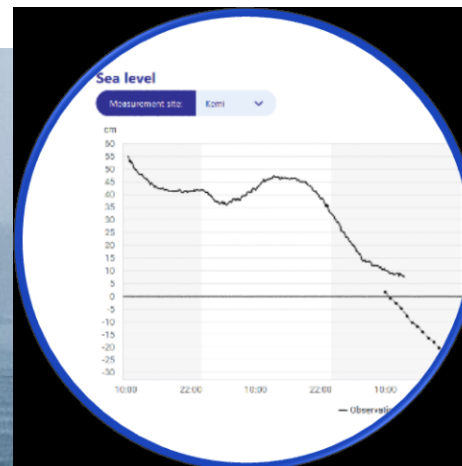
Warnings



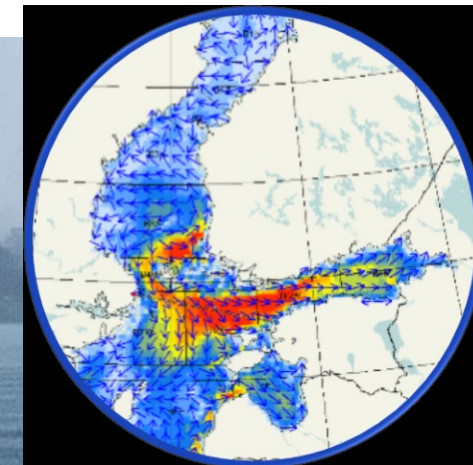
Waves



Sea level

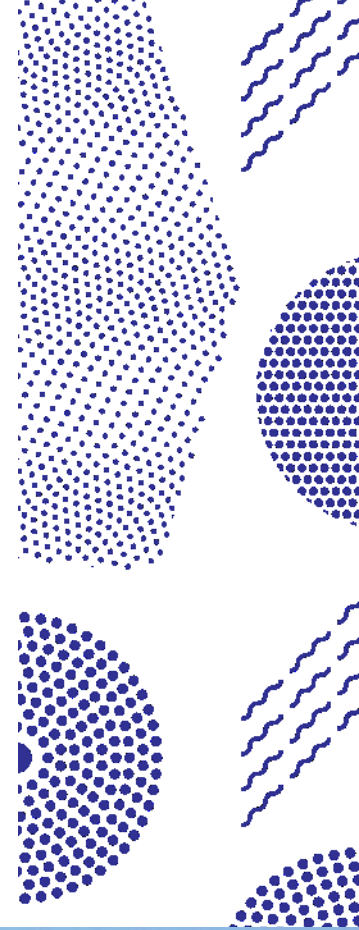


Surface currents



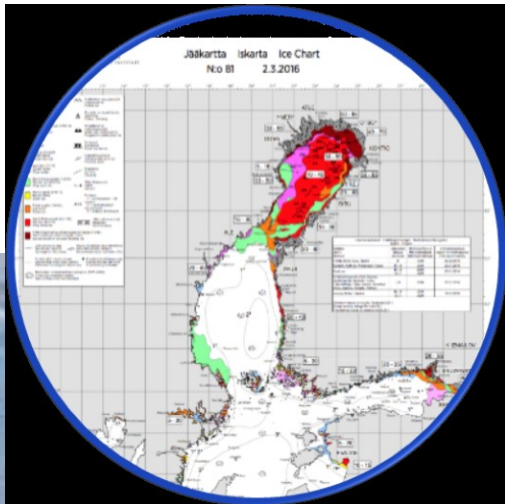
Weather Forecasts

- FMI is running, or has access to, several atmospheric and metocean forecasting models and has access to global weather model data.
- For critical applications, the model output forecast is verified and improved manually by experts before dissemination to the users. Some services are manually produced based on existing information.
- Based on the forecasts and observations, FMI issues weather warnings in accordance with the WMO guidelines.

