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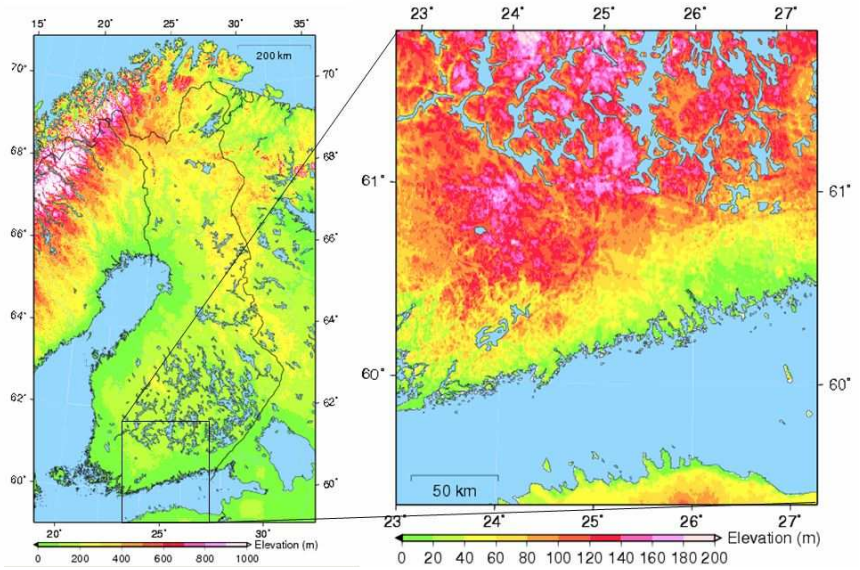
Helsinki Testbed: news from Ubicasting project and contribution to NASA's Global Precipitation Measurement mission

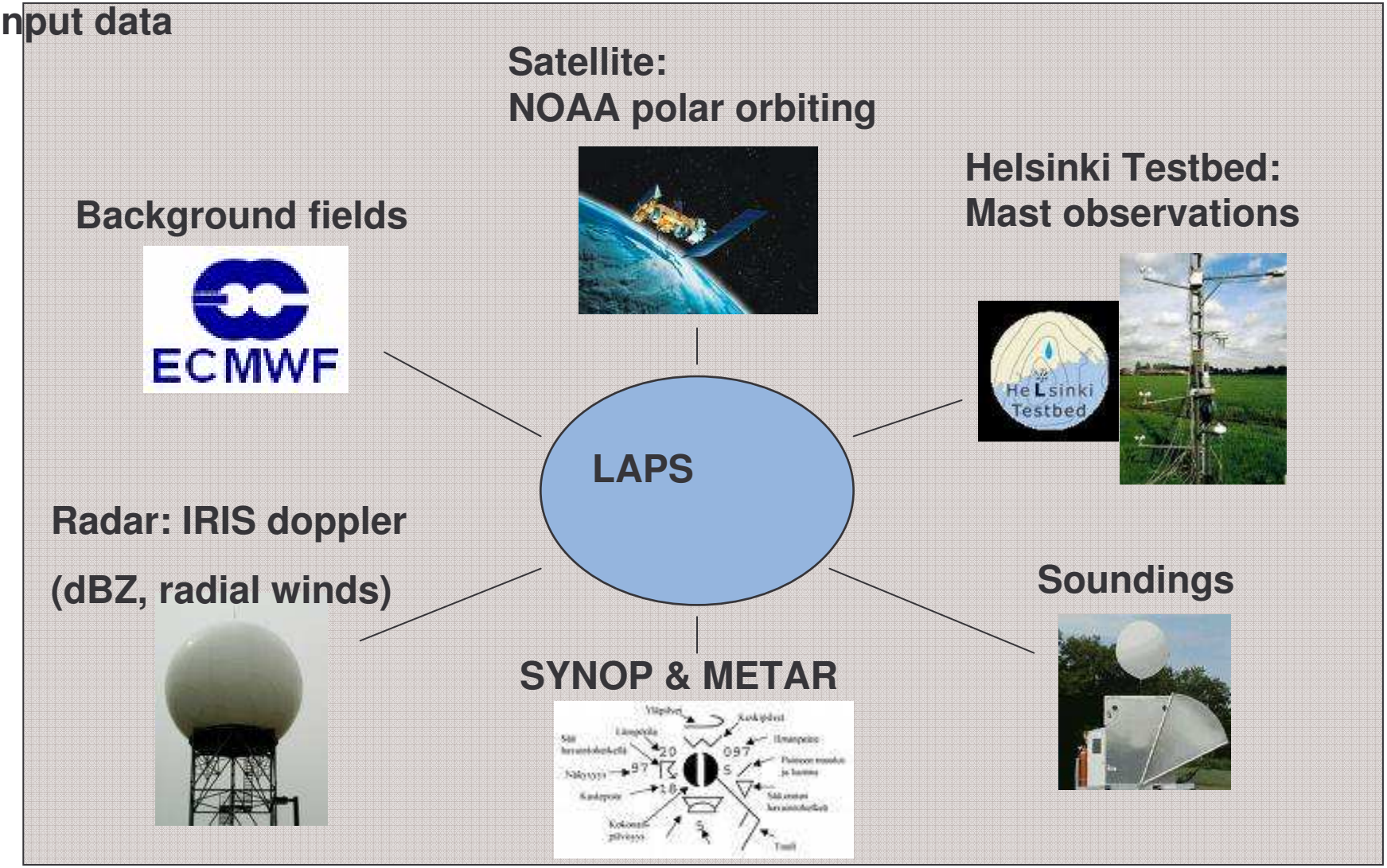
Joint NetFAM - COST ES0702 workshop, March 18, 2009, Oslo

