Norwegian
Meteorological Institute
met.no

Diana: A Free Meteorological Workstation

Lisbeth Bergholt and Helen Korsmo

Audun Christoffersen

Anstein Foss

Juergen Schulze

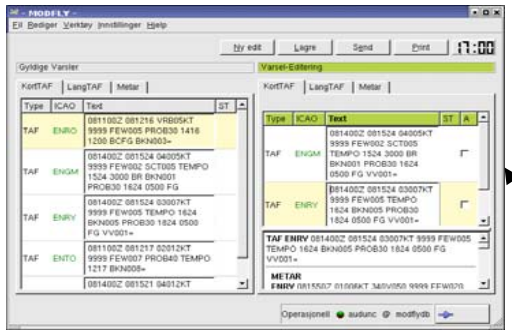
Helen Korsmo

Lisbeth Bergholt

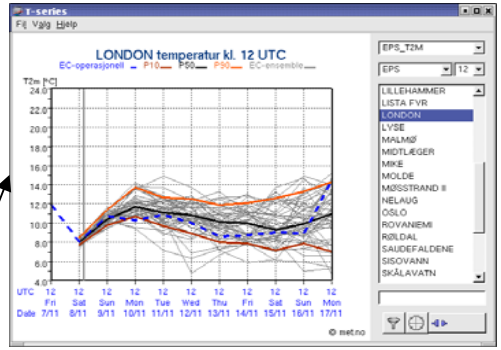
We are a team of 5 people working with product development at the Norwegian Meteorological Institute.

