Deutscher Wetterdienst

Visualisation and Production using *NinJo*

DWD - Zentrale Entwicklung

Michael Rohn, Dirk Heizenreder

Eleventh Workshop on Meteorological Operational Systems

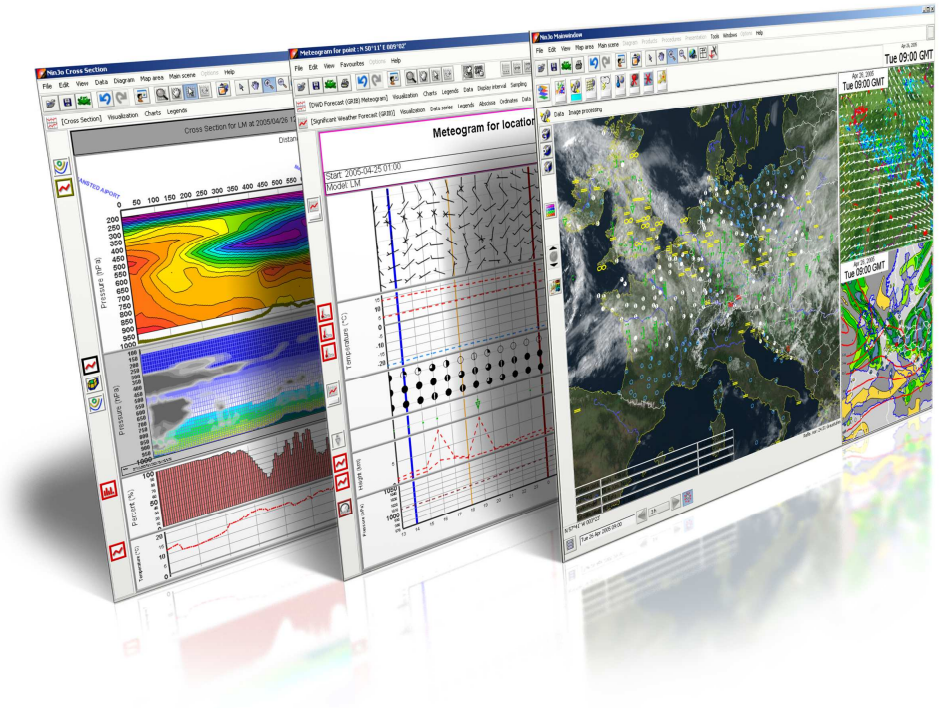
ECMWF, 12-16 November 2007

- ***NinJo*: Overview**
- **Visualisation**
- **Product generation**
- **Automatisation with *NinJoScience***
- **Status and Outlook**

NinJo: Developed by …

International collaboration
of Met Services in
Canada, Denmark, Germany, Switzerland

Further joint Development
and Maintenance



Deutscher Wetterdienst
MeteoSwiss
dmi.dk
Environment Canada Environnement Canada
Meteorological Service of Canada
Service météorologique du Canada
Ernst Basler + Partner GmbH
sd&m
software design & management

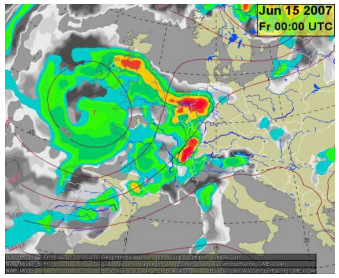
NinJo has …

Modular structure

eg.GRIB data

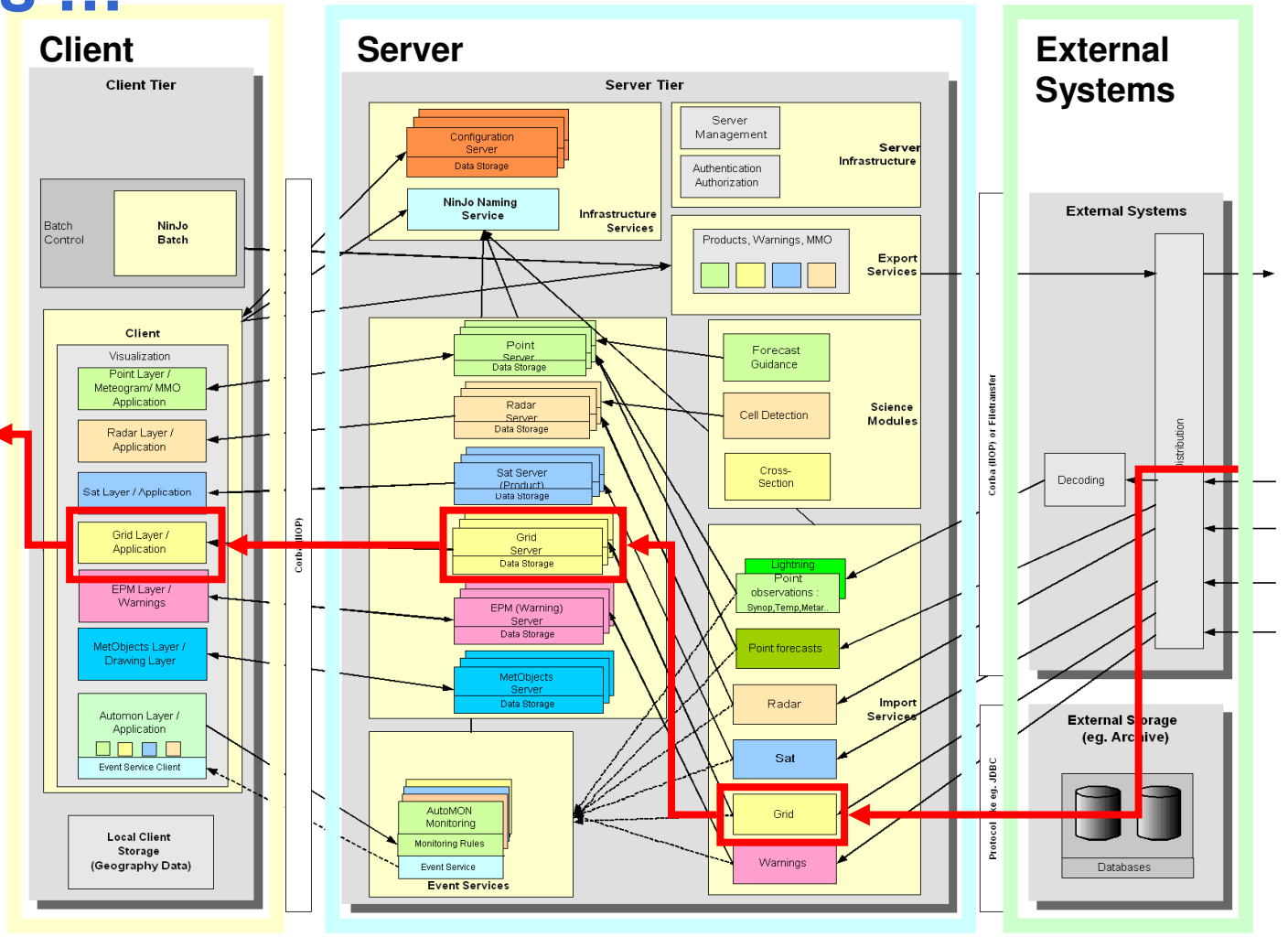
↓

GridLayer



Many data types

GRID, BUFR, Radar, Satellite, warnings, cells, points, areas, …



NinJo is …

Building kit for meteorological applications

From a satellite image viewer to a complex meteorological workstation

Visualization and Production tools can be configured

each application represented by own layer

Flexible programming environment

each partner constructs his *NinJo* and adds own data types

completely Java based

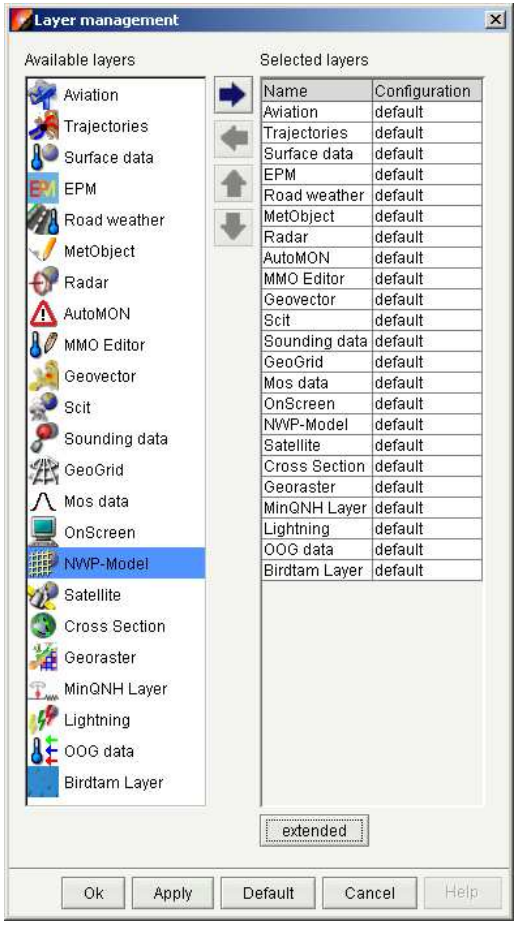
User oriented

user can define his own *NinJo* desktop

everything is configurable by user action

Generic Meteorological Workstation

easy extension possible (open for new data, new storage systems)



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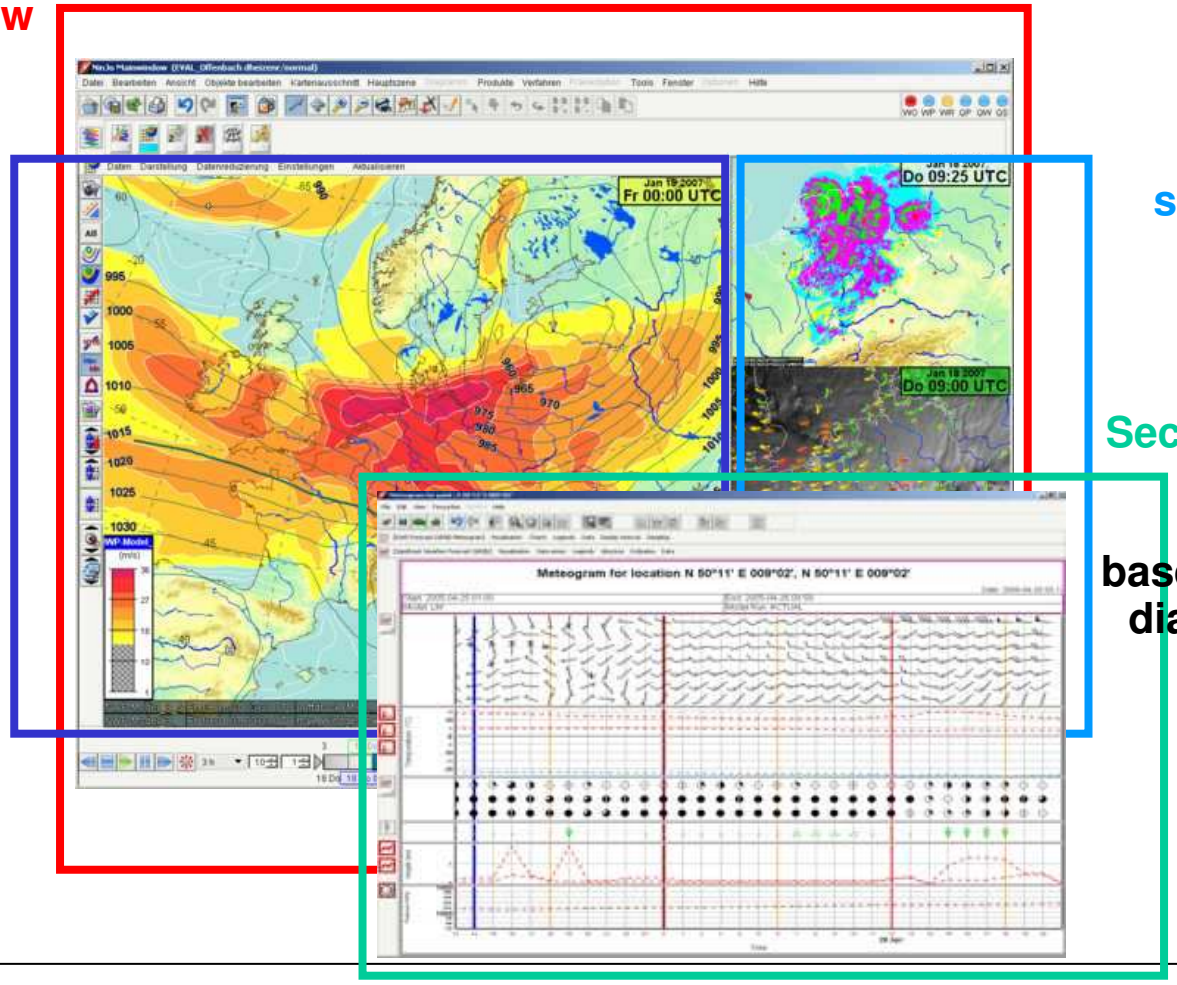
NinJo: Visualisation - Concept