Jani Poutiainen / FMI Observation Services



Ubicasting outcomes: Local Analysis and Prediction System

Input data



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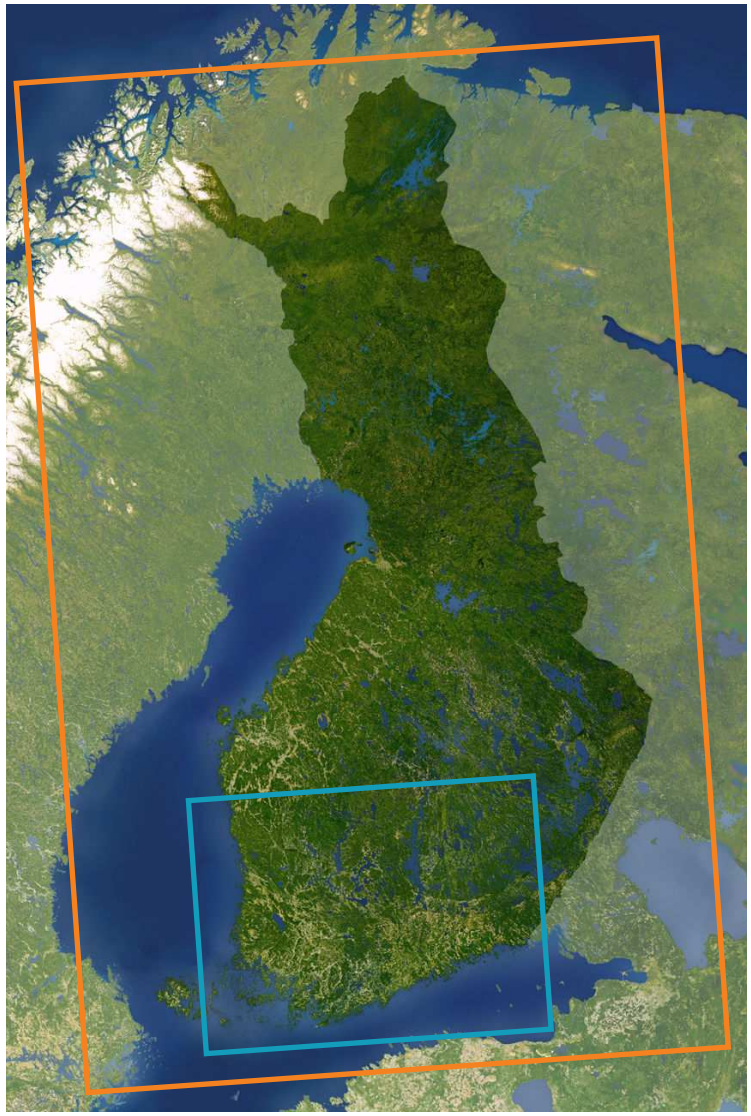
Info: Erik Gregow/FMI

Configuration for two areas

- Southern Finland (Helsinki Testbed) domain:
  Resolution 1 km in horizontal
  41 Vertical levels (every 25 hPa)
  Gridpoints: 400 * 300

- Whole Finland domain:
  Resolution 3 km in horizontal
  41 vertical levels (every 25 hPa)
  Gridpoints: 200 * 400

- Runs operationally every hour at FMI super computer system



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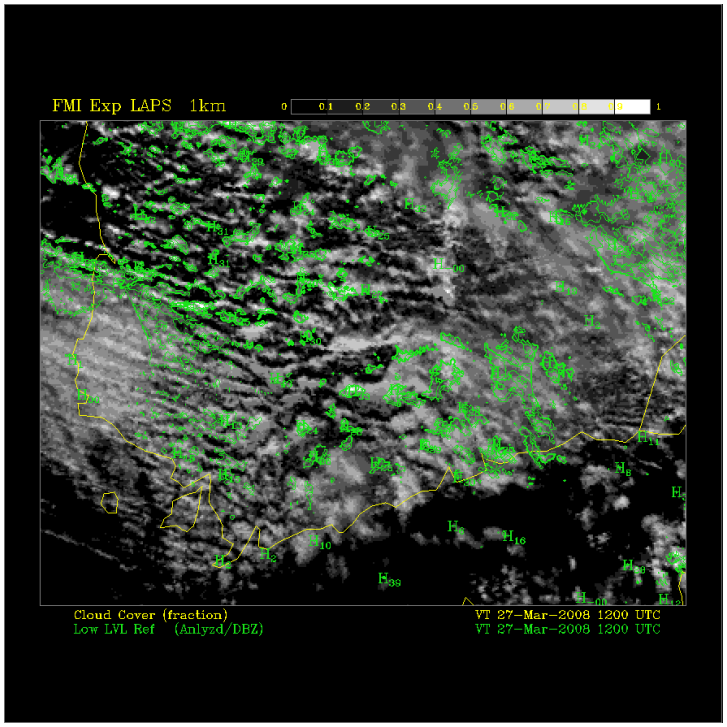
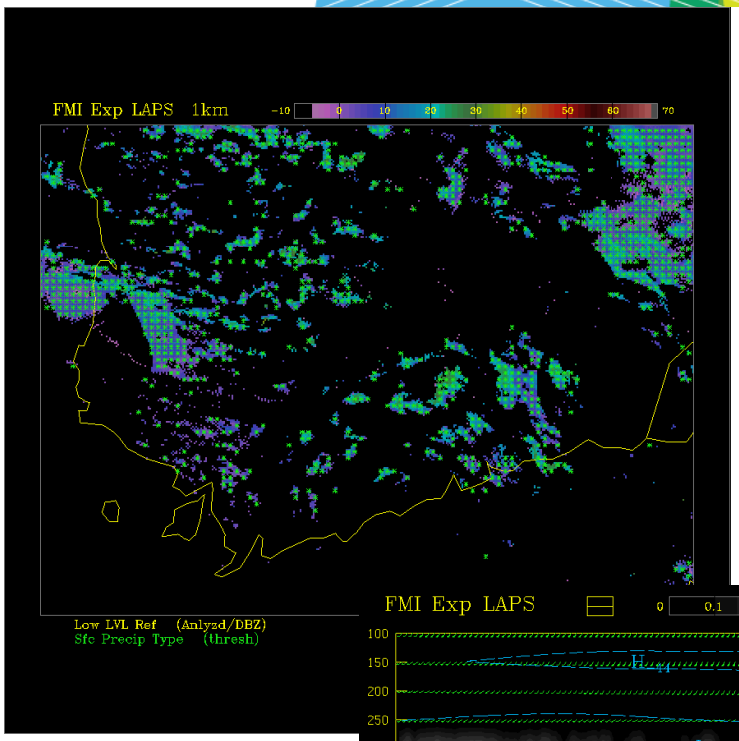
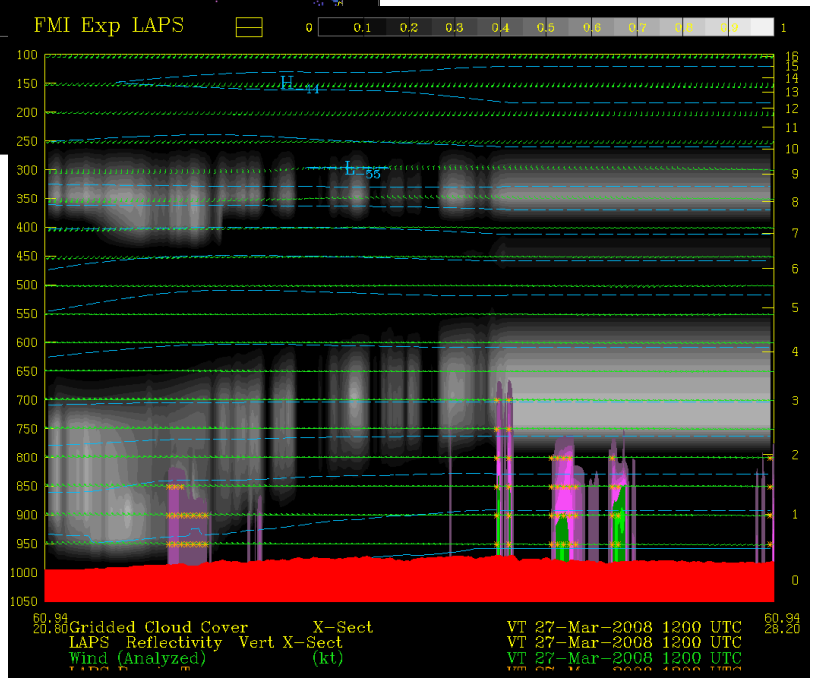






