Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Recent Developments of the NinJo Workstation

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Selected Recent Developments at DWD: Improvement of Nowcasting Capabilities

- New meteorological data
- Additional layers, e.g.
  - NowcastGrid
  - G-SCIT
  - Ensembles
  - WMS
- Additional & enhanced functionality, GUI improvements

Major Other Developments at DWD & within consortium

- Improvement / Redesign of (automated) warning generation (component AutoWARN)
- AviationEPM (Edition, Production, Monitoring) of text-based warnings
- Additional & improved Radar data & products
  - Volume precipitation scans
  - More derived products (e.g. VIL)
  - ability to interactively define a path and visualize cross sections
  - European Radar composit OPERA

not covered here

Major Other Developments (cont'd)

- Considerable extensions of Interactive Graphical Editor / Product Workbench
- Satellite layer: volcanic ash products
- NinJo Batch: off-line graphic products
- Batch Test Suite (BTS): automatic test of products
  - Regression tests
  - Web-based GUI
- … and much more

not covered here

References, Acknowledgements

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- EGOWS conferences:
  http://www.knmi.nl/samenw/egows

  http://www.meteo.fr/cic/meetings/2011/EGOWS/presentations.html
  - See e.g. presentation from Sibylle Haucke
    http://www.meteo.fr/cic/meetings/2011/EGOWS/EGOWS_2011_presentations/NinJo-Recent-developments-EGOWS2011.pdf
- General publications:
  http://www.meteo.fr/cic/wsn05/resumes_longs/7.13-502.pdf
- web site of commercial development & marketing partner (EuMetSys):
  http://www.ninjo-workstation.com
- Background information
  (Techn. reports from FEZE members, given at DWD workshop May 2011)
  - S. Trepte: CellMOS, Ein Gewitternowcasting- und Unwetterwarnsystem
  - P. James: NowCastMIX - Vorverarbeitung von Nowcasting-Daten für AutoWARN
  - T. Hengstebeck: Mesocyclone Detection Algorithm and VIL

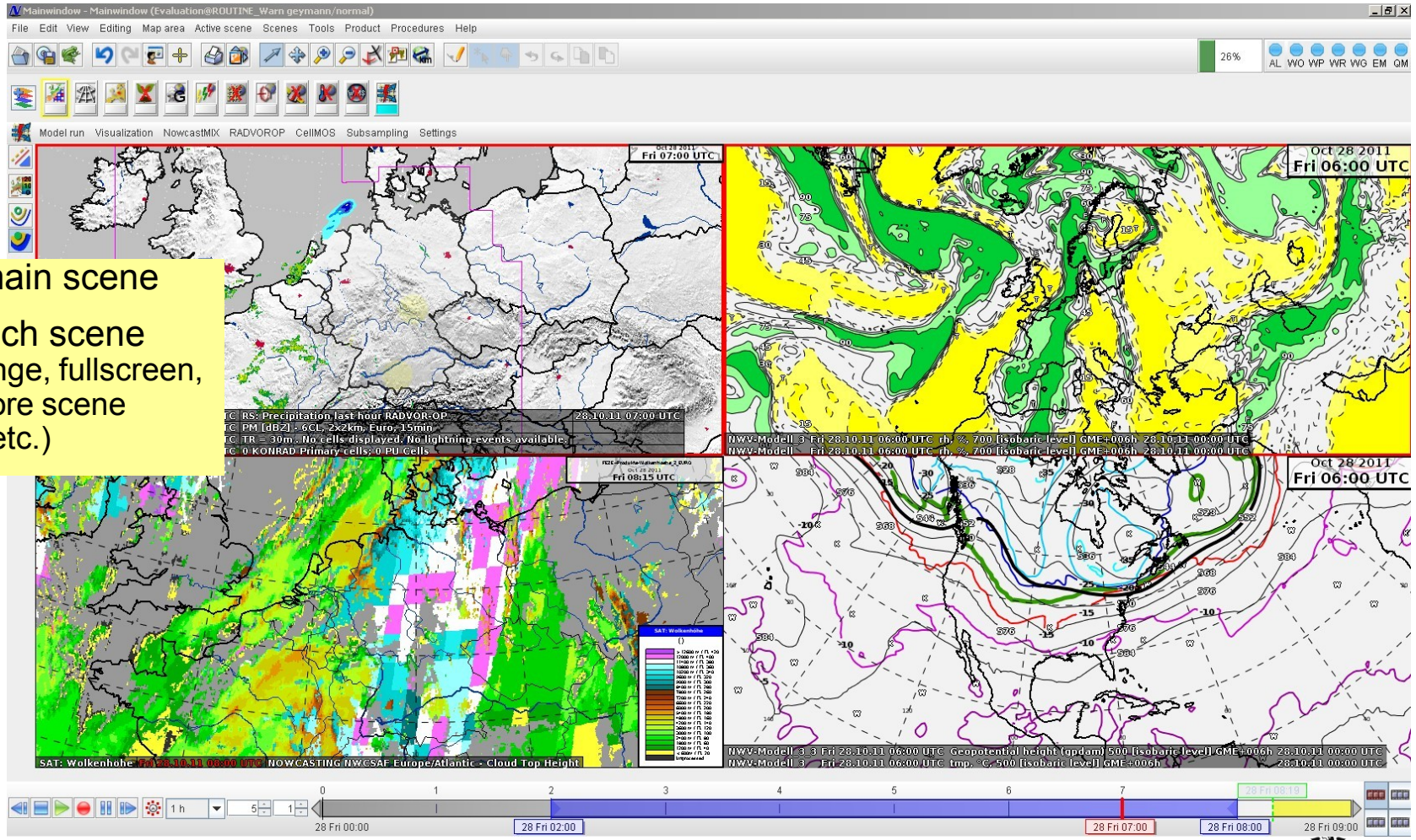
Thanks to the NinJo team !

Technical Developmets: GUI layout

- Multi-map layout
  - Earlier 1 main scene + 0…3 secondary scenes
- Now 2 / 4 / 8 … 12 equal-sized scenes
  - Synchronized in time (optional)
  - Full functionality for each scene (sep. GUI)
- CellView layout