Main Window

Main scene



secondary scenes
up to 3, configurable

Secondary Windows
Meteograms, CrossSections, based on extendable diagram framework

NinJo: Visualisation - Flexibility

Highly configurable

NinJo is the GUI for configuration (System-, Site-, User-Level)
xml behind the scene

Favourites and Functionality can be configured

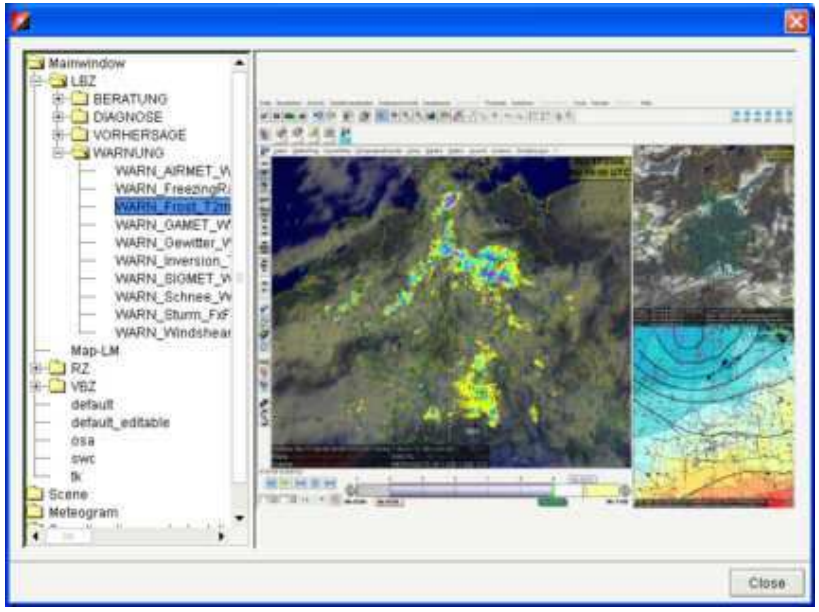
Maps/ Geographical data

- Data types
- Color Tables
- Legend positions

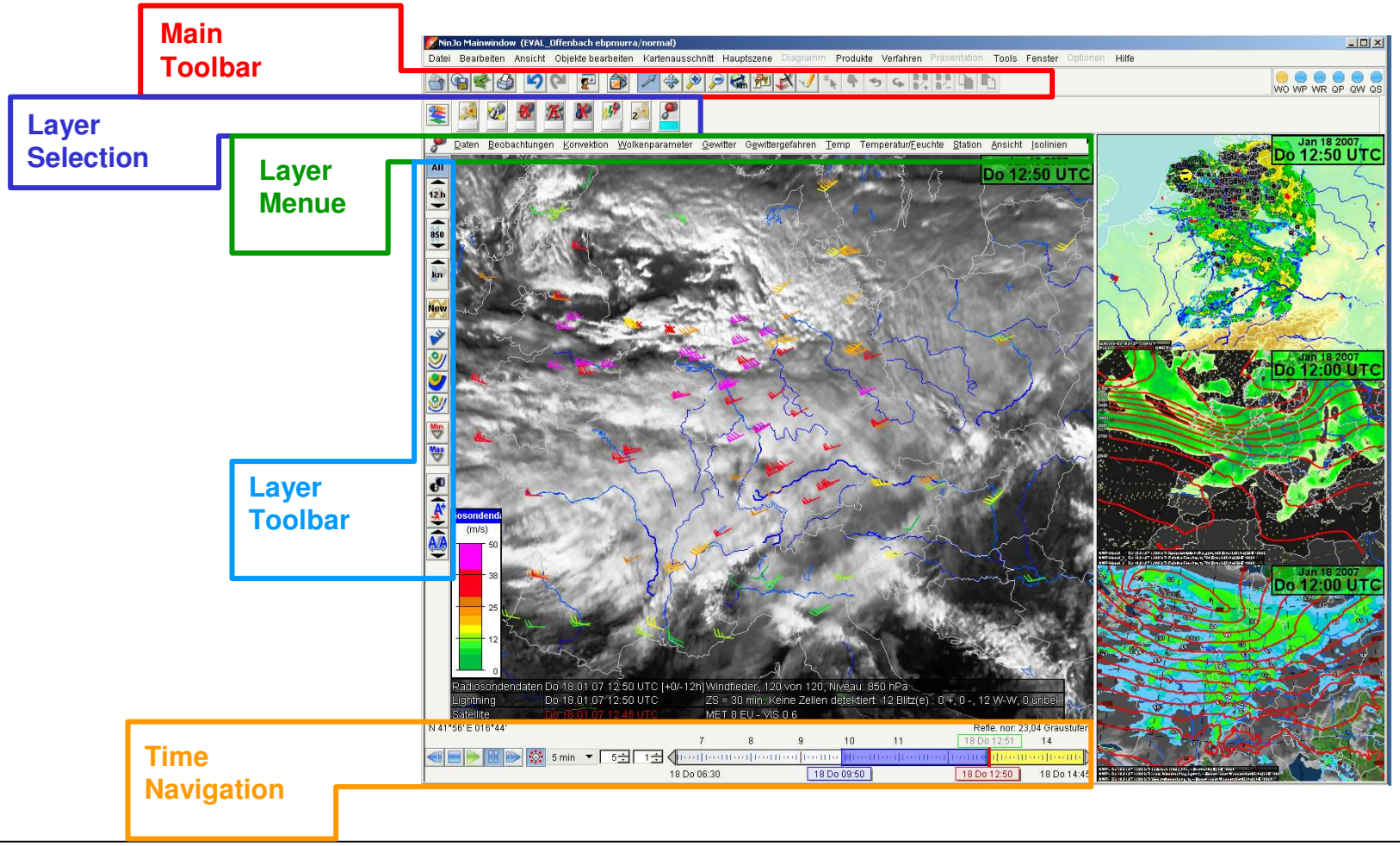
GUI

Menues
Selected data types
Selected layers, active layer
Number of (secondary) scenes

Multi-lingual



NinJo: Visualisation - Layer specific



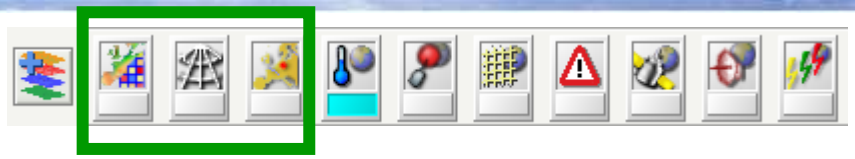
NinJo: available Layer in 1.2

Independent visualisation
- meteorological data
- geographical information

Flexible composition of scene
- Superimposed visualisation
- Modes active, invisible, duplicated