Animations at webpages:

Helsinki Testbed domain (HTB):
http://testbed.fmi.fi/history_browser-laps-helsinki-public.php

Finland domain:
http://testbed.fmi.fi/history_browser-laps-finland-public.php

Info: Erik Gregow / FMI

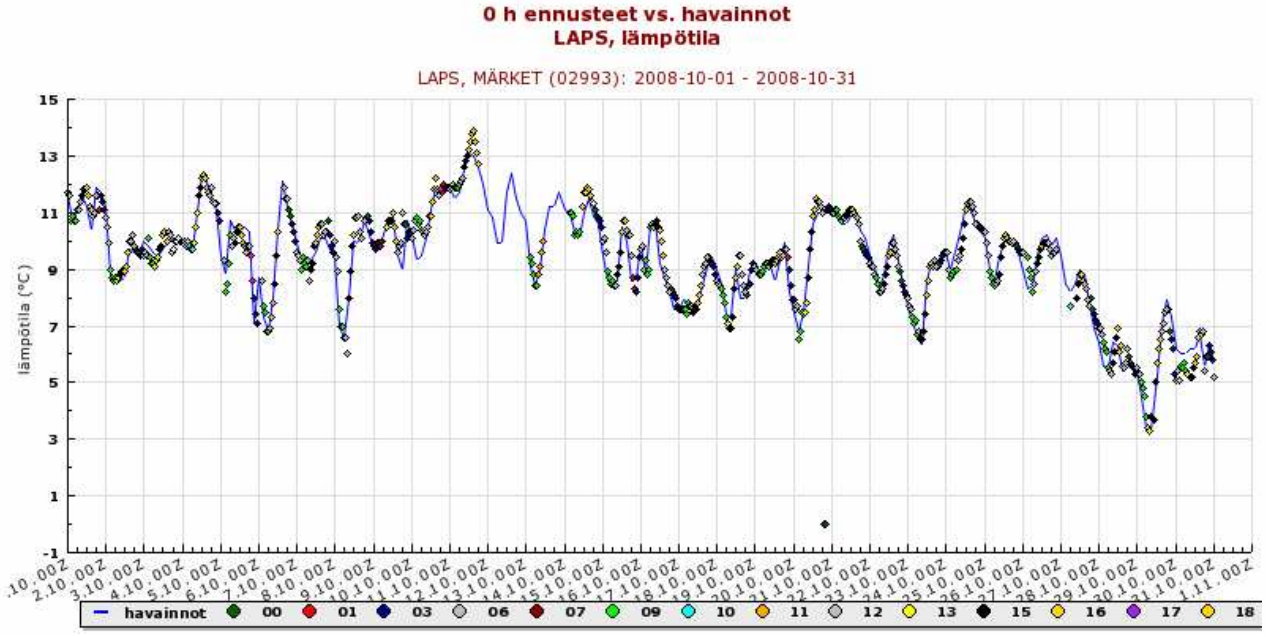
LAPS verification against observations, stations that are not used as input to LAPS analysis

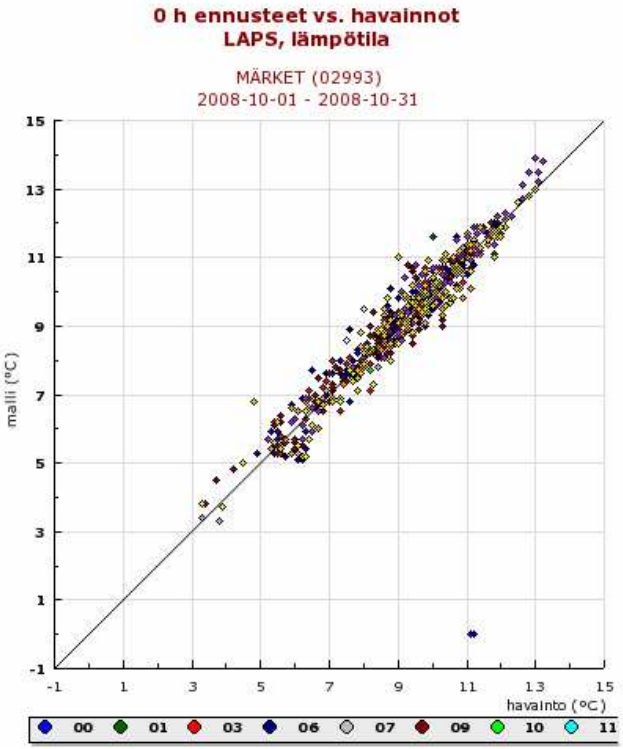
Station: Märket (green mark, seapoint west from island)