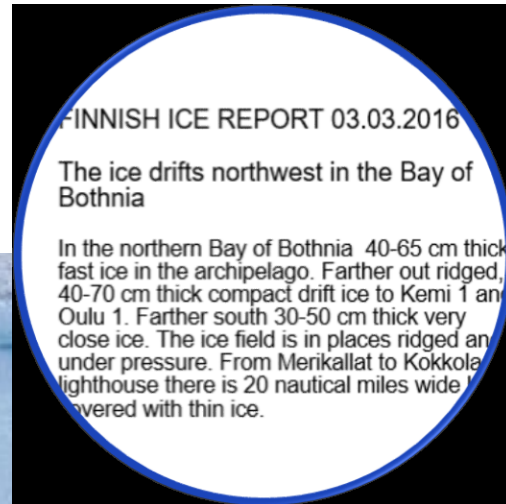


FMI ice service products

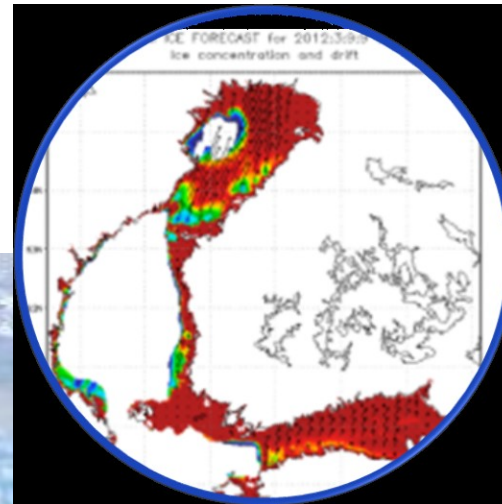
Ice chart



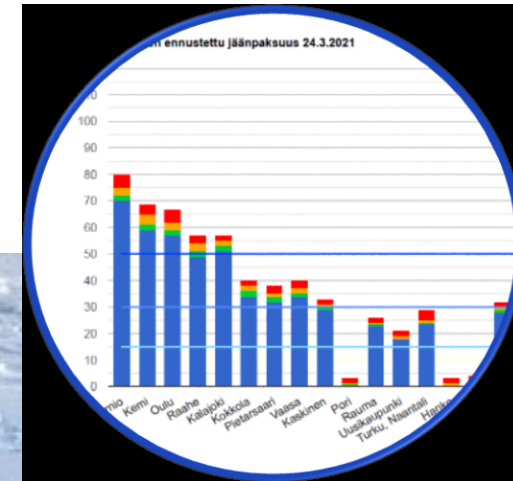
Ice report



Ice forecast

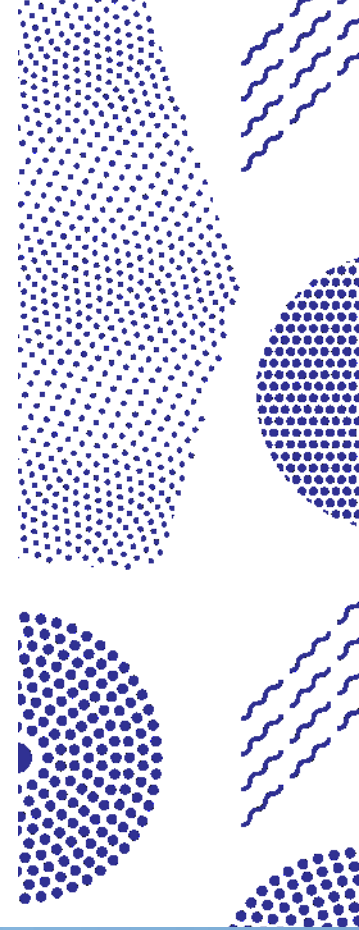


Ice thickness monitoring



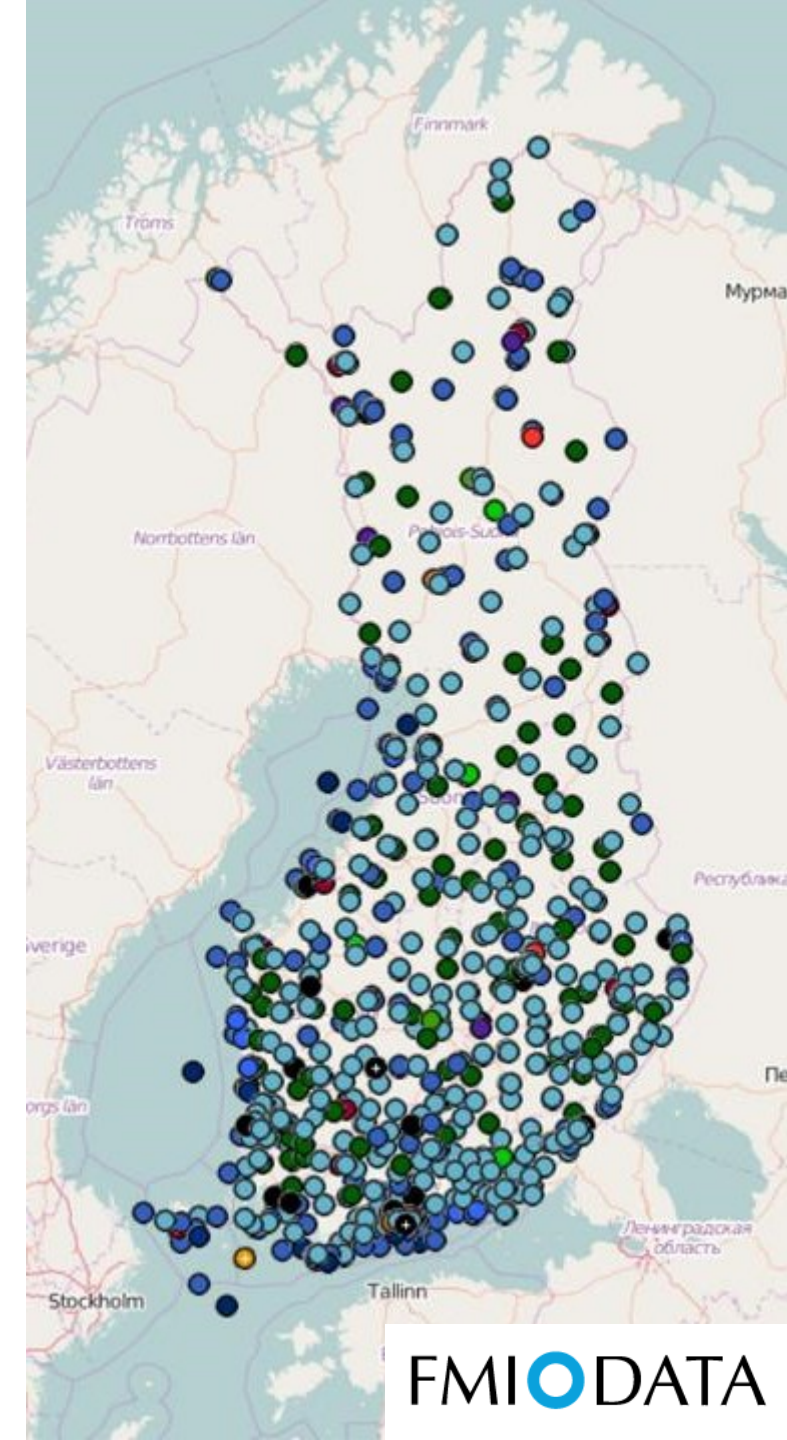
Performance

- FMI monitors and reports key performance indicators, of which the most important for shipping are the marine wind forecast accuracy, service delivery rate, weather forecast accuracy & forecast lead time.
- The Weather, Sea and Climate Centre services are ISO 9001:2015 certified and audited regularly by an external operator.
- In addition, an extensive customer feedback survey is conducted annually, based on which operations are developed.



Observation network

Operational stations	c. 500
Automation % of stations	c. 99 %
Coastal weather stations	51
Weather radars	11 (soon 12)
Lightning location sensors	8
Tide gauges	14
Buoys, wave + SST	4 + 7
Sea ice observation stations	22



Dissemination of services