- Clients: move to 64 Bit systems (incl. JVM)
  - OS Win XP-64, Win 7, Linux

GUI layout : multiple scenes



Top left: main scene

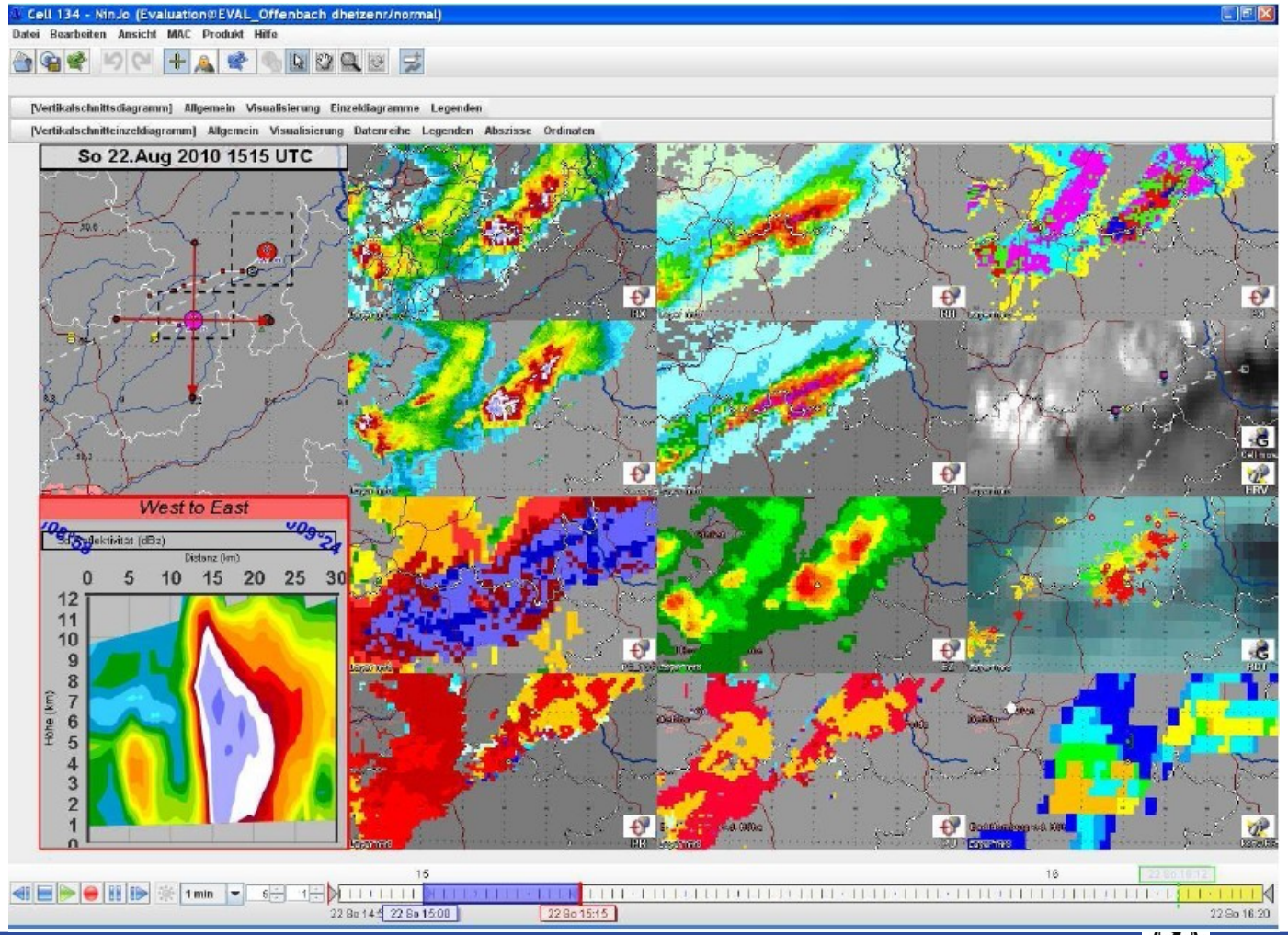
GUI for each scene
(exchange, fullscreen, load/store scene favorit etc.)

GUI layout: CellView for nowcasting

Top left:
main map window with locator

Bottom left:
cross section window (active)

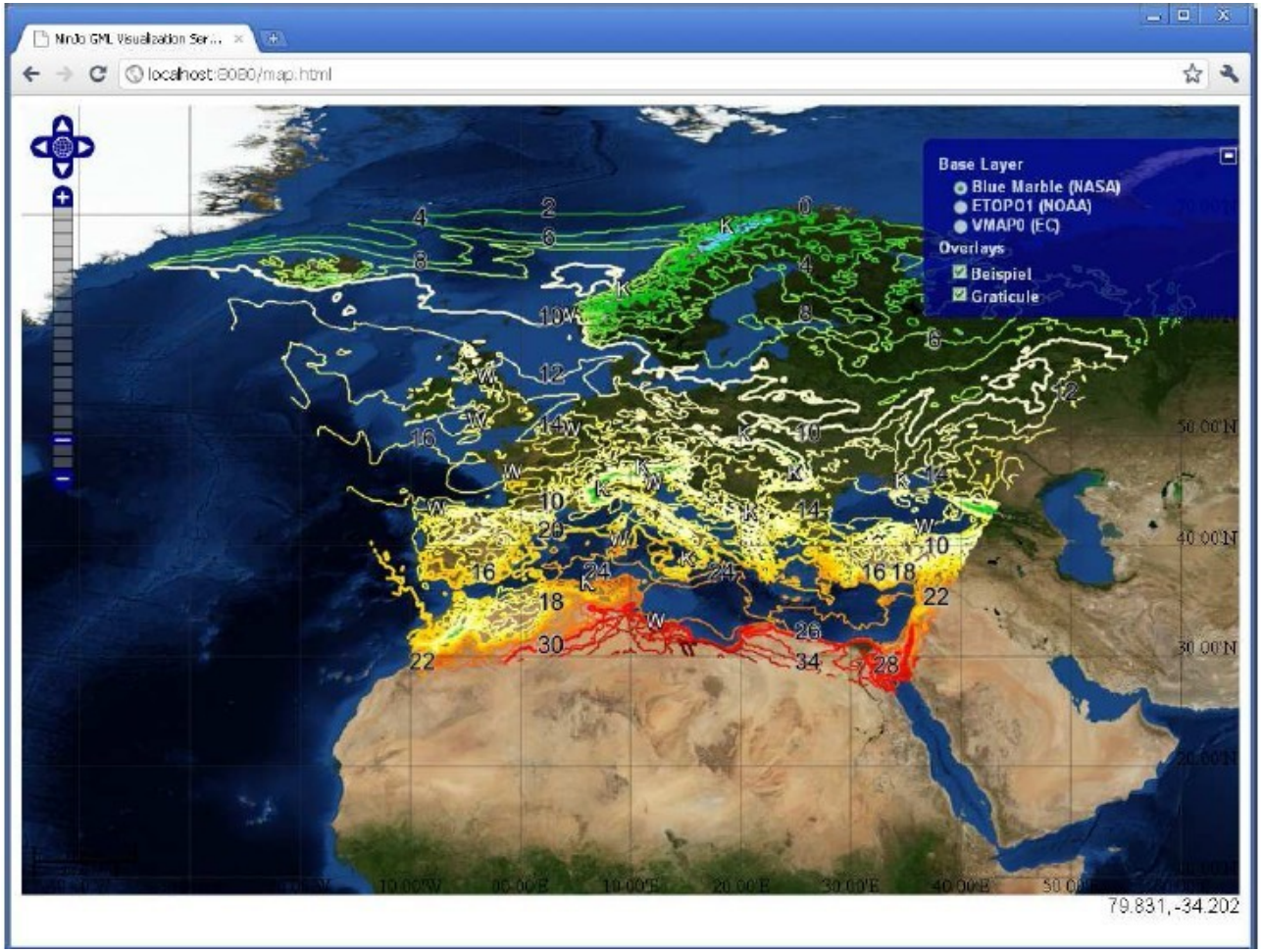
Right side:
12 sub-windows with various Radar [+ Satellite] data (same location)



Technical issues : GeoTIFF & GML export

➔ Current scene may be exported as GeoTIFF or GML (certain projections only) and results used / displayed e.g. in GIS

GML export example (visualized by WMS client)



Recent Developments: Nowcasting Layer

- Data types:
  - NowcastMIX
  - CellMOS
  - RADVOR-OP (earlier in NWP layer)
- automatic update of model run
  - also (as available earlier) automatic update of time
  - model-run frequency 5 min … 15 min
- all visualization methods of grid data possible
  - Isoline, isoarea, pixel-related, filtering methods

Nowcasting Layer : NowcastMix data

- Simulteaneous monitoring & analysis of several important types of input data in order to produce a unique value indicating the kind and severity of an expected weather event, depending on location
- Auto WARN: monitor several data types individually
- NowcastMIX: only one (per location) parameter is output
  - Combined evaluation of relevant data
  - Has meteorological „intelligence“ through filtering and weighting
  - Serves as AutoWARN input