FMI observation station

Station: Märket

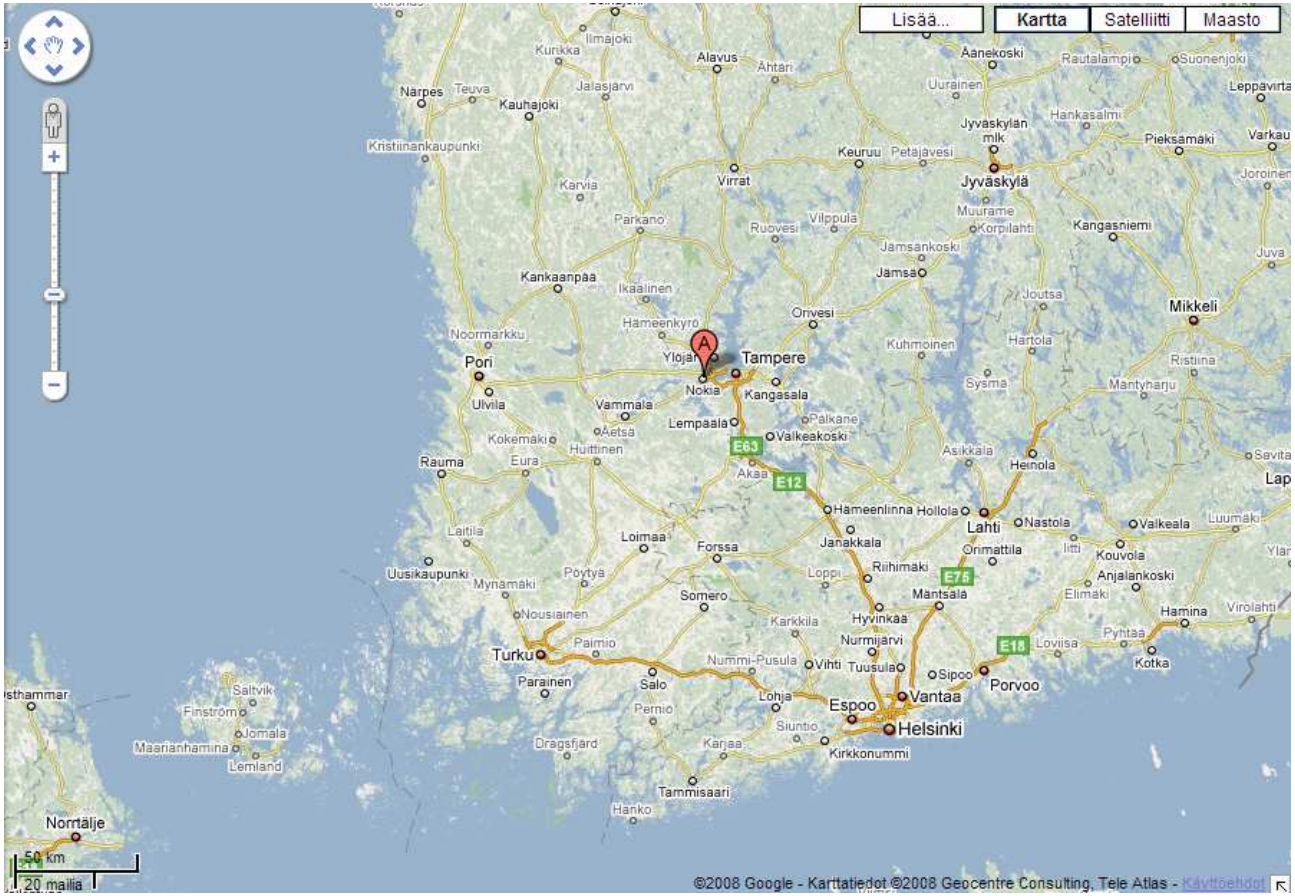
Malli: LAPS
Parametri: lämpötila
Ennustepituuden perusta: saapumisaika
Ennustepituus: 0 h
Analyysiajat: 00 UTC, 01 UTC, 03 UTC, 06 UTC, 07 UTC, 09 UTC, 10 UTC, 11 UTC, 12 UTC, 13 UTC, 14 UTC, 15 UTC, 16 UTC, 17 UTC, 18 UTC, 21 UTC, 22 UTC, 23 UTC
Alkuhetki: 2008-10-01 00:00Z
Loppuhetki: 2008-10-31 00:00Z
Asema: MÄRKET (02993)





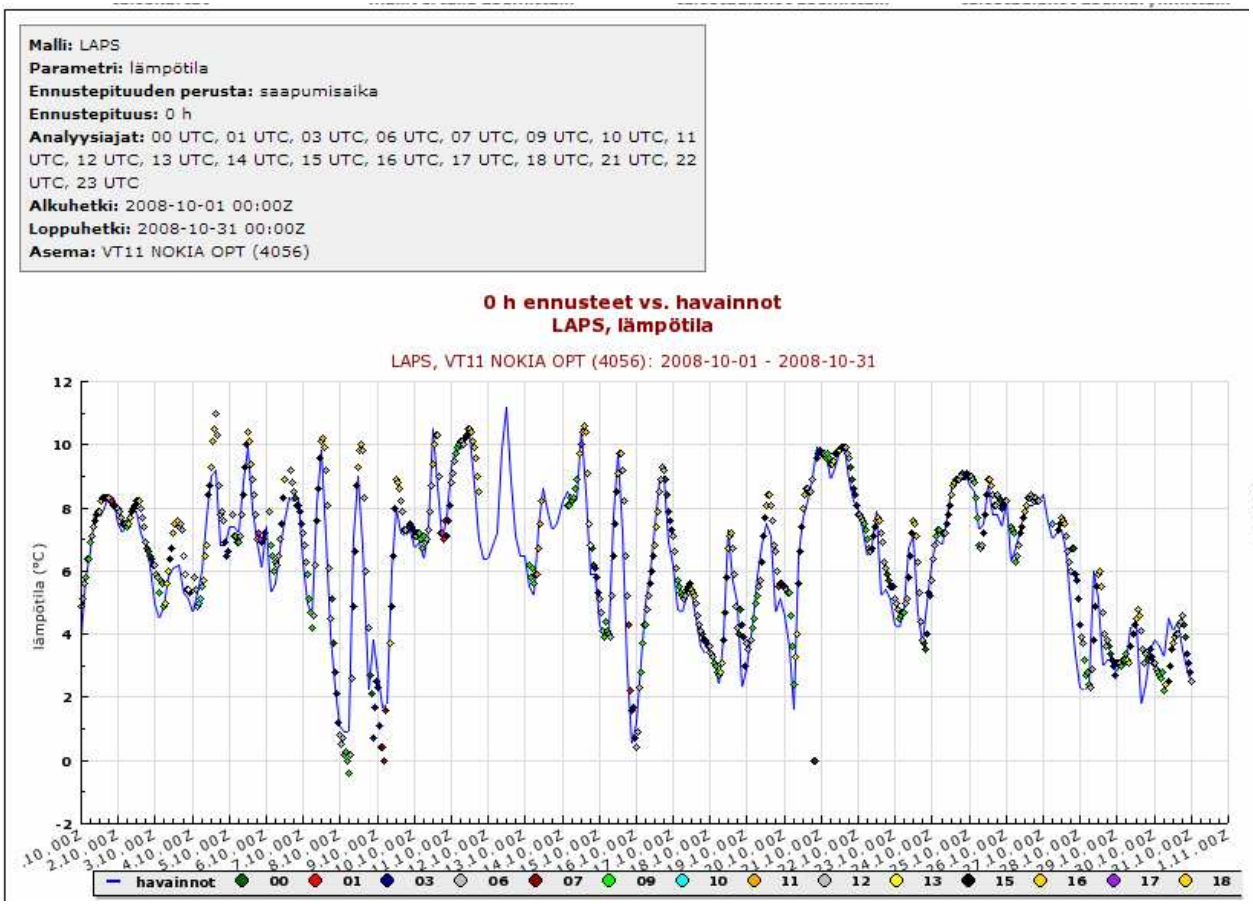
Station: VT11 Nokia OPT 4056 (see red point in map)