Interactive layers
- specific applications

NinJo: Geo Layers



Geo Raster

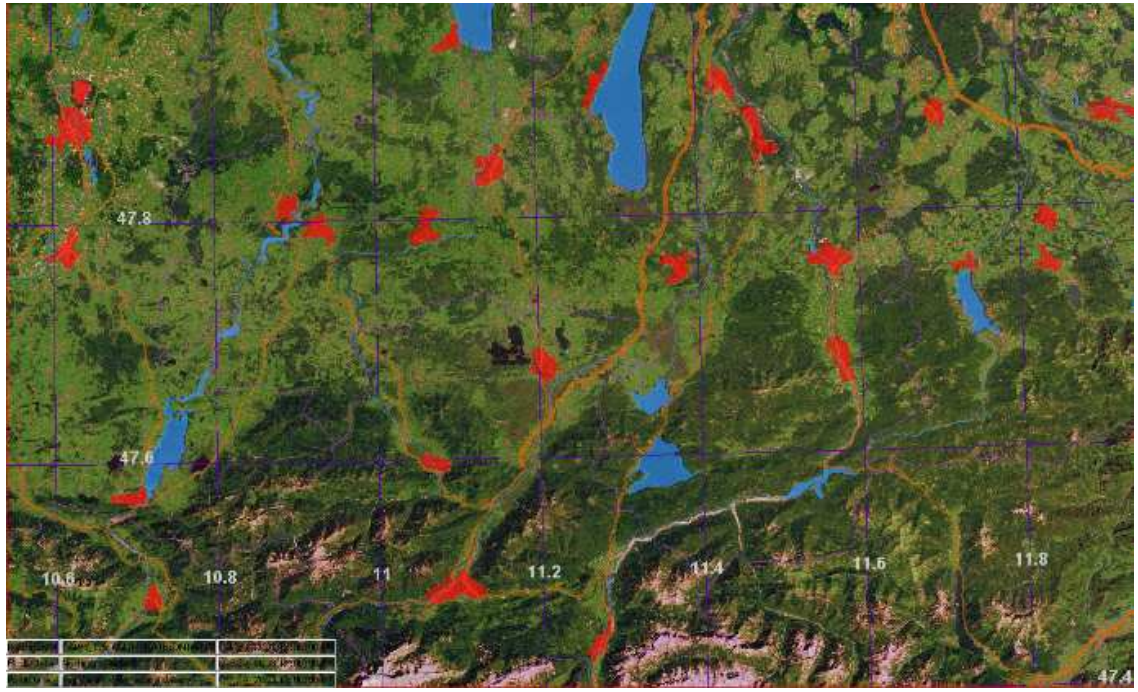
- Height
- Elevation
- Landuse

Geo Vector

- Coastline, boundaries
- Roads, railway,
- Rivers, cities, airports

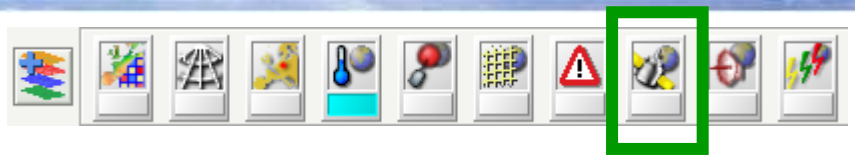
Geo Grid

- parallels and meridians



Landsat image (50m resolution) + Geovector data

NinJo: Satellite Layer



Supports major platforms

GOES, GMS, Meteosat

NOAA, FENGYUN

Products

Channel combinations

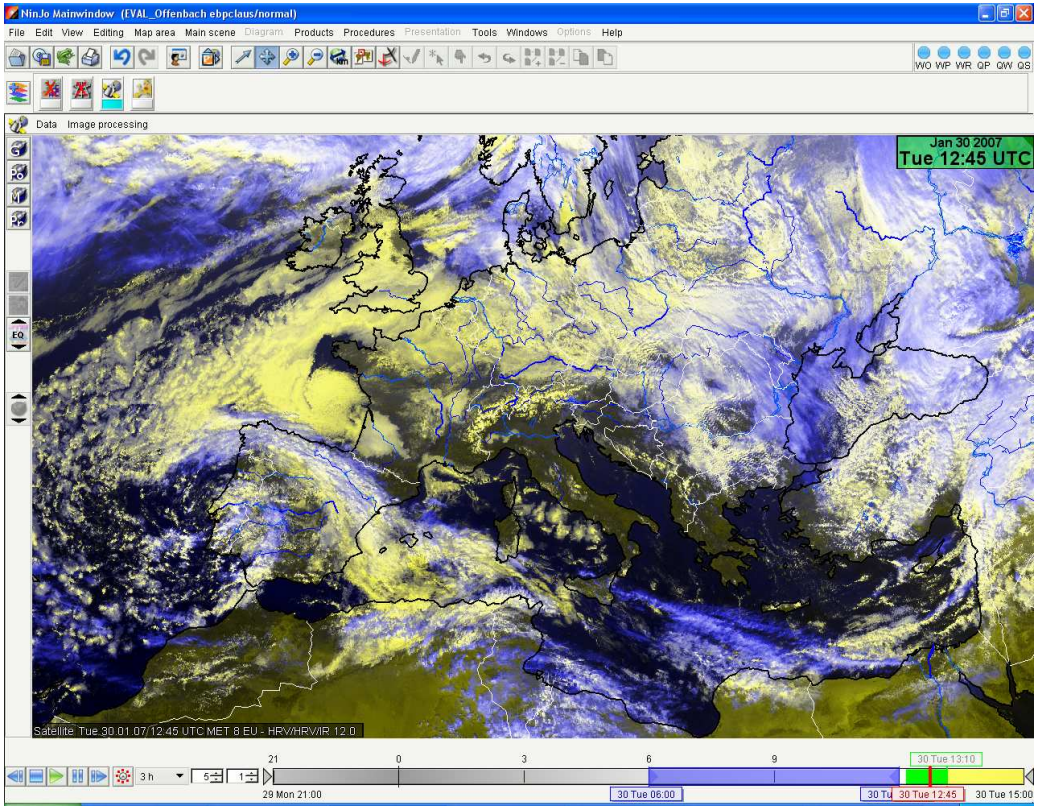
Composites

SAF products

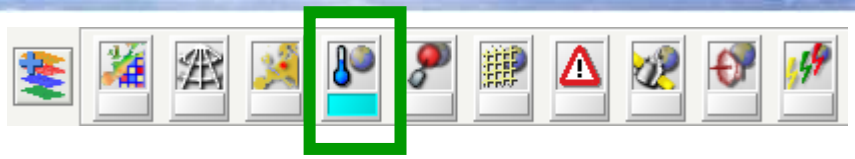
Basic Image processing

contrast enhancement

colour tables



NinJo: Surface Layer



observation and forecast data

Visualization of station based data

configurable display

symbols and plot models

Sorting algorithms

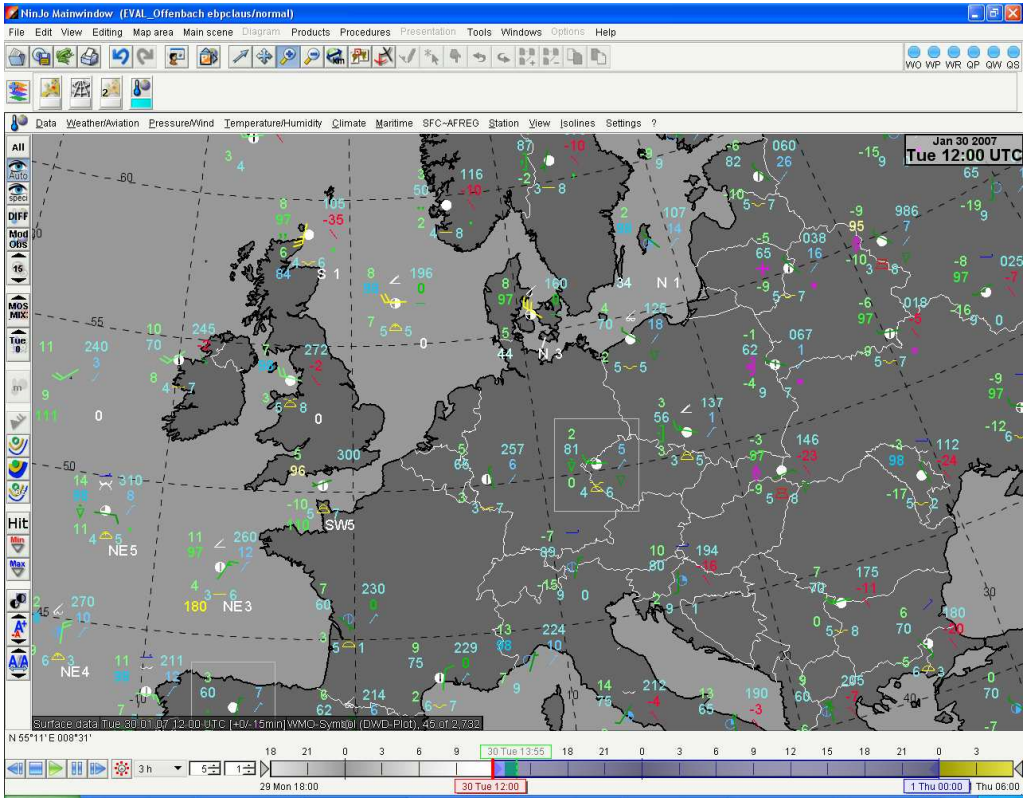
Min/Max

Rating

Hitlist

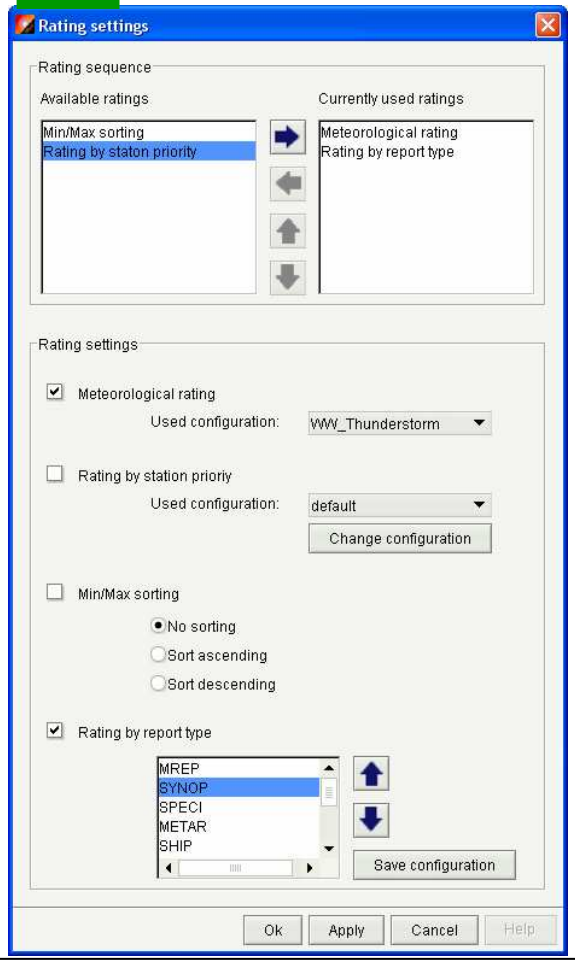
Meteograms

at selected locations

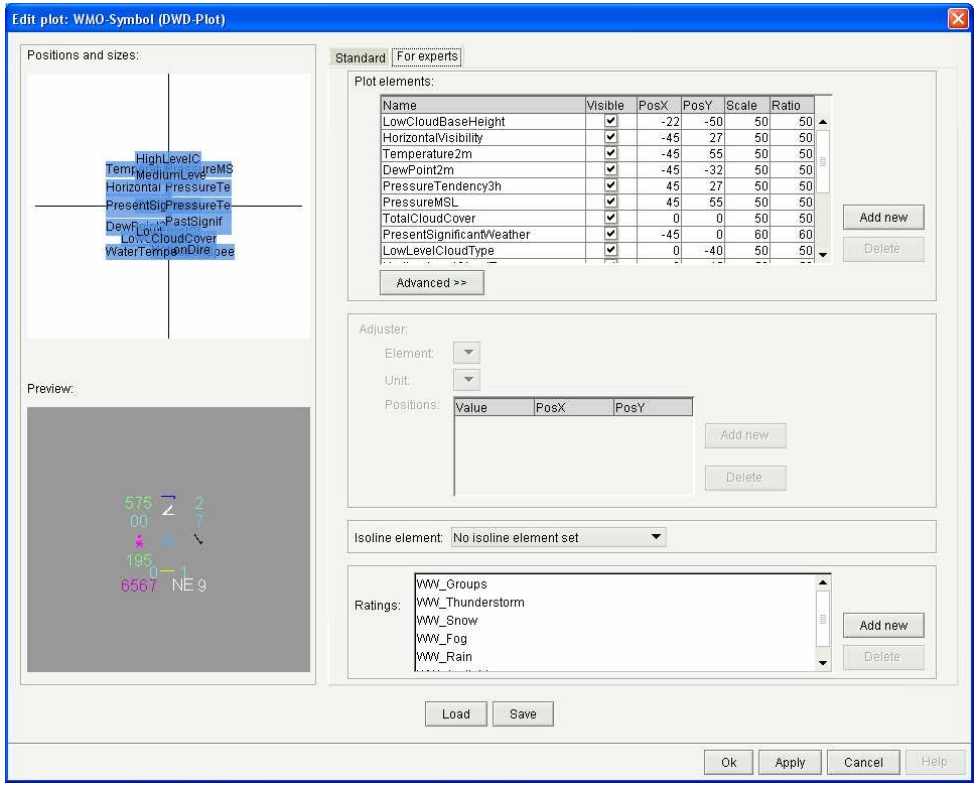


NinJo: Surface Layer - Configuration

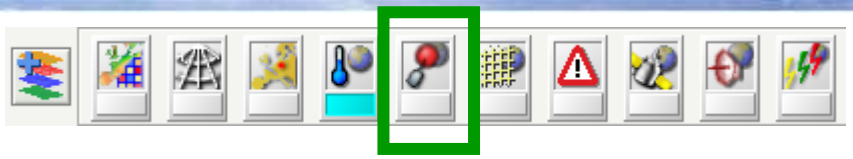
Priorization



Editable plot-model



NinJo: Sounding Layer



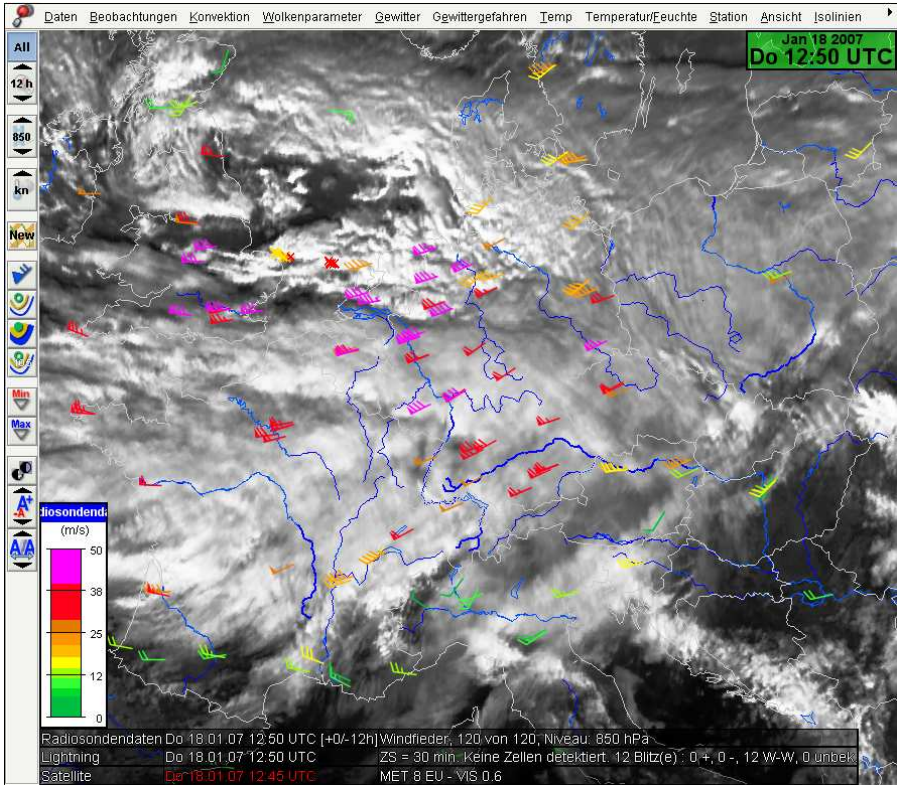
Point map

horizontal distribution of selected elements

Sounding diagrams

vertical distribution at specific locations

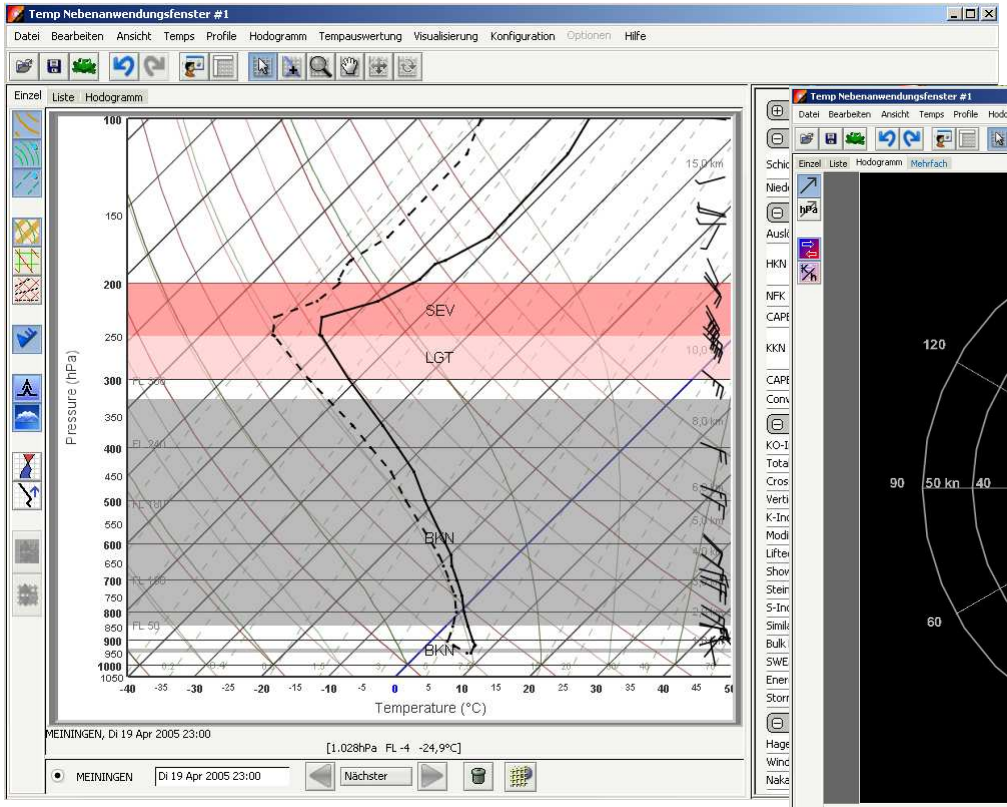
(next slide)