- Maritime safety radio "Turku Radio"
<https://www.fintraffic.fi/en/vts/maritime-safety-radio>
- Finnish broadcasting company "YLE" Marine weather
- Warnings shown at Finnish broadcasting company's TV-weather broadcasts

- FMI web pages
 - Navigational warnings and weather forecast
<https://en.ilmatieteenlaitos.fi/weather-and-sea>
 - Marine weather observations
<https://en.ilmatieteenlaitos.fi/marine-weather-observations>
 - Sea level information <https://en.ilmatieteenlaitos.fi/sea-level>
 - Wave information <https://en.ilmatieteenlaitos.fi/wave-height>
 - Sea ice conditions <https://en.ilmatieteenlaitos.fi/ice-conditions>

Turku Radio broadcast times

UTC BROADCAST

0233 NAVIGATIONAL WARNINGS

0633 WEATHER FORECAST, NAVIGATIONAL WARNINGS

0803 POSITIONS OF ICEBREAKERS

1033 NAVIGATIONAL WARNINGS, ICE REPORT

1433 NAVIGATIONAL WARNINGS

1833 WEATHER FORECAST, NAVIGATIONAL WARNINGS, ICE REPORT

2233 NAVIGATIONAL WARNINGS

WEATHER MESSAGES

Weather forecast for shipping 270500 UTC

No [warnings](#).