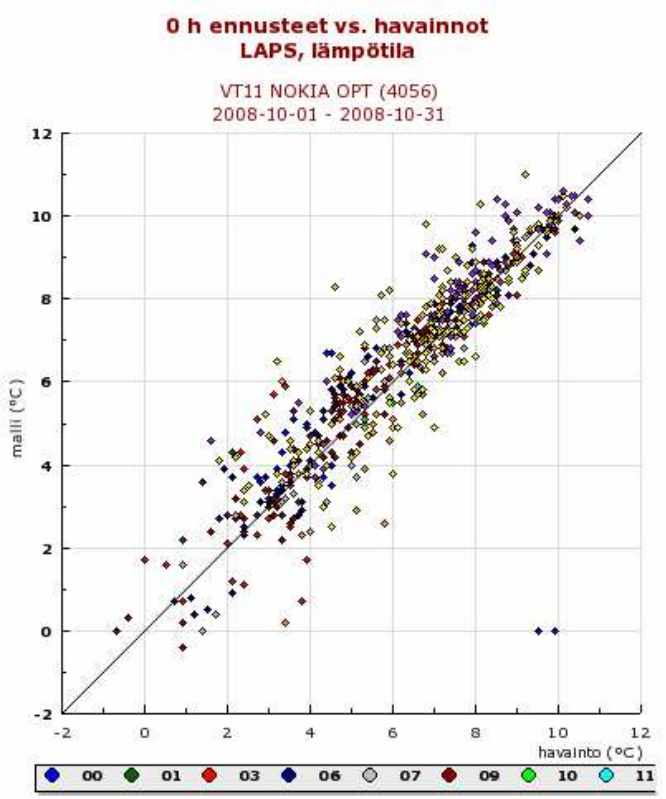
Road observation station



Station: VT11 Nokia 4056

Malli: LAPS
Parametri: lämpötila
Ennustepituuden perusta: saapumisaika
Ennustepituus: 0 h
Analyysiajat: 00 UTC, 01 UTC, 03 UTC, 06 UTC, 07 UTC, 09 UTC, 10 UTC, 11 UTC, 12 UTC, 13 UTC, 14 UTC, 15 UTC, 16 UTC, 17 UTC, 18 UTC, 21 UTC, 22 UTC, 23 UTC
Alkuhetki: 2008-10-01 00:00Z
Loppuhetki: 2008-10-31 00:00Z
Asema: VT11 NOKIA OPT (4056)





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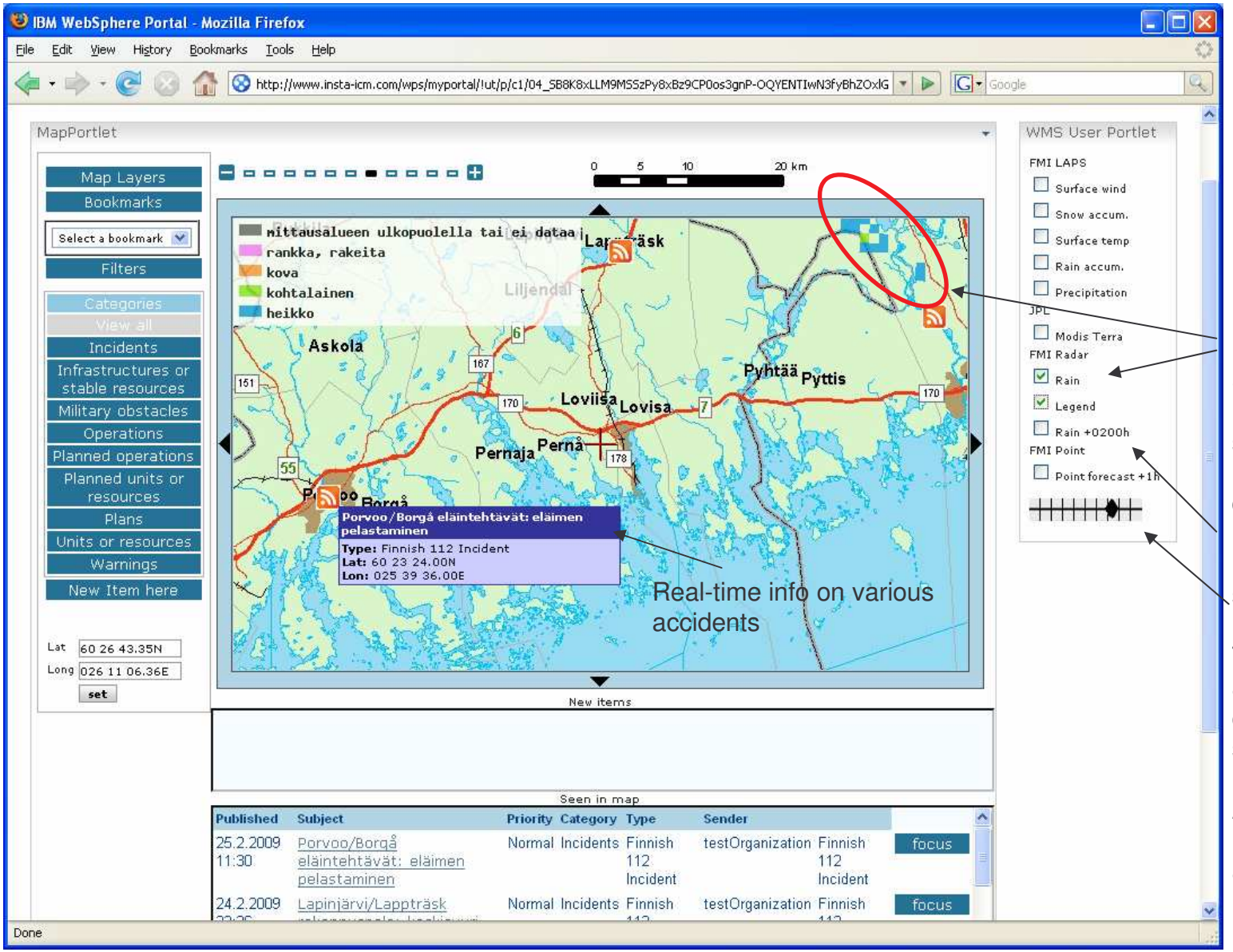
Ubicasting outcomes: Nuclear power plant weather and dispersion application



