



## Visualisation and Production using *NinJo*

**DWD - Zentrale Entwicklung**  
**Michael Rohn, Dirk Heizenreder**

**Eleventh Workshop on Meteorological Operational Systems**  
**ECMWF, 12-16 November 2007**

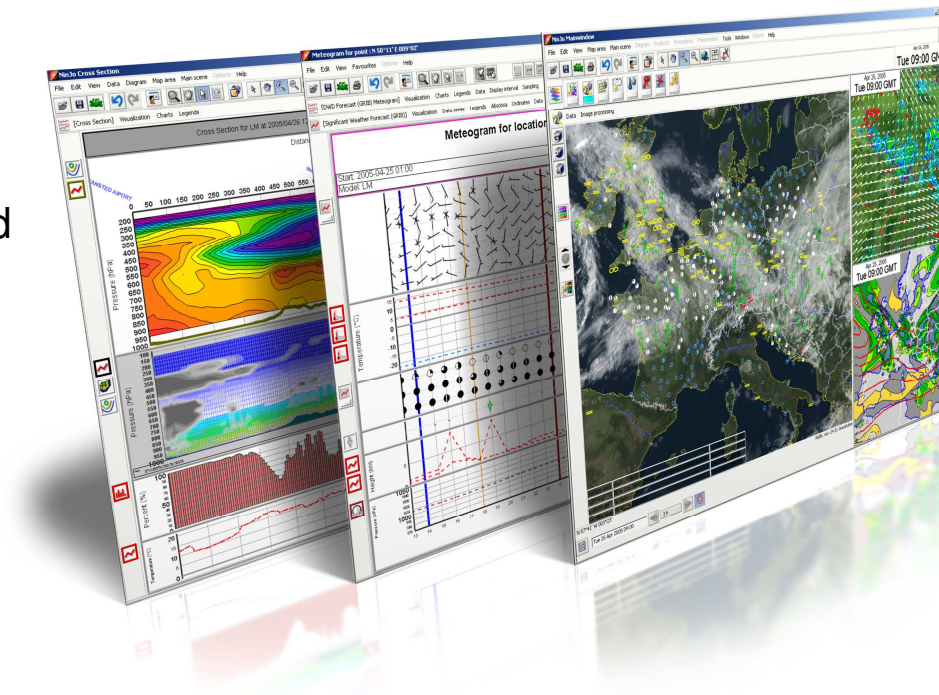
- NinJo*: Overview**
- Visualisation**
- Product generation**
- Automatisation with *NinJoScience***
- Status and Outlook**



## NinJo: Developed by ...

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

Further joint Development  
and Maintenance



MeteoSwiss



Meteorological Service of Canada  
Service météorologique du Canada

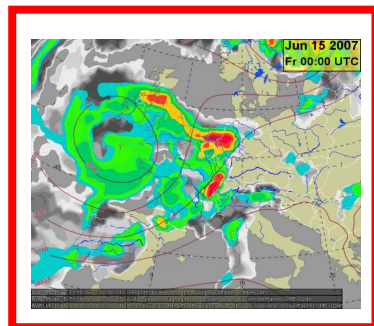
Environment Canada  
Environnement Canada

Ernst Basler + Partner GmbH

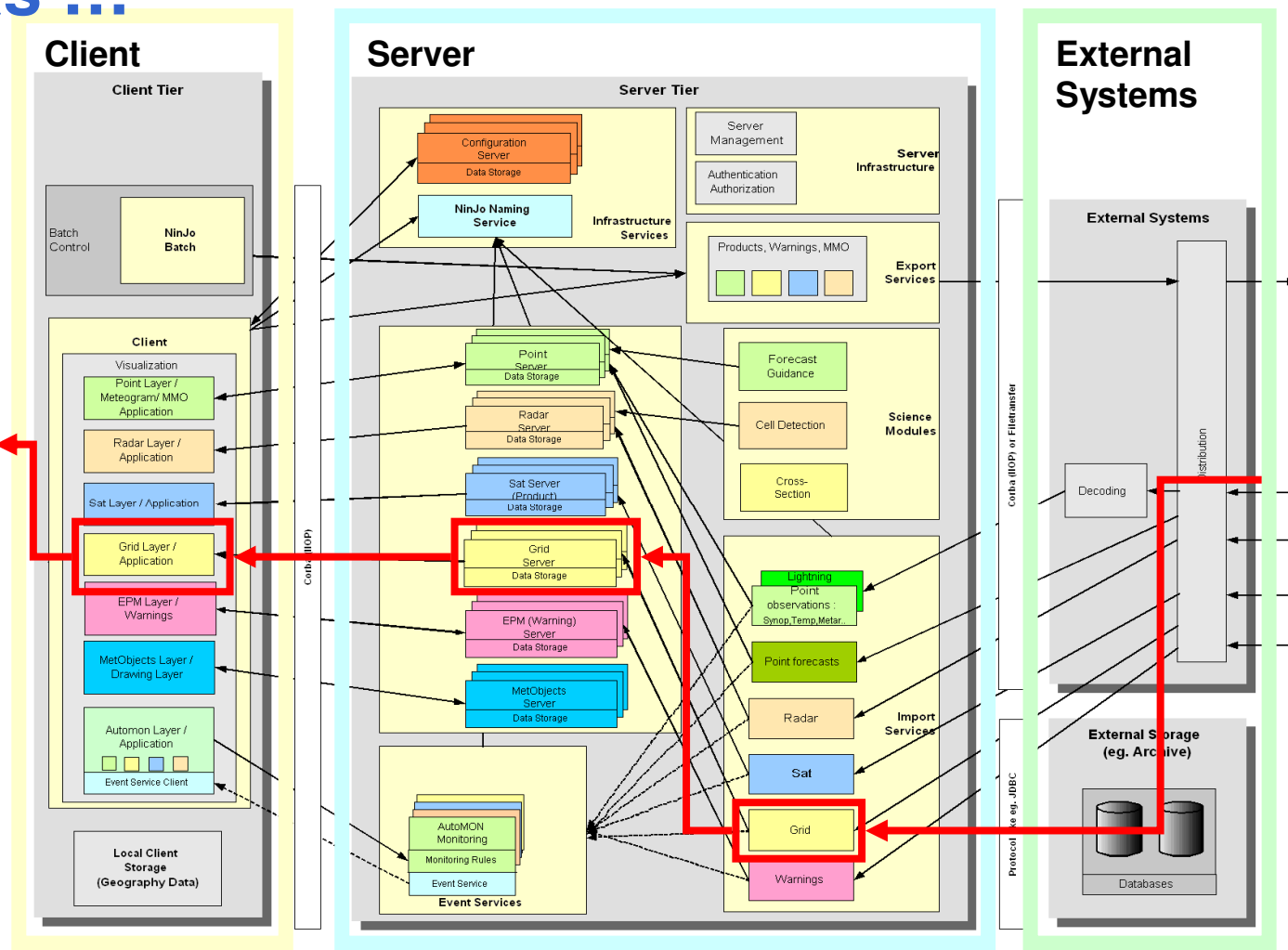
sd&m  
software design & management

## 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

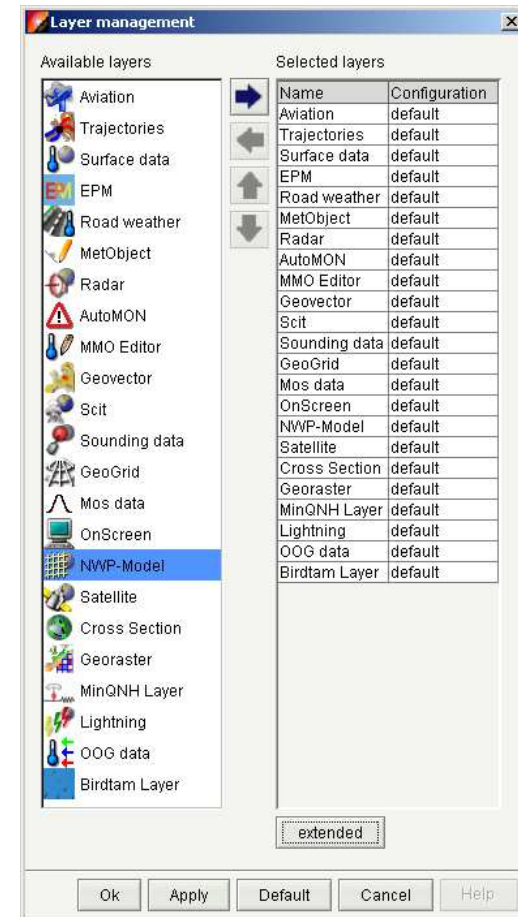
each partner constructs his *NinJo* and adds own data types  
completely Java based

### 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)

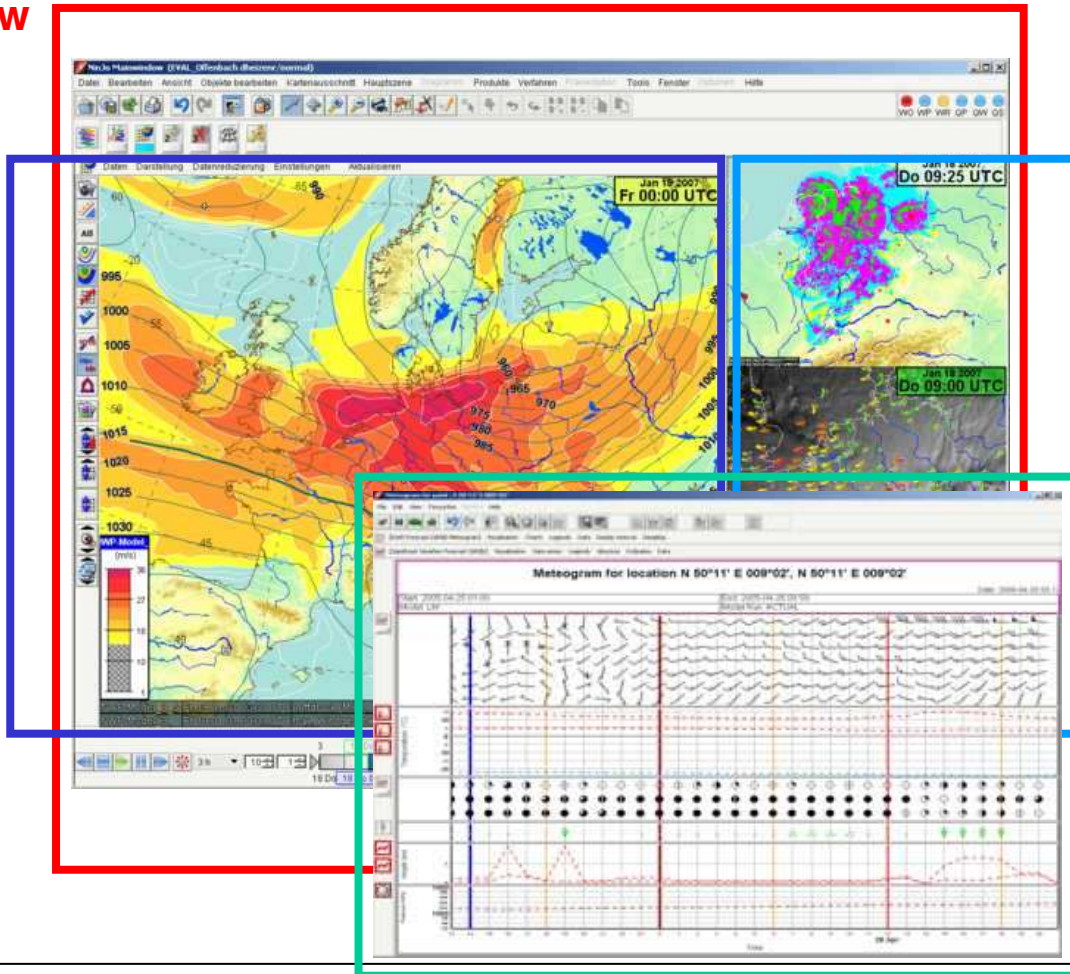


- NinJo*: Overview**
- Visualisation**
- Product generation**
- Automatisation with *NinJoScience***
- Status and Outlook**