Inference

Vast area of low over Fennoscandia.

Forecast for next 24 hours:

Gulf of Finland

Mainly west 4-8 m/s, from the evening on 2-6. Good vis.

Northern Baltic, Sea of Åland and Sea of Archipelago

West to southwest 2-6 m/s, from the afternoon on 4-8. In the evening backing to south to southwest. Good vis.

Sea of Bothnia

South to southwest 2-6 m/s. From the evening on south 4-8 m/s. Good vis.

Quark and Bay of Bothnia

Variable 1-5 m/s. Good vis.

Lake Saimaa

Variable 1-4 m/s. Showers and thunder locally, otherwise good vis.

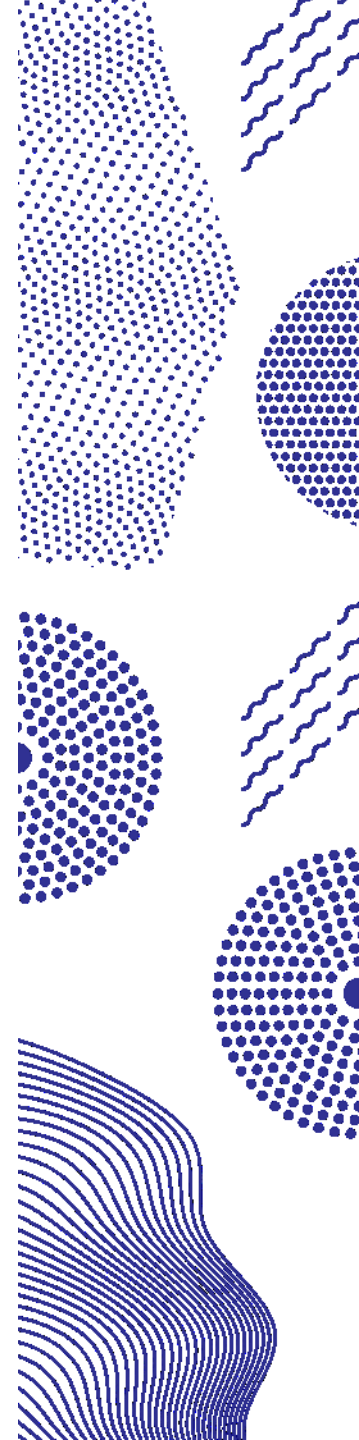
Competence requirements

- The weather and oceanographic services are produced by meteorologists and oceanographers. Requirements for them are university level education (M.Sc.) on relevant field and ability to communicate in Finnish, English, Swedish languages.
- Before independent work, training period and acceptance to tasks is given. Documents are kept in competence records (excel).
- Experts' competence is continuously improved in annual trainings, case studies, exercises and self-studies.



Exercises

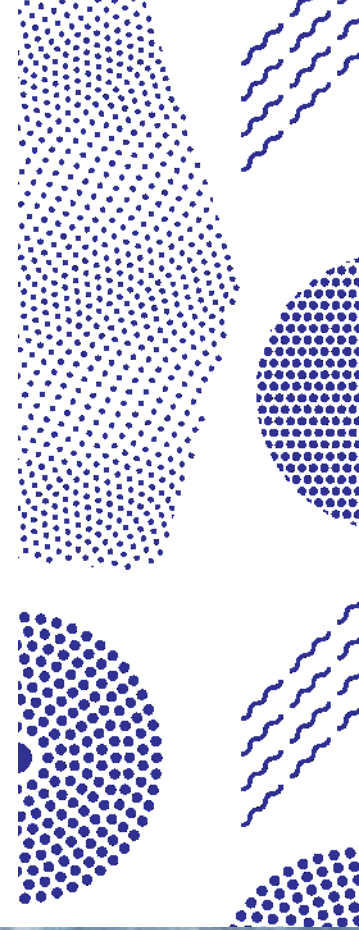
- In order to develop its services and competence, FMI is annually organizing preparedness exercises. Latest are:
 - 2023 VOLCEX23 – European volcanic eruption
 - 2022 ILMO. Multi disturbance/failure exercise.
 - 2021 Balex Delta. Large scale marine environmental response exercise.
 - 2020 OLKI. Nuclear radiation exercise.
- FMI is participating in Finnish maritime authorities' exercises by default:
 - Search and Rescue exercises (latest NATO Dynamic Mercy 2023 exercise, by FBG)
 - Environmental response exercises (Balex Delta exercises)
 - Weekly oil spill calculation exercises
- FMI is also participating in international tsunami exercises carried out every second year.