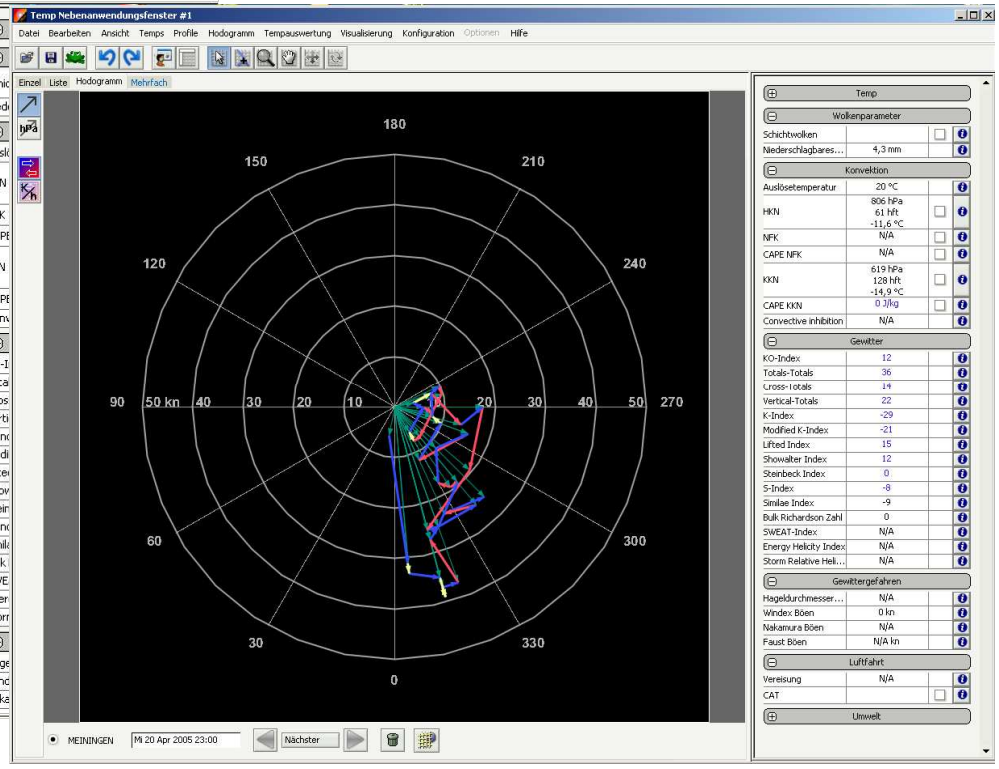


NinJo: Sounding Layer - diagrams

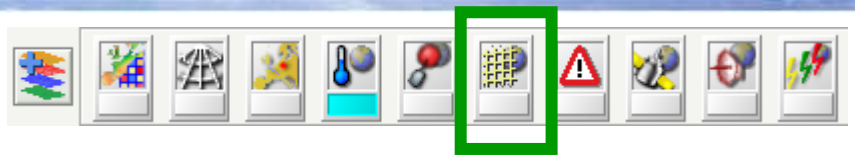
Cloud cover and turbulences

Hodograph





NinJo: Grid Layer



various numerical NWP data

GME, LME, ECMWF, GFS,
LFP, HIRLAM...

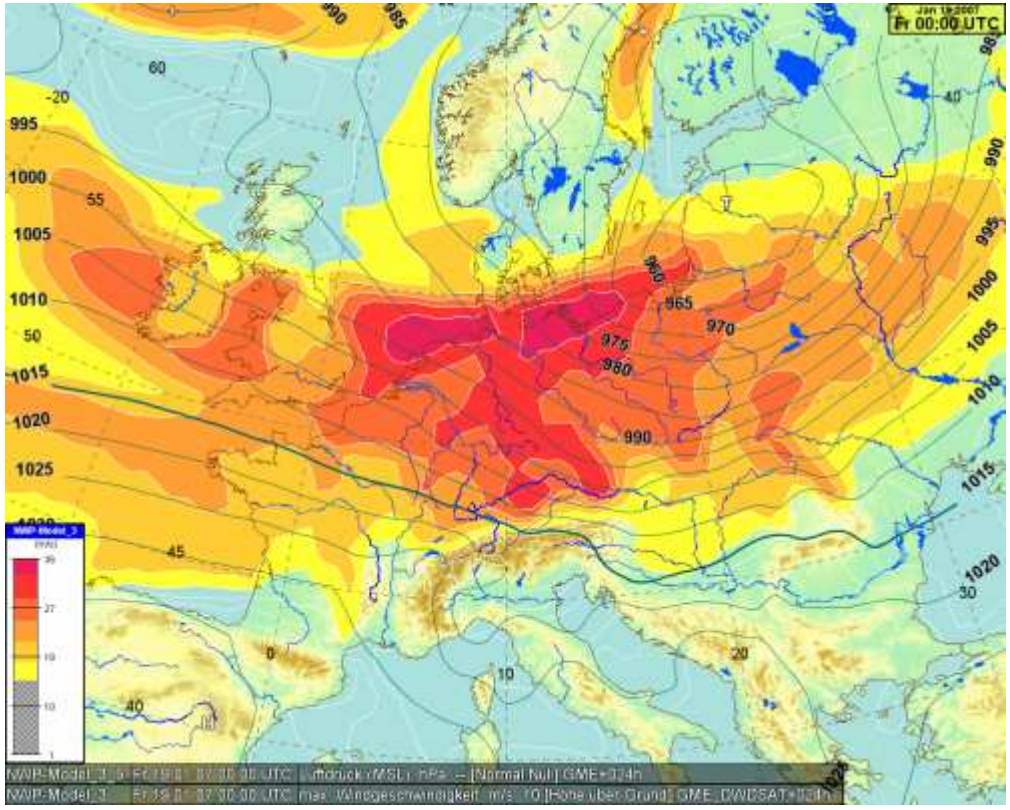
calculated elements

precip. sums, differences

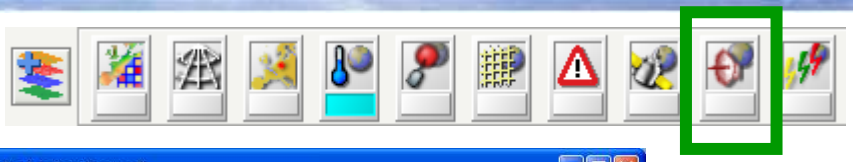
display modes:

Isolines, Isoareas

values, symbols, wind barbs



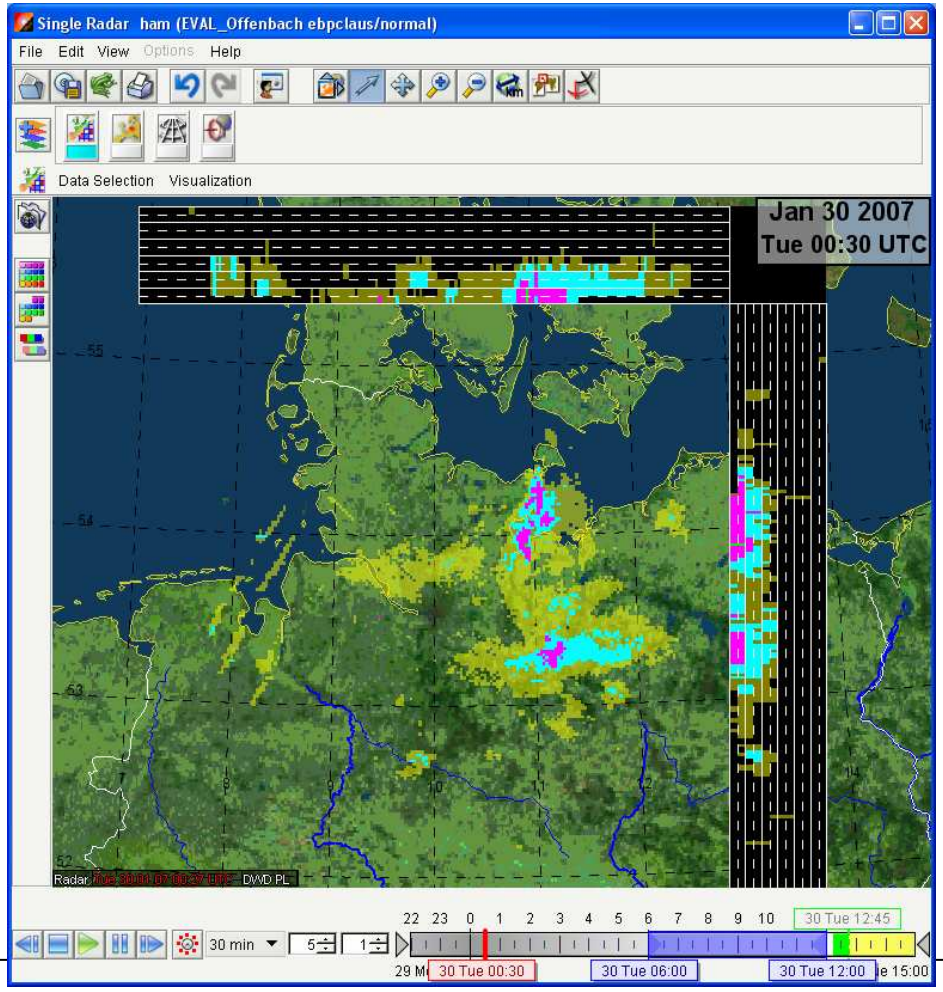
NinJo: Radar Layer



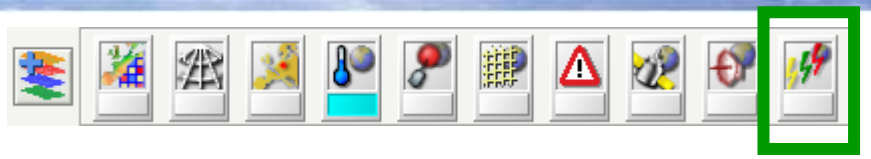
various Radar products

Projections

cartesian,
stereographic



NinJo: Lightning Layer



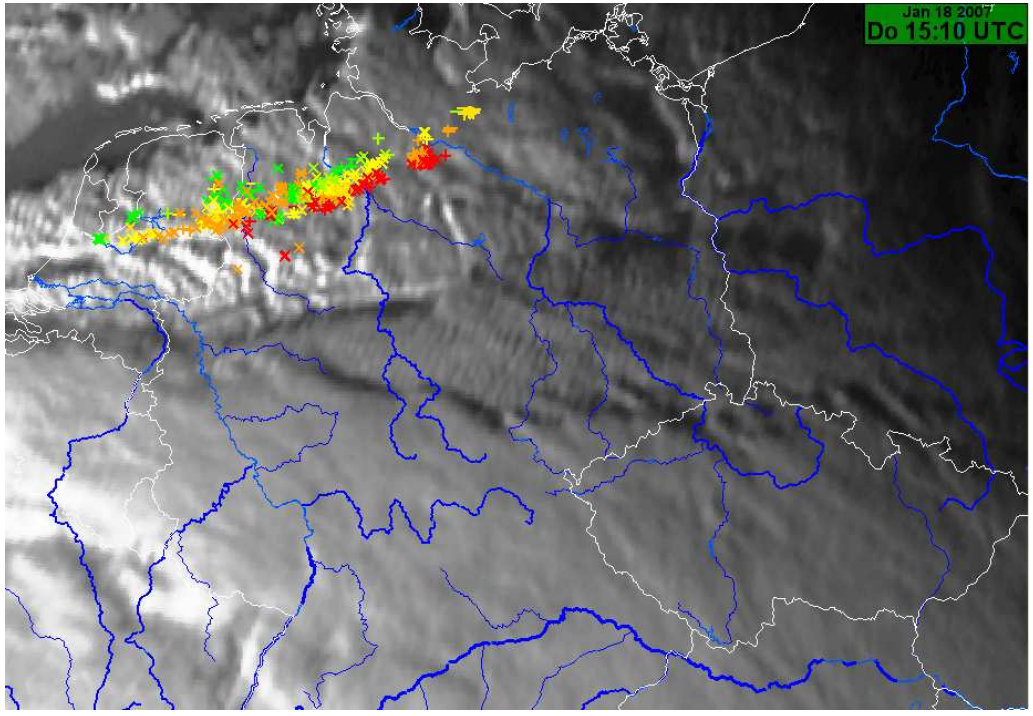
Different networks

Visualization of characteristics

- Cloud to ground, cloud to cloud
- Polarity
- no. of strokes
- amplitude

Color-encoding

- depending on age or polarity



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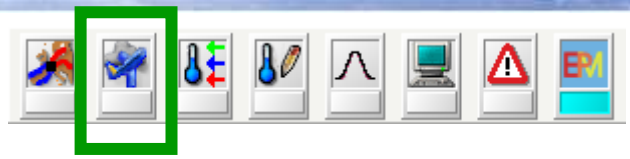
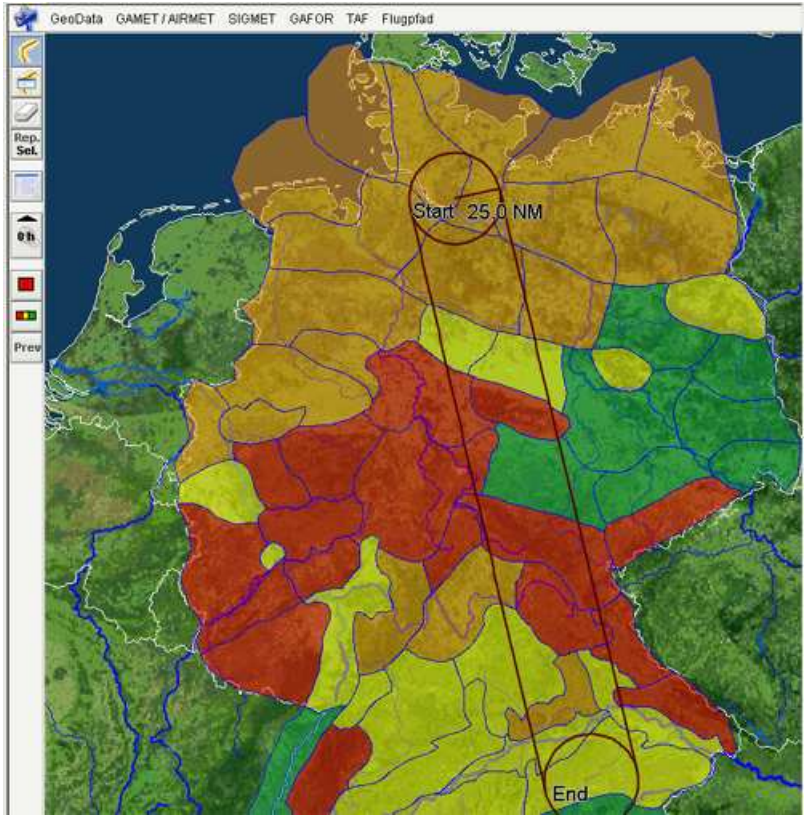
NinJo: Aviation Layer





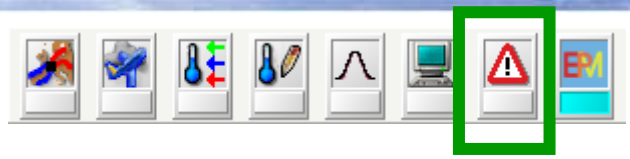
Report types: GAFOR, GAMET, SIGMET, TAF

Aeronautical

- warnings
- aerea forecasts
- point forecasts

defined flight paths

NinJo: AutoMON



Weather monitoring

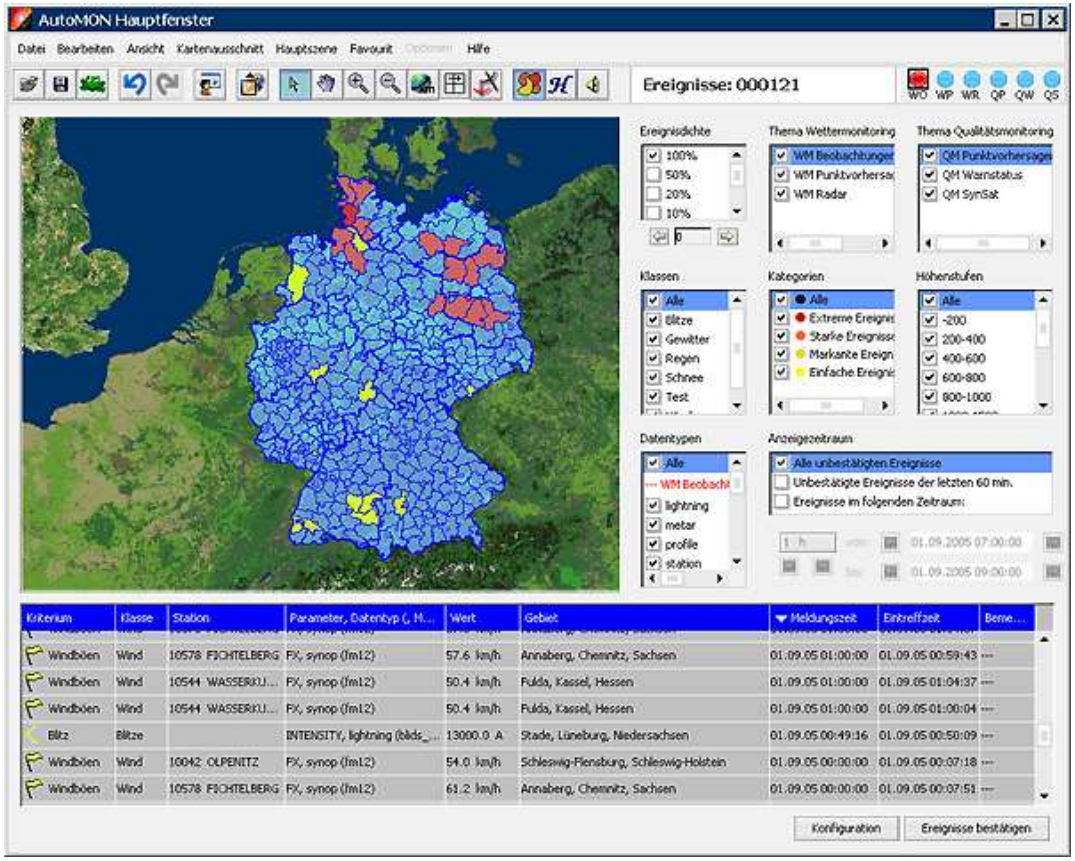
continous alerting to
severe weather situations

Monitoring of quality

comparison of warnings
to observed weather

Monitoring rules

highly configurable
all data types
threshold definitions
combination of criteria



NinJo: EPM Layer

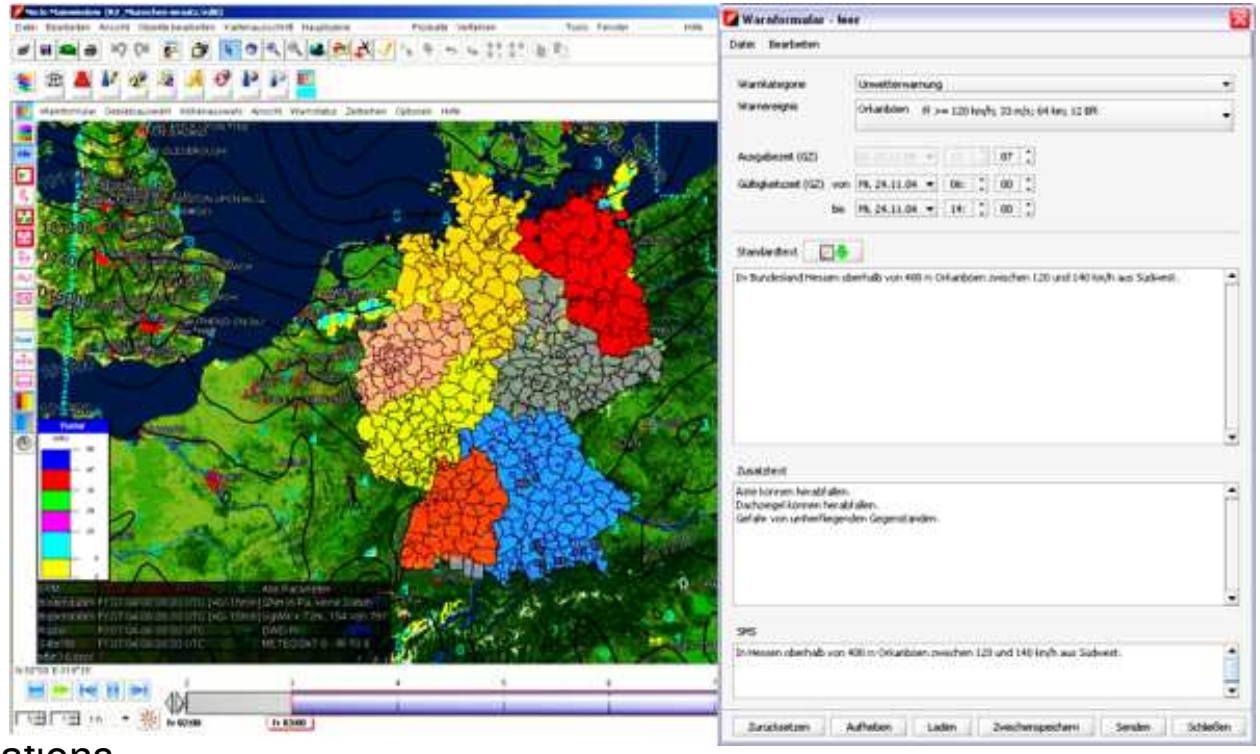
Serves to issue warnings: **E**diting **P**roduction **M**onitoring