Nowcasting Layer : NowcastMix data

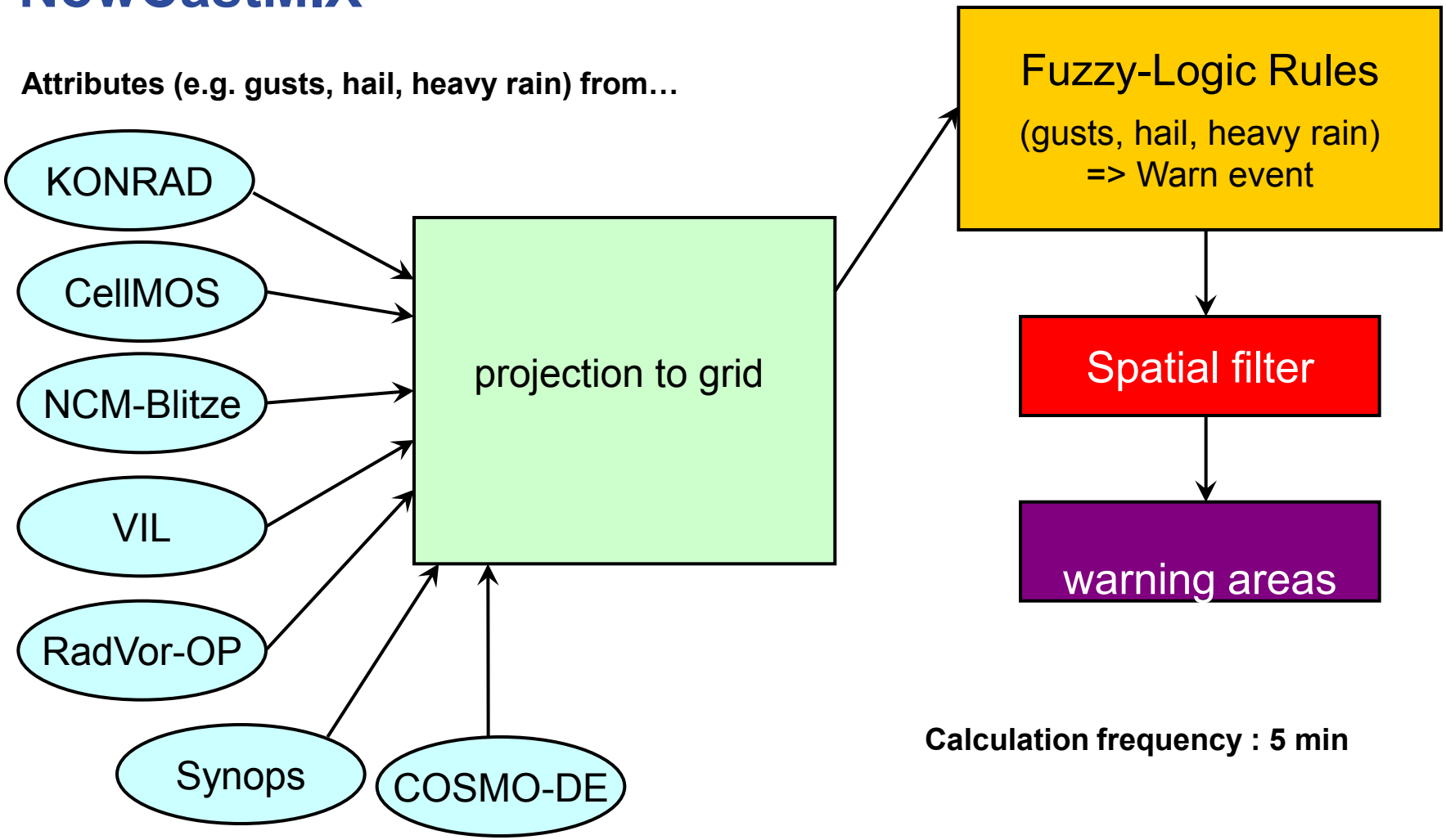
➔ Input data (point type + gridded data)

- **Konrad (Radar based detection of convectice cells)**
- **CellMOS (Tracking of convective cells by MOS methods)**
- **Lightnings (NCM network)**
- **Surface observations (SYNOP)**

- **RADVOR-OP**
- **COSMO-DE DWD NWP model**
- **VIL (from radar data)**
- **Cell trajectories**

NowCastMIX

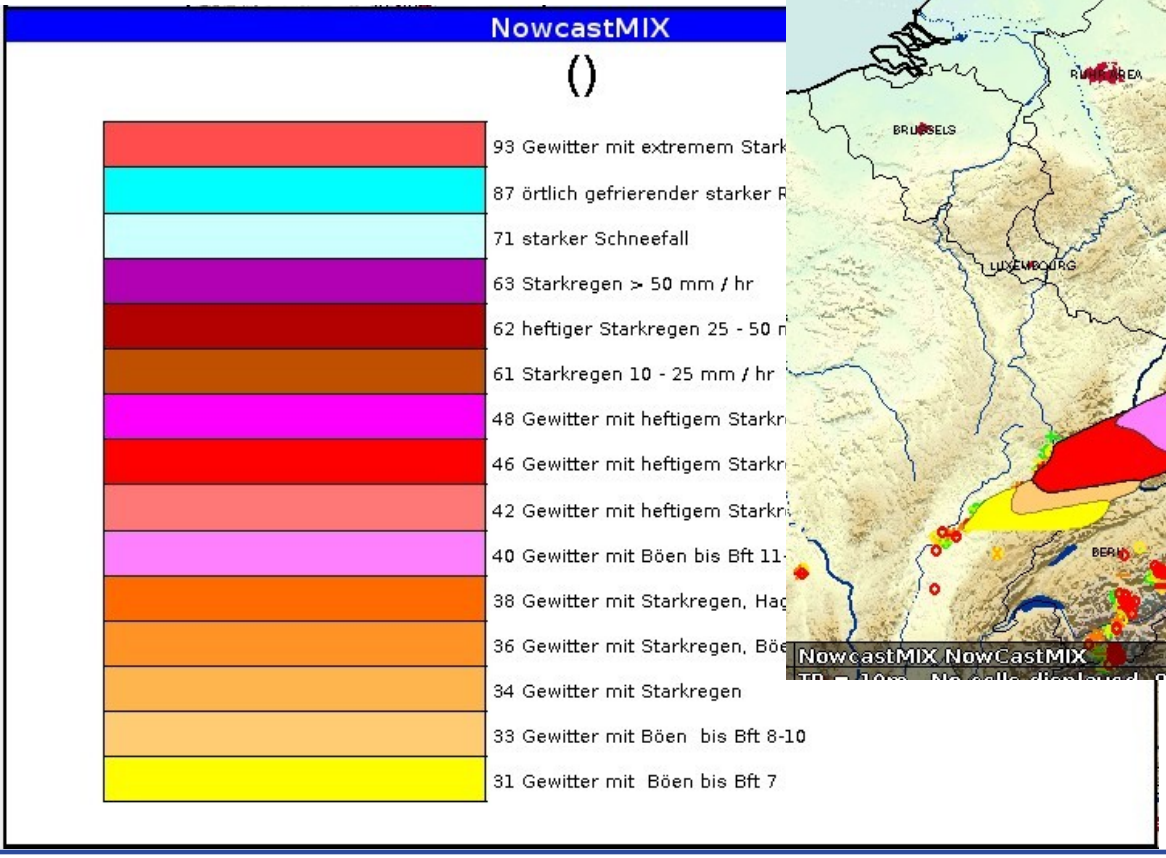
Attributes (e.g. gusts, hail, heavy rain) from…