## 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

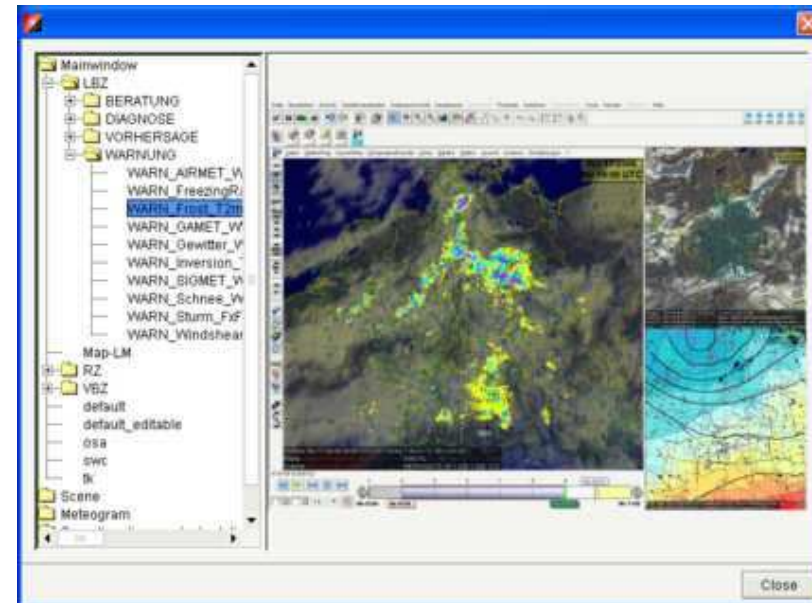
Menues

Selected data types

Selected layers, active layer

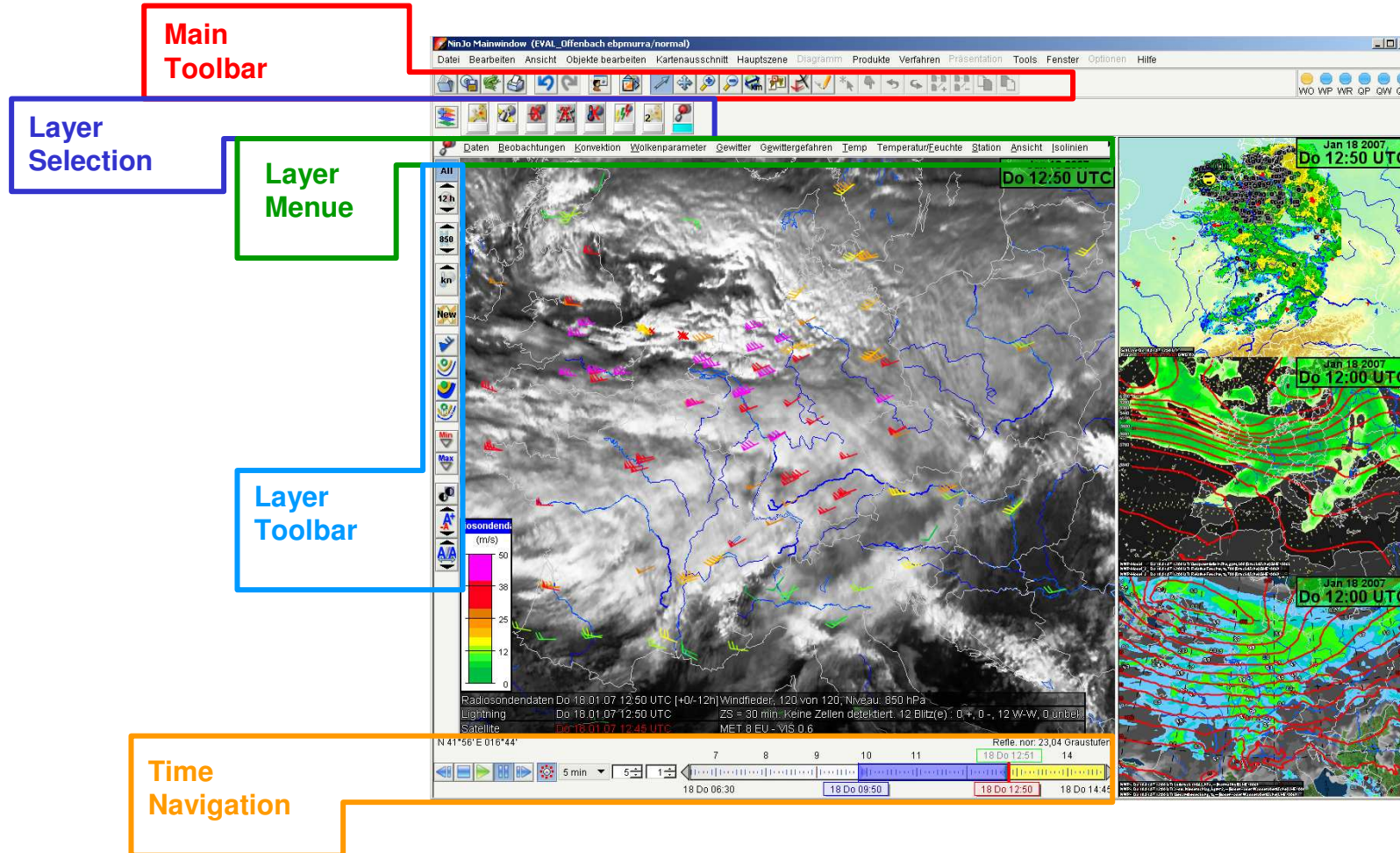
Number of (secondary) scenes

### Multi-lingual





## NinJo: Visualisation - Layer specific



The screenshot displays the NinJo software interface with several key components highlighted by colored boxes and labels:

- Main Toolbar:** A red box highlights the top toolbar containing various icons for file operations, editing, and navigation.
- Layer Selection:** A blue box highlights the layer selection menu on the left side of the interface.
- Layer Menu:** A green box highlights the layer menu options, including 'All', '12h', '850', 'kn', 'New', and 'Min/Max'.
- Layer Toolbar:** A blue box highlights the layer toolbar on the left side, which includes icons for 'osondend.' and 'AA'.
- Time Navigation:** An orange box highlights the time navigation controls at the bottom, including a timeline and playback buttons.

The main display area shows a 3D visualization of a weather system over a geographical region, with various data layers overlaid. The interface includes a menu bar at the top with options like 'Datei', 'Bearbeiten', and 'Ansicht'. The status bar at the bottom shows coordinates (N 41°56' E 016°44') and a scale of 1:23,04 Graustufen.

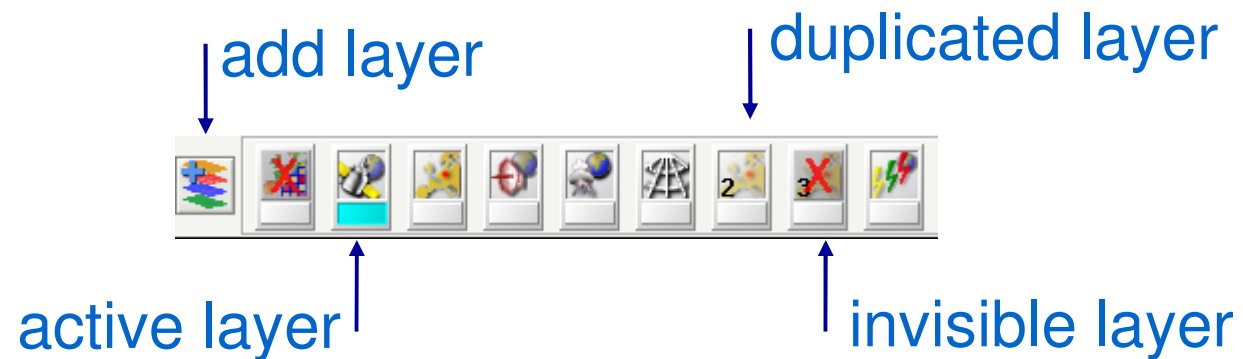
## NinJo: available Layer in 1.2



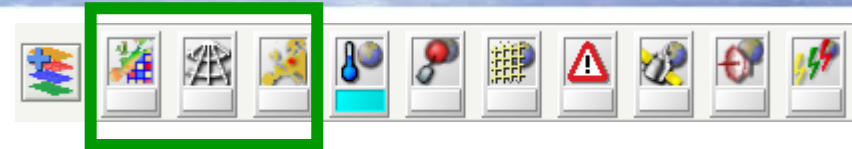
Independent visualisation  
meteorological data  
geographical information