Selection
- objects/areas

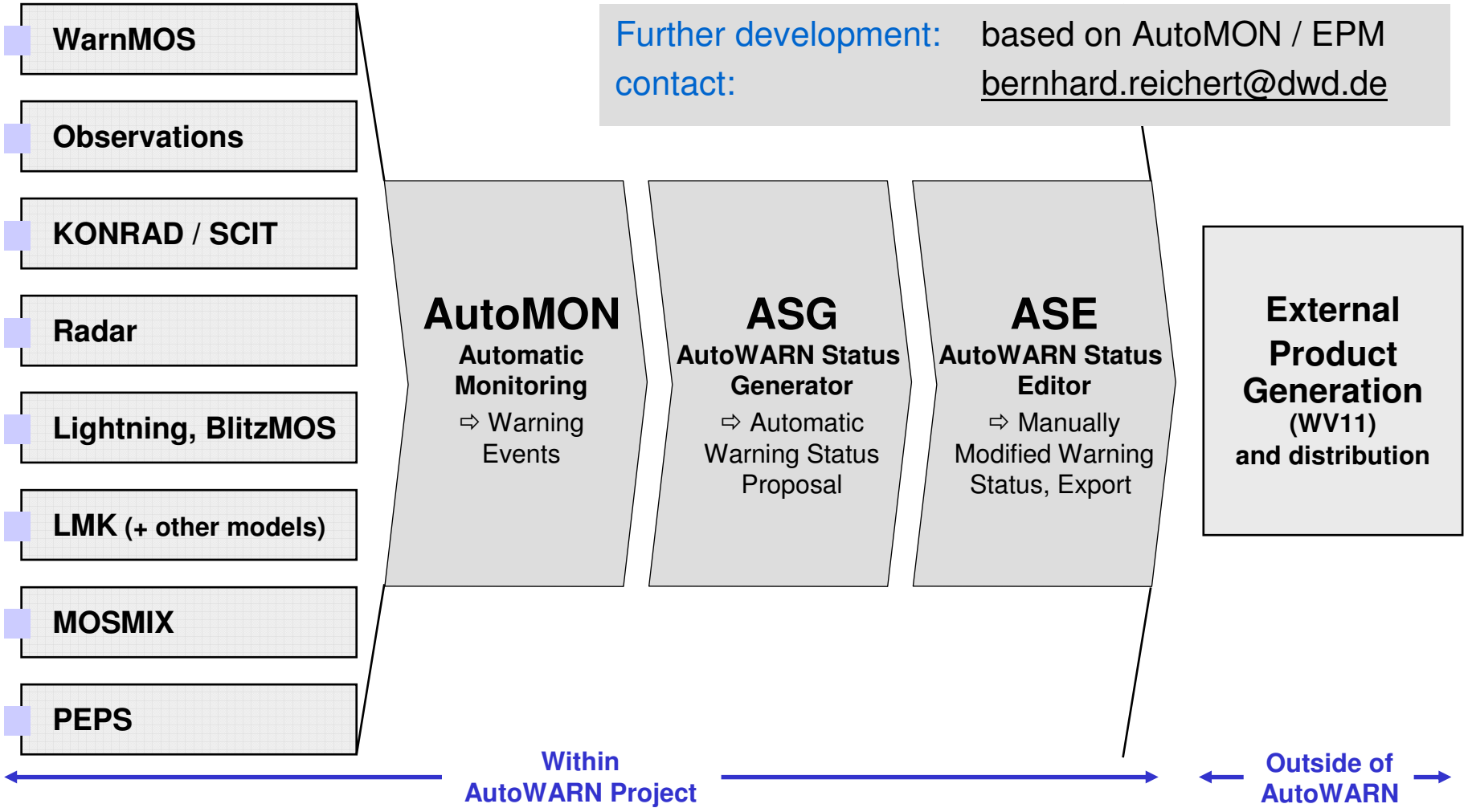
Editing
- warning template
- height selection
- time selection

Production
- dissemination to text generation/user

Monitoring
- comparison to observations
- assisted by AutoMON



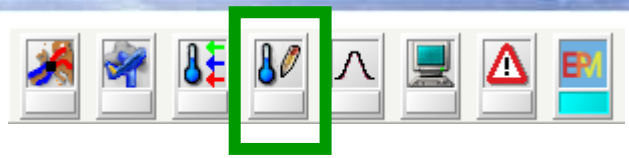
Outlook: Automatic Warning – Project until 2009



Further development: based on AutoMON / EPM

contact: bernhard.reichert@dwd.de

NinJo: MMO Layer



Point Forecast Editing

Selection

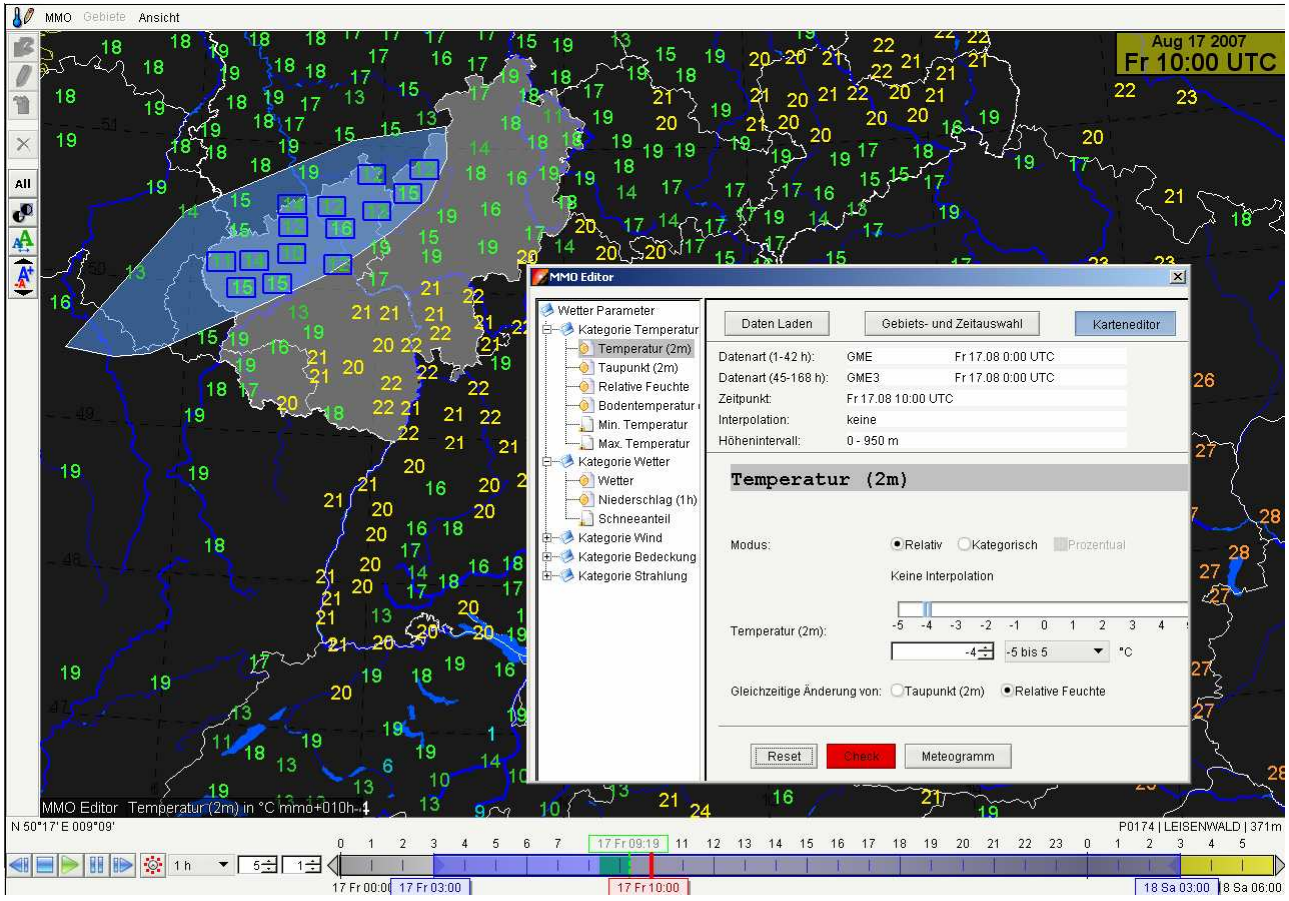
area / point
forecast time
height level

Editing

absolute / relative
interpolation

Consistency

compares elements
optional corrections



NinJo: IGE

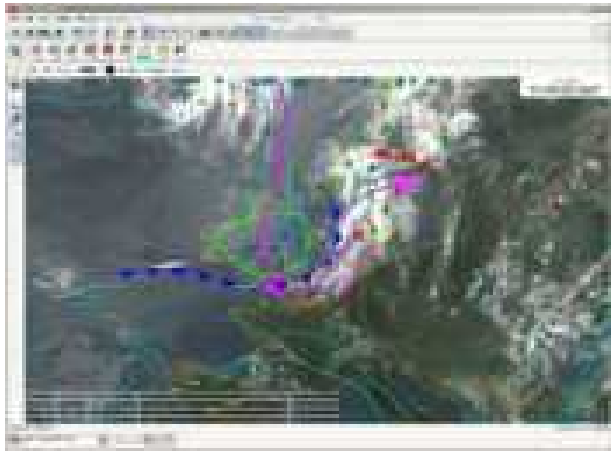
Interactive graphical editor

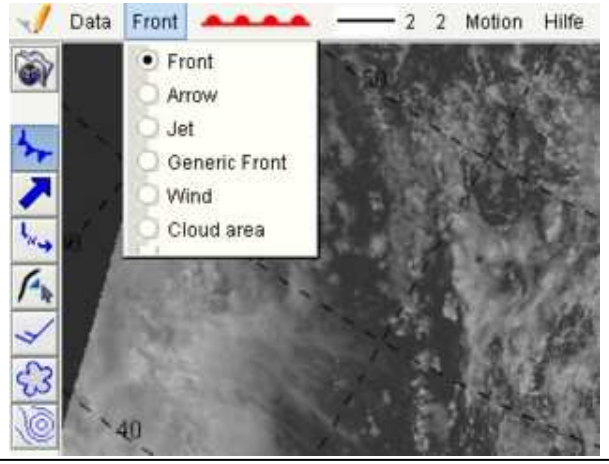
Editing Graphical Objects

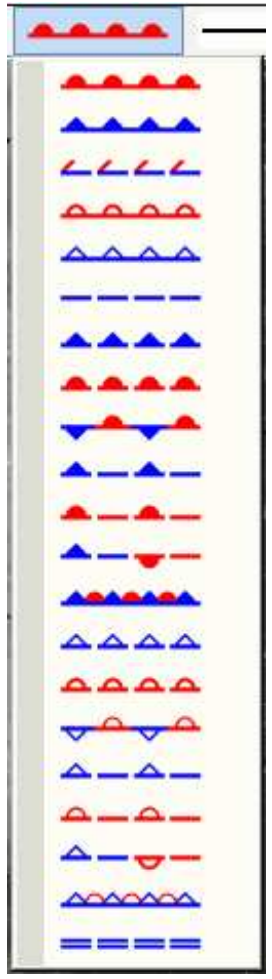
- Fronts, Jet, Clouds,
- SigWx elements
- Weather areas,…
- Texts and icons

MetObjects

- encoding
- distribution for other users







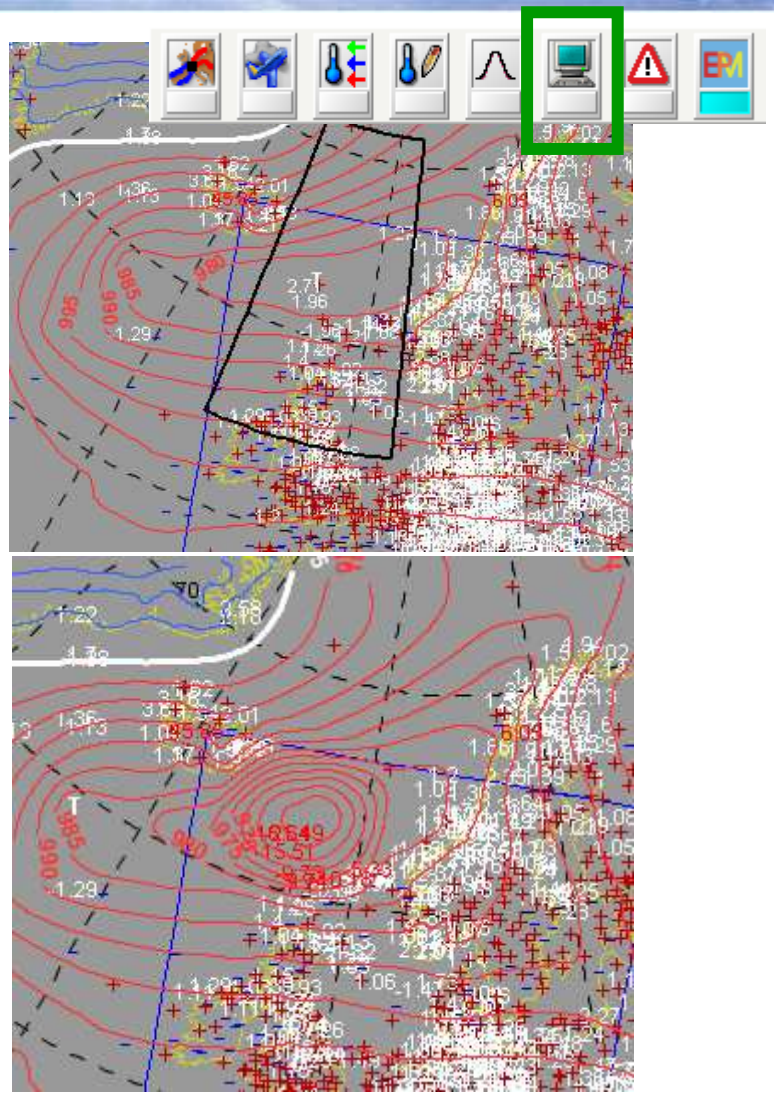
NinJo: On Screen Analysis

Field editing
- physically based modifications
- result storage for further processing