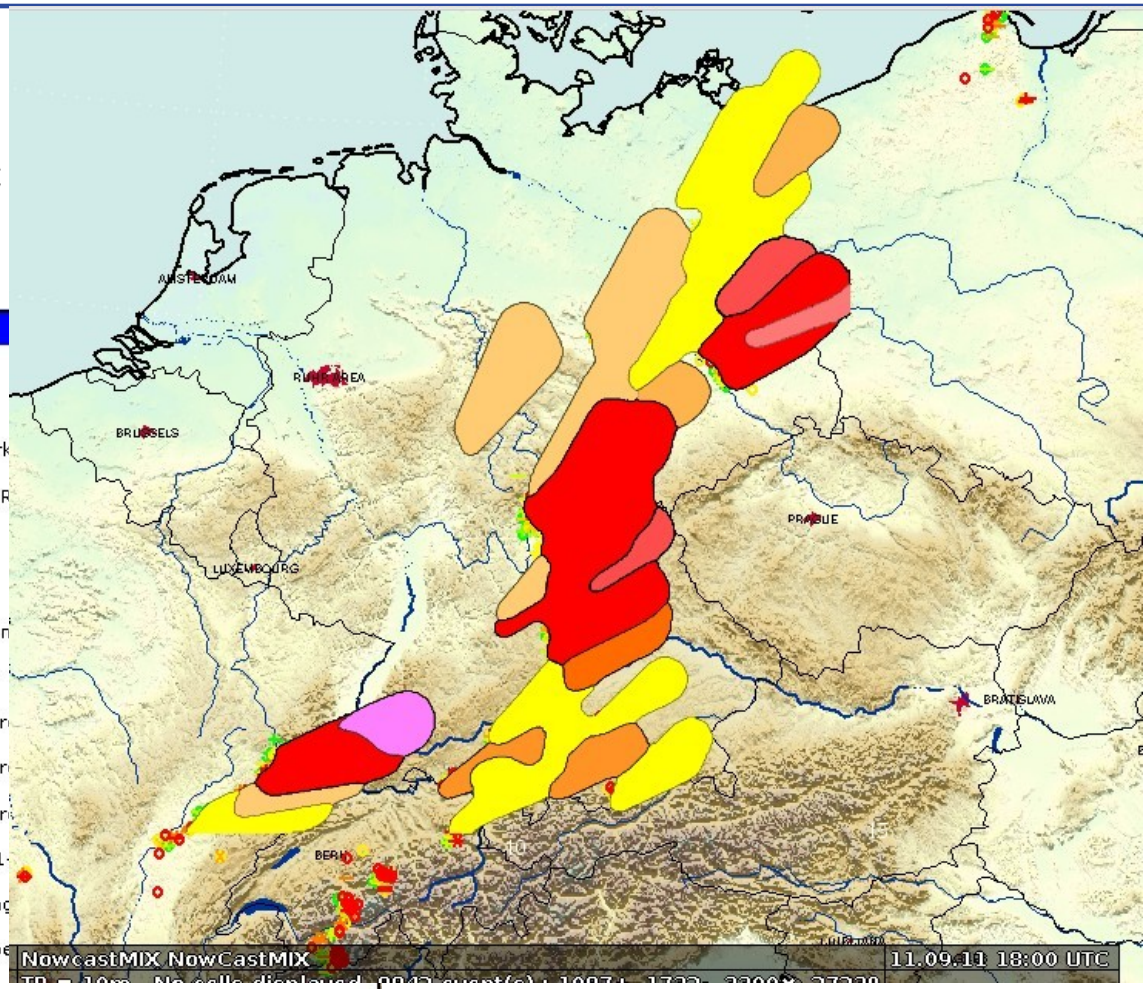


Calculation frequency : 5 min

NowcastMix data

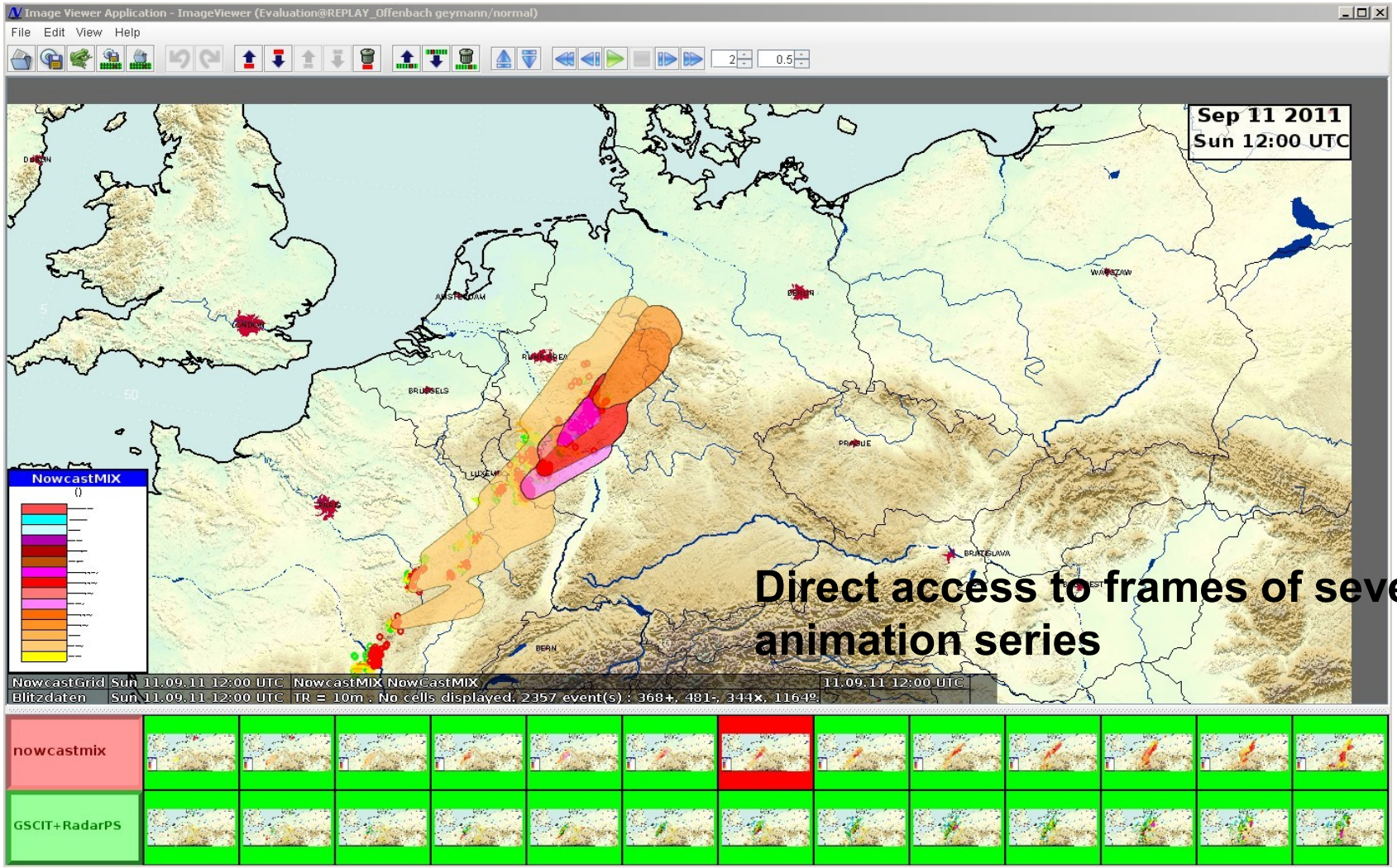
example from 2011-09-11 15h UTC with lightnings