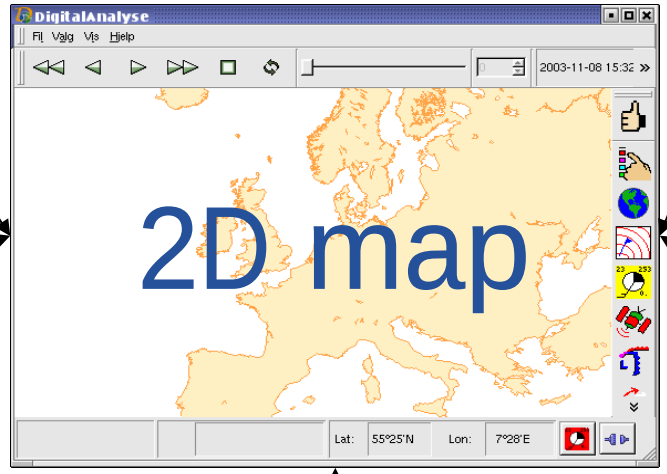
Visualisation model

Taf monitoring

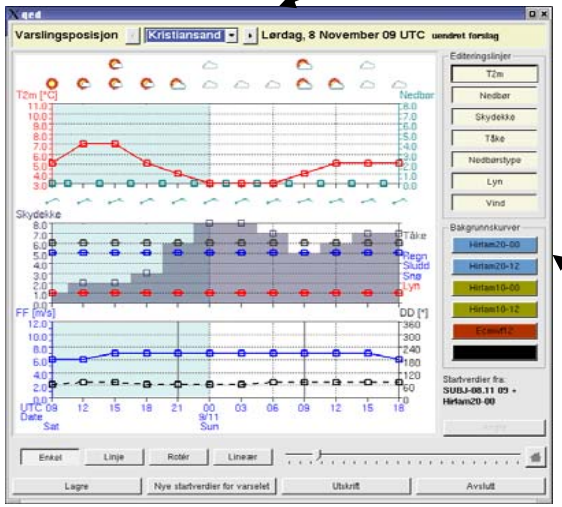


Time series



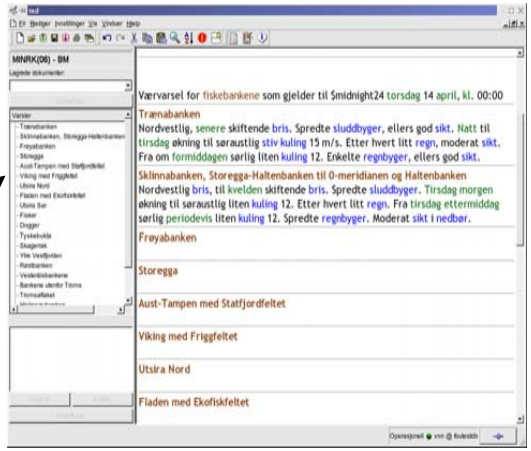


Time series editing



Point verification

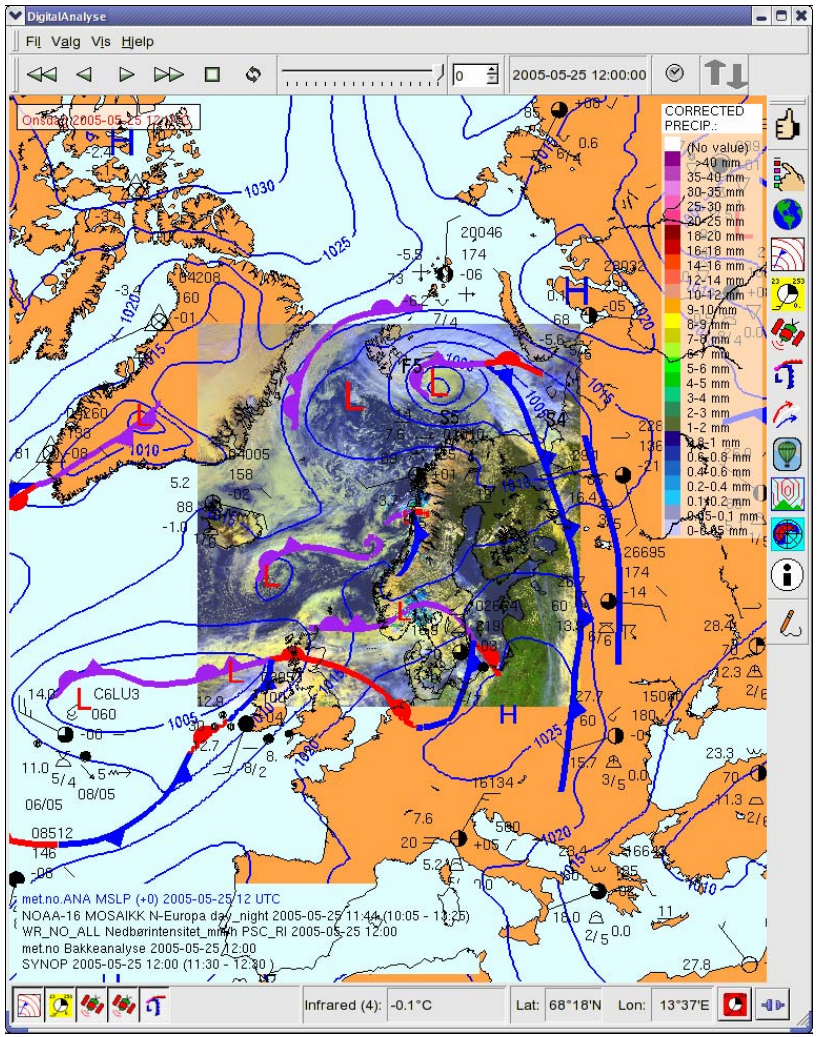
Text editing

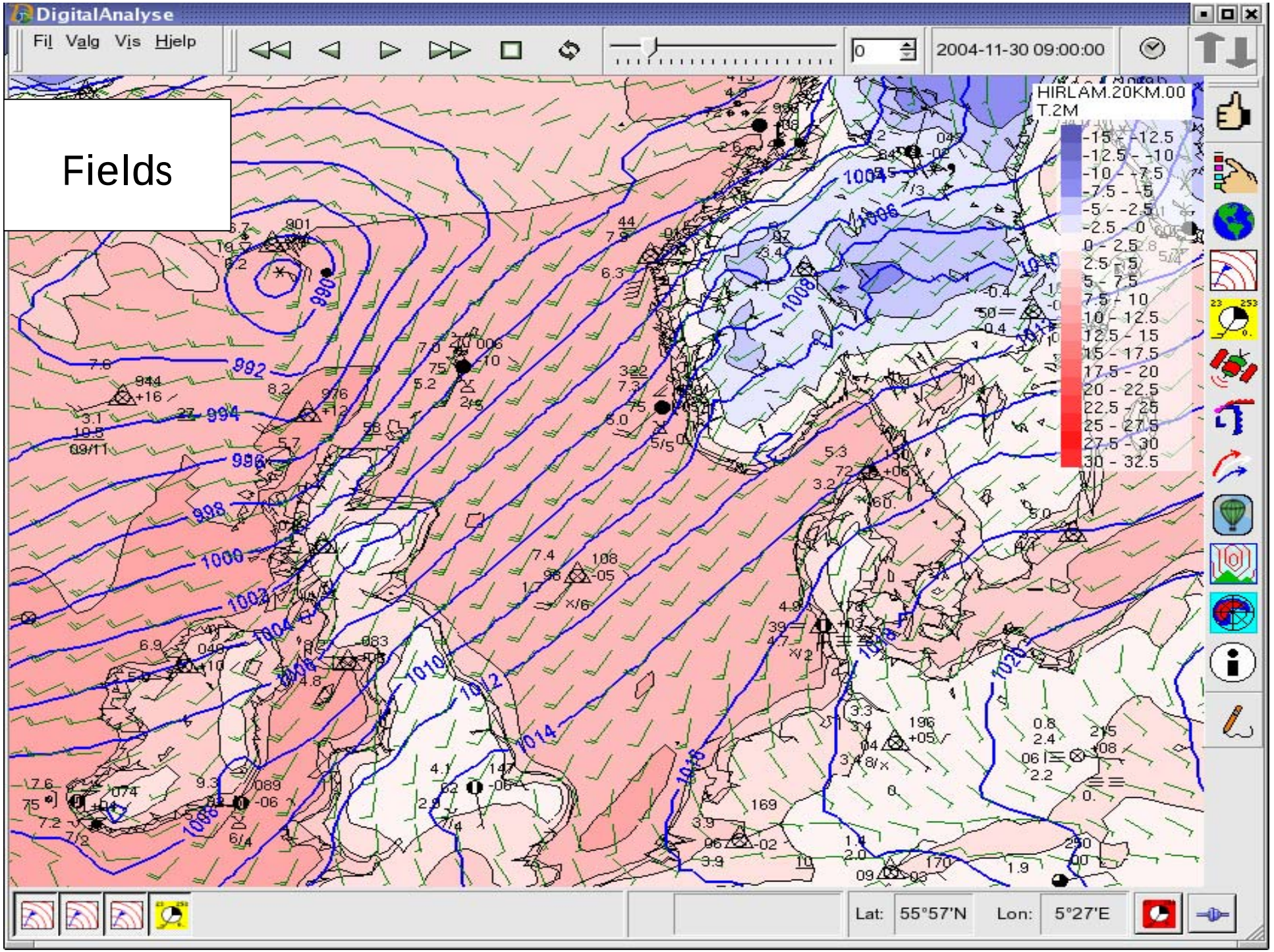


Diana

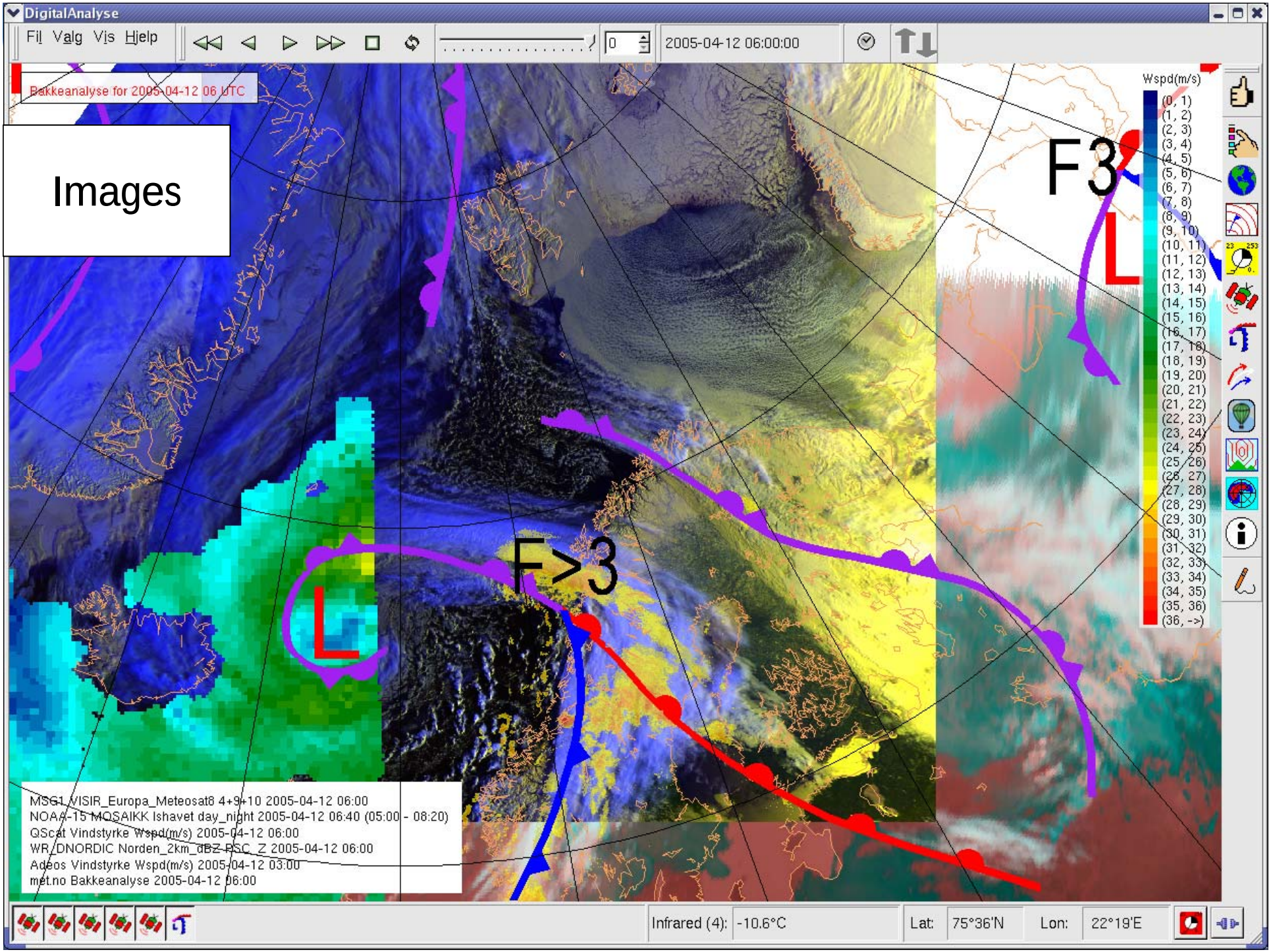
Visualisation

- Fields
- Satellite and radar images
- Surface observations
- Soundings
- Cross Sections
- Trajectories in isosurfaces
- Forecast products




DigitalAnalyse
Fil Valg Vis Hjelp
2004-11-30 09:00:00
HIRLAM.20KM.00
T.2M
-15 - -12.5
-12.5 - -10
-10 - -7.5
-7.5 - -5
-5 - -2.5
-2.5 - 0
0 - 2.5
2.5 - 5
5 - 7.5
7.5 - 10
10 - 12.5
12.5 - 15
15 - 17.5
17.5 - 20
20 - 22.5
22.5 - 25
25 - 27.5
27.5 - 30
30 - 32.5
Lat: 55°57'N
Lon: 5°27'E

Fields


DigitalAnalyse
Fil Valg Vis Hjelp
2005-04-12 06:00:00
Bakkeanalyse for 2005-04-12 06 UTC
Images