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

Interactive layers  
specific applications



## NinJo: Geo Layers



### Geo Raster

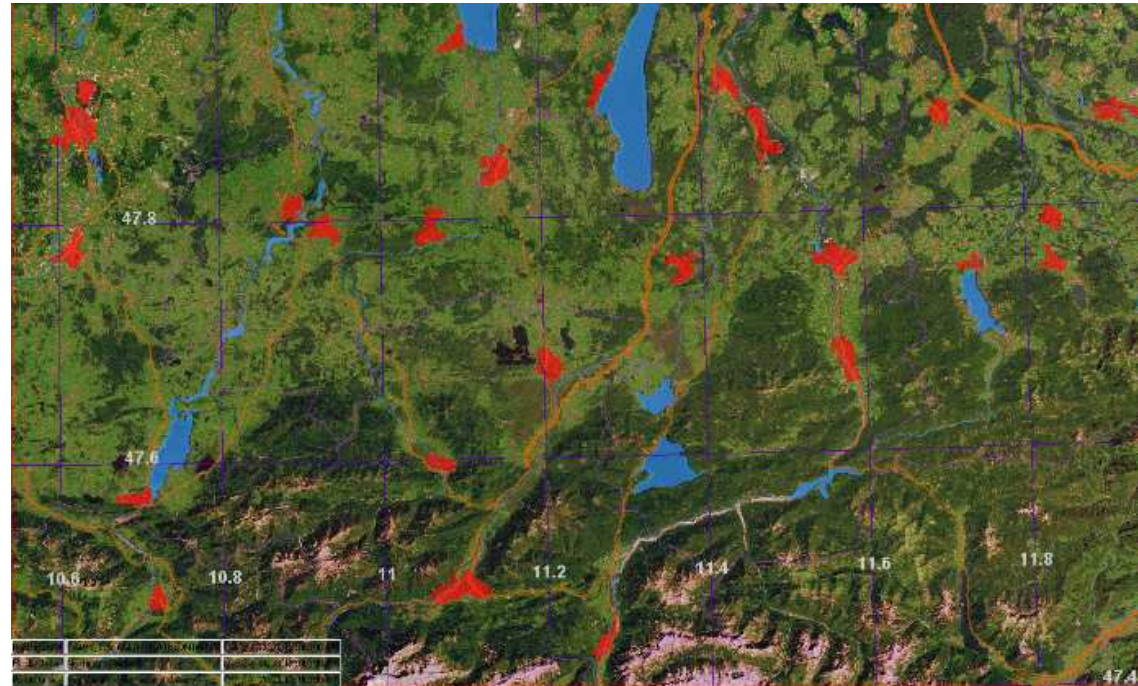
- Height
- Elevation
- Landuse

### 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

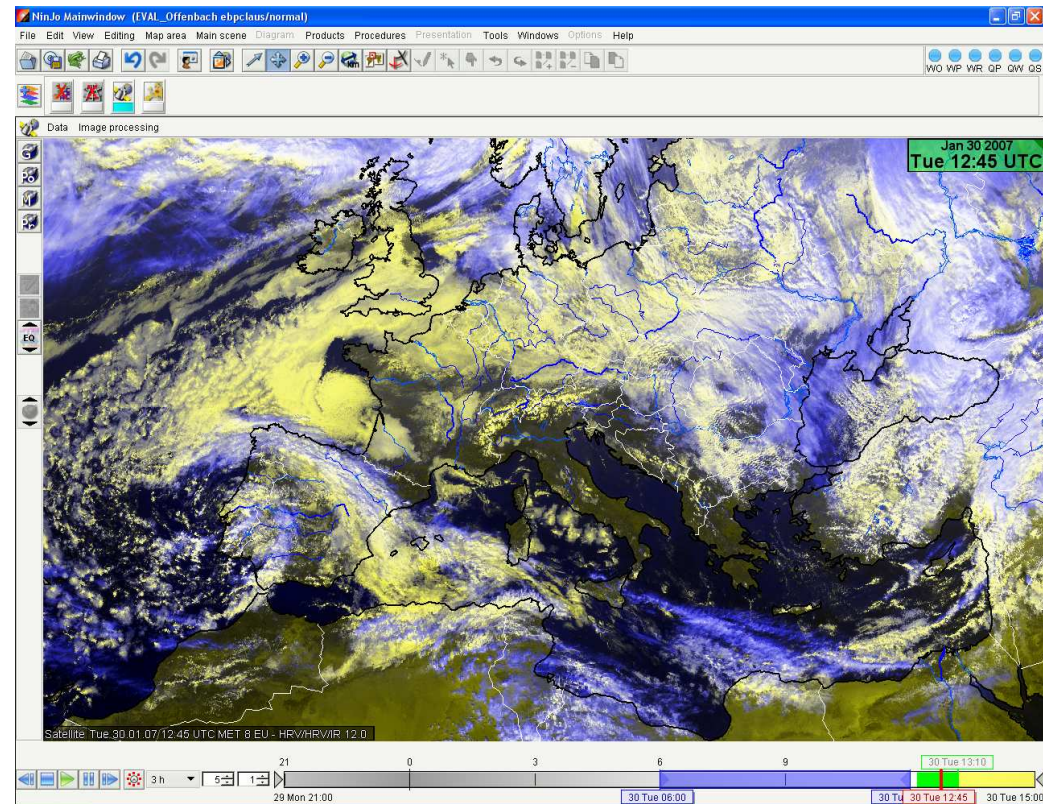
GOES, GMS, Meteosat  
NOAA, FENGYUN

Products

Channel combinations  
Composites  
SAF products

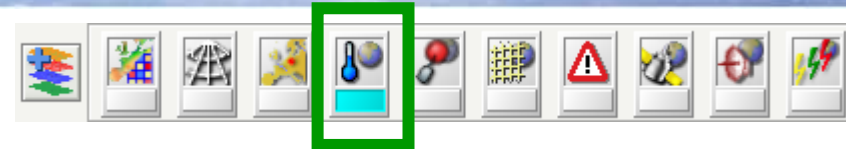
Basic Image processing

contrast enhancement  
colour tables





## NinJo: Surface Layer



observation and forecast data

Visualization of station based data

configurable display

symbols and plot models

Sorting algorithms

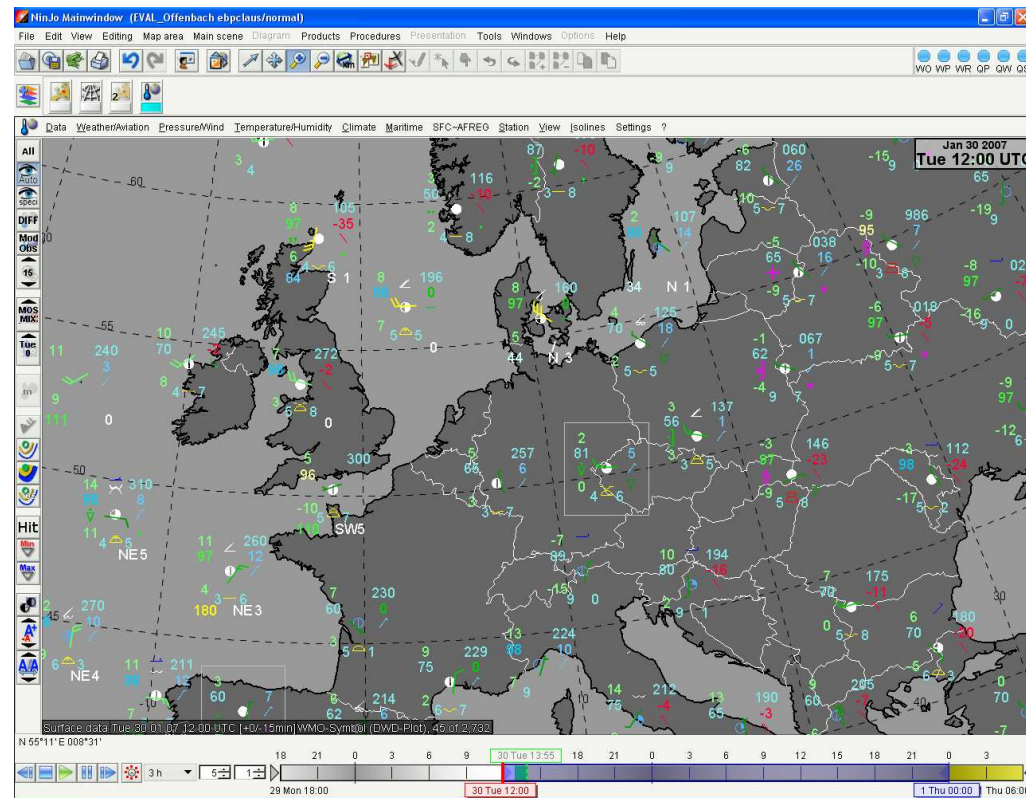
Min/Max

Rating

Hitlist

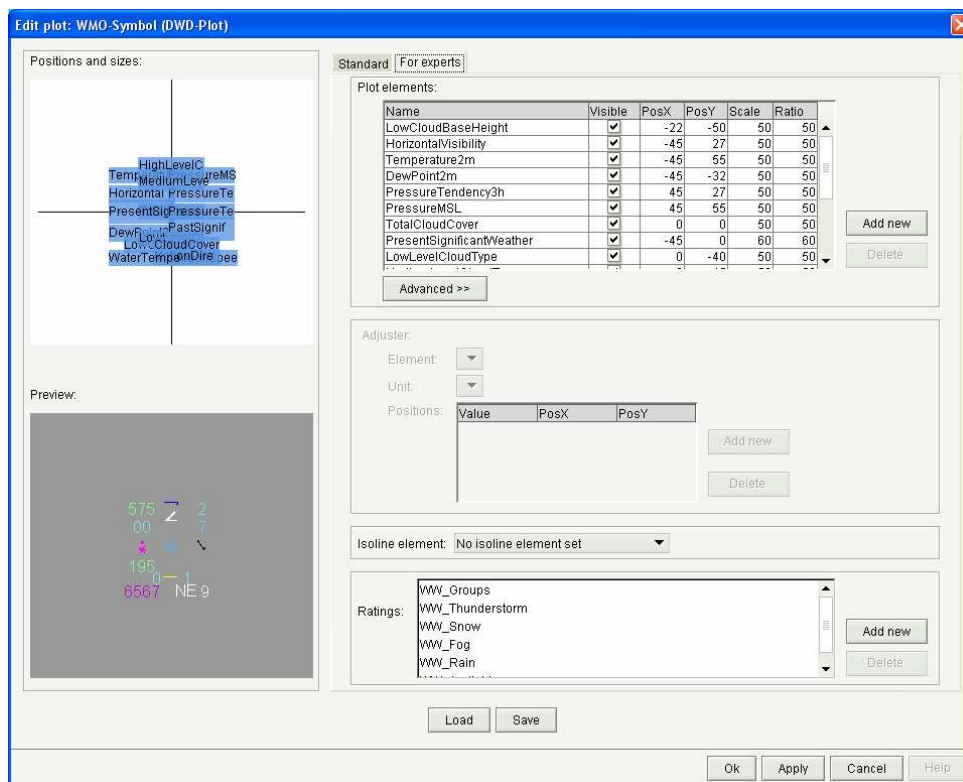
Metograms

at selected locations



## NinJo: Surface Layer - Configuration

### Editable plot-model



**Edit plot: WMO Symbol (DWD-Plot)**

Positions and sizes:

Standard | For experts

Name	Visible	PosX	PosY	Scale	Ratio
LowCloudBaseHeight	<input checked="" type="checkbox"/>	-22	-50	50	50
HorizontalVisibility	<input checked="" type="checkbox"/>	-45	27	50	50
Temperature2m	<input checked="" type="checkbox"/>	-45	55	50	50
DewPoint2m	<input checked="" type="checkbox"/>	-45	-32	50	50
PressureTendency3h	<input checked="" type="checkbox"/>	45	27	50	50
PressureMSL	<input checked="" type="checkbox"/>	45	55	50	50
TotalCloudCover	<input checked="" type="checkbox"/>	0	0	50	50
PresentSignificantWeather	<input checked="" type="checkbox"/>	-45	0	60	60
LowLevelCloudType	<input checked="" type="checkbox"/>	0	-40	50	50

Advanced >>

Adjuster:

Element:  Unit:

Value	PosX	PosY

Isoline element:

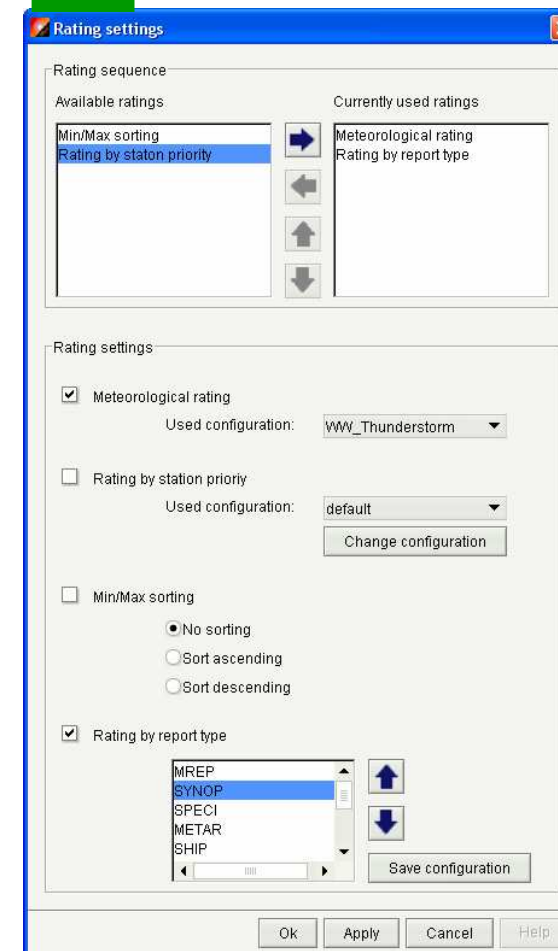
Ratings:

- WW\_Groups
- WW\_Thunderstorm
- WW\_Snow
- WW\_Fog
- WW\_Rain

Load Save Ok Apply Cancel Help



### Priorization



**Rating settings**

Rating sequence

Available ratings: Min/Max sorting, Rating by station priority

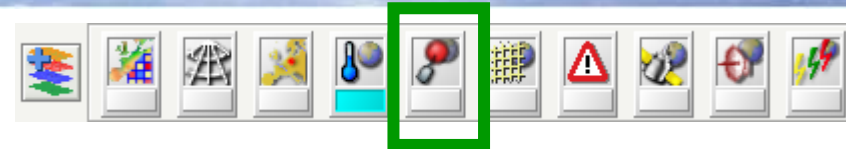
Currently used ratings: Meteorological rating, Rating by report type

Rating settings:

- Meteorological rating  
Used configuration: WW\_Thunderstorm
- Rating by station priority  
Used configuration: default
- Min/Max sorting
  - No sorting
  - Sort ascending
  - Sort descending
- Rating by report type
  - MREP
  - SYNOP
  - SPECI
  - METAR
  - SHIP

Save configuration Ok Apply Cancel Help

## NinJo: Sounding Layer

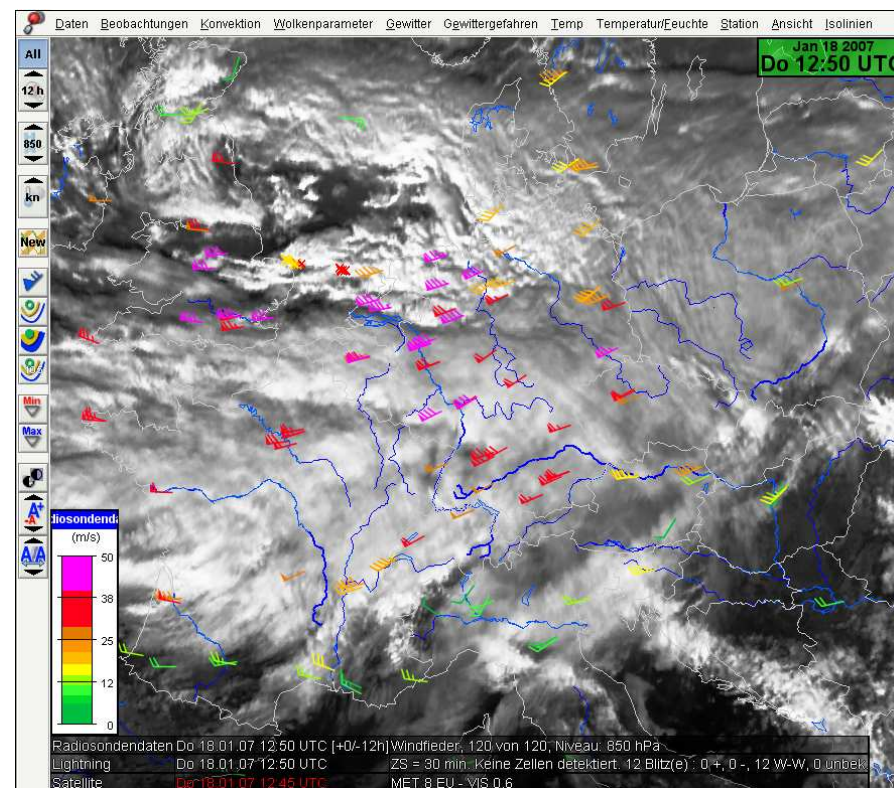


### Point map

horizontal distribution of  
selected elements

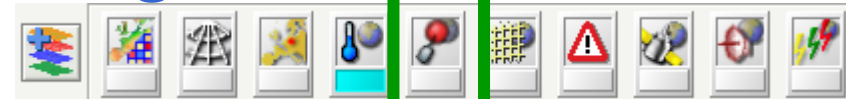
### Sounding diagrams

vertical distribution at specific  
locations  
(next slide)