NowcastMix data

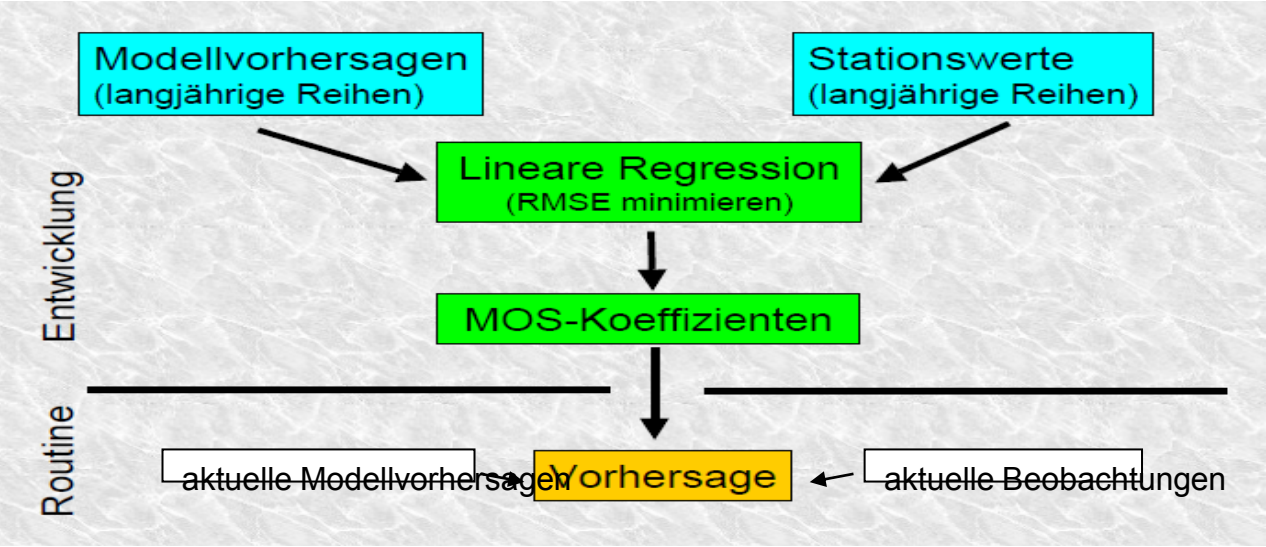
ImageViewer visualization



Direct access to frames of several animation series

Nowcasting Layer : CellMOS data

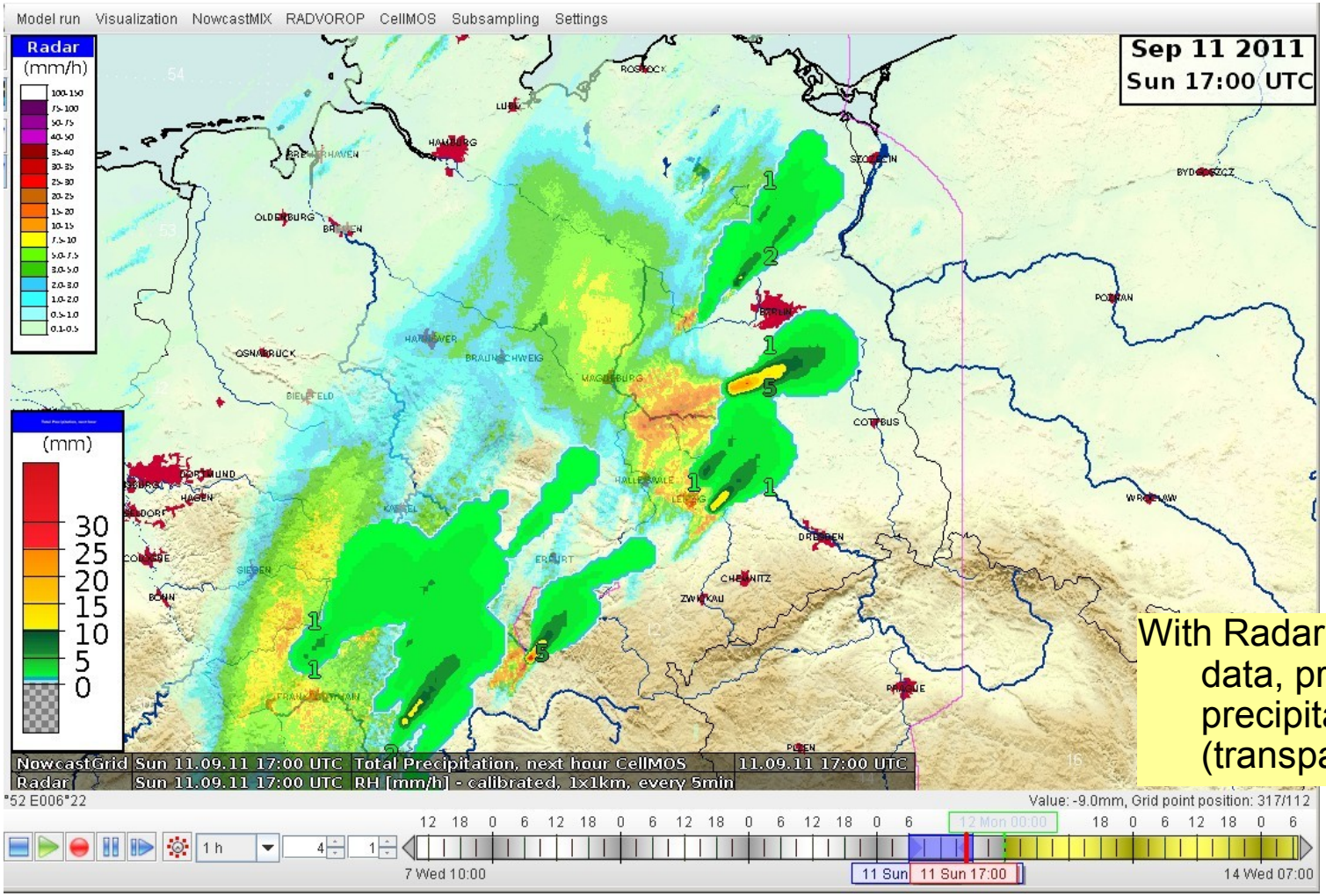
- CellMOS : a new system to forecast thunderstorms and heavy precipitation
- „MOS“: Model Output Statistics