Wspd(m/s)
(0, 1)
(1, 2)
(2, 3)
(3, 4)
(4, 5)
(5, 6)
(6, 7)
(7, 8)
(8, 9)
(9, 10)
(10, 11)
(11, 12)
(12, 13)
(13, 14)
(14, 15)
(15, 16)
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(17, 18)
(18, 19)
(19, 20)
(20, 21)
(21, 22)
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(24, 25)
(25, 26)
(26, 27)
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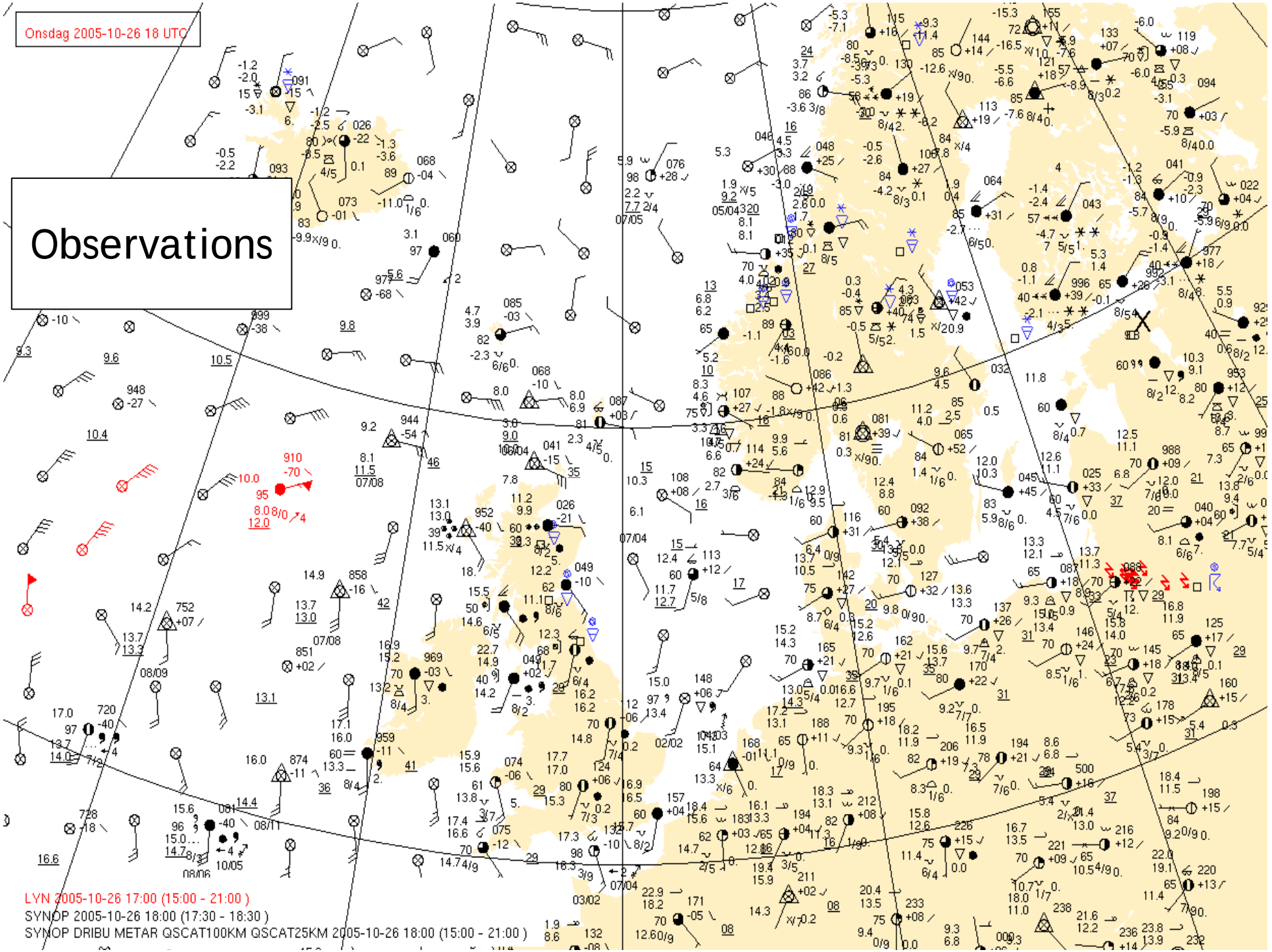
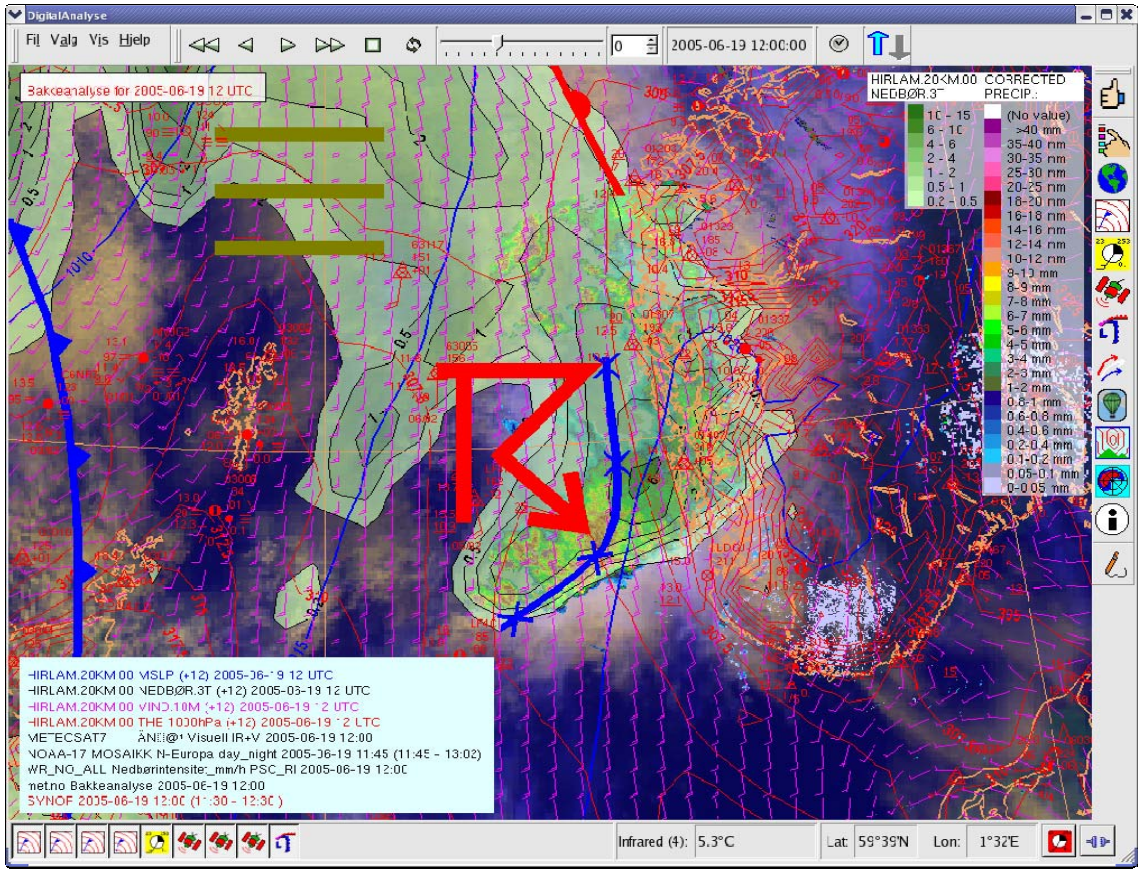
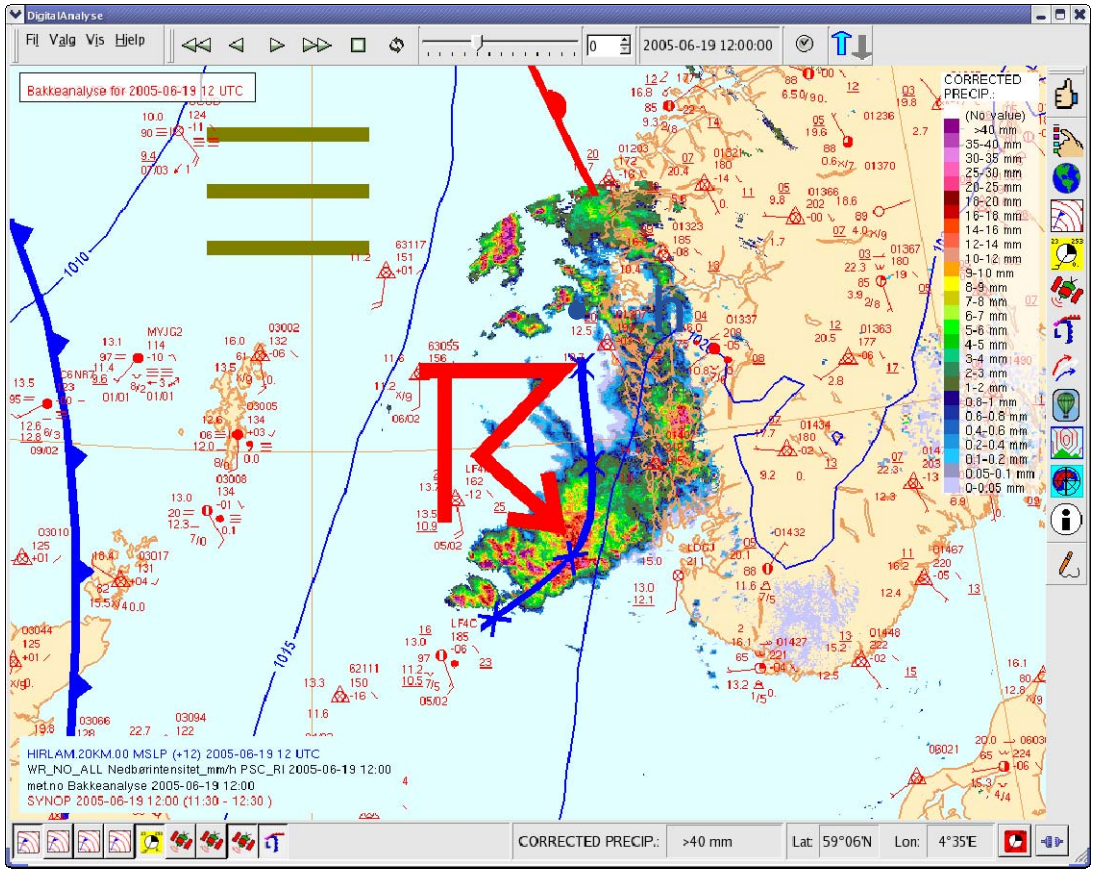
(29, 30)
(30, 31)
(31, 32)
(32, 33)
(33, 34)
(34, 35)
(35, 36)
(36, ->)
F3
L
F>3
L
MSG1_VISIR_Europa_Meteosat8 4+9+10 2005-04-12 06:00
NOAA-15 MOSAIKK Ishavet day_night 2005-04-12 06:40 (05:00 - 08:20)
QScat Vindstyrke Wspd(m/s) 2005-04-12 06:00
WR_DNORDIC Norden_2km_dBZ-RSC_Z 2005-04-12 06:00
Adeos Vindstyrke Wspd(m/s) 2005-04-12 03:00
met.no Bakkeanalyse 2005-04-12 06:00
Infrared (4): -10.6°C
Lat: 75°36'N
Lon: 22°19'E