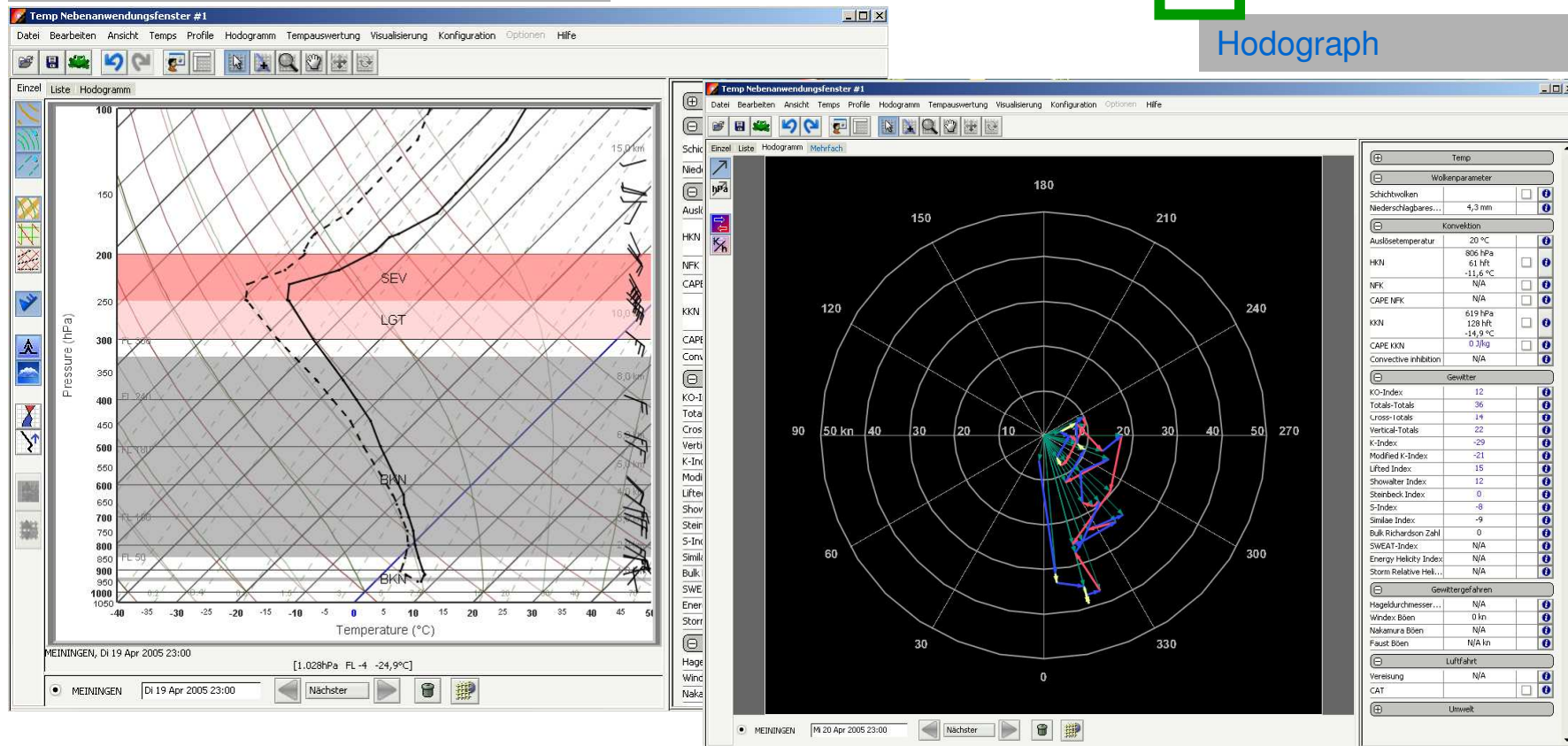


## NinJo: Sounding Layer - diagrams

Cloud cover and turbulences



Hodograph





## NinJo: Grid Layer



various numerical NWP data

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

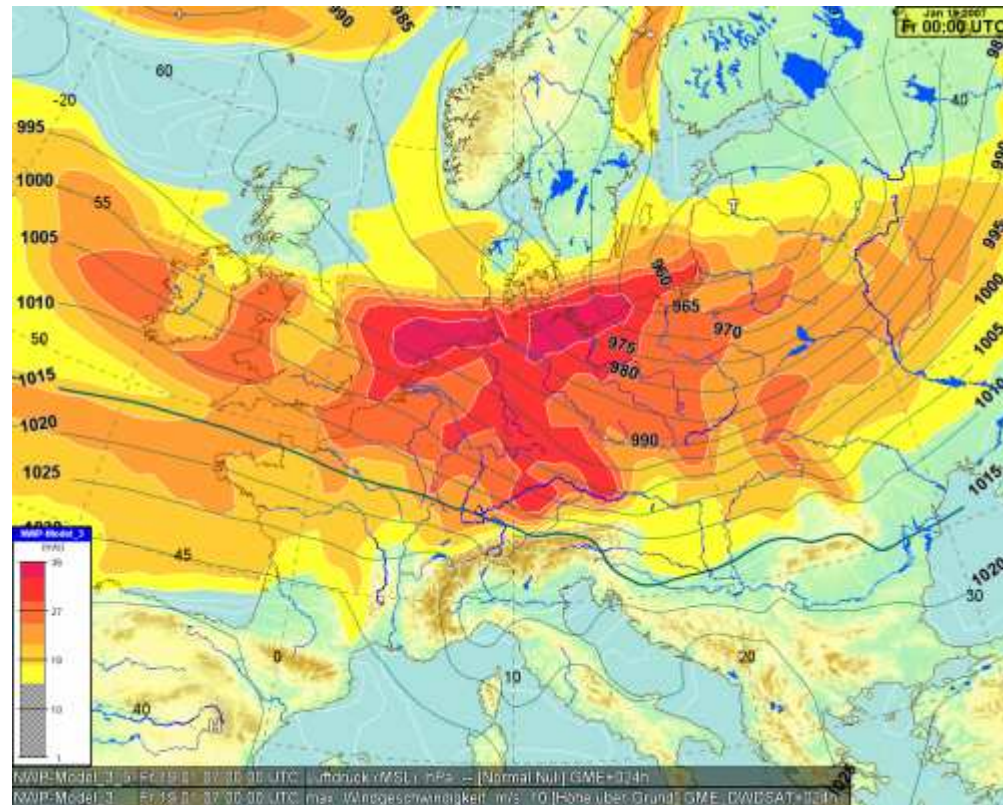
calculated elements

precip. sums, differences

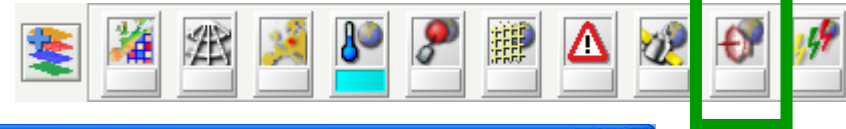
display modes:

Isolines, Isoareas

values, symbols, wind barbs

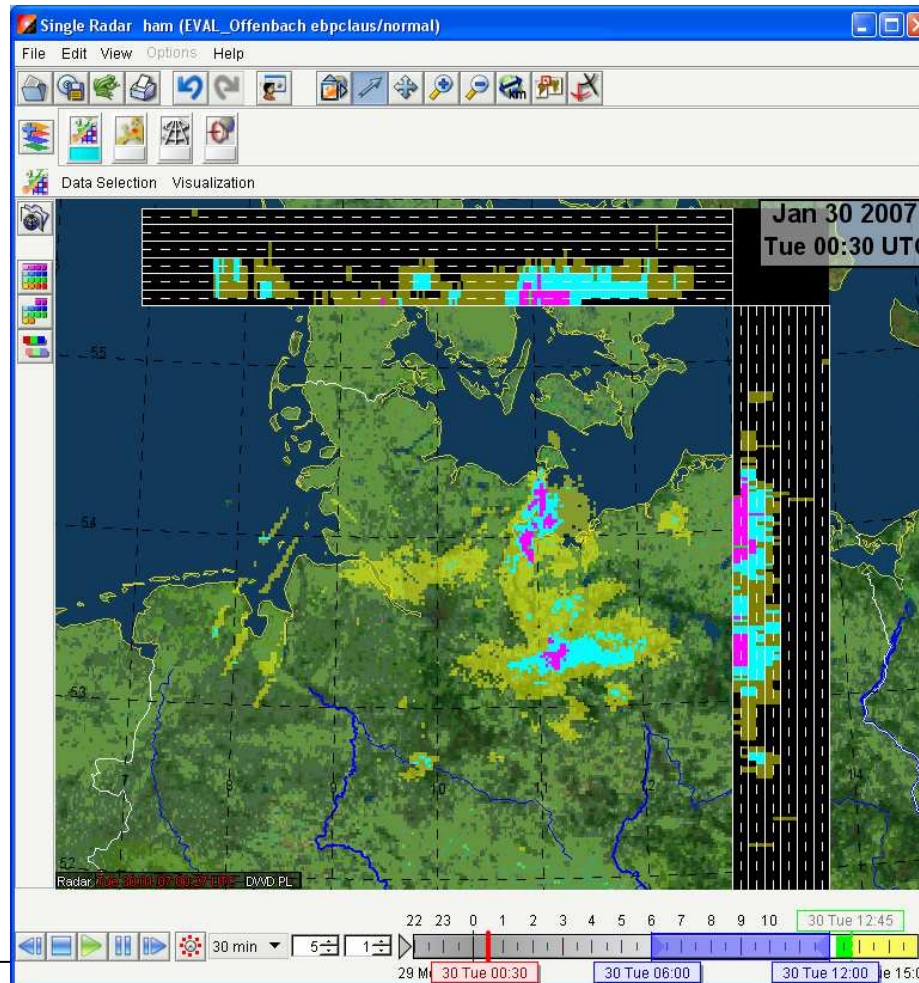


## NinJo: Radar Layer



various Radar products

Projections  
cartesian,  
stereographic



## NinJo: Lightning Layer



Different networks

Visualization of characteristics

- Cloud to ground, cloud to cloud

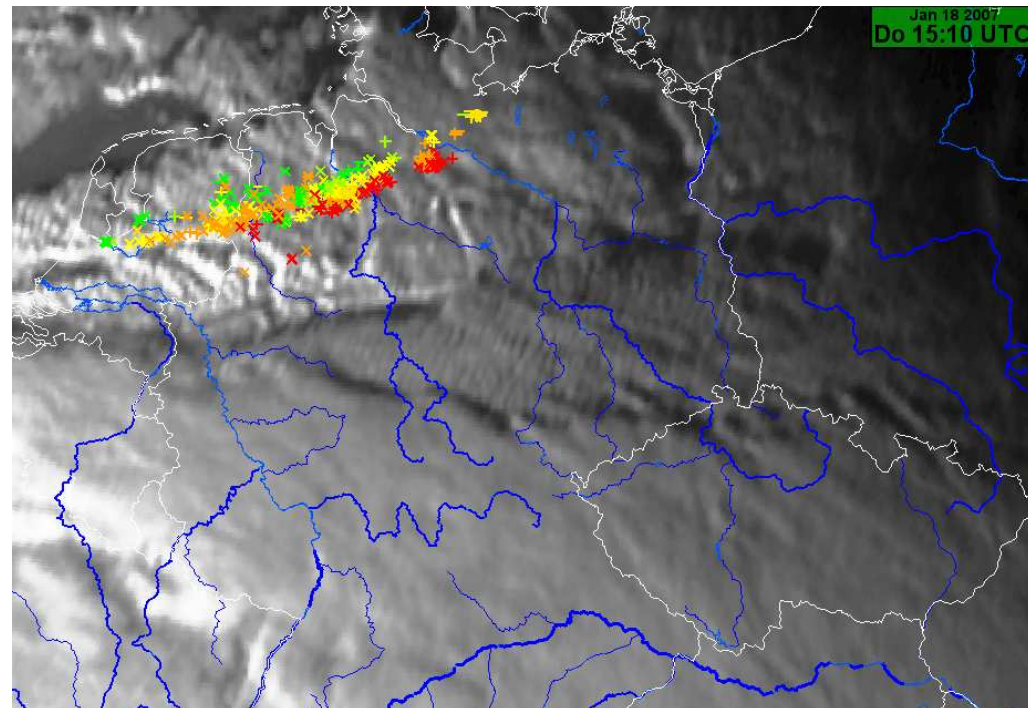
- Polarity

- no. of strokes

- amplitude

Color-encoding

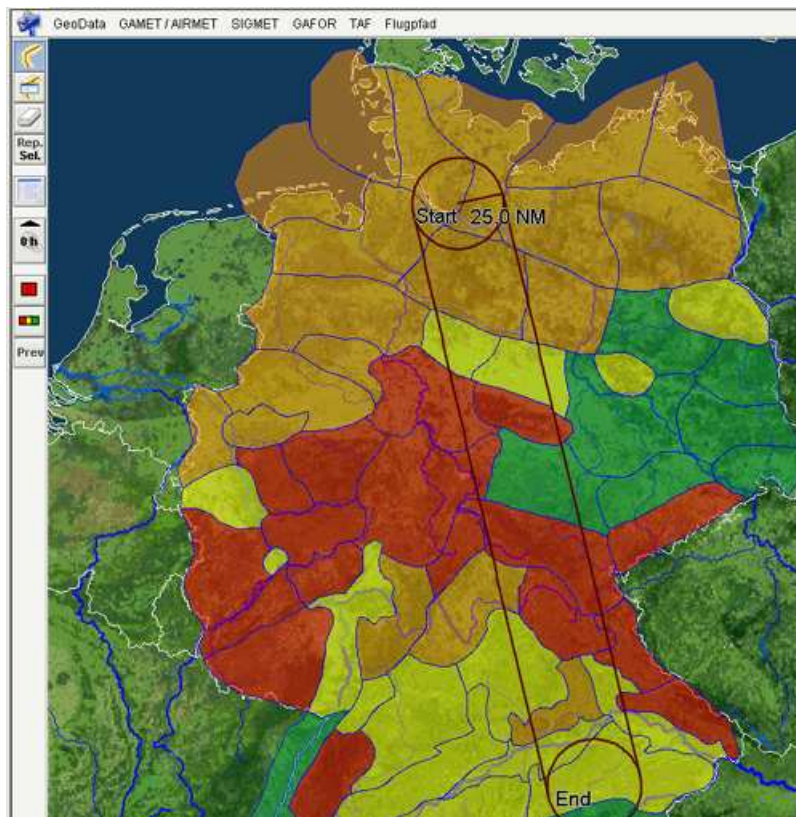
- depending on age or polarity





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

## NinJo: Aviation Layer



Report types: GAFOR, GAMET, SIGMET, TAF  
Aeronautical

warnings

area forecasts

point forecasts

defined flight paths



The screenshot shows a window titled 'Meldungsliste' with a table of reports. The table has columns for 'Typ', 'Station', 'Ref.-Zeit', and 'Meldungstext'. There are four rows of data, all for 'TAF Short' reports from station 'EDDF'. The reports are for different times on 12.09.2007. Below the table, it indicates 'Number of reports: 4' and provides options to 'Kopieren', 'Drucken', and 'Schließen'. There is also a checkbox for 'Kopf-Informationen hinzufügen'.

Typ	Station	Ref.-Zeit	Meldungstext
TAF Short	EDDF	12.09.2007 03:00	FCDL31 EDZO 120300 TAF EDDF 120300Z 120413 02004KT 9999 FEW030 SCT045=
TAF Short	EDDF	12.09.2007 06:00	FCDL31 EDZO 120600 TAF EDDF 120600Z 120716 36006KT 9999 FEW035=
TAF Short	EDDF	12.09.2007 09:00	FCDL31 EDZO 120900 TAF EDDF 120900Z 121019 01005KT 9999 FEW040=
TAF Short	EDDF	12.09.2007 12:00	FCDL31 EDZO 121200 TAF EDDF 121200Z 121322 01005KT 9999 BKN045=

## NinJo: AutoMON



### Weather monitoring

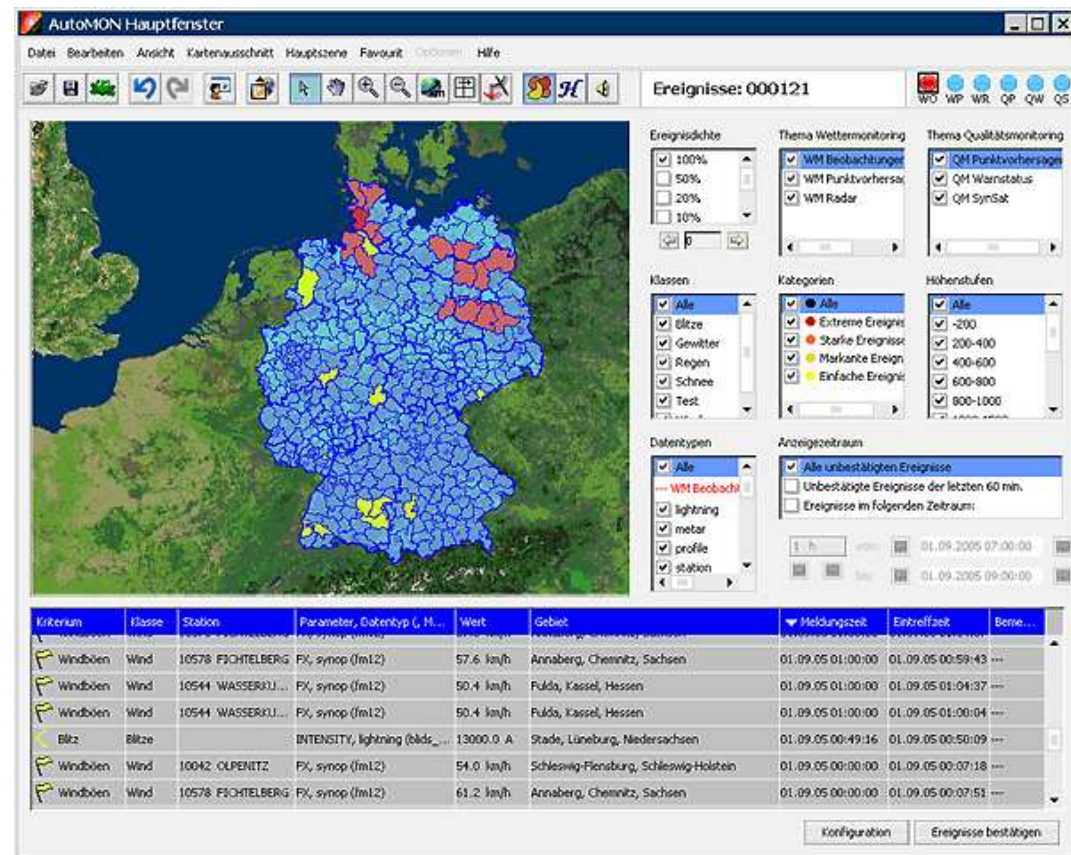
continuous alerting to severe weather situations

### Monitoring of quality

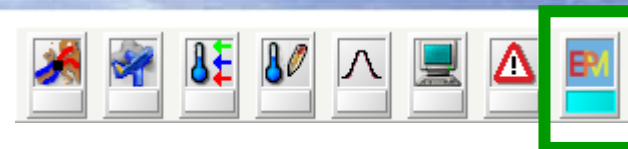
comparison of warnings to observed weather

### Monitoring rules

highly configurable  
all data types  
threshold definitions  
combination of criteria



## NinJo: EPM Layer



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

### Selection

objects/areas

### Editing

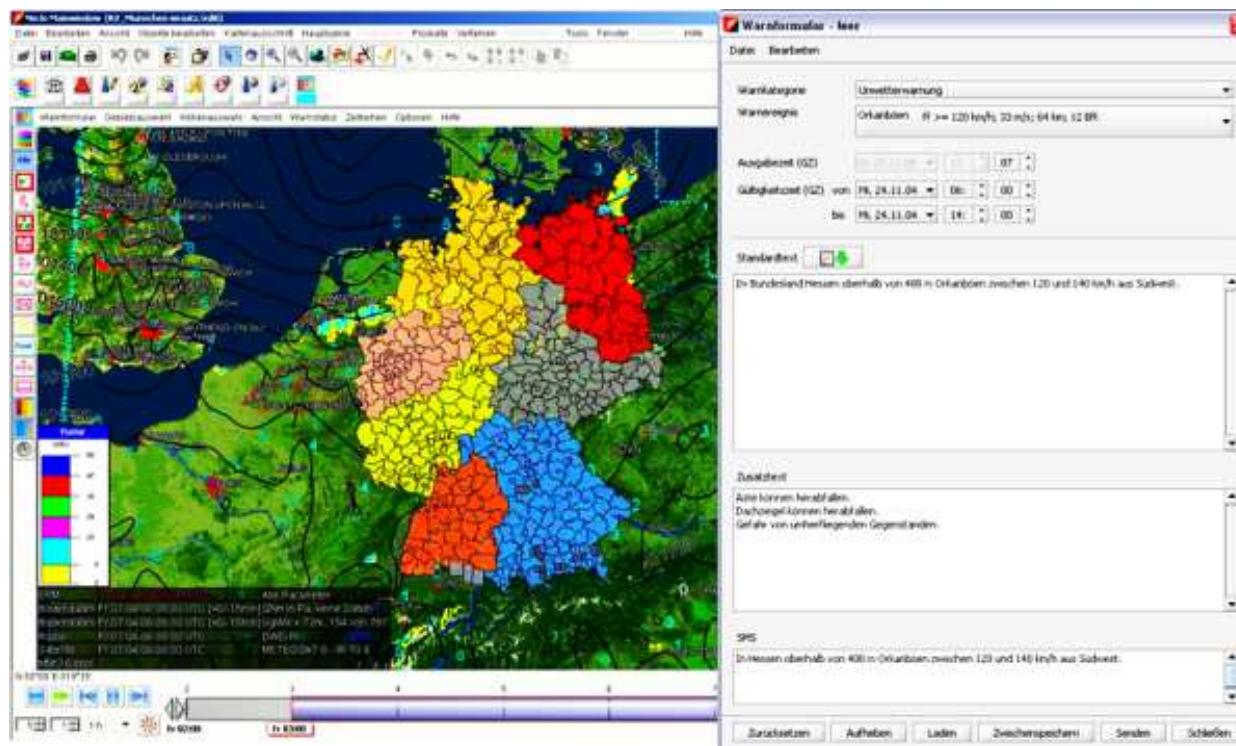
warning template  
height selection  
time selection