Nowcasting Layer : CellMOS

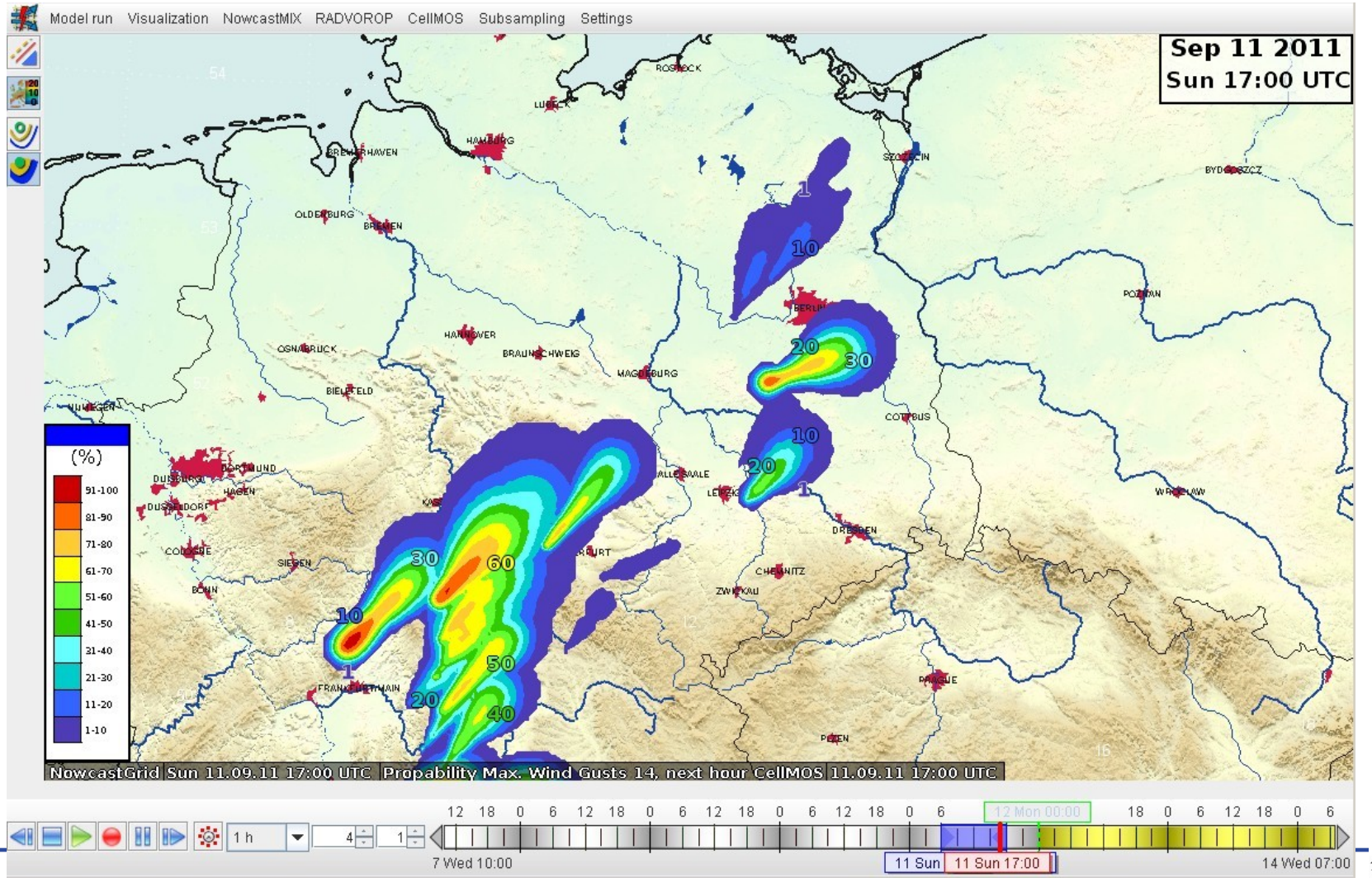
- Input data:
  - **Radar reflectivities (RX-product/composit, 1x1 km², every 5 min)**
  - **Lightnings (NCM-Netz, every min)**
  - **DWD GME-NWP model (00, 12 UTC)**
- Image / pattern analysis of radar data
- Certain criteria to identify a cell
- Forecast of cell tracks (various probabilities)
- Elements forcasted:
  - **Precipitation (using Z-R relation)**
  - **Hail (grain size) (empirically)**
  - **(convective) Wind gusts (empirically)**
  - **Lightning frequerncy**

CellMOS precipitation forecast (next hour)



With Radar precipitation data, product RH, precipitation in mm/h (transparent)