Onsdag 2005-10-26 18 UTC
Observations
LYN 2005-10-26 17:00 (15:00 - 21:00)
SYNOP 2005-10-26 18:00 (17:30 - 18:30)
SYNOP DRIBU METAR QSCAT100KM QSCAT25KM 2005-10-26 18:00 (15:00 - 21:00)

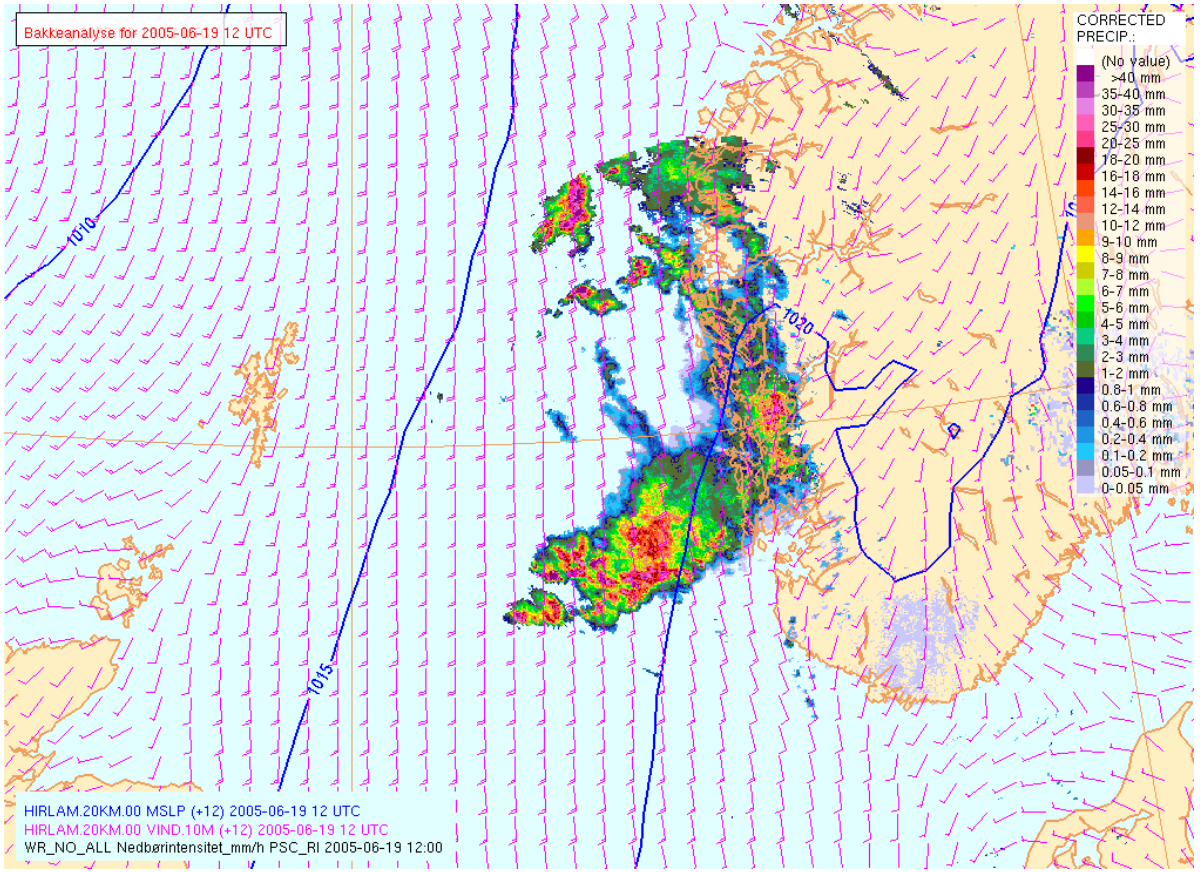
Diana with too much information



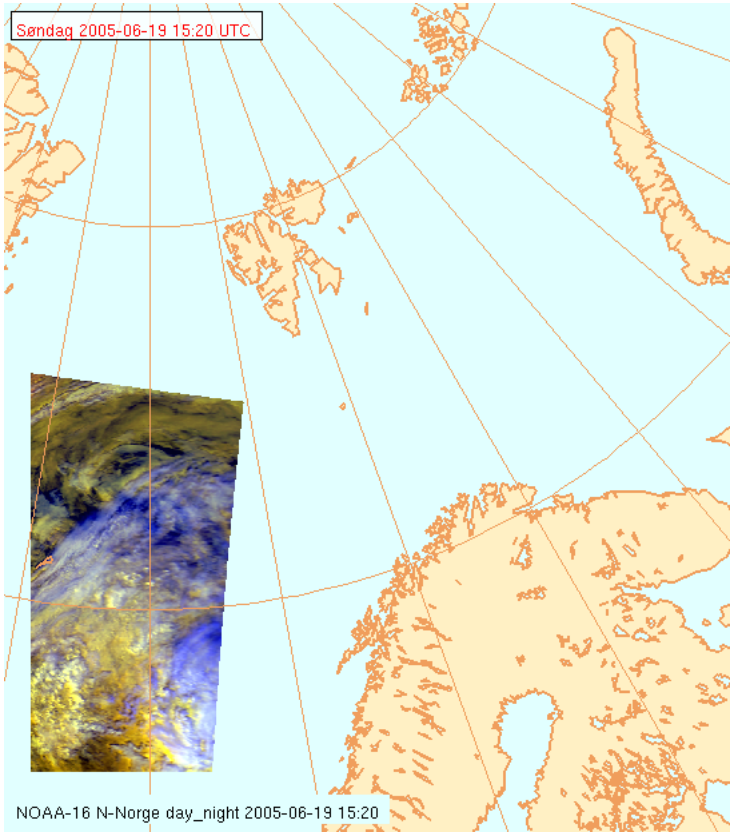
Diana ... some ”layers”

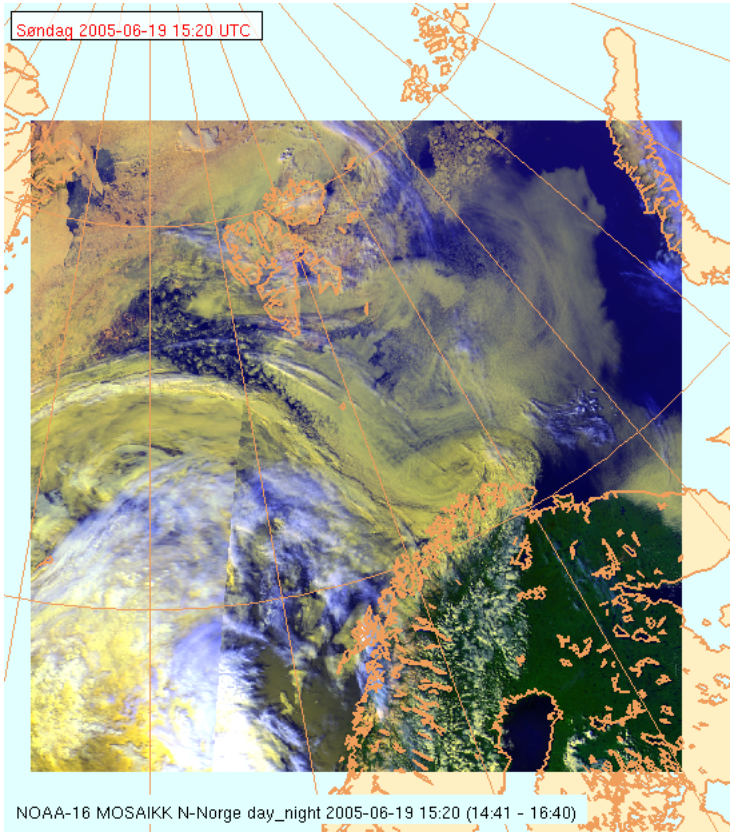


Diana

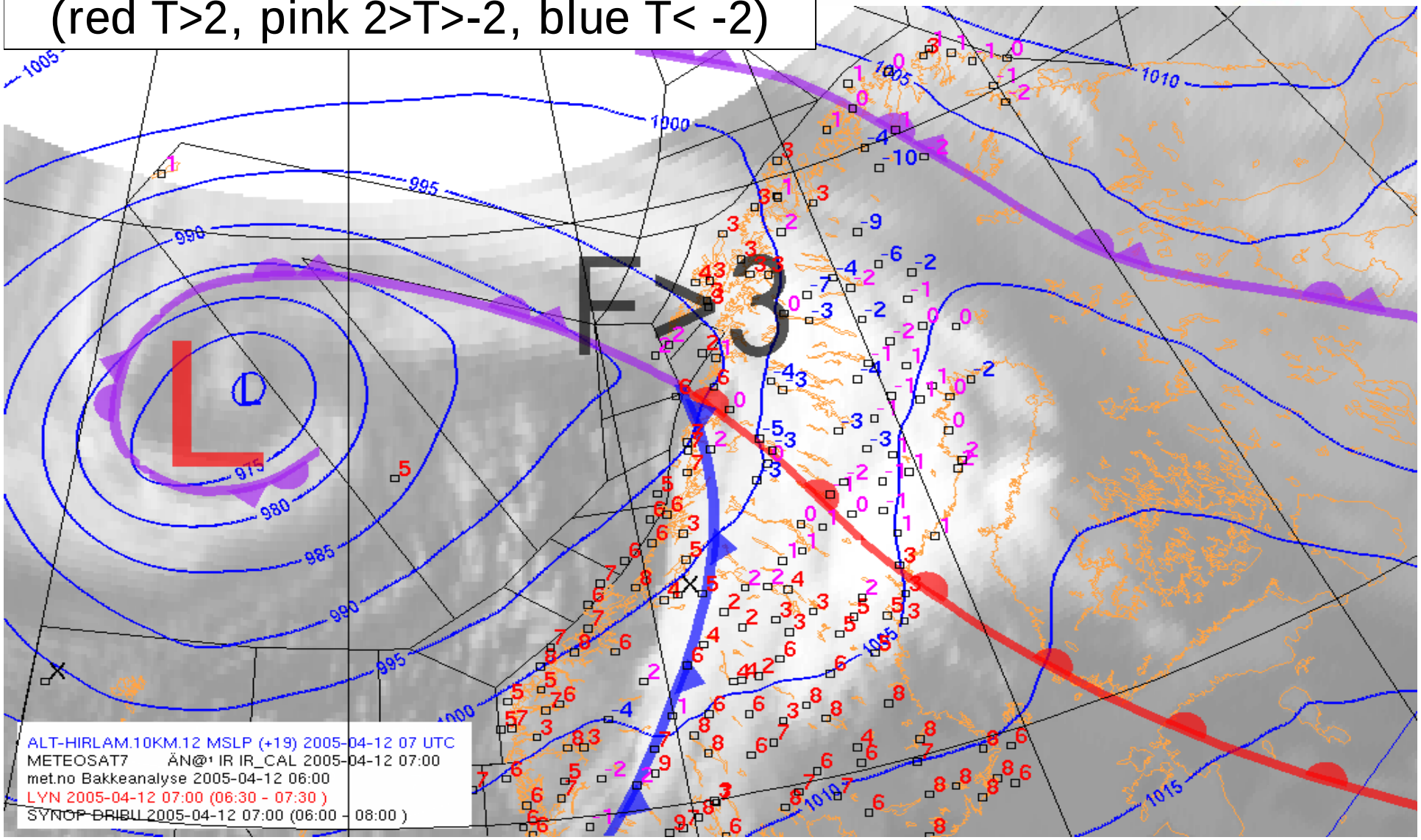

Bakkeanalyse for 2005-06-19 12 UTC
CORRECTED PRECIP.:
(No value)
>40 mm
35-40 mm
30-35 mm
25-30 mm
20-25 mm
18-20 mm
16-18 mm
14-16 mm
12-14 mm
10-12 mm
9-10 mm
8-9 mm
7-8 mm
6-7 mm
5-6 mm
4-5 mm
3-4 mm
2-3 mm
1-2 mm
0.8-1 mm
0.6-0.8 mm
0.4-0.6 mm
0.2-0.4 mm
0.1-0.2 mm
0.05-0.1 mm
0-0.05 mm
1010
1015
1020
HIRLAM.20KM.00 MSLP (+12) 2005-06-19 12 UTC
HIRLAM.20KM.00 VIND.10M (+12) 2005-06-19 12 UTC
WR_NO_ALL Nedbørintensitet_mm/h PSC_RI 2005-06-19 12:00