Edit Modes
- point, single and multiple
- structure
- drag points on isolines

black list
- filter observations

Prototypical
- *adapt balanced fields*
- *e.g. wind - mass*



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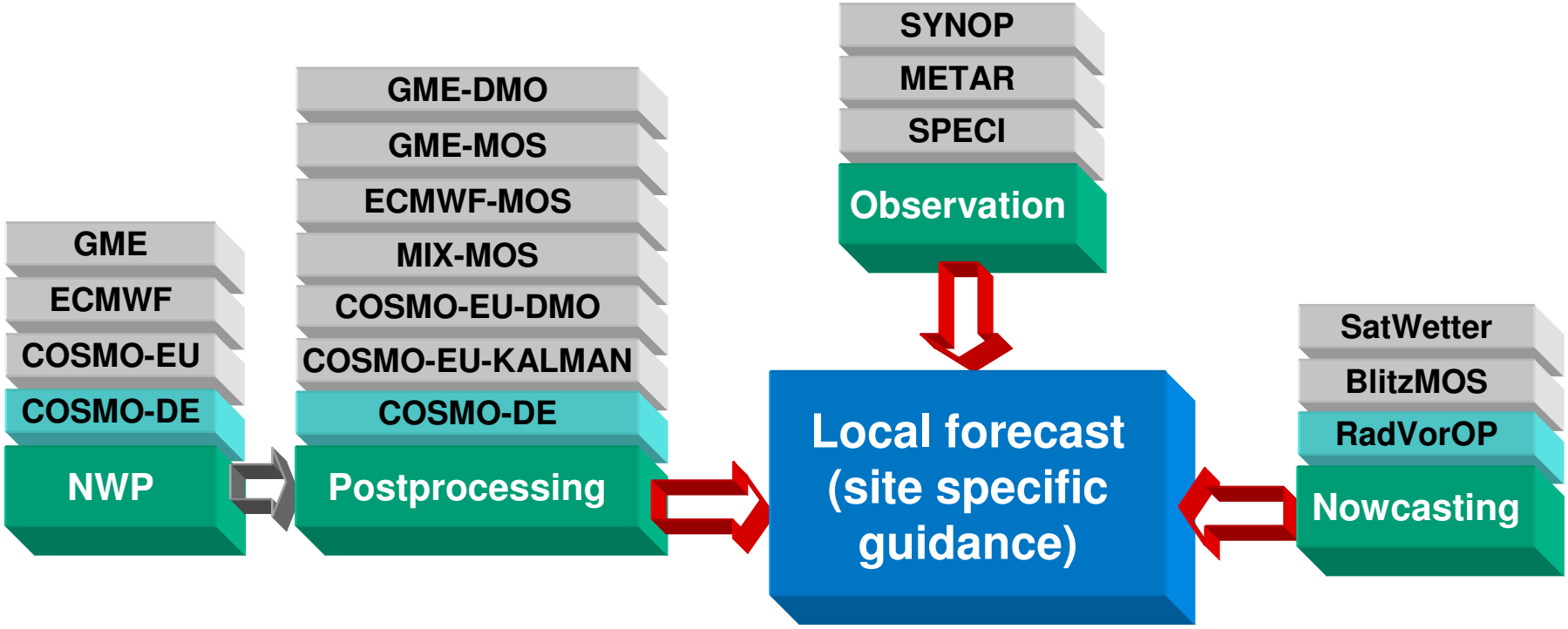
Motivation: *NinJo-Science*



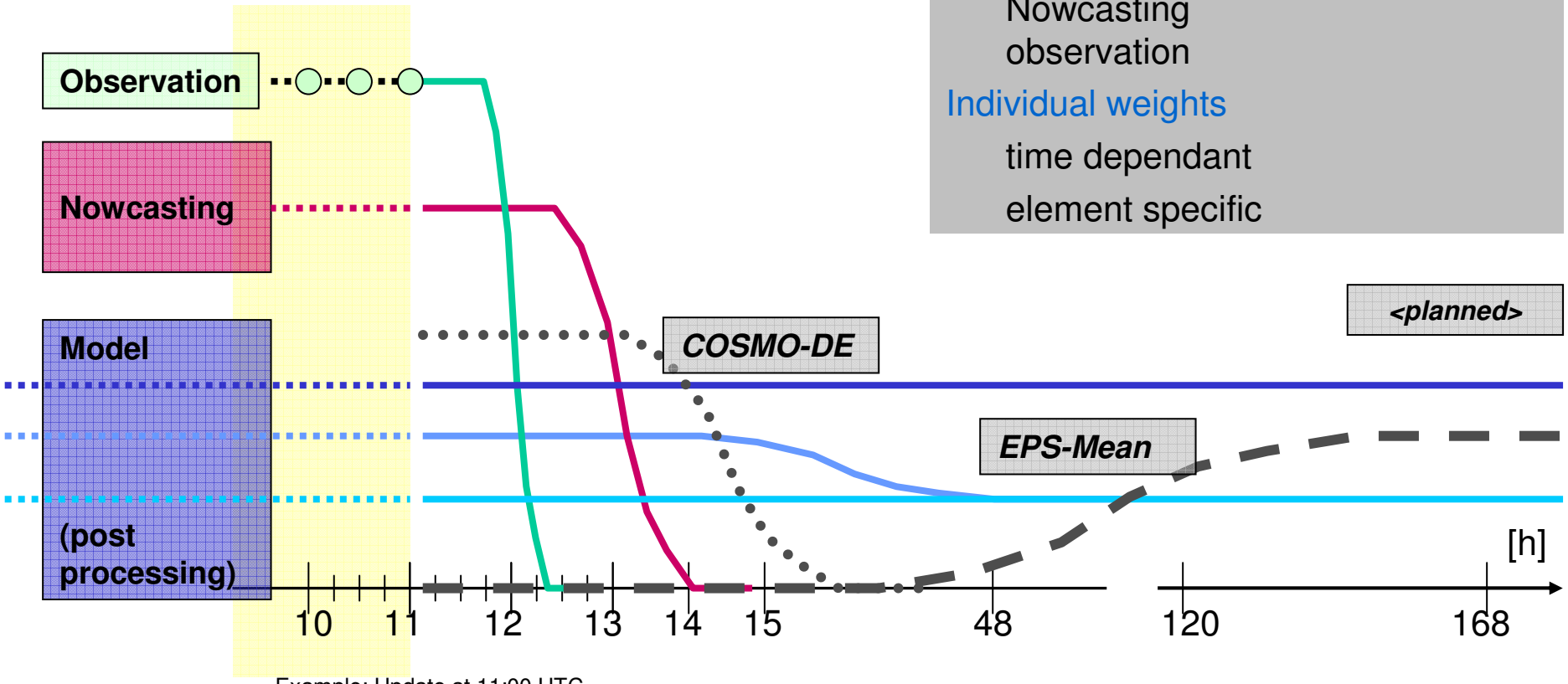
large variety of data:
only partial used in forecast
close to impossible to manually assess

Automatisation
support forecaster
more time for extreme weather forecasting/warning

Adaptation/Objective Optimisation

Data merging:
- Model postprocessing
- Nowcasting
- observation

Individual weights
- time dependant
- element specific



Example: Update at 11:00 UTC

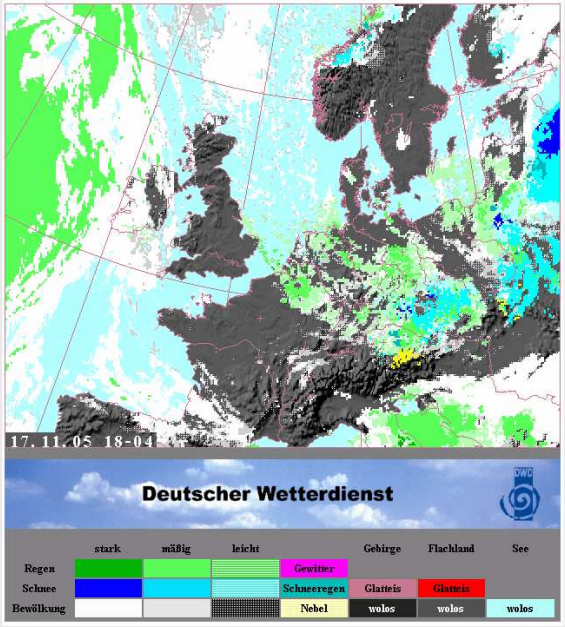
Adaptation: Interpretation of nowcasting products

Heterogeneous data
- formats, resolution
- information content, probabilistic

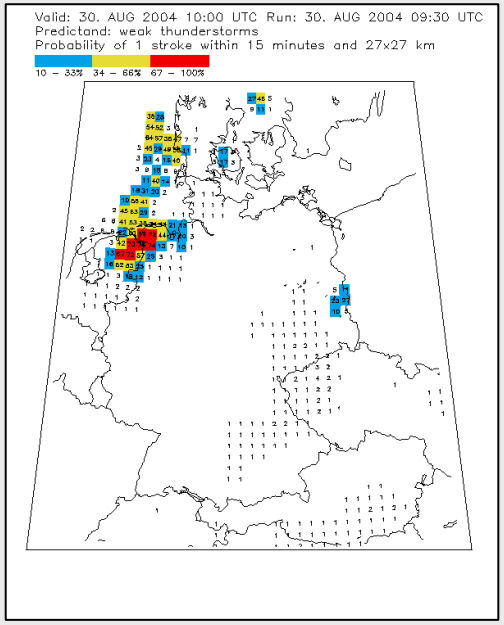
Interpretation required

SatWetter: cluster analysis imagery + synop
BlitzMOS: probabilities for lightning, MOS based
RadVor-OP: precipitation from Radar + translation

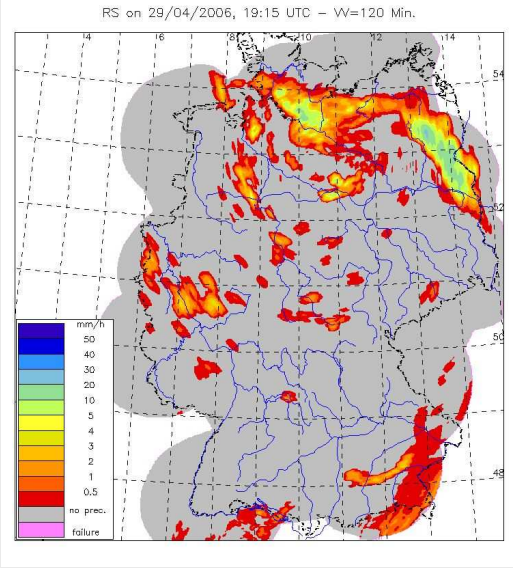
SatWetter



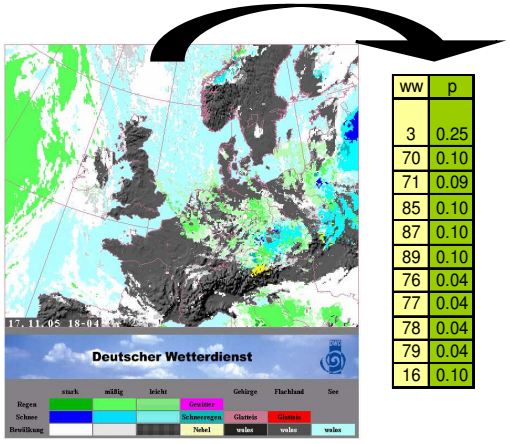
BlitzMOS



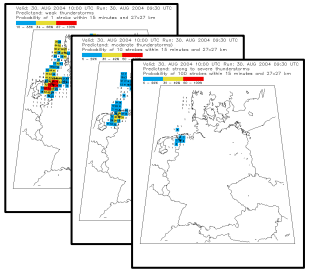
RadVor_Op



Adaptation: Combination of products



ww	p
3	0.25
70	0.10
71	0.09
85	0.10
87	0.10
89	0.10
76	0.04
77	0.04
78	0.04
79	0.04
16	0.10



ww	p(norm)
17	0.045
80	0.017
81	0.017
82	0.017
83	0.017
84	0.017
85	0.017
86	0.017
87	0.017
88	0.017
89	0.017
90	0.017
95	0.045
96	0.045
97	0.036
98	0.045
99	0.036
Sum	0.435
wwi(wk4)	(1-0.435)/50