OGC/WMS/WFS based

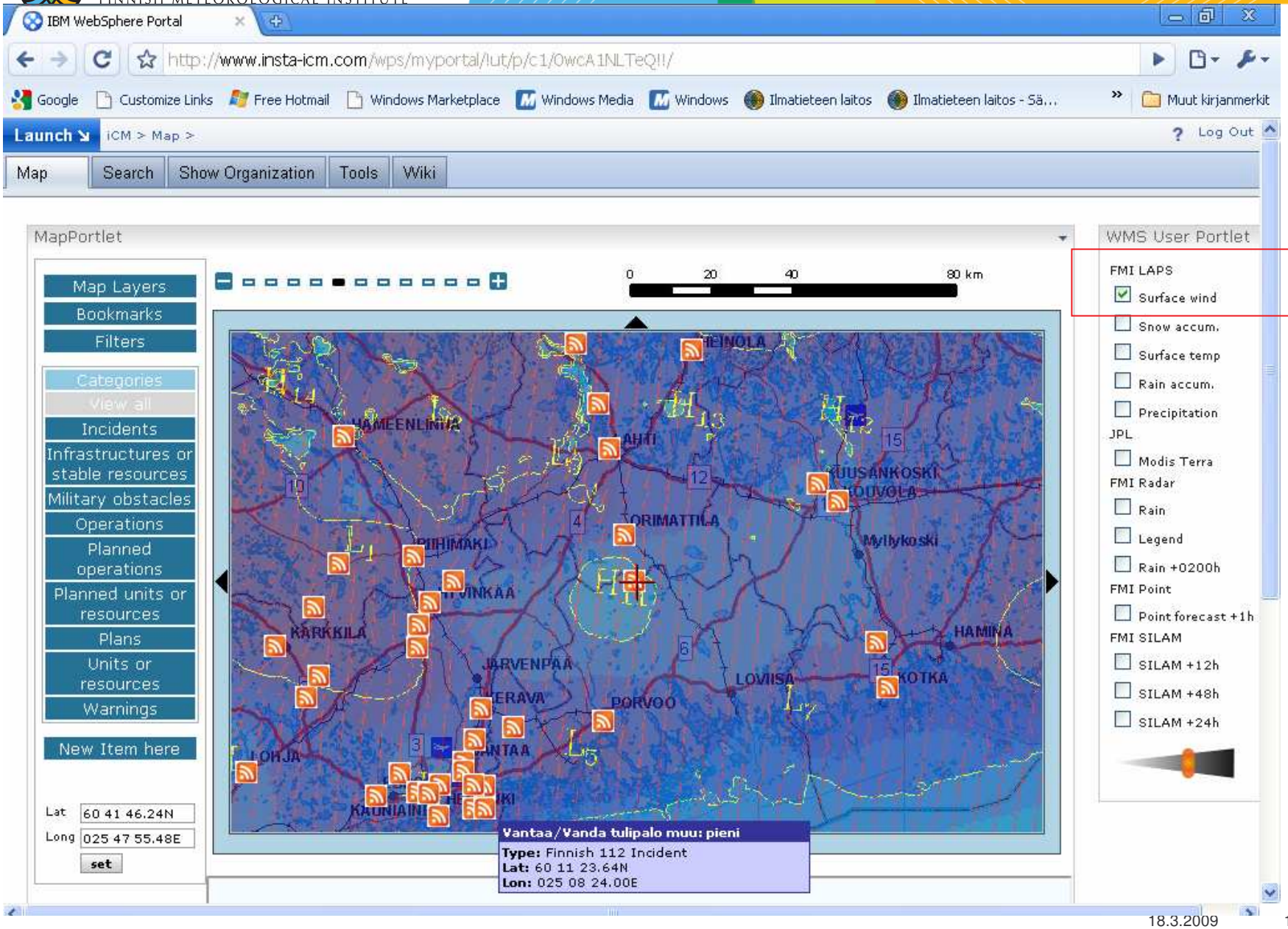
FMI, Insta

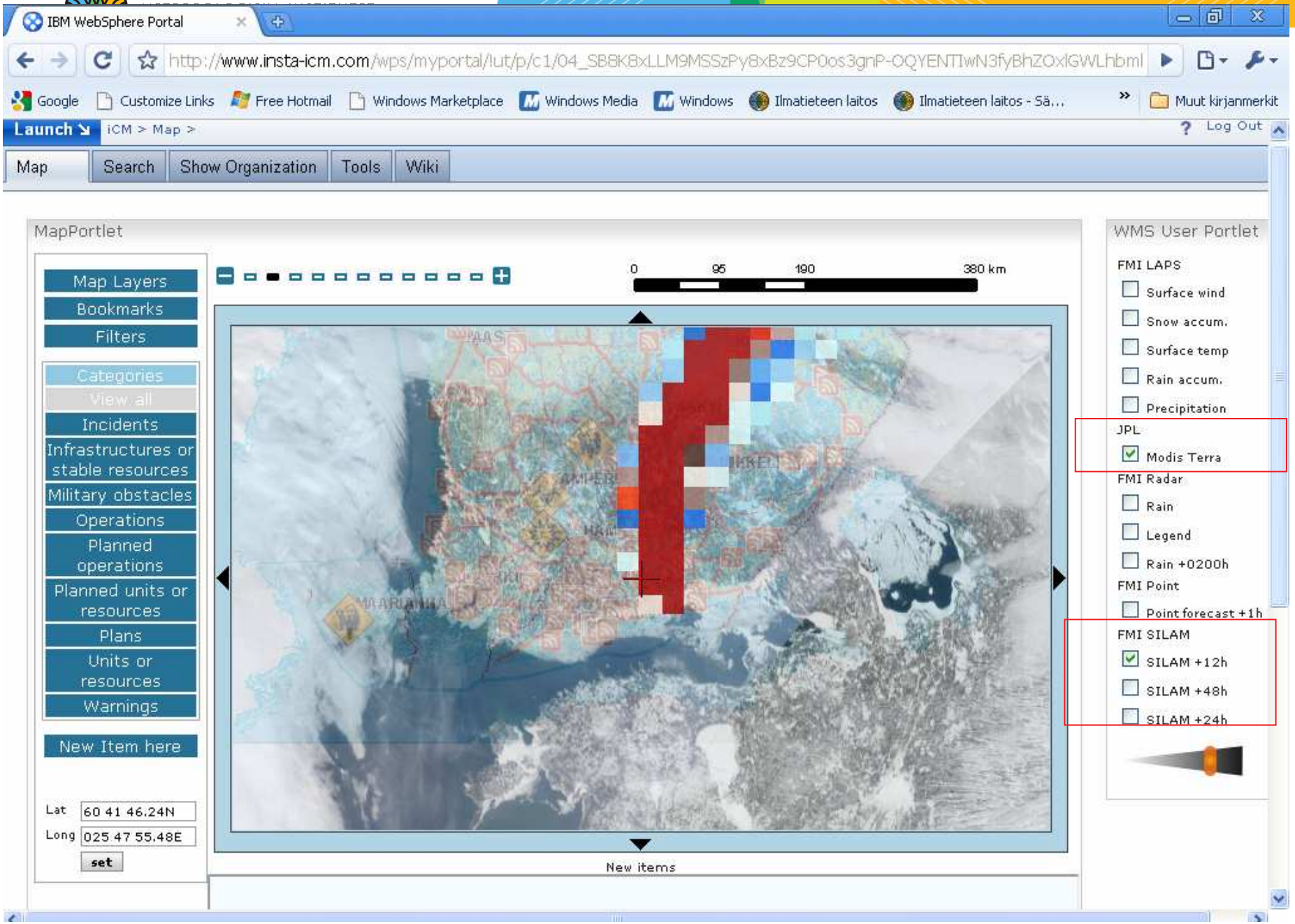
Latest radar obs, Some echoes. Dynamically produced scale as WMS-service, in addition to the actual data.