Diana: Image mosaic

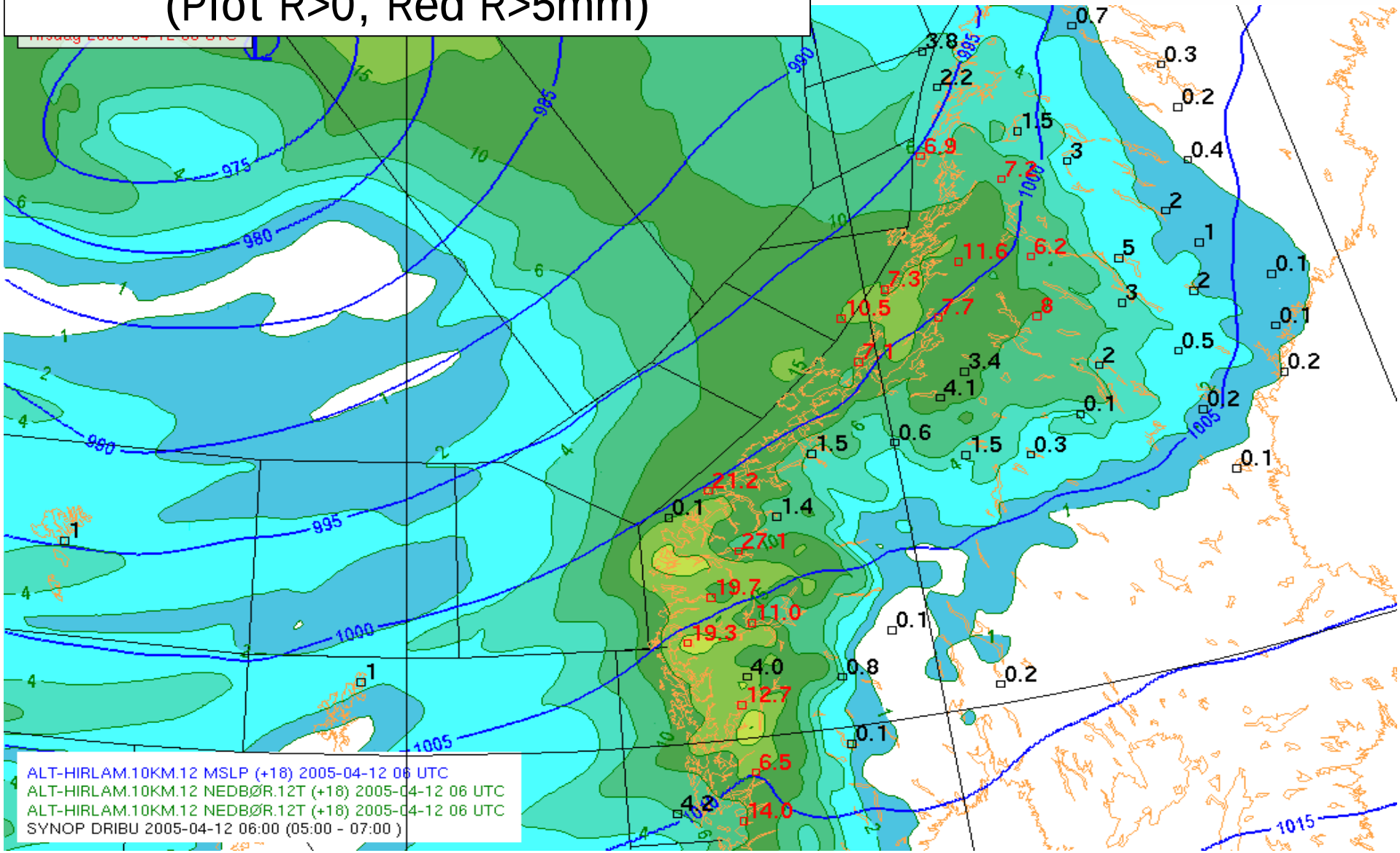




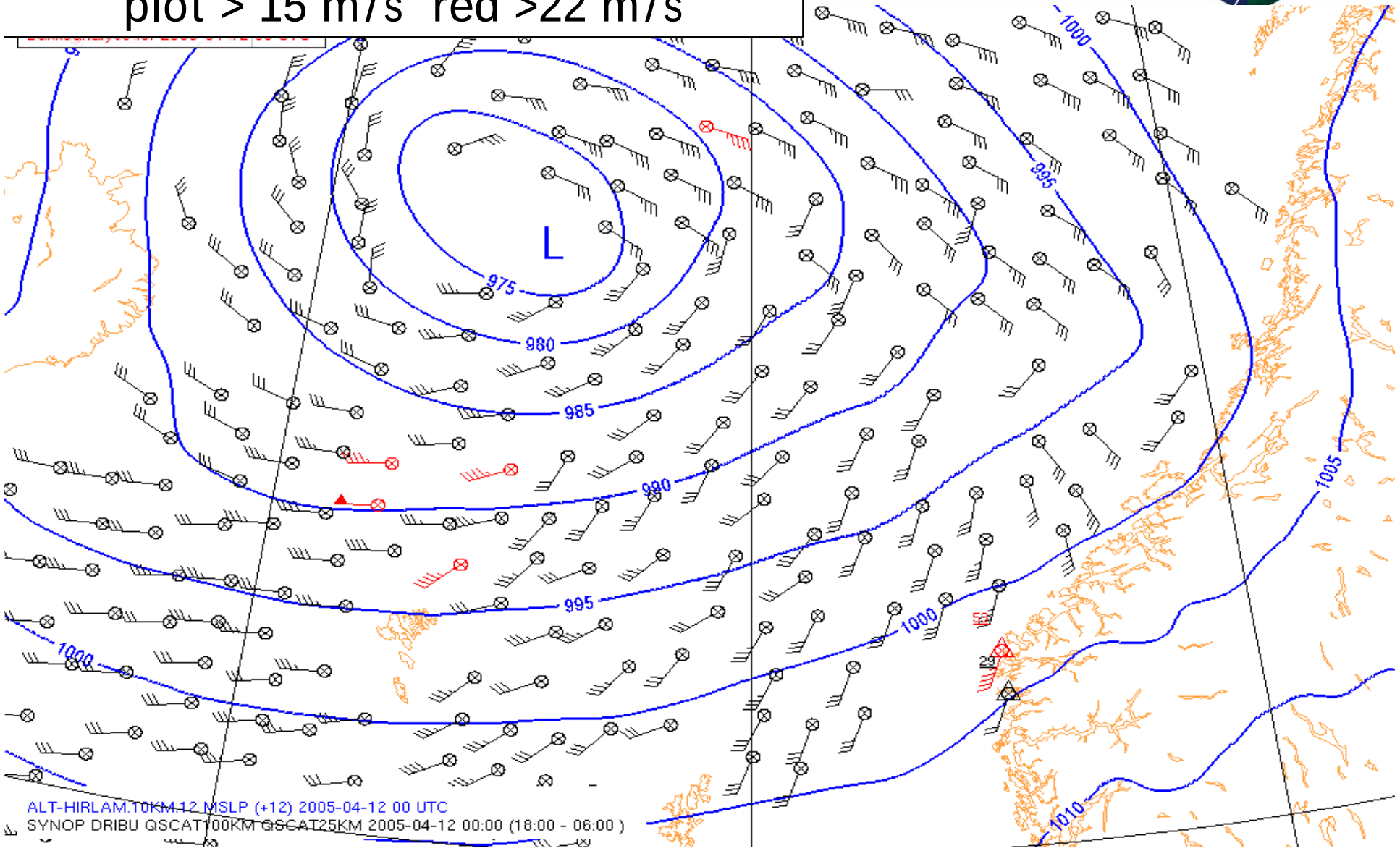
Criteria: Temp
(red T>2, pink 2>T>-2, blue T< -2)

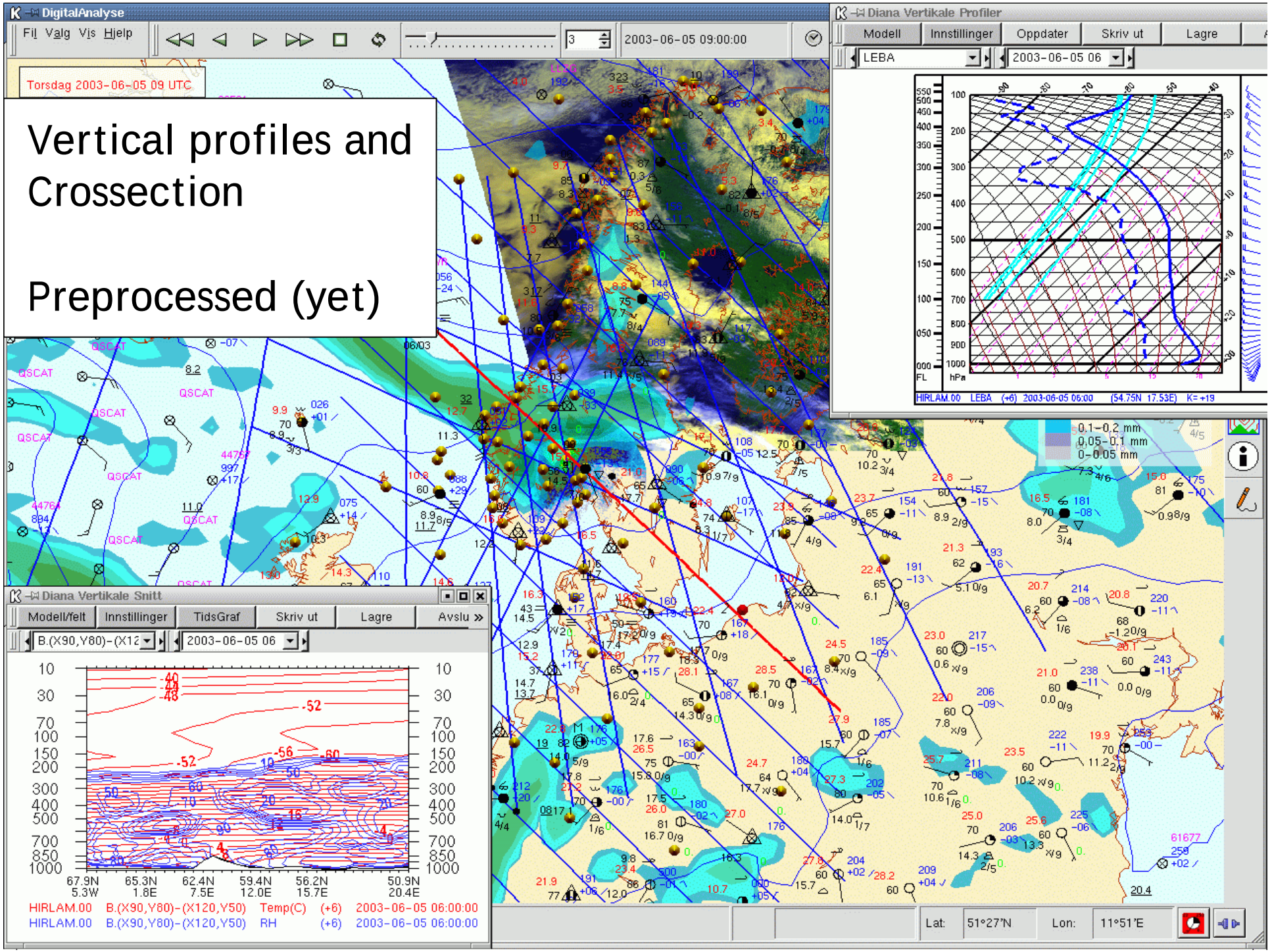


Criteria: Precipitation
(Plot R>0, Red R>5mm)