Co-operation with Finnish authorities

- The services are continuously developed in cooperation with the Finnish authorities to meet the needs of maritime users. For this task, FMI is hosting the Maritime Administration Weather Cooperation Group
- An annual extensive customer satisfaction survey is conducted, including specific questions to the maritime customers

<https://agora.fmi.fi/pages/viewpage.action?pageId=12289213>





Finnish Meteorological Institute

Collaboration - Impact - Pioneering

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Ice Service
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Links

Metarea 1 – WMO

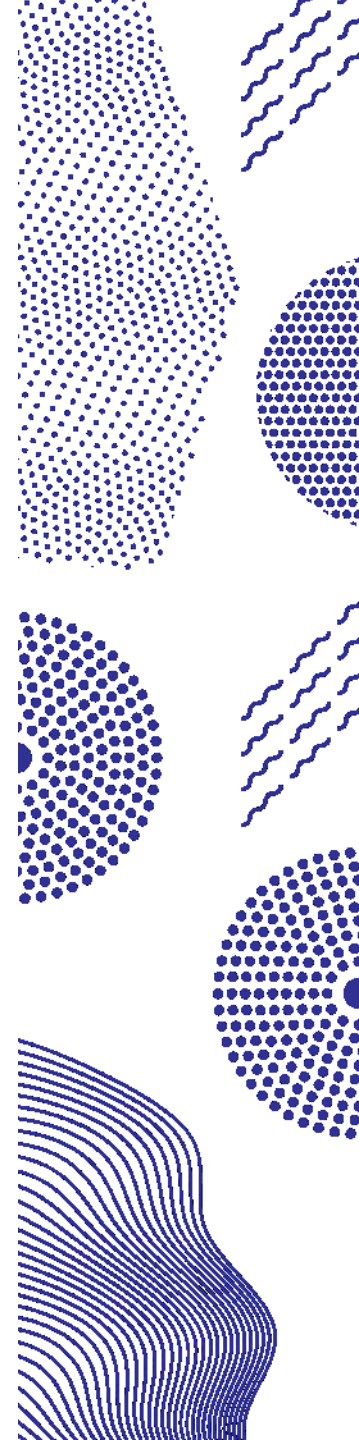
Inkl. Forecast Areas & MRCC Turku broadcasting schedule

<https://community.wmo.int/en/global-maritime-distress-and-safety-system-services-gmdss/metarea-1>

[Finnish GTS message broadcasts \(WMO Vol C1\)](#)

[FMI GTS message configurations](#)

[FMI Warnings](#)



FMI-FTIA contract, SERVICE DESCRIPTION 2a

TRANSLATION:

Other data than grids to be submitted to the VTS centre

- Messages are sent via the Finnish Meteorological Institute's messaging machine to the channels TURKURADIO (turku.radio@fintraffic.fi) and SAIMAAVTS (saimaa.vts@fintraffic.fi).
- The content of the messages is marine weather forecasts and warnings (WOFI45 EFKL Weather forecast for shipping and FQFI45 EFKL Weather forecast for shipping).
- Turku Radio will also receive ice information in English from the posti.fmi.fi server.
- SAR satellite images for the Winter Navigation are transmitted to the Finnish Transport Infrastructure Agency to the IBNet system and are available in accordance with the terms of Appendix 2b to the agreement.

ORIGINAL in Finnish

VTS-keskukselle toimitettavat muut kuin hilatiedot

- Ilmatieteen laitoksen viestikoneen kautta lähetetään sanomat kanaville TURKURADIO (turku.radio@fintraffic.fi) ja SAIMAAVTS (saimaa.vts@fintraffic.fi).
- Viestien sisältönä on englanninkieliset merisääennusteet ja -varoitukset (WOFI45 EFKL Weather forecast for shipping ja FQFI45 EFKL Weather forecast for shipping).
- Turkuradioon toimitetaan lisäksi englanninkielinen jäätiedotus posti.fmi.fi -palvelimelta.
- Väylävirastolle välitettävät talvimerenkulun SAR-satelliittikuvat IBNet-järjestelmään ovat käytettävissä sopimusliitteen 2b ehtojen mukaisesti.