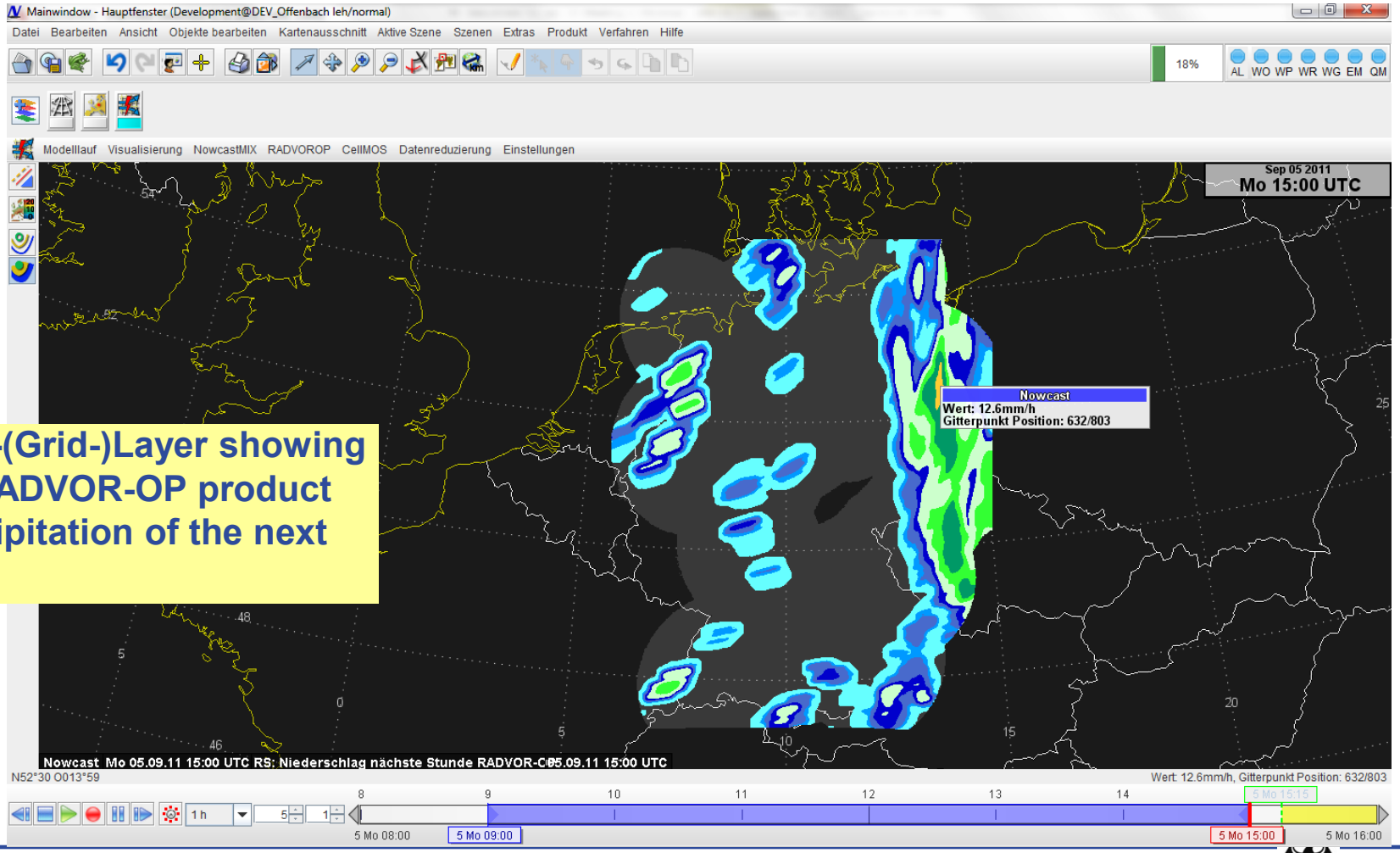
CellMOS wind gust probability



Nowcasting Layer : RADVOR-OP data

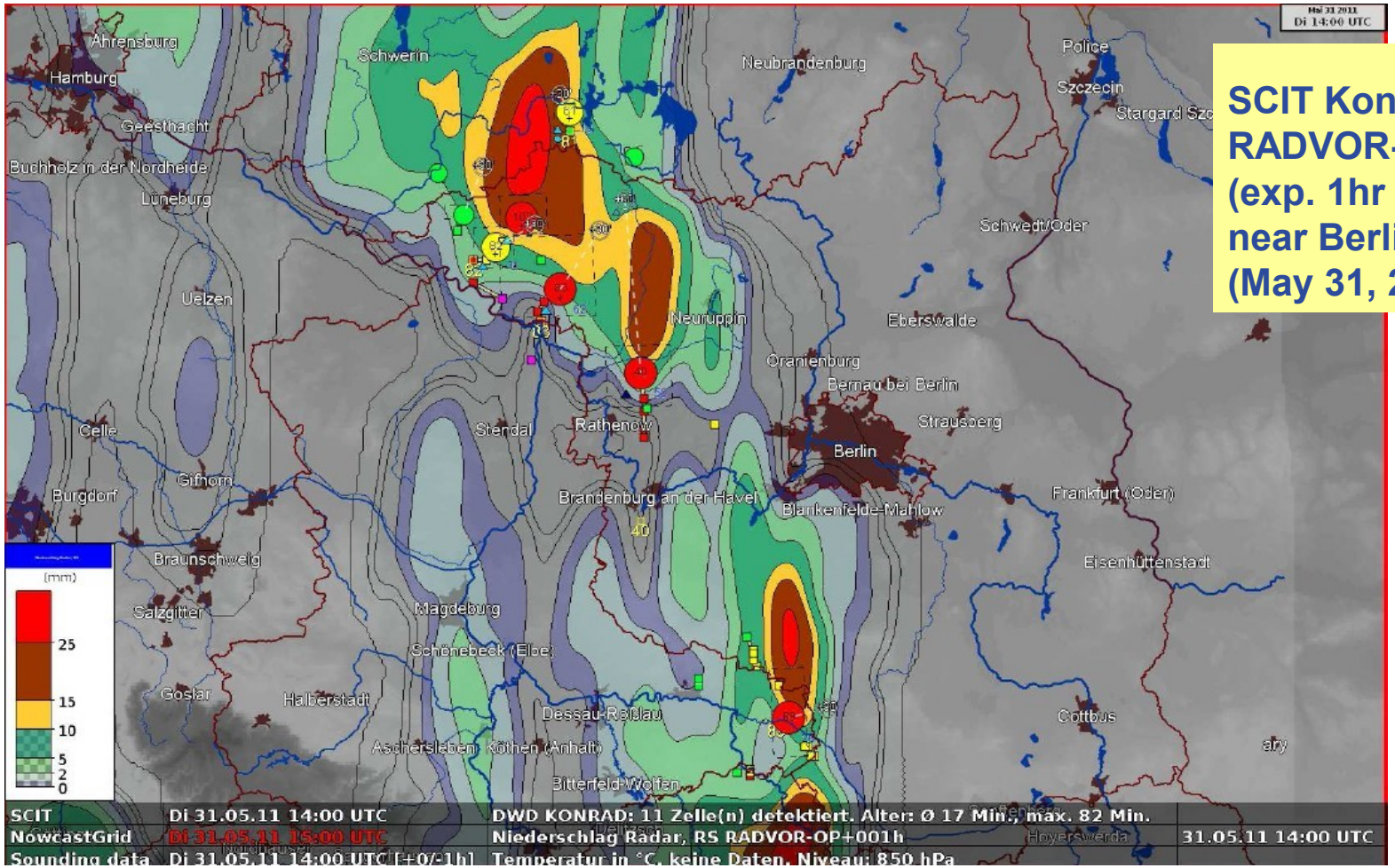
- Data provided by climatological / hydrological dept.
  - project Radolan
  - in NWP layer earlier
- Radar based forecast and analysis of precipitations
- Various products, also calibrated
- Forecast for ½ and 1 hour, available in steps of 5 & 15 min.

RADVOR-OP data



Nowcast-(Grid-)Layer showing DWD's RADVOR-OP product for „precipitation of the next hour"

SCIT & RADVOR-OP data



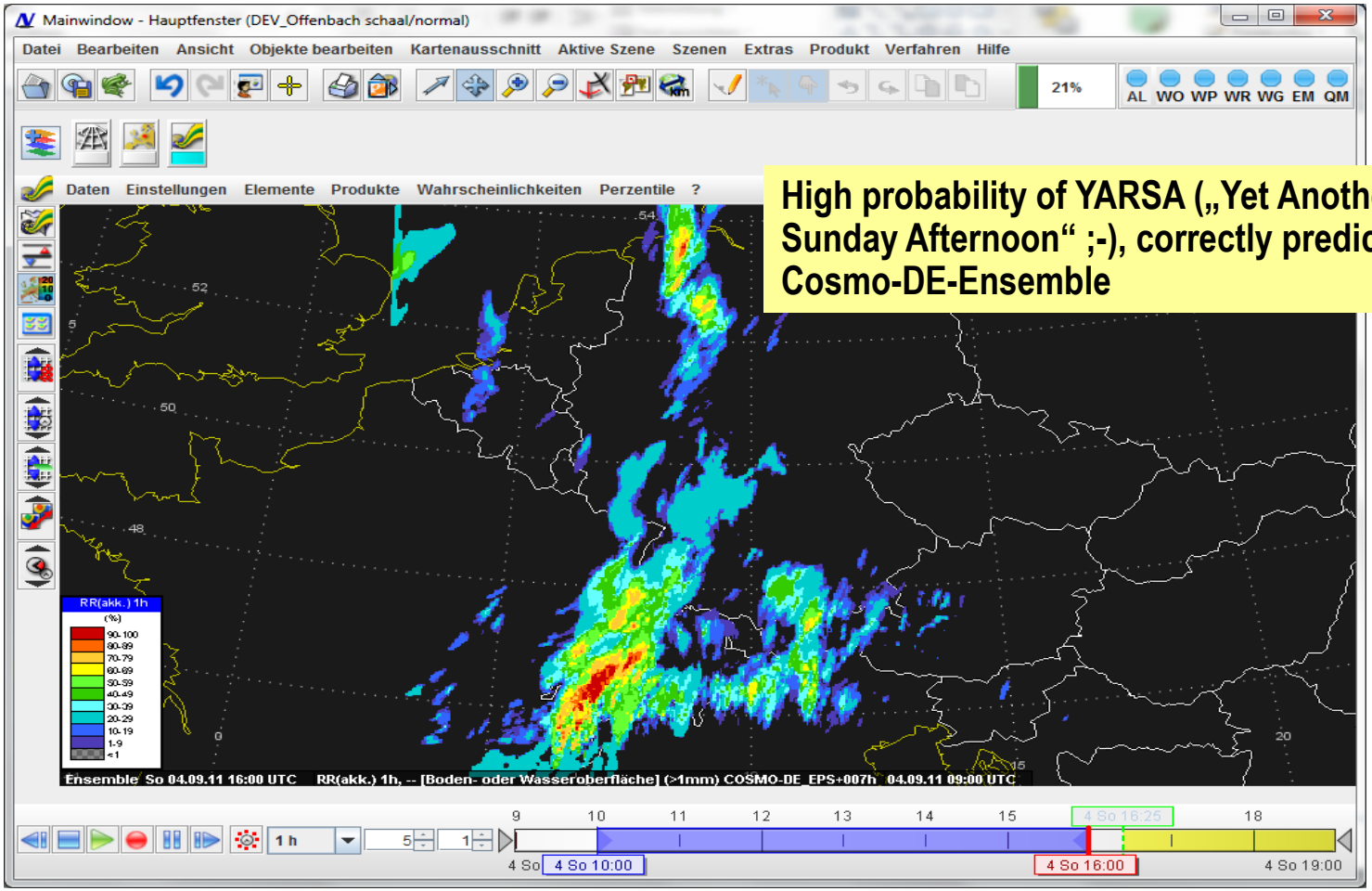
SCIT Konrad data + RADVOR-OP (exp. 1hr precipitation) near Berlin (May 31, 2011)