Radar forecast +2h selectable.

Transparence of layere adjustable. Many layeres can be selected at the same time.

Available layeres e.g. LAPS precipitation type analysis


IBM WebSphere Portal
http://www.insta-icm.com/wps/myportal/!ut/p/c1/0wcA1NLTeQ!!/
Google
Customize Links
Free Hotmail
Windows Marketplace
Windows Media
Windows
Ilmatieteen laitos
Ilmatieteen laitos - Sä...
Muut kirjanmerkit
Launch
iCM > Map >
Log Out
Map
Search
Show Organization
Tools
Wiki
MapPortlet
Map Layers
Bookmarks
Filters
Categories
View all
Incidents
Infrastructures or stable resources
Military obstacles
Operations
Planned operations
Planned units or resources
Plans
Units or resources
Warnings
New Item here
Lat
60 41 46.24N
Long
025 47 55.48E
set
0
20
40
80 km
HAMEENLINNA
AHTI
TUUSANKOSKI
LOUVOLA
ORIMATTILA
Mylykoski
RIIHIMAKI
KARKKILA
JARVENPAA
ERAVA
PORVOO
LOVIISA
HAMINA
KOTKA
LOHJA
KAUNIAINEN
Vantaa/Vanda tulipalo muu: pieni
Type: Finnish 112 Incident
Lat: 60 11 23.64N
Lon: 025 08 24.00E
WMS User Portlet
FMI LAPS
Surface wind
Snow accum.
Surface temp
Rain accum.
Precipitation
JPL
Modis Terra
FMI Radar
Rain
Legend
Rain +0200h
FMI Point
Point forecast +1h
FMI SILAM
SILAM +12h
SILAM +48h
SILAM +24h


IBM WebSphere Portal
http://www.insta-icm.com/wps/myportal/lut/p/c1/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gnP-OQYENTIwN3fyBhZOxlGWLhbml
Google
Customize Links
Free Hotmail
Windows Marketplace
Windows Media
Windows
Ilmatieteen laitos
Ilmatieteen laitos - Sä...
Muut kirjanmerkit
Launch
iCM > Map >
Log Out
Map
Search
Show Organization
Tools
Wiki
MapPortlet
Map Layers
Bookmarks
Filters
Categories
View all
Incidents
Infrastructures or stable resources
Military obstacles
Operations
Planned operations
Planned units or resources
Plans
Units or resources
Warnings
New Item here
Lat
60 41 46.24N
Long
025 47 55.48E
set
0
95
190
380 km
New items
WMS User Portlet
FMI LAPS
Surface wind
Snow accum.
Surface temp
Rain accum.
Precipitation
JPL
Modis Terra
FMI Radar
Rain
Legend
Rain +0200h
FMI Point
Point forecast +1h
FMI SILAM
SILAM +12h
SILAM +48h
SILAM +24h

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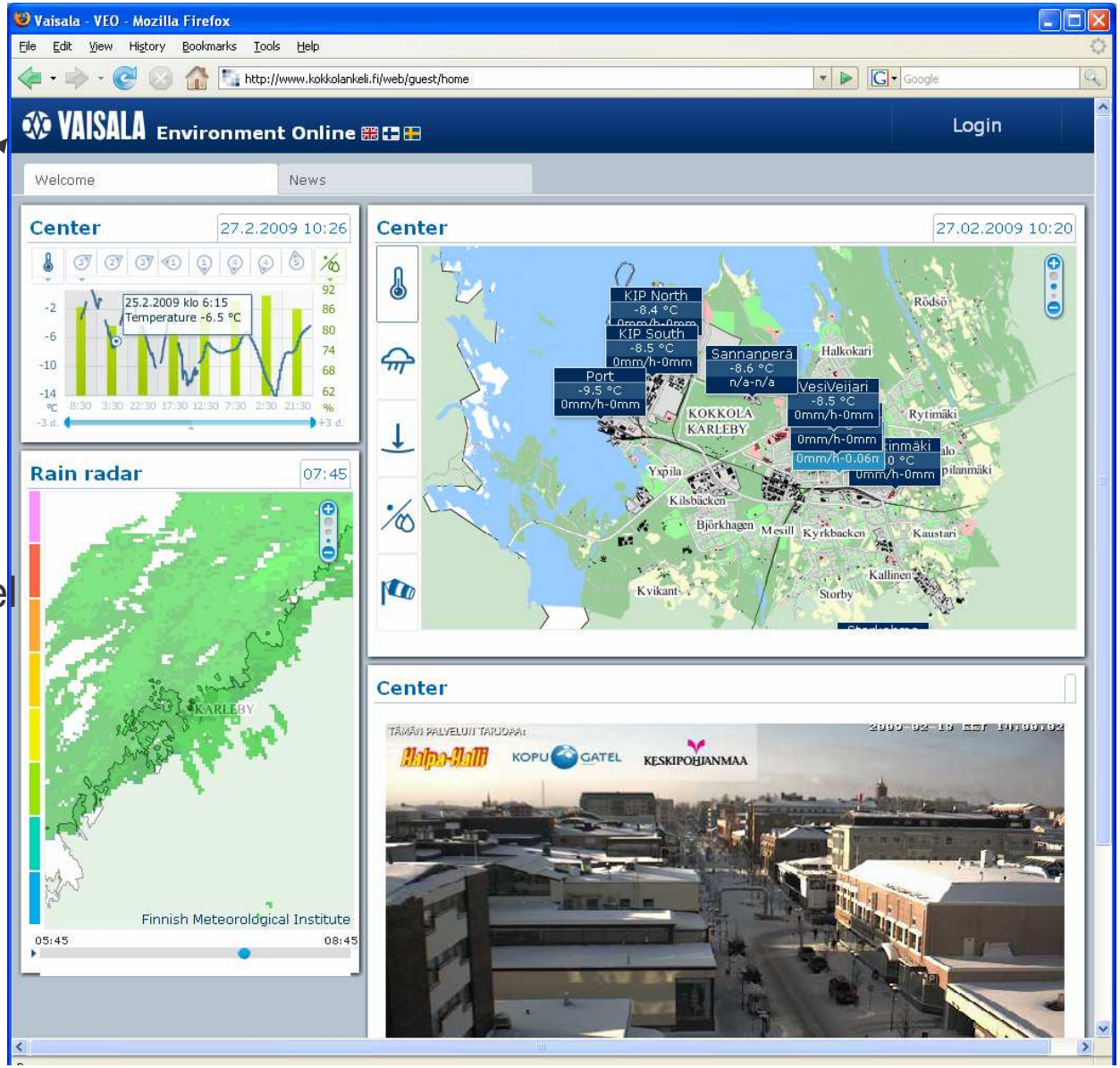
Ubicasting outcomes: Industrial weather web site in Kokkola city