### Production

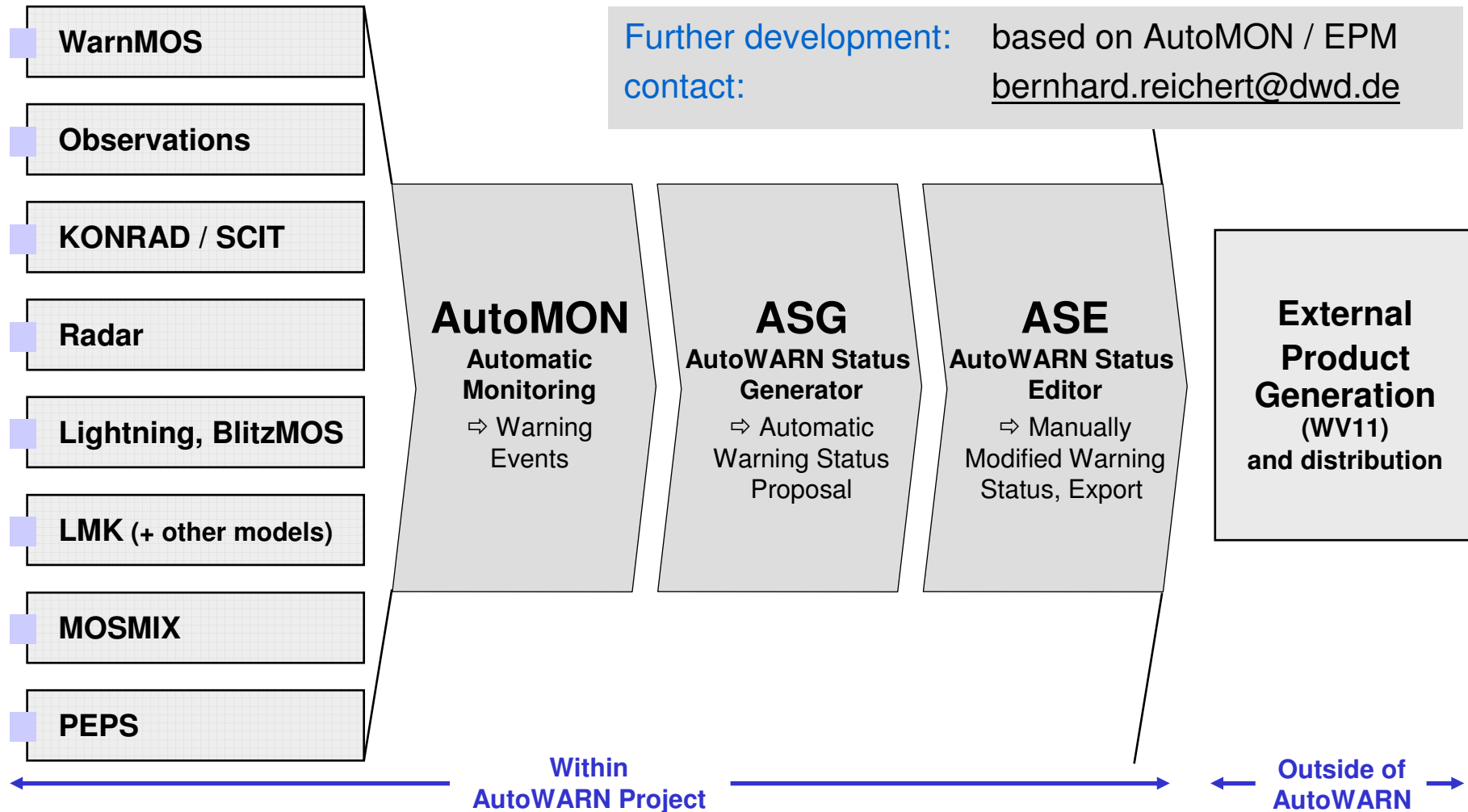
dissemination to text  
generation/user

### Monitoring

comparison to observations  
assisted by AutoMON



## Outlook: Automatic Warning – Project until 2009





## NinJo: MMO Layer



### Point Forecast Editing

#### Selection

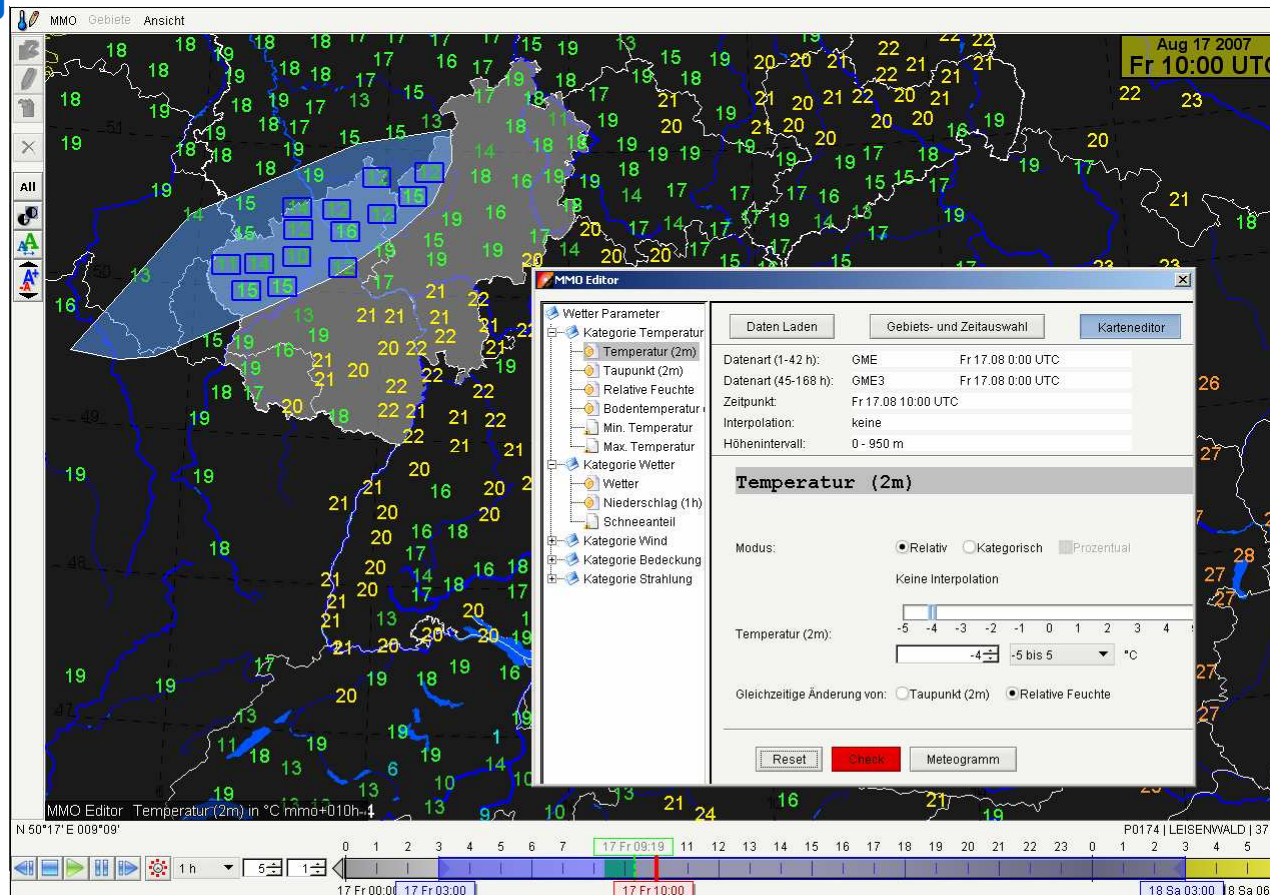
- area / point
- forecast time
- height level

#### Editing

- absolute / relative
- interpolation

#### Consistency

- compares elements
- optional corrections



## NinJo: IGE

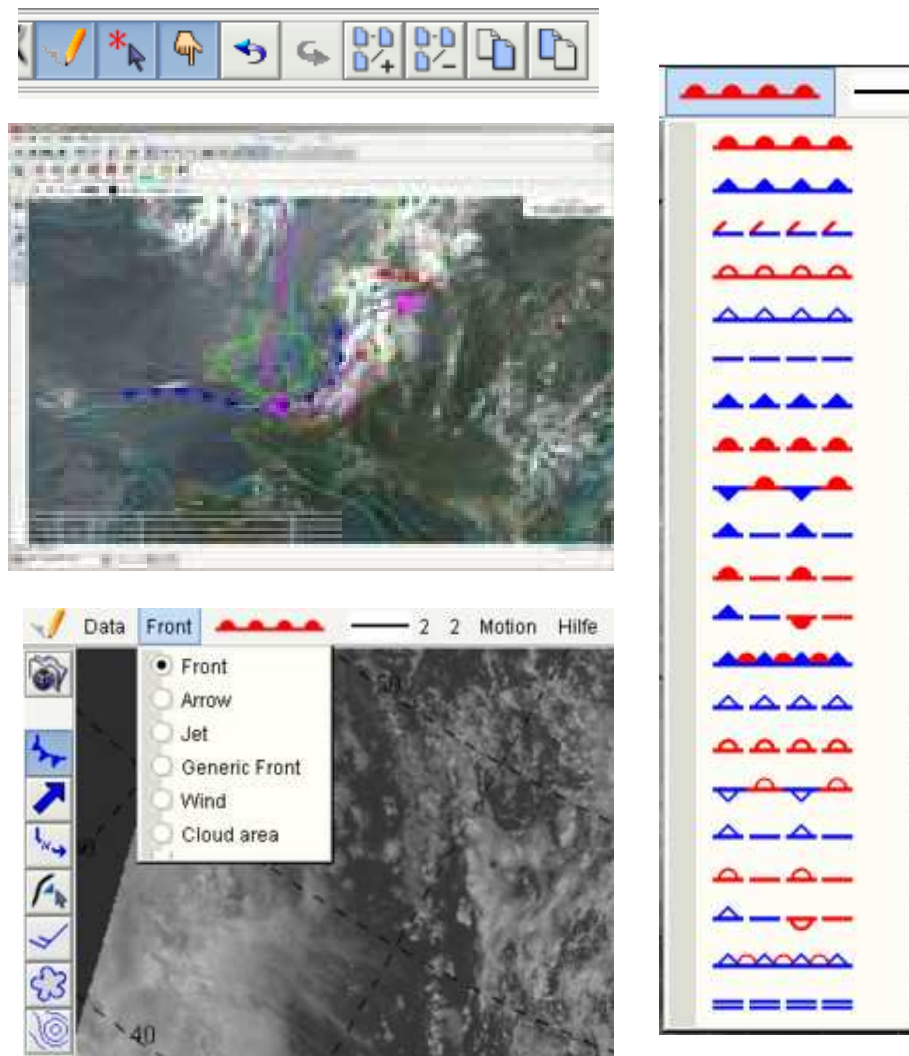
Interactive graphical editor

### 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

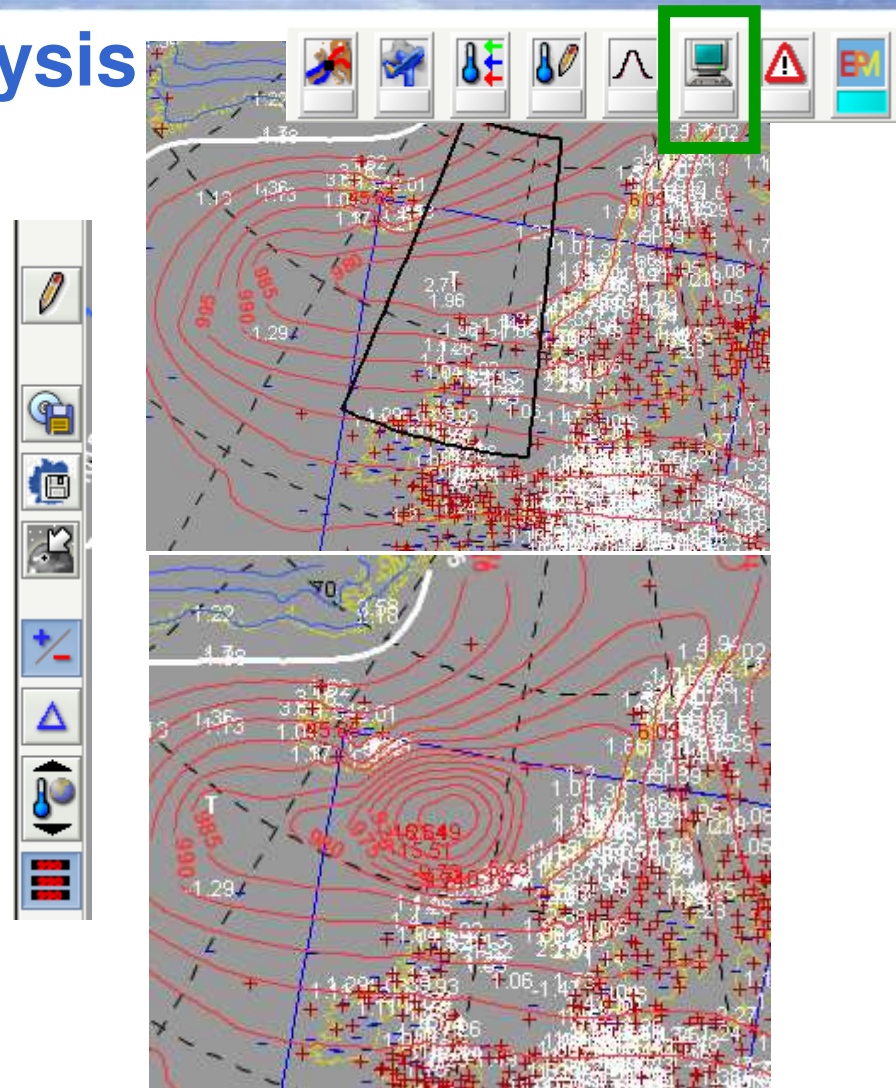
point, single and multiple  
structure  
drag points on isolines