Criteria: Wind
plot > 15 m/s red >22 m/s

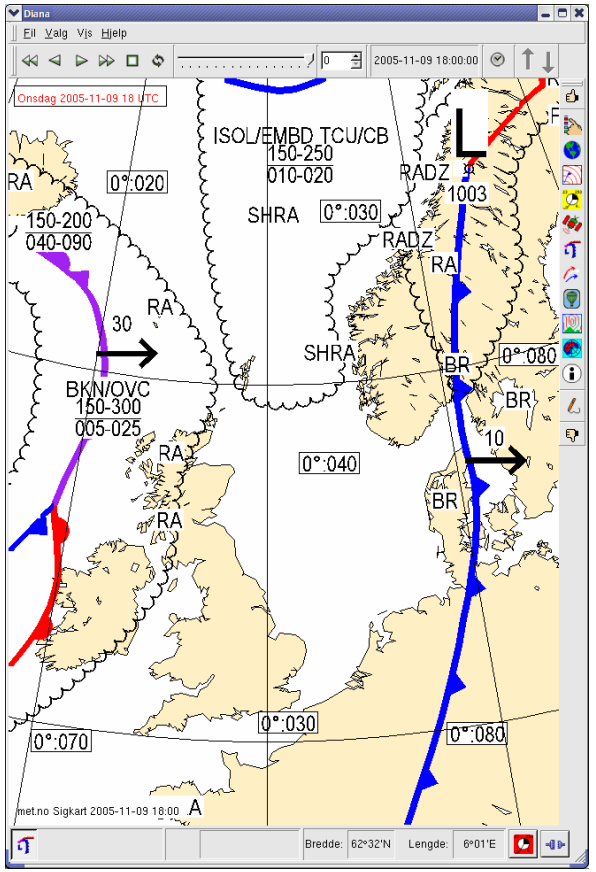



DigitalAnalyse
Fil Valg Vis Hjelp
2003-06-05 09:00:00
Torsdag 2003-06-05 09 UTC
Vertical profiles and
Crossection
Preprocessed (yet)
Diana Vertikale Profiler
Modell
Innstillinger
Oppdater
Skriv ut
Lagre
LEBA
2003-06-05 06
HIRLAM.00 LEBA (+6) 2003-06-05 06:00 (54.75N 17.53E) K=+19
Diana Vertikale Snitt
Modell/felt
Innstillinger
TidsGraf
Skriv ut
Lagre
Avslu
2003-06-05 06
HIRLAM.00 B.(X90,Y80)-(X120,Y50) Temp(C) (+6) 2003-06-05 06:00:00
HIRLAM.00 B.(X90,Y80)-(X120,Y50) RH (+6) 2003-06-05 06:00:00
0.1-0.2 mm
0.05-0.1 mm
0-0.05 mm
Lat: 51°27'N
Lon: 11°51'E

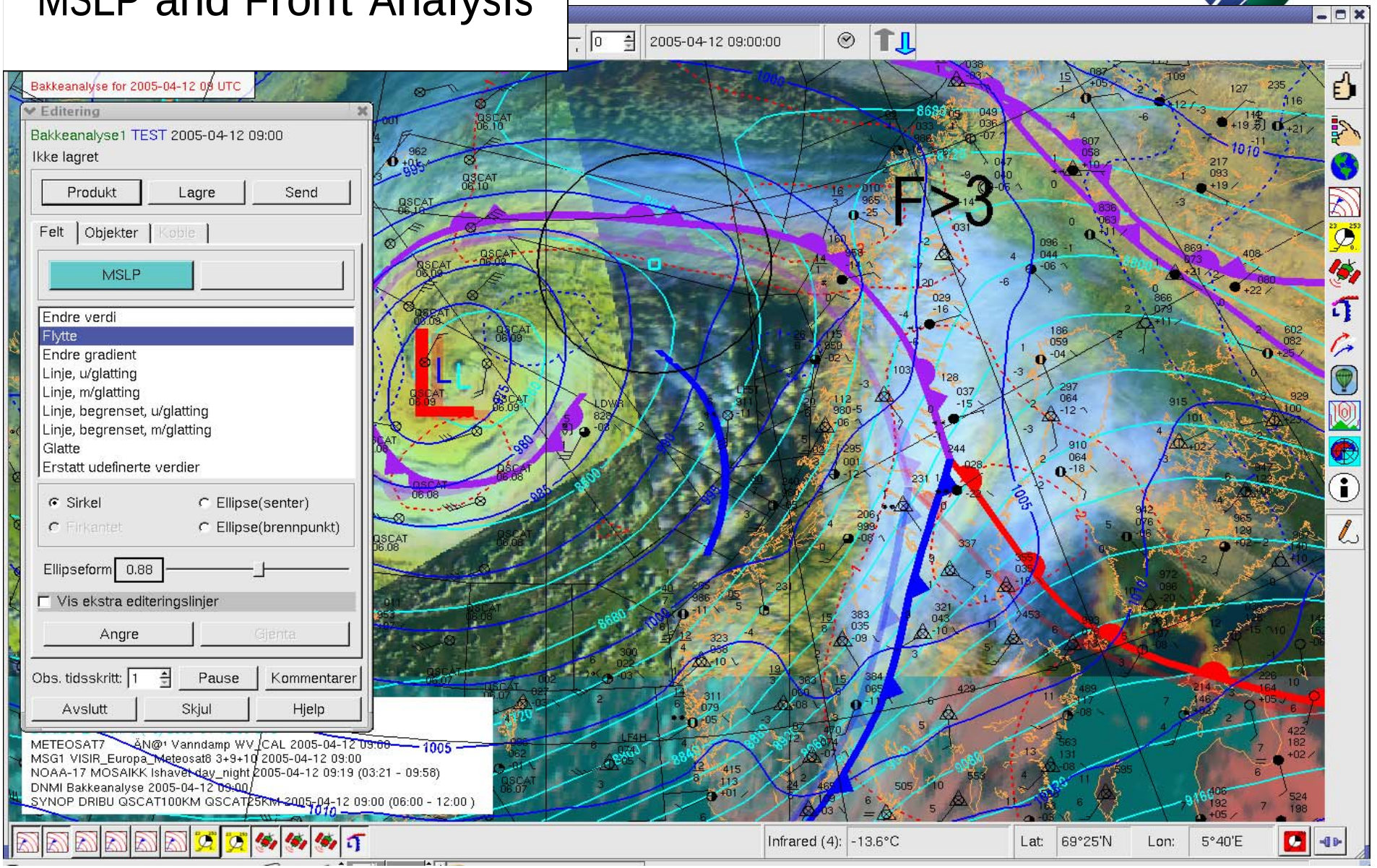
DIANA

Interactive tools

- Scalar field modification
- Drawing of fronts, weather symbols, etc.
- Combination of products from regional centers
- Data visualisation is fully available