FMI
Vaisala
Insta

Public view

For registered also
ESCAPE dispersion model
and radar extrapolations



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A contribution to NASA's Global Precipitation Measurement (GPM) mission

*Jarkko Koskinen, Jarmo Koistinen, Jouni Pulliainen, Elena Saltikoff, David Schultz / **FMI***
*Heikki Pohjola / **Vaisala***
*Sabine Göke, Dmitri Moiseev, Timo Nousiainen / **UH***
*Marko Mäkynen, Martti Hallikainen / **HUT***
*Bertel Vehviläinen / **Syke***

18.3.2009

GPM

Unify and advance global precipitation measurements from a constellation of dedicated and operational satellites for research and applications

GPM LIO (40º)
(Low-Inclination Observatory)
10-183 GHz radiometer

- *Asynoptic observations*
- *Improved sampling for near-realtime monitoring of hurricanes and midlatitude storms*

GPM CORE (65º)
Ku-Ka band radar
10-183 GHz radiometer

- *Precipitation physics observatory*
- *Reference standard for intercalibration of constellation precipitation measurements*

Both type of instruments: Advances in light rain and snow detection, accuracy

Next-generation global precipitation products through

- *advanced active & passive microwave sensor measurements*
- *a consistent framework for inter-satellite calibration (radiance & rain rates)*
- *international collaboration in algorithm development and ground validation*

Cornerstone for the CEOS Precipitation Constellation under GOESS & GEO

GODDARD SPACE FLIGHT CENTER NASA

GPM: A science mission with integrated application objectives

Scientific Contributions

- New reference standards for global precipitation measurements from space
- Better understanding of water cycle variability and its link to climate change
- New insights into storm structures, cloud microphysics, & mesoscale dynamics
- Improved understanding of climate processes for better prediction of future climate

Societal Benefits

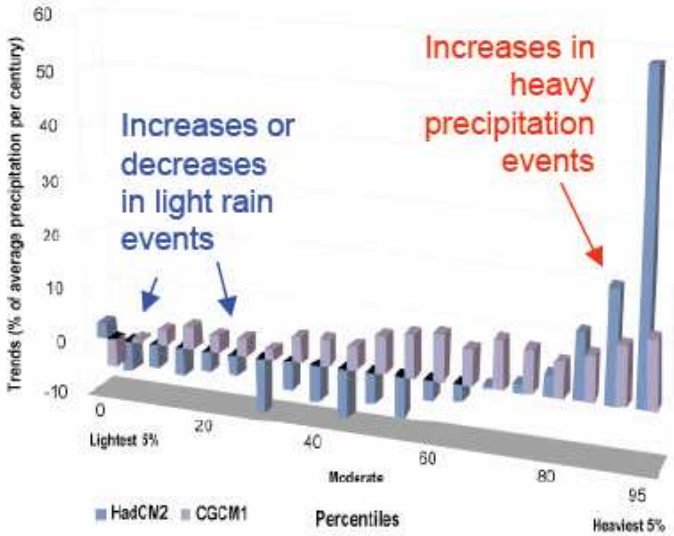
- Extending current capabilities in monitoring of hurricanes and other extreme weather events
- Enhanced numerical weather and precipitation prediction skills through assimilation of instantaneous precipitation observations
- Improved forecasting for freshwater resources, river flows, and natural hazards (floods, droughts, landslides) through better estimation of rainfall accumulation
- Assessment of human impact on precipitation and the environment

GODDARD SPACE FLIGHT CENTER NASA

Science needs for improved precipitation measurement capabilities

GLOBAL CLIMATE MODELS PREDICT SIGNIFICANT CHANGES IN PRECIPITATION AMOUNT AND INTENSITY OVER THE 21st CENTURY

Projected 21st Century Change in US Daily Precipitation



ARE THE MODELS RIGHT?

Detection of changes in precipitation characteristics requires better measurements of

- *light rain rates (prevalent in middle & high latitudes)*
- *solid precipitation (cold seasons)*
- *microphysical information*

- *Is the global water cycle accelerating as the climate warms?*

  - How do precipitation frequency, distribution, and intensity change in a warmer climate?

- *How do precipitation microphysical properties (particle size distribution, liquid/ice partition, hydrometeor profiles, etc.) and precipitation efficiency vary with the environmental state and climate regimes?*

GODDARD SPACE FLIGHT CENTER

US-Finnish co-operation

- **Finnish proposal for PMM-team accepted**
  - Concentrates, especially, on winter precipitation in high latitudes
  - Work to be completed at two test sites in Finland:
    - Helsinki Testbed
    - Sodankylä-Pallas
  - Contains 5 Work Packages with special emphasis on
    - Ground validation
    - Validation of GPM algorithms for high latitudes
    - Research related to microphysics of precipitation
    - Research related to snow cover, emission and hydrology

Future matters

- **Testbed follow-on projects: Ubicasting – ”From research to services”**
  - Phase 1 (2007-09) completes by the end of March
  - New application for 2009-11
- **Public real-time web service at least until Oct 2009, Researcher’s Interface will stay in any case**
- **Helsinki Testbed**
  - 2009: Conributions from Vaisala Testbed within Helsinki Testbed domain
  - Has been running since August 2005
- **GPM Co-operation**
  - NASA field campaigns in Helsinki Testbed
    - Possibility for joint campaign with Cloudsat, GPM and ESA Earthcare mission in fall 2010
    - GPM cold climate campaigns in 2012 and 2014
  - GPM GV workshop in Helsinki in 2010