### black list

filter observations

### Prototypical

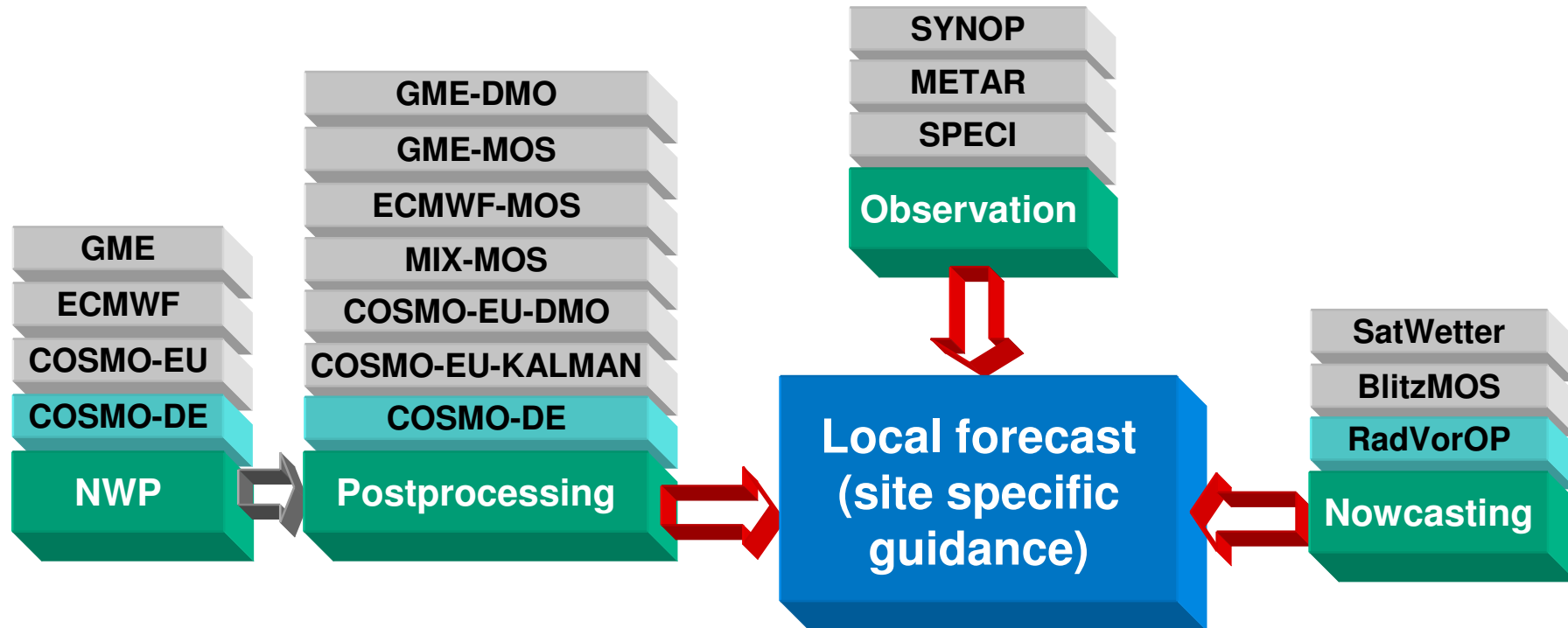
*adapt balanced fields*  
*e.g. wind - mass*





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

## Motivation: *NinJo-Science*



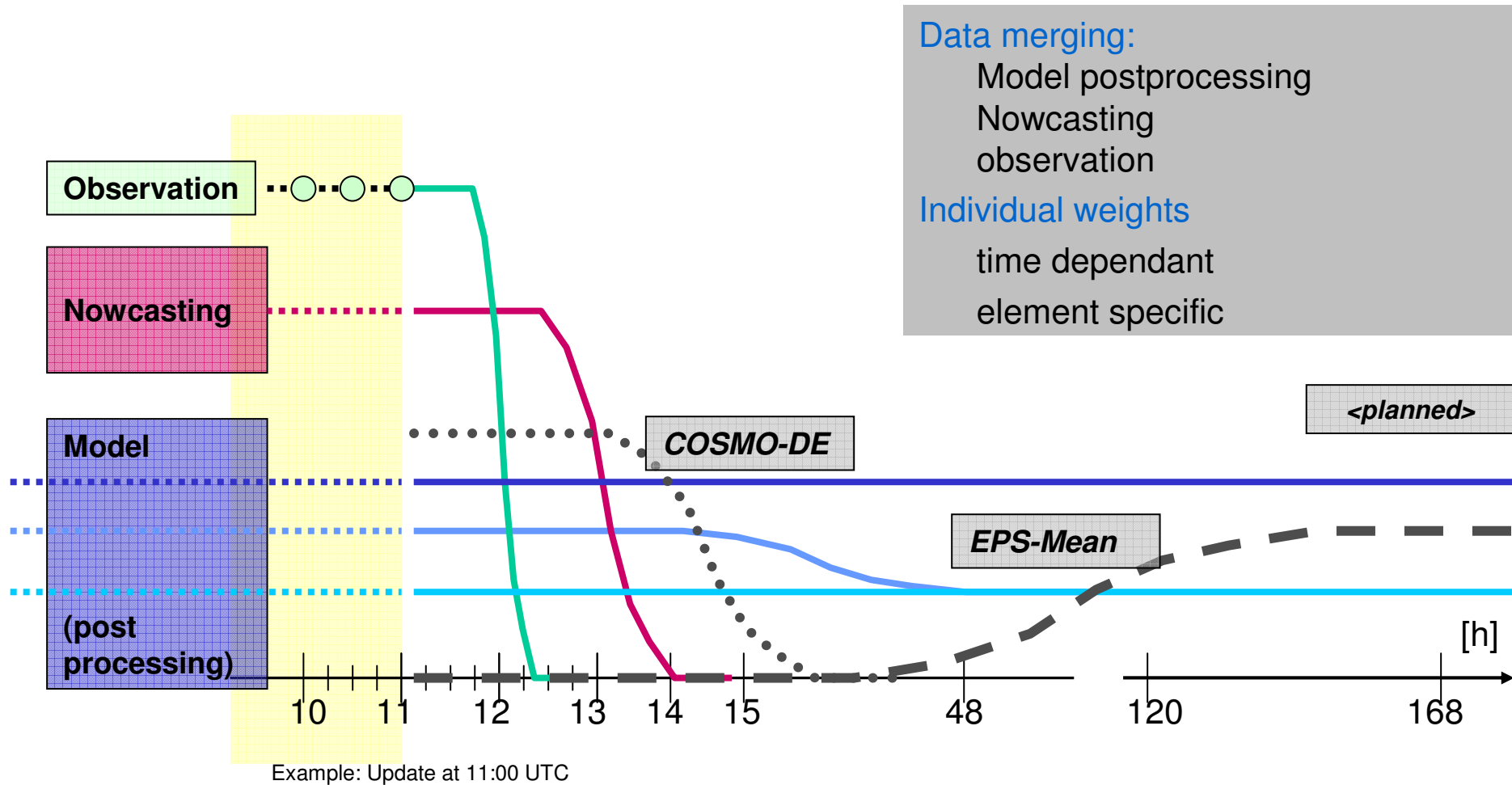
### large variety of data:

only partial used in forecast  
close to impossible to manually assess

### Automatisation

support forecaster  
more time for extreme weather forecasting/warning

## Adaptation/Objective Optimisation

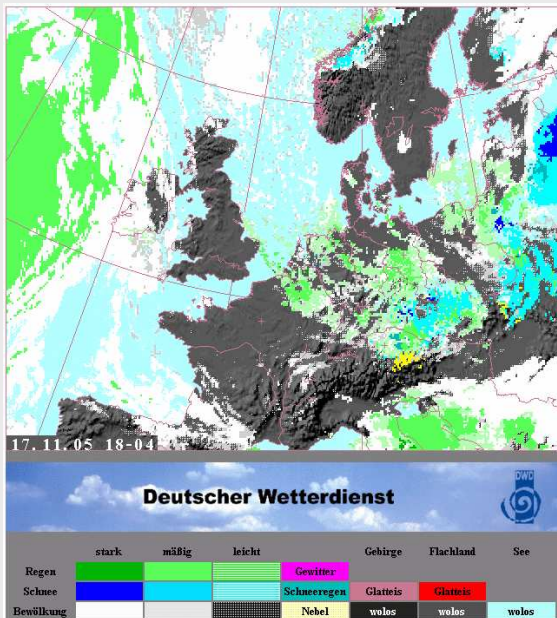


## Adaptation: Interpretation of nowcasting products

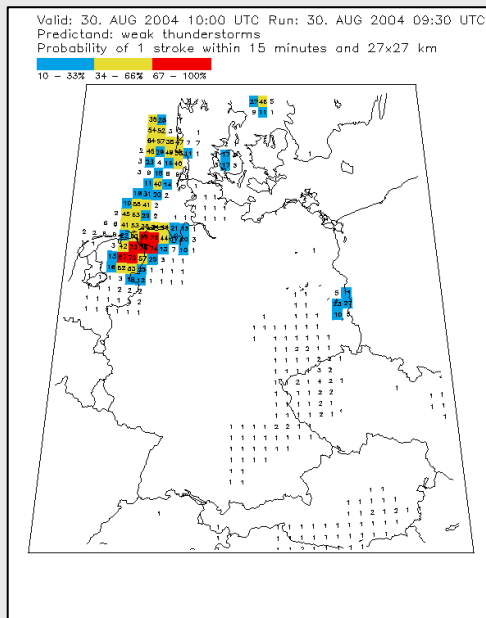
Heterogeneous data  
formats, resolution  
information content, probabilistic  
Interpretation required

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

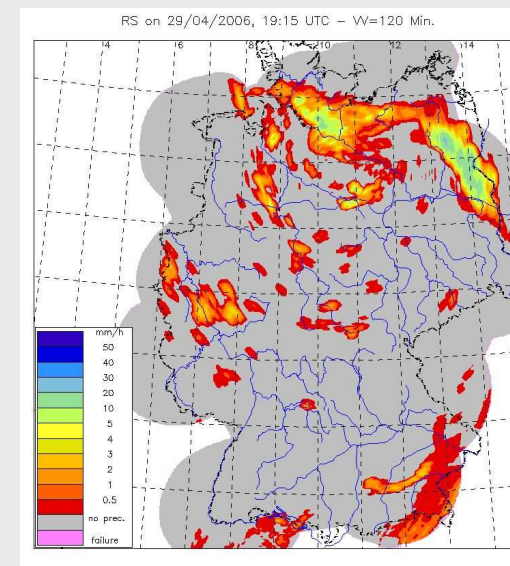
### SatWetter



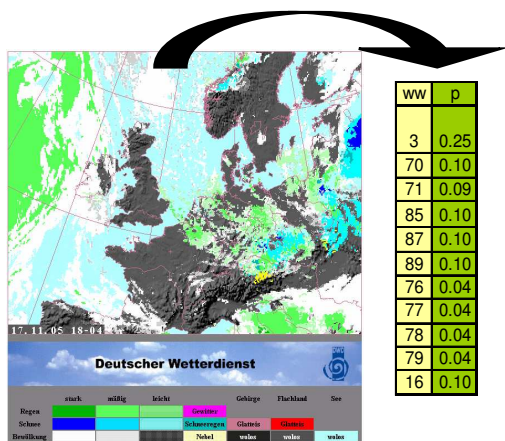
### BlitzMOS



### RadVor\_Op



## Adaptation: Combination of products



„Linear Opinion Pool“:

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

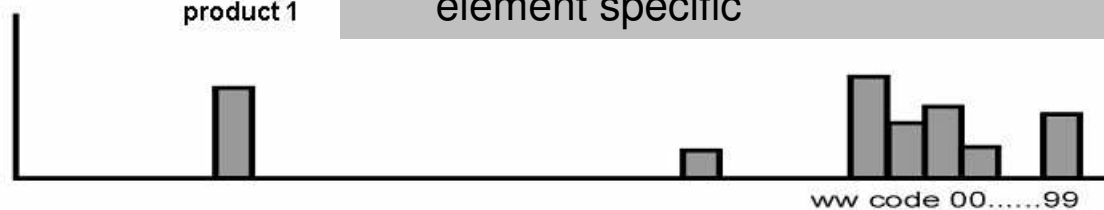
individual weights

time dependant

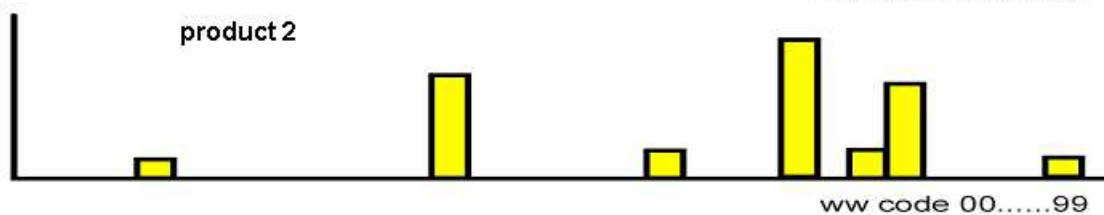
element specific

probability

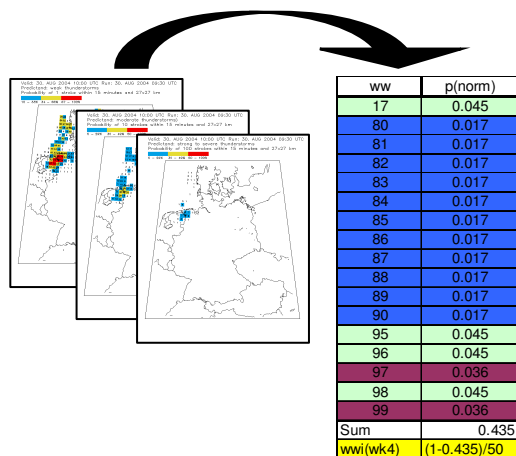
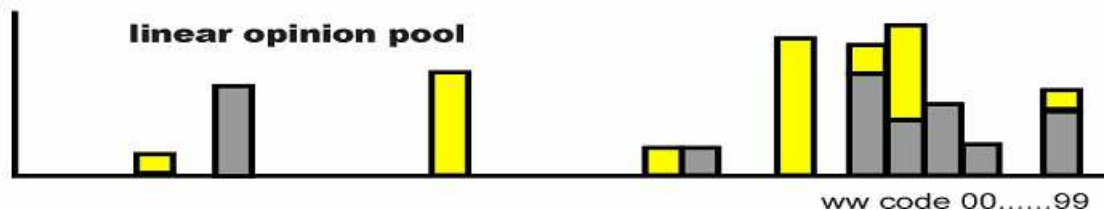
product 1