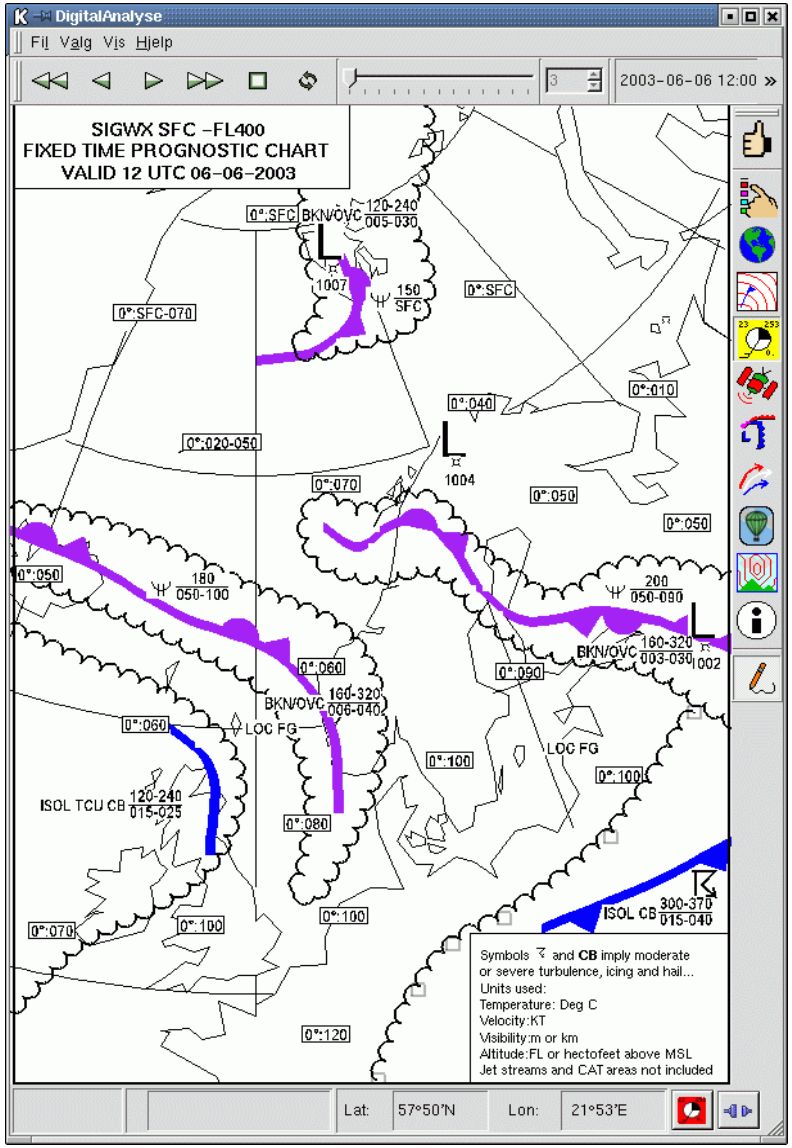


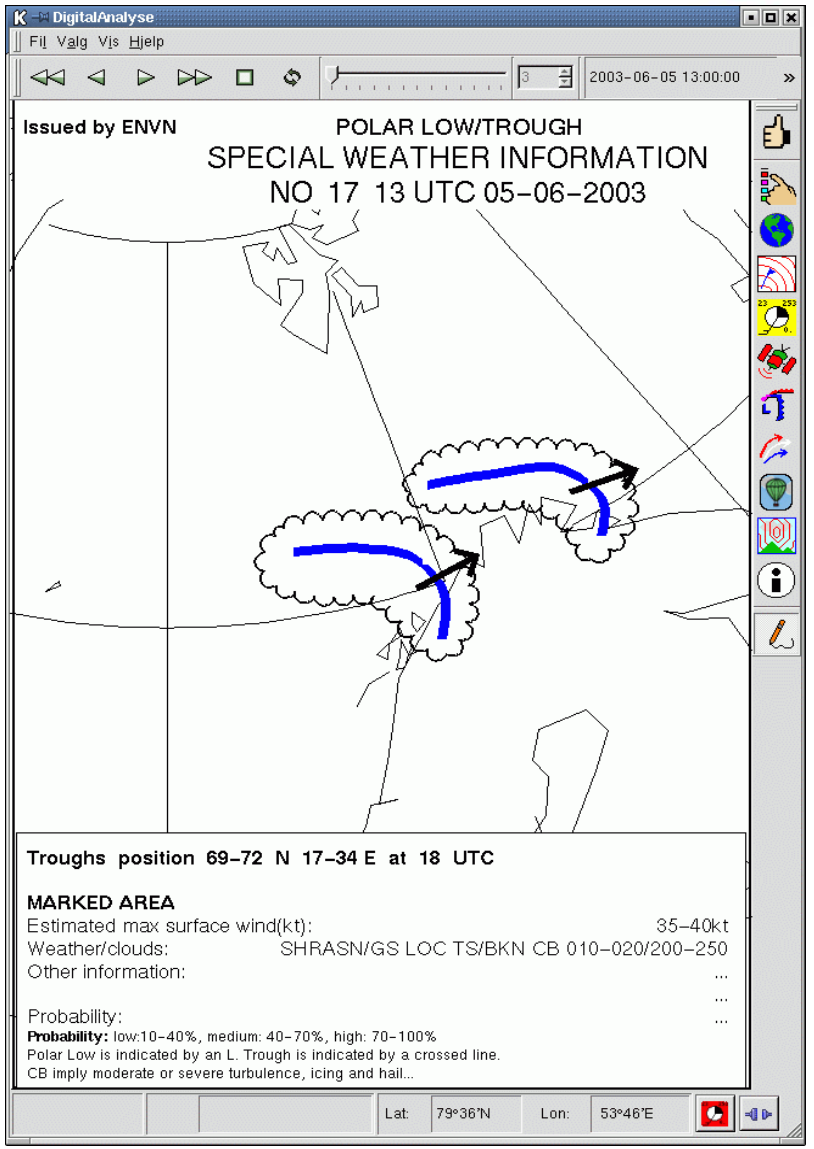
MSLP and Front Analysis



Significant weather

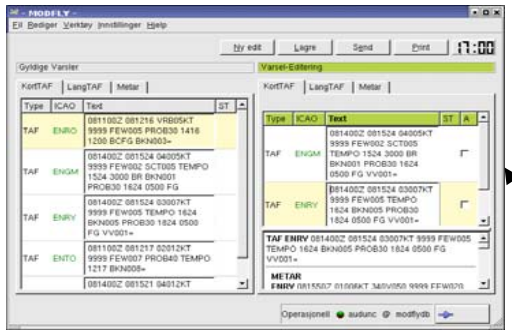
Polar low



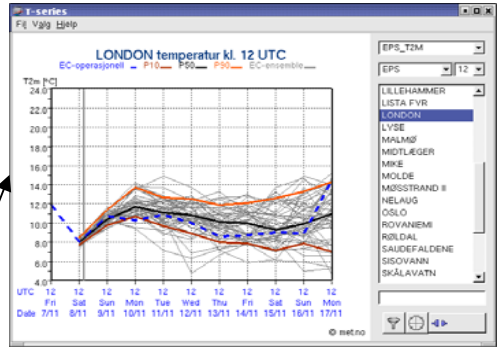


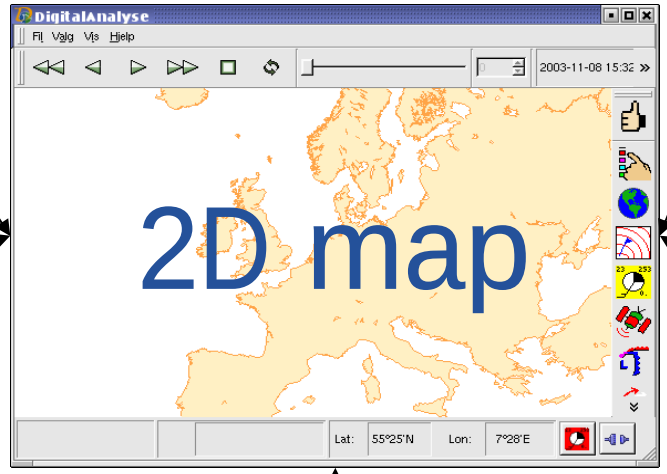
Visualisation model

Taf monitoring

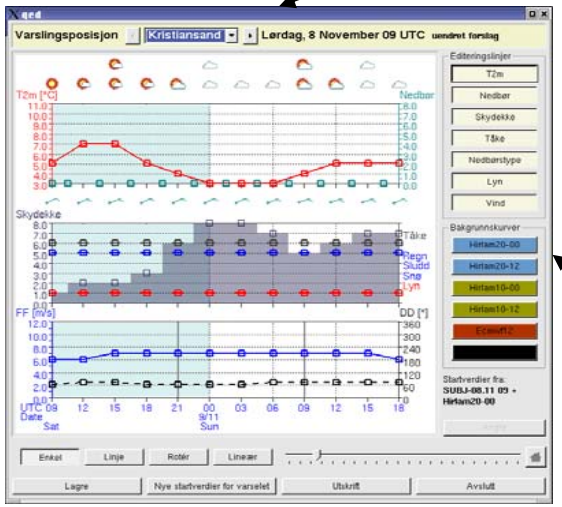


Time series



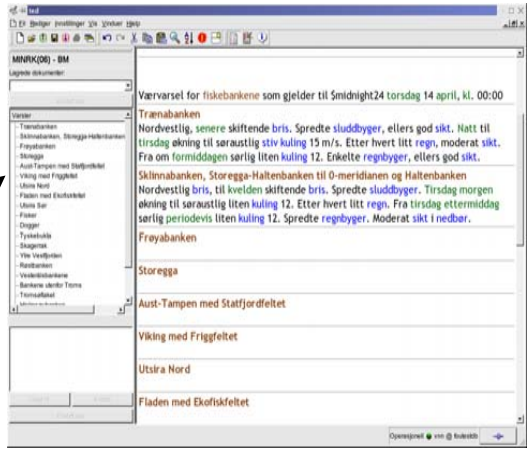


Time series editing

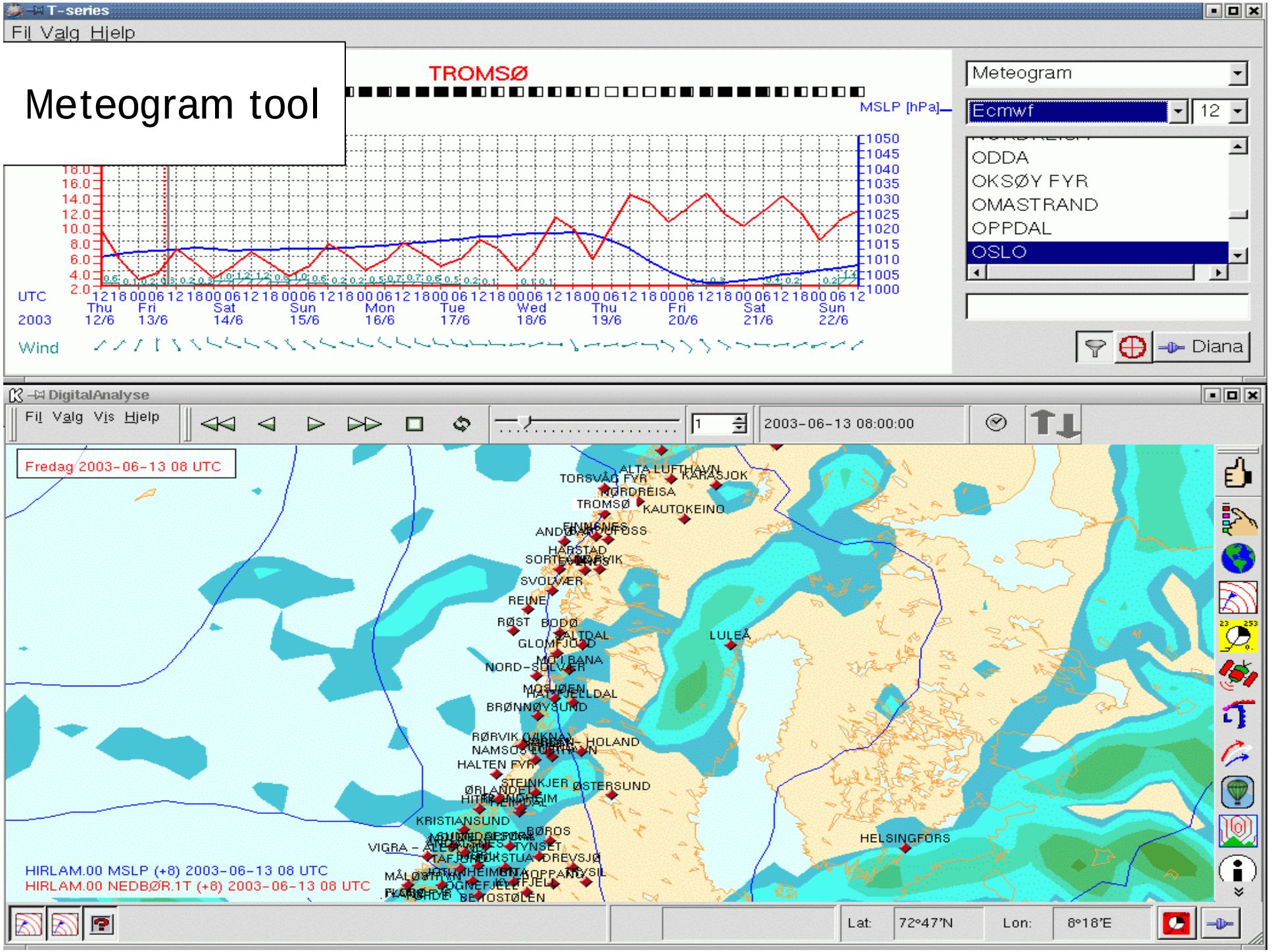


Point verification

Text editing

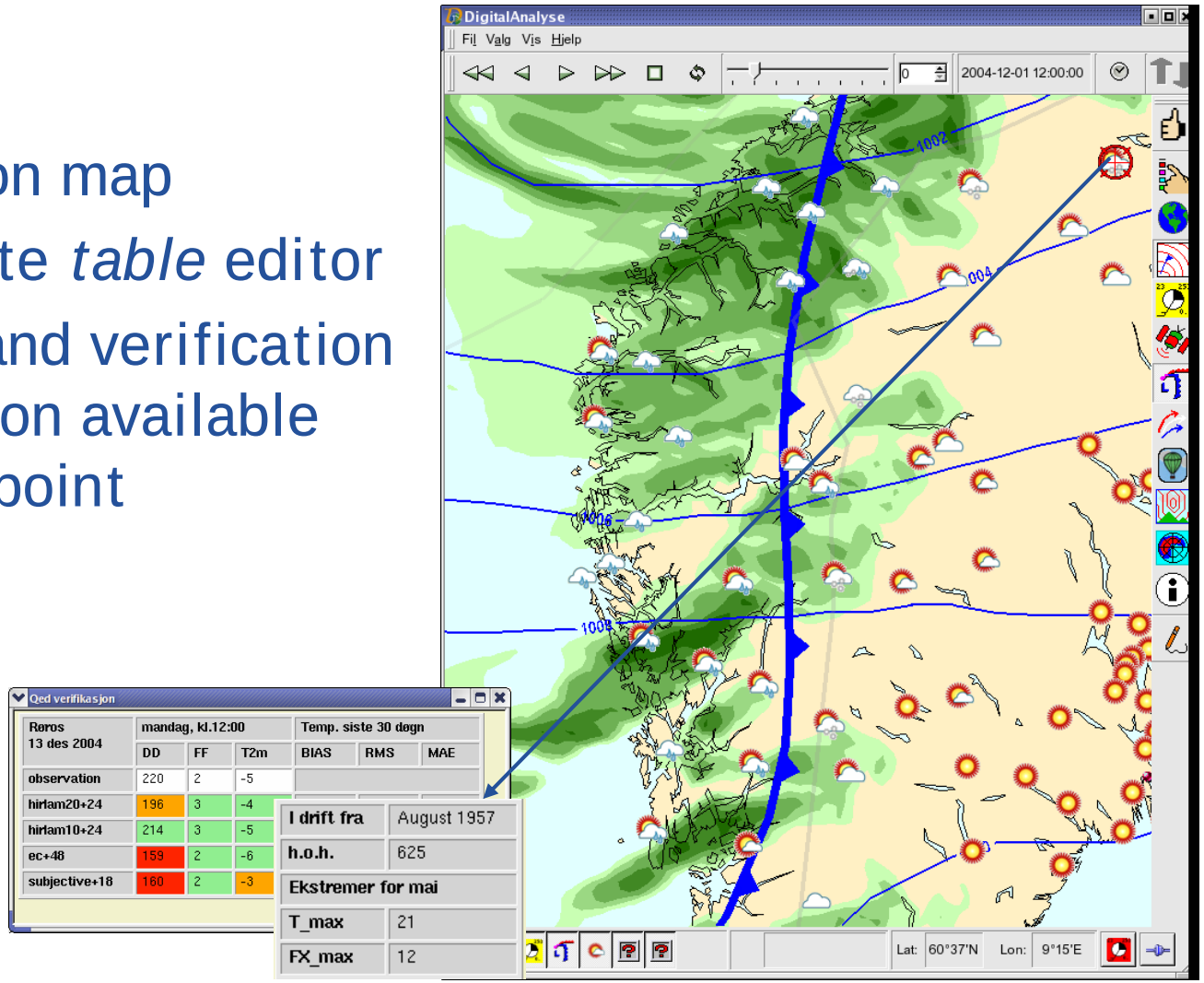


Meteogram tool

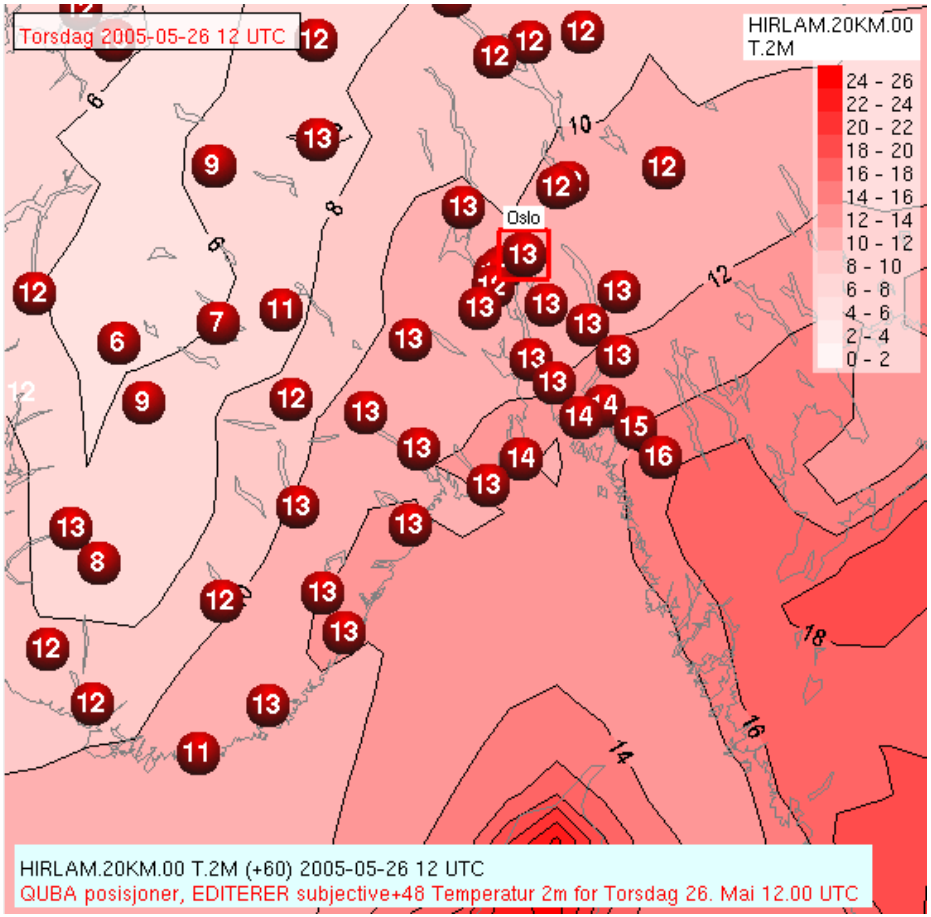


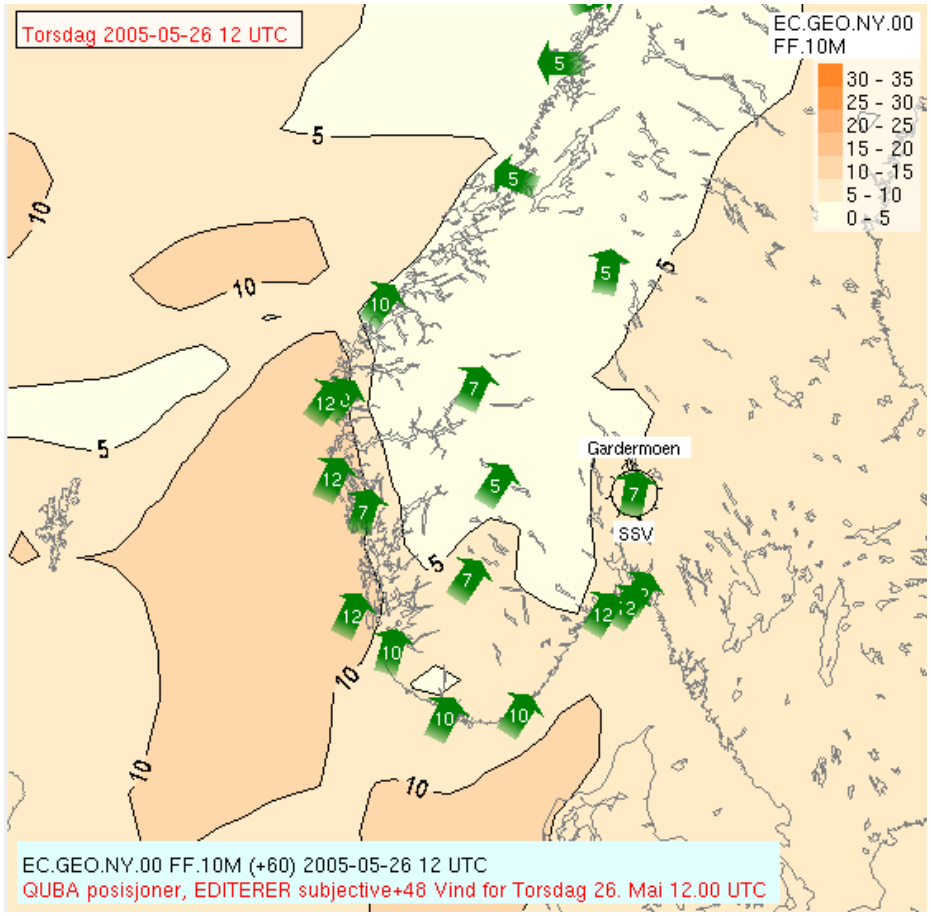
Forecast production

- Directly on map
- In separate *table* editor
- Climate and verification information available for each point