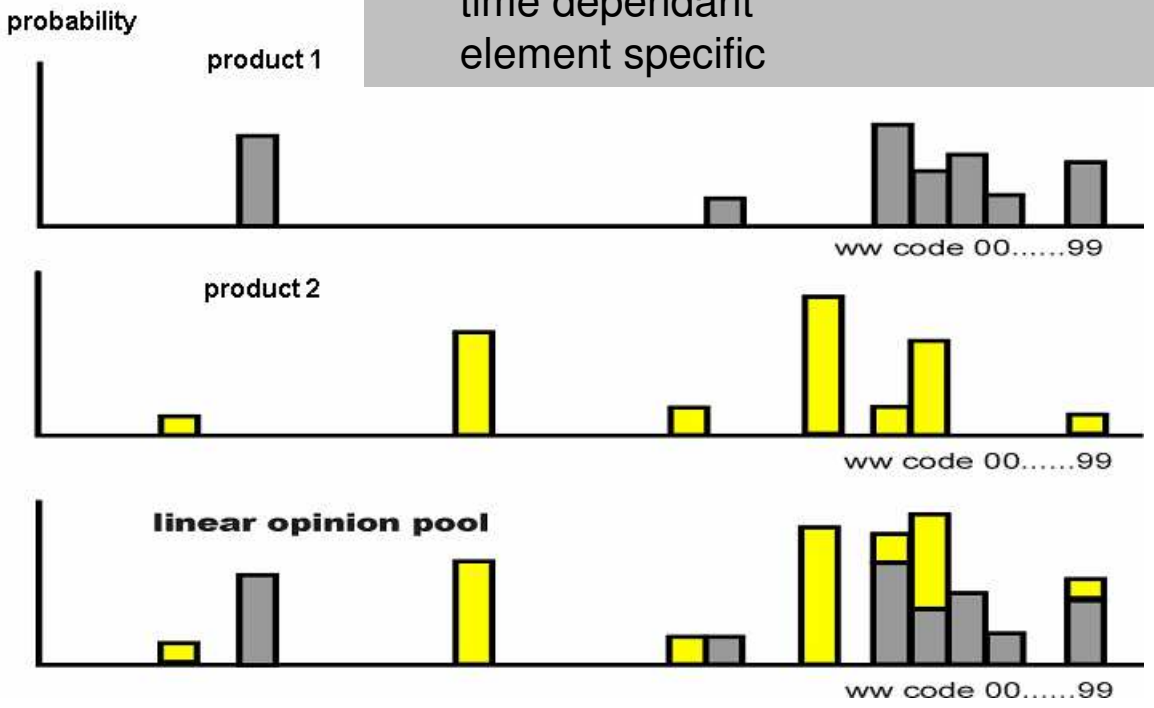
„Linear Opinion Pool“:

Aggregation of probability distribution (eg. „Significant weather“)

individual weights

time dependant

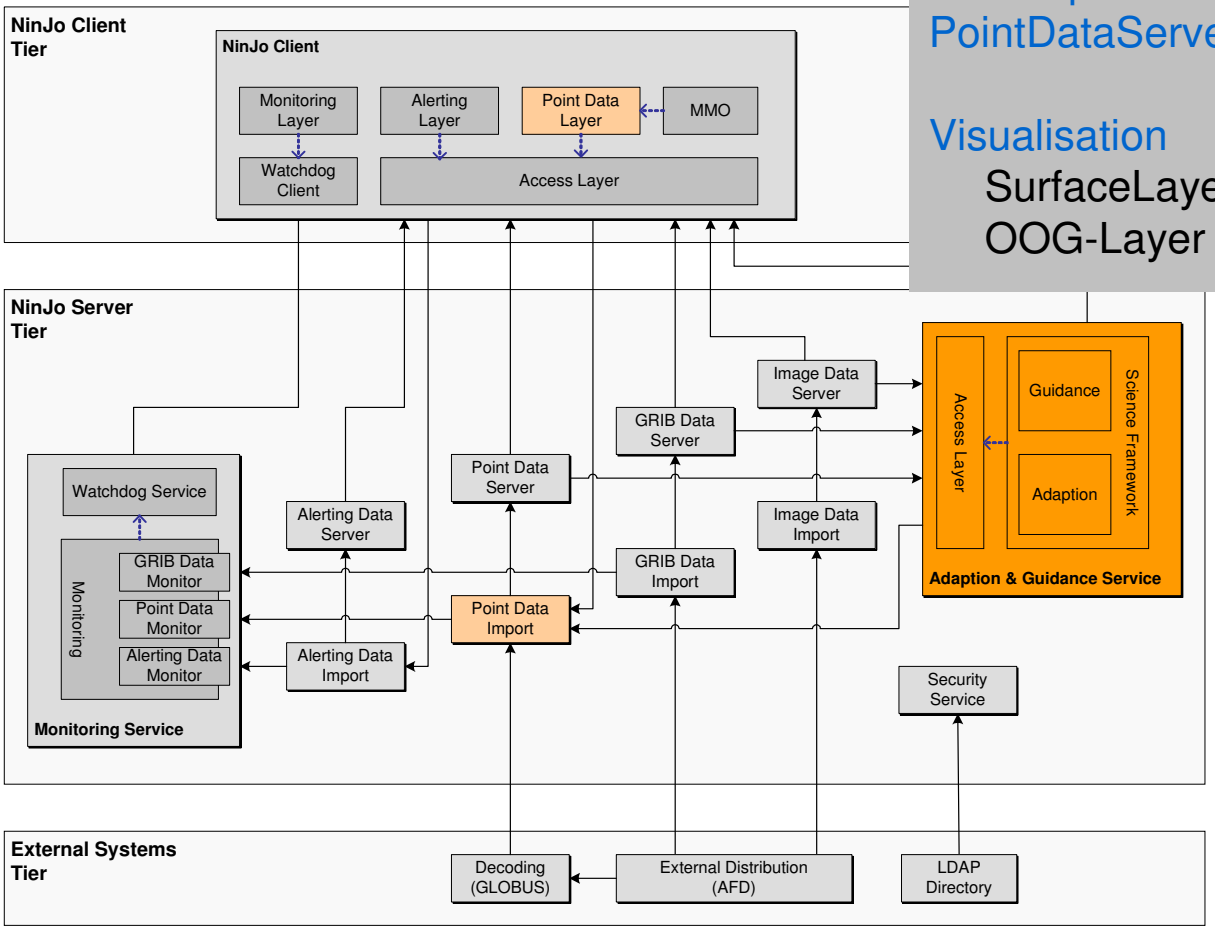
element specific



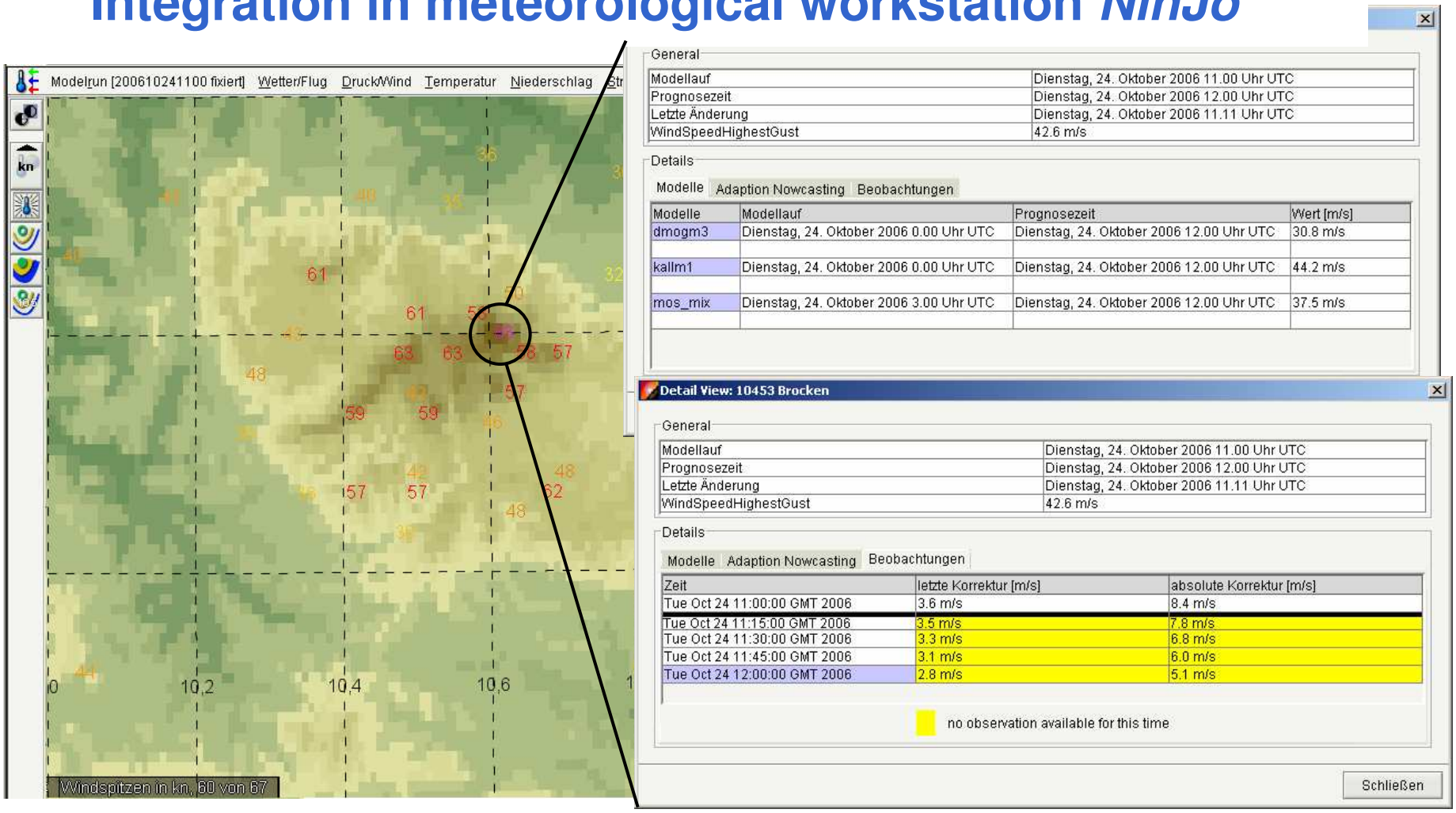
NinJo-Science: Technical View

central production integrated in NinJo
PointDataServer to hold result data

Visualisation
- SurfaceLayer (operational forecast)
- OOG-Layer („Expert view“)



Integration in meteorological workstation *NinJo*



NinJo-Science modules

Objective Optimisation / Adaptation

Site specific forecast data merging

currently being evaluated at DWD

AutoSWIS

site specific road weather forecast + energy balance model

… more to come

Cell detection from Radar data: DWD, current project until 2009

Streamlines, Cross sections,Trajectories: MeteoSwiss

- ***NinJo*: Overview**
- **Visualisation**
- **Product generation**
- **Automatisation with *NinJoScience***
- **Status and Outlook**

Summary

Visualisation

complete package of layers supporting the entire forecasting process at DWD (determinstic, warning, aviation, etc.)

Production

Interactive layers to enable manual quality control, editing, and product generation

NinJo Science

to support automatisation at DWD

NinJo Status

DWD: replaced legacy system *MAP* in October 2007

BGIS (military): replaces legacy system in December 2007

MSC: operational introduction early 2008

NinJo: Outlook

NinJo View

current Version 1.2
DWD: since 2006 operationally used parallel with legacy system
October 2007: legacy system has been switched off
DMI and MeteoSwiss: in 2007 operationally usage parallel with legacy system
MSC: operational introduction in 2008

NinJo Product (1.3 Q3 2008)

New: Interactive graphic editing / Production work bench

NinJo Enterprise (1.4 Q3 2009)

Enabling third parties to develop their own layers and functionalities

Current licence holders

INM – Spain
SAWS - South Africa

NinJo: Licensing

www.ninjo-workstation.com

info@ebp.de

More

… information
… examples
… news