product 2

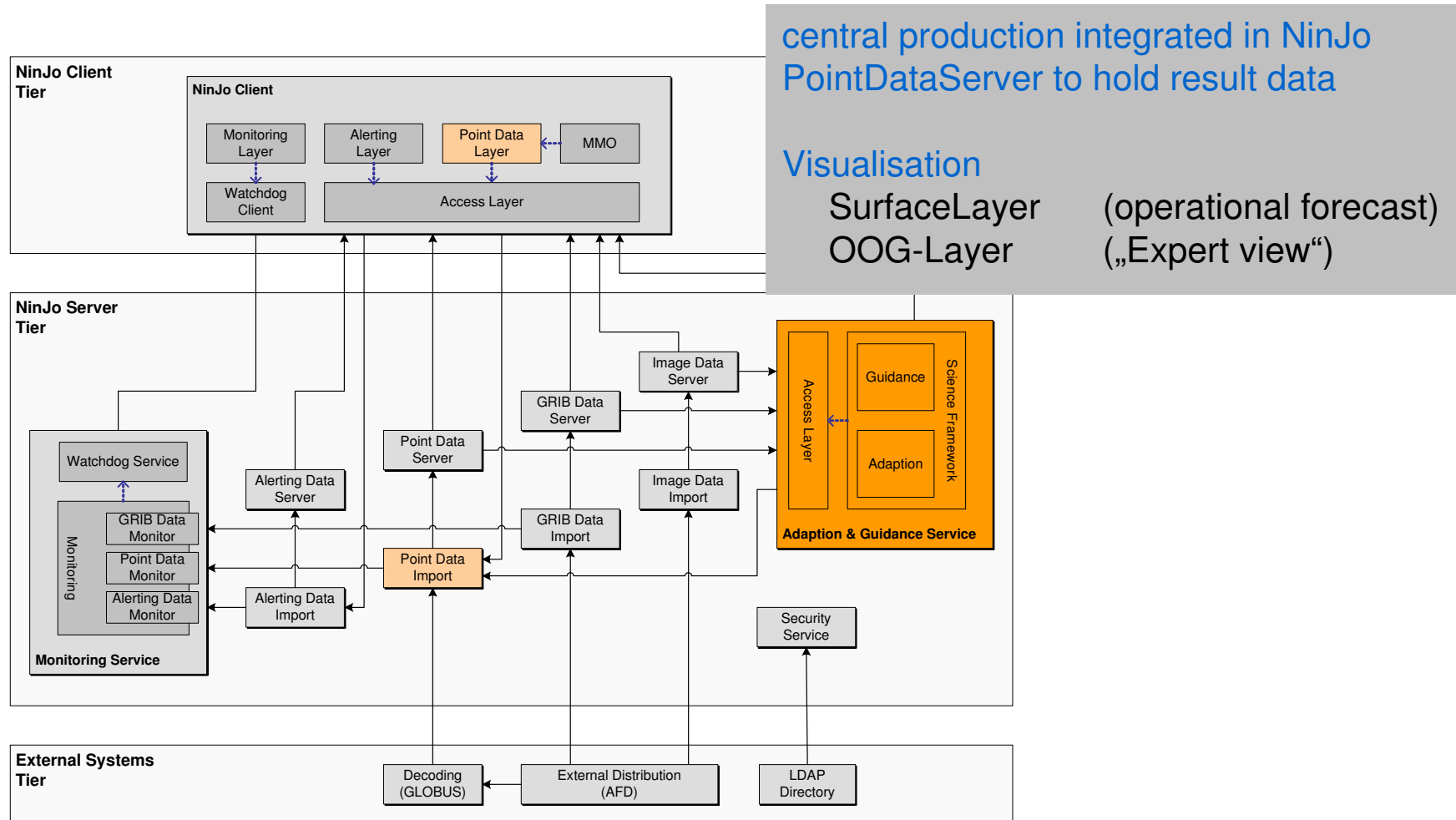


linear opinion pool

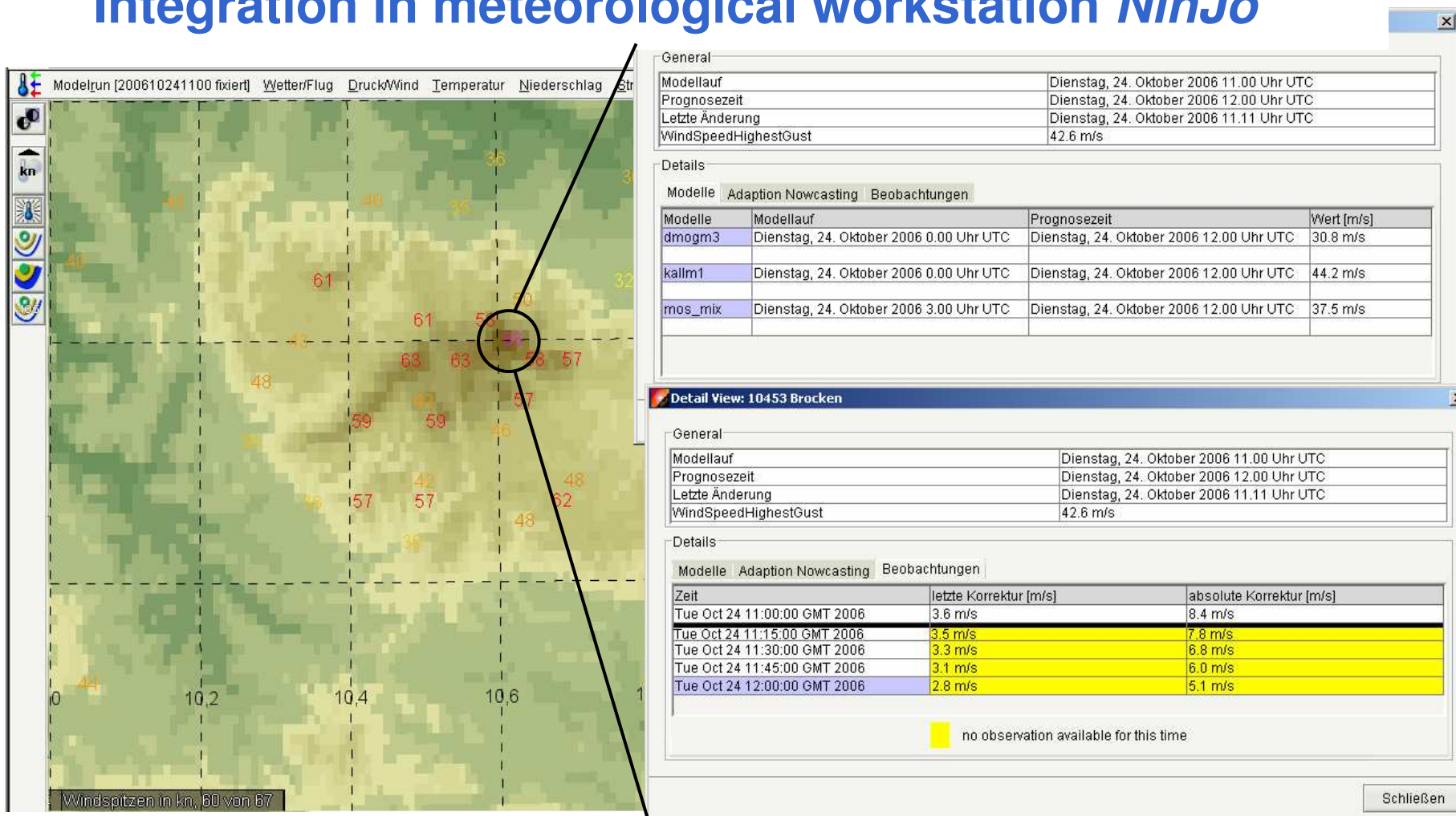




## NinJo-Science: Technical View



## Integration in meteorological workstation *NinJo*



Modelrun [200610241100 fixiert] Wetter/Flug Druck/Wind Temperatur Niederschlag Str

kn

Windspitzen in kn, 80 von 87

General

Modellauf	Dienstag, 24. Oktober 2006 11.00 Uhr UTC
Prognosezeit	Dienstag, 24. Oktober 2006 12.00 Uhr UTC
Letzte Änderung	Dienstag, 24. Oktober 2006 11.11 Uhr UTC
WindSpeedHighestGust	42.6 m/s

Details

Modelle Adaption Nowcasting Beobachtungen

Modelle	Modellauf	Prognosezeit	Wert [m/s]
dmogm3	Dienstag, 24. Oktober 2006 0.00 Uhr UTC	Dienstag, 24. Oktober 2006 12.00 Uhr UTC	30.8 m/s
kallm1	Dienstag, 24. Oktober 2006 0.00 Uhr UTC	Dienstag, 24. Oktober 2006 12.00 Uhr UTC	44.2 m/s
mos_mix	Dienstag, 24. Oktober 2006 3.00 Uhr UTC	Dienstag, 24. Oktober 2006 12.00 Uhr UTC	37.5 m/s

Detail View: 10453 Brocken

General

Modellauf	Dienstag, 24. Oktober 2006 11.00 Uhr UTC
Prognosezeit	Dienstag, 24. Oktober 2006 12.00 Uhr UTC
Letzte Änderung	Dienstag, 24. Oktober 2006 11.11 Uhr UTC
WindSpeedHighestGust	42.6 m/s

Details

Modelle Adaption Nowcasting Beobachtungen

Zeit	letzte Korrektur [m/s]	absolute Korrektur [m/s]
Tue Oct 24 11:00:00 GMT 2006	3.6 m/s	8.4 m/s
Tue Oct 24 11:15:00 GMT 2006	3.5 m/s	7.8 m/s
Tue Oct 24 11:30:00 GMT 2006	3.3 m/s	6.8 m/s
Tue Oct 24 11:45:00 GMT 2006	3.1 m/s	6.0 m/s
Tue Oct 24 12:00:00 GMT 2006	2.8 m/s	5.1 m/s

no observation available for this time

Schließen

## *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 (deterministic, warning, aviation, etc.)

### Production

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

### *NinJo Science*

to support automatisisation 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](http://www.ninjo-workstation.com)

[info@ebp.de](mailto:info@ebp.de)

### More

- ... information
- ... examples
- ... news



The screenshot shows the NinJo Workstation website interface. The header features the NinJo logo with a globe and the text 'NinJo Workstation System' and 'Projekt der posteo AG/Deutscher Wetterdienst'. Below the header is a search bar and a navigation menu with links for Home, Contact, Imprint, and Project Members. The main content area is divided into two columns. The left column contains a sidebar with sections: 'NinJo Workstation' (with sub-links for Overview, Publications, Customer Support, and Infos of the Week), and a footer with 'Copyright 2006 NinJo Workstation | Impressum'. The right column features a 'NinJo Workstation Software Highlights' section with a list of features: ultramodern meteorological workstation system with multi-window technology, easily integrated geographic map displays, Meteograms, cross-sections, tephigrams etc., monitoring of incoming data, interactive and automatic product generation, flexible client/server architecture as well as, and highly configurable via XML and immediately usable without altering code. To the right of the list is an image of the software interface showing a cross-section, meteogram, and maps. Below the image is the caption: 'Some NinJo Application Windows showing a Cross-Section, Meteogram and Maps'. At the bottom of the right column, there is a paragraph: 'Are you interested in more? Please read the [Overview](#) to get a brief introduction. NinJo is the outcome of a successful [international collaboration](#) by various meteorological services with support from experienced IT companies. Information about pricing and licensing can be requested using the [Contact](#) form.'