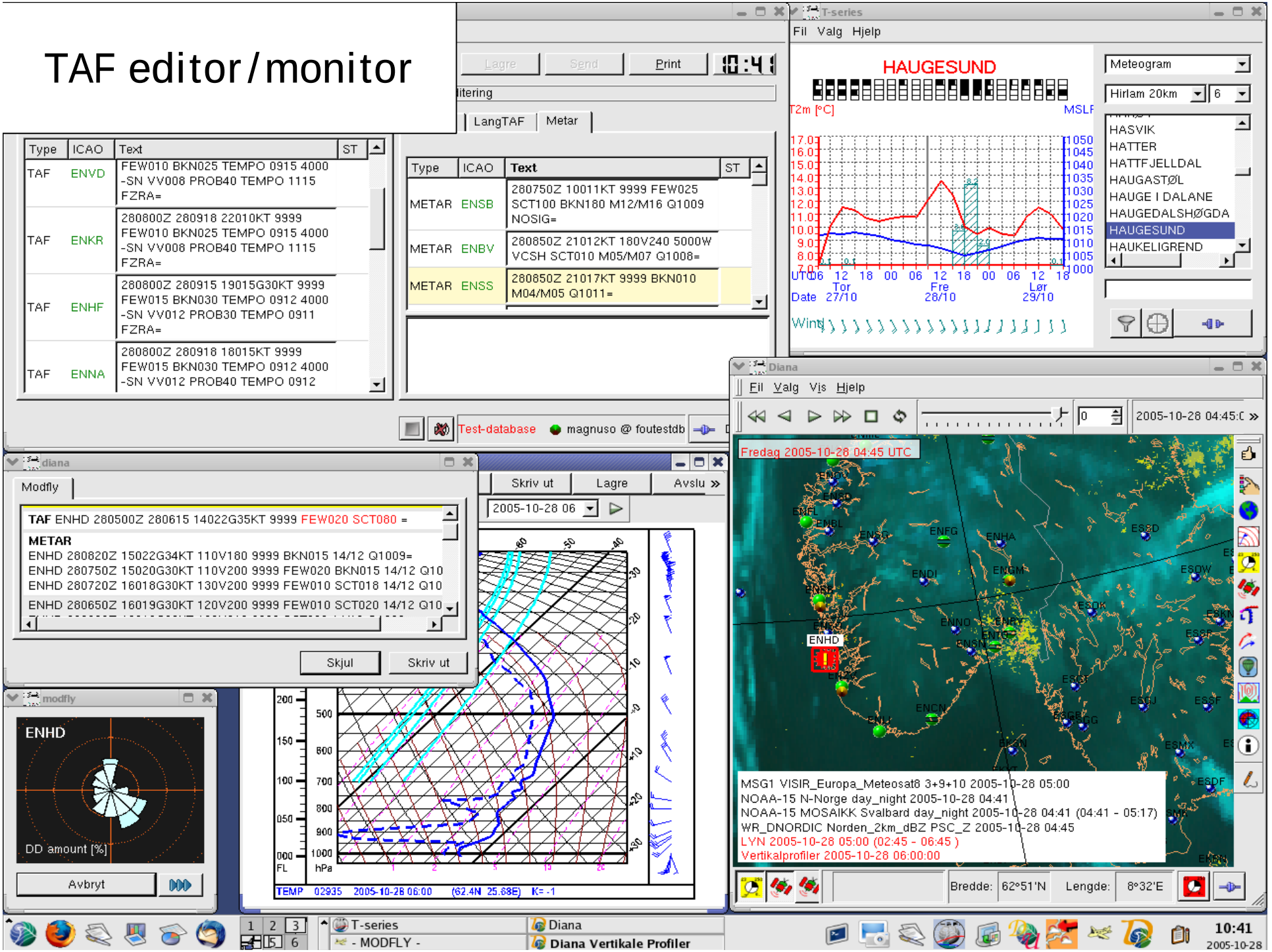


Point forecasting temperature and wind

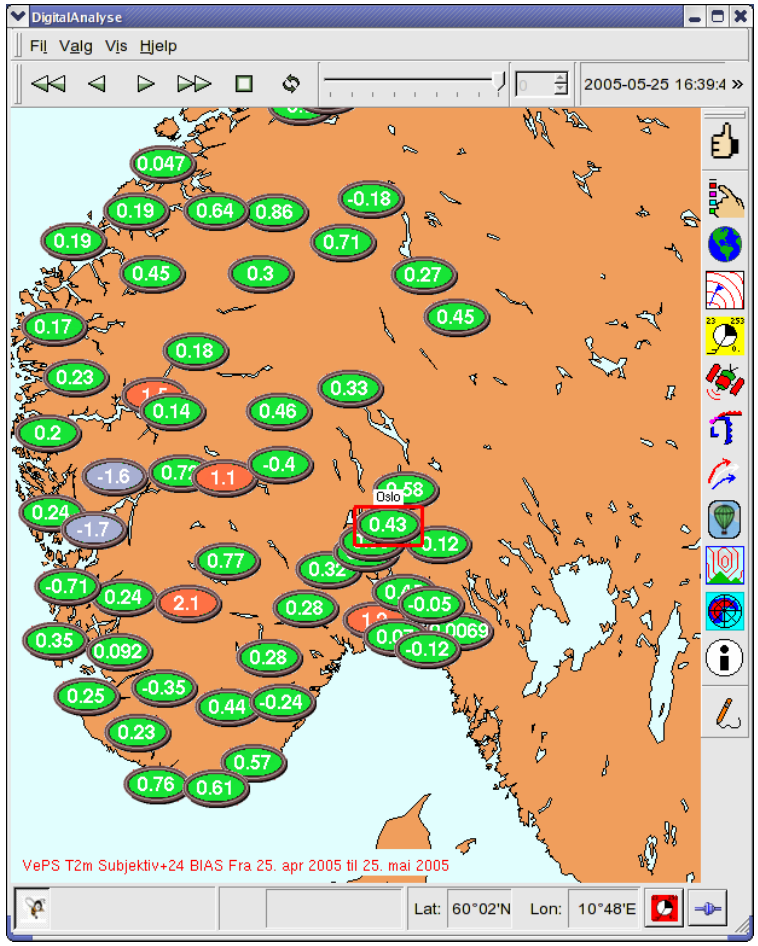




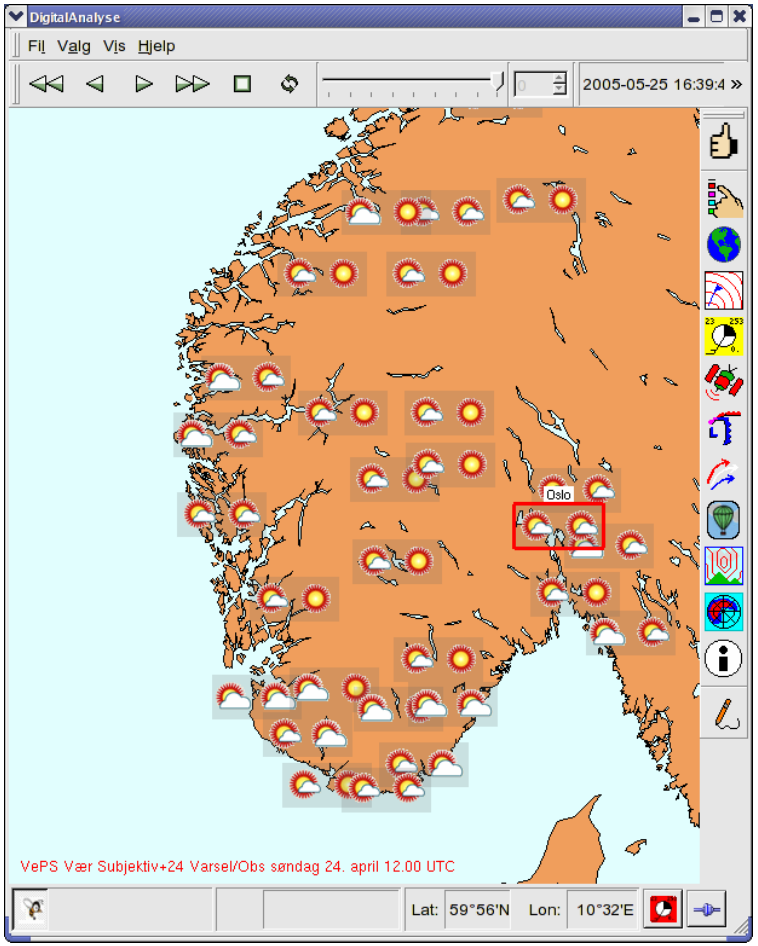
TAF editor/monitor



Online verification of point forecasts



Temperature bias

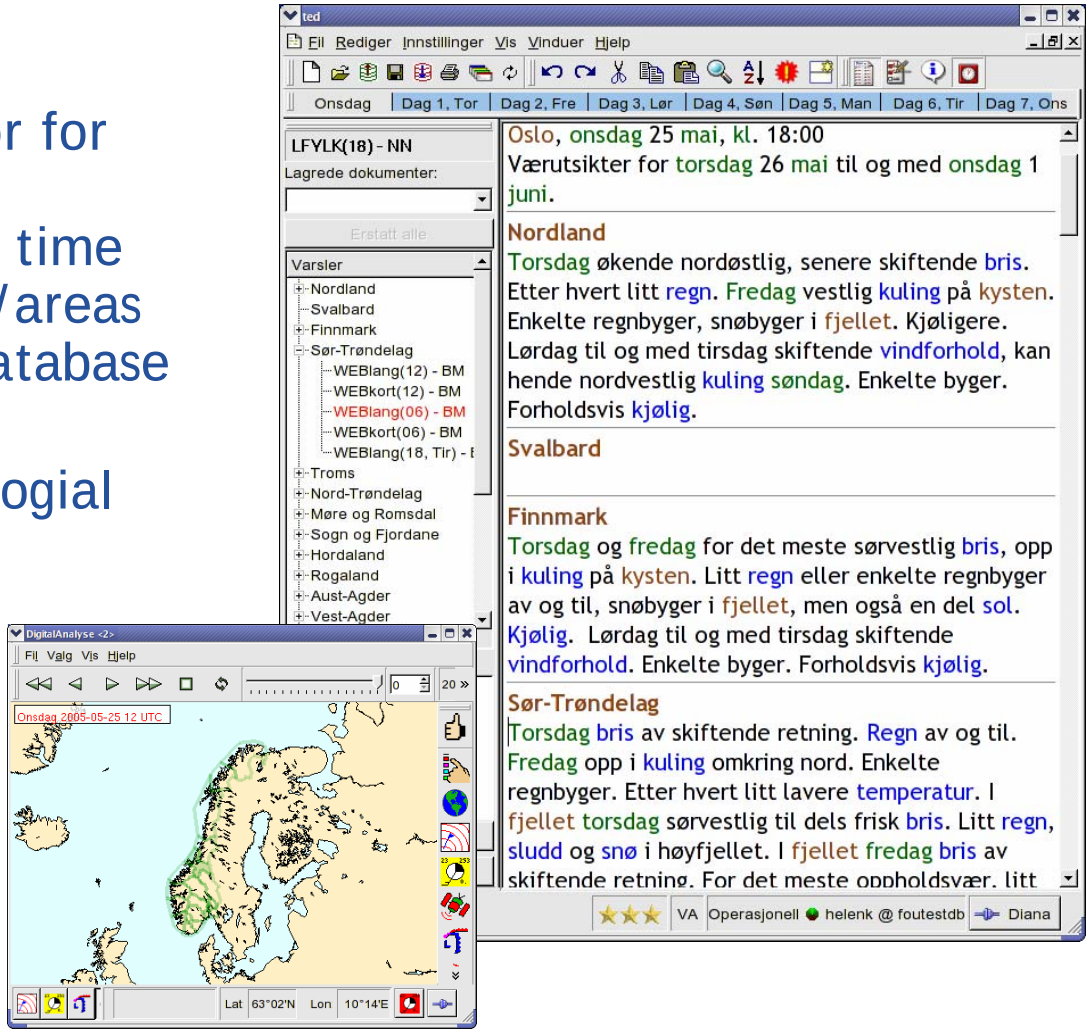


Forecasted/observed weather

TEXT FORECAST

- Specialiced text editor for weather forecasts, recognizing areas and time period. Text for time/areas saved separately in database for reuse
- Translation, meteorologial dictionary

- Future: extracting forecast values for monitoring(against obs/models) and verification



DIANA

- Developed for operational use
- Increased usage by researchers
- Small development crew in close cooperation with forecasters
- Fast development cycle - monthly updates
- Easy to add new applications

DIANA - interfaces

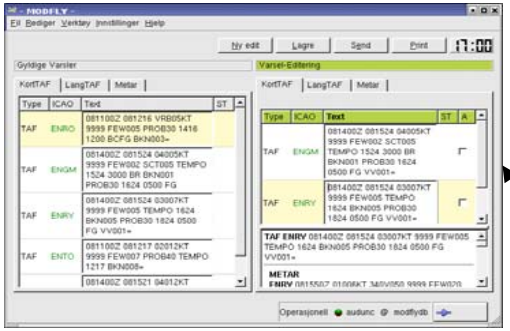
- Tailored for operational use in a forecasting environment
- Dialogs and Quick menus (Standard and private)
- Most options/preferences and command history in a log to next session.
- Keyboard shortcuts for all functions
- Batch version – identical code base

Programming environment

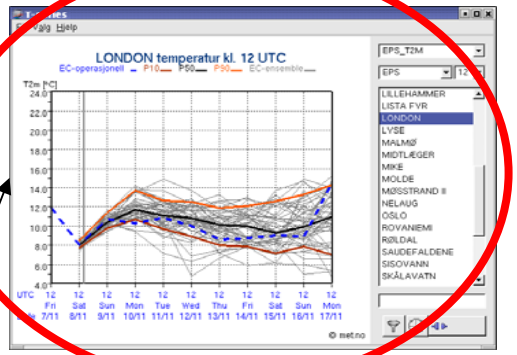
- Linux (Red Hat Fedora Core 3), all *met.no* workstations
- C++ (g++)
- Qt for GUI and window handling, platform independent
- Mesa3D OpenGL
- MySQL databases
- a few other freeware libraries (fonts etc.)
- connections between applications by Qt QSocket
- GPL: Freely available, free to use, free to change (from January 2006)

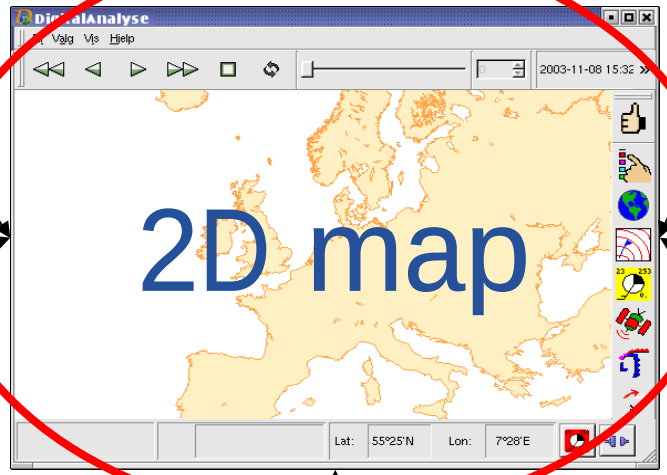
Open source release, January 2006

Taf monitoring

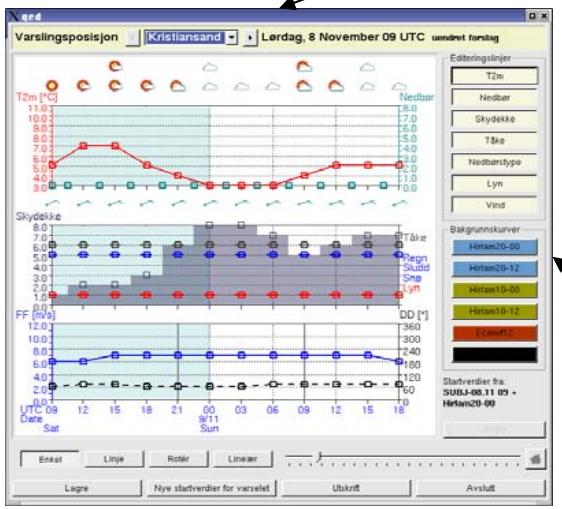


Time series



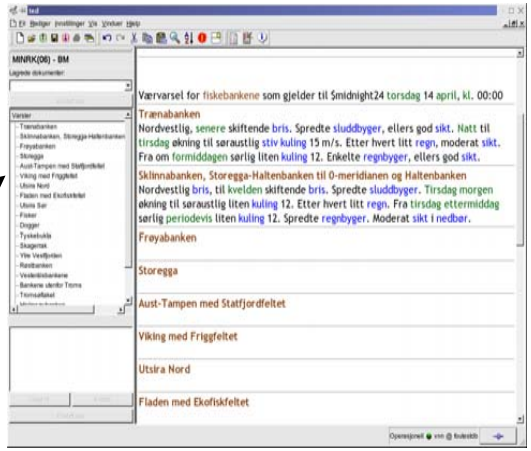


Time series editing



Point verification

Text editing

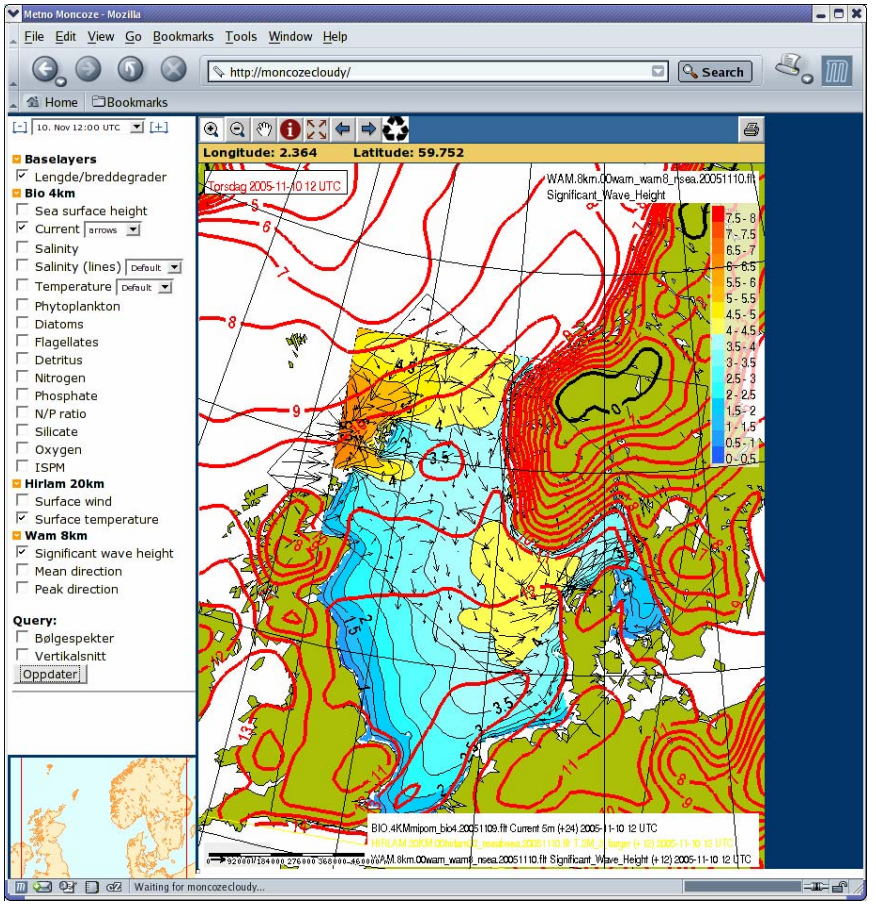


Free software release (GPL), January 2006

- Multilingual dialogs (Qt Linguist translations)
- Make it easier to add other data formats
  - Observation format: BUFR (with an ascii index)
  - Field formats: NetCDF and GRIB (with some index)
  - Image format: HDF5, geoTiff

Web Map Service

- A standard for showing maps in a web browser
- Defined by Open Geospatial Consortium (OGC)
- Maps can be requested from different servers
- Clients can build customized maps



Web Map Service

- Batch Diana make plots (png files) to be displayed by a Web Map Service on the fly
- Fast enough to let Diana make new plots when zooming or panning the map
- Interface between WMS and Diana: Now files, will be replaced by a socket connection
- Demand: Support many projections, PROJ4-library (which does not support wind/vector rotation…)

Future at met.no

Main project: PROFF = ”forecasts for the public”

- One gridbased database with controlled and adjusted data.
- Resolution ~4 km.
- This database contains all data needed to make products (Maps, symbols, graphs, texts)
- Possibly sorted to get fast and easy access to point and area data.
- There will be databases with pure NWP to verify forecasters improvements and to point out the need for model improvements.

Adding value to high resolution data

1. Severe weather information
2. All forecast products should be consistent
3. High resolution forecasts
4. We accept dynamical inconsistencies

Future at met.no

- Currently, forecasters, researchers and IT-developers discuss how, and to what extent, the forecasters should modify the grid data.
- The further development of Diana highly depends on the result of these discussions.