Ensemble Layer

- Models
  - COSMOS_DE_EPS
  - COSMO-LEPS
  - ECMWF_EPS
  - PEPS

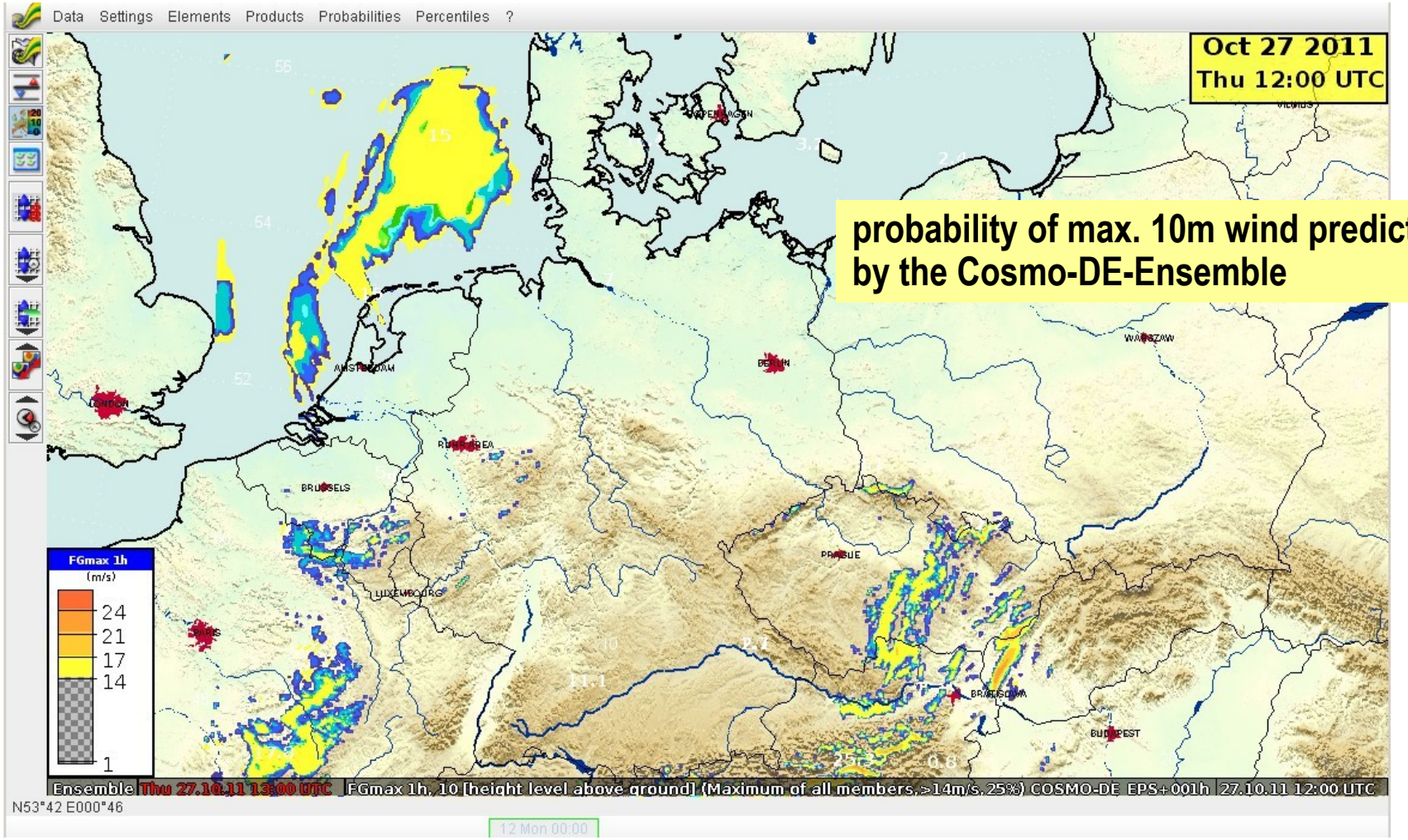
- More visualization types for meteograms

Ensemble Layer



High probability of YARSA („Yet Another Rainy Sunday Afternoon“ ;-), correctly predicted by the Cosmo-DE-Ensemble

Ensemble Layer

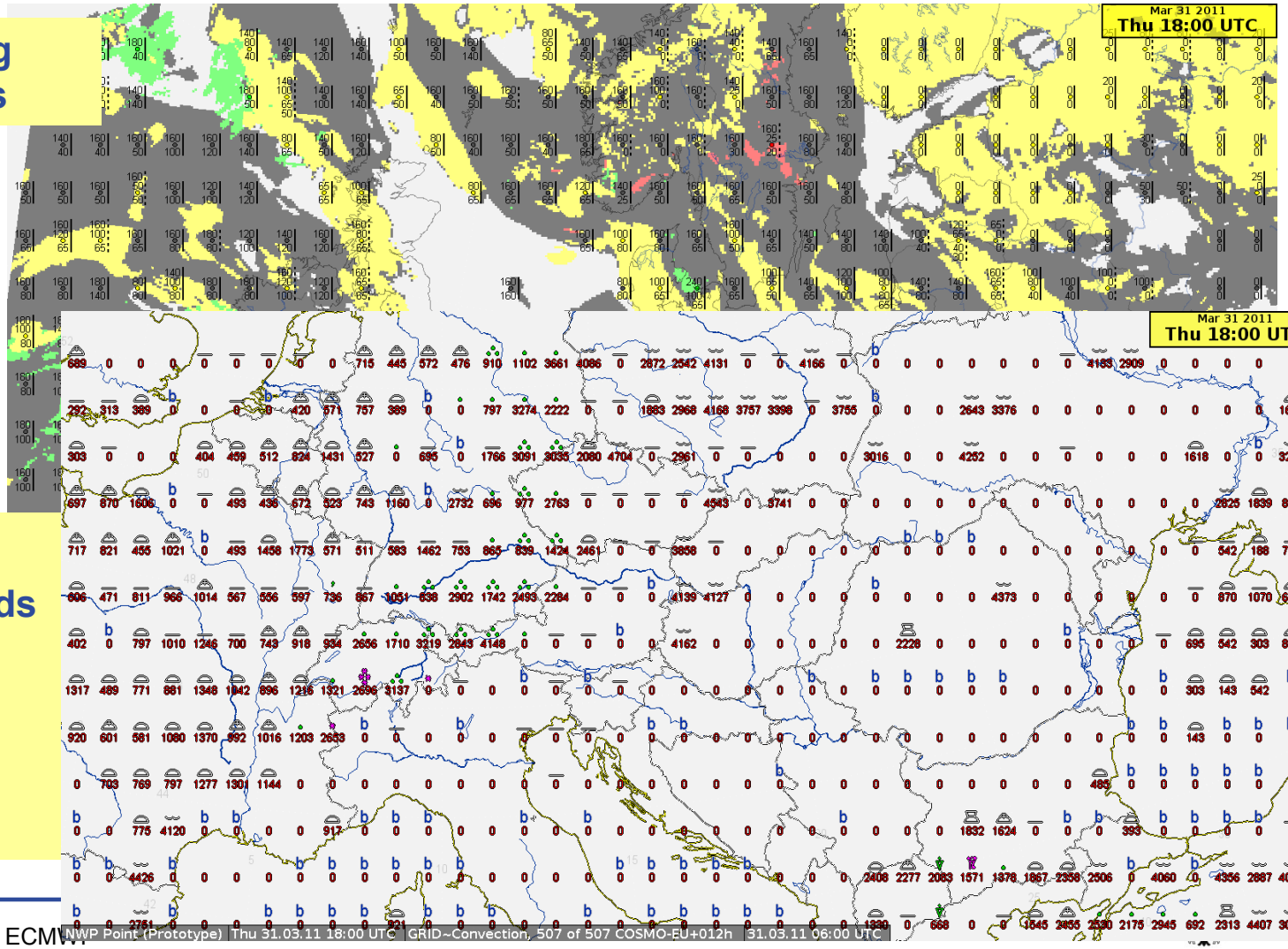


Numerical Weather Forecast Point Layer

- Specialized combi plots for gridded model data
  - Visualization methods taken from point data layer
- Maps for aviation & maritime purposes
  - WAFC data
  - ADWICE data
  - Wave height models
  - Used also for batch products

NWP Point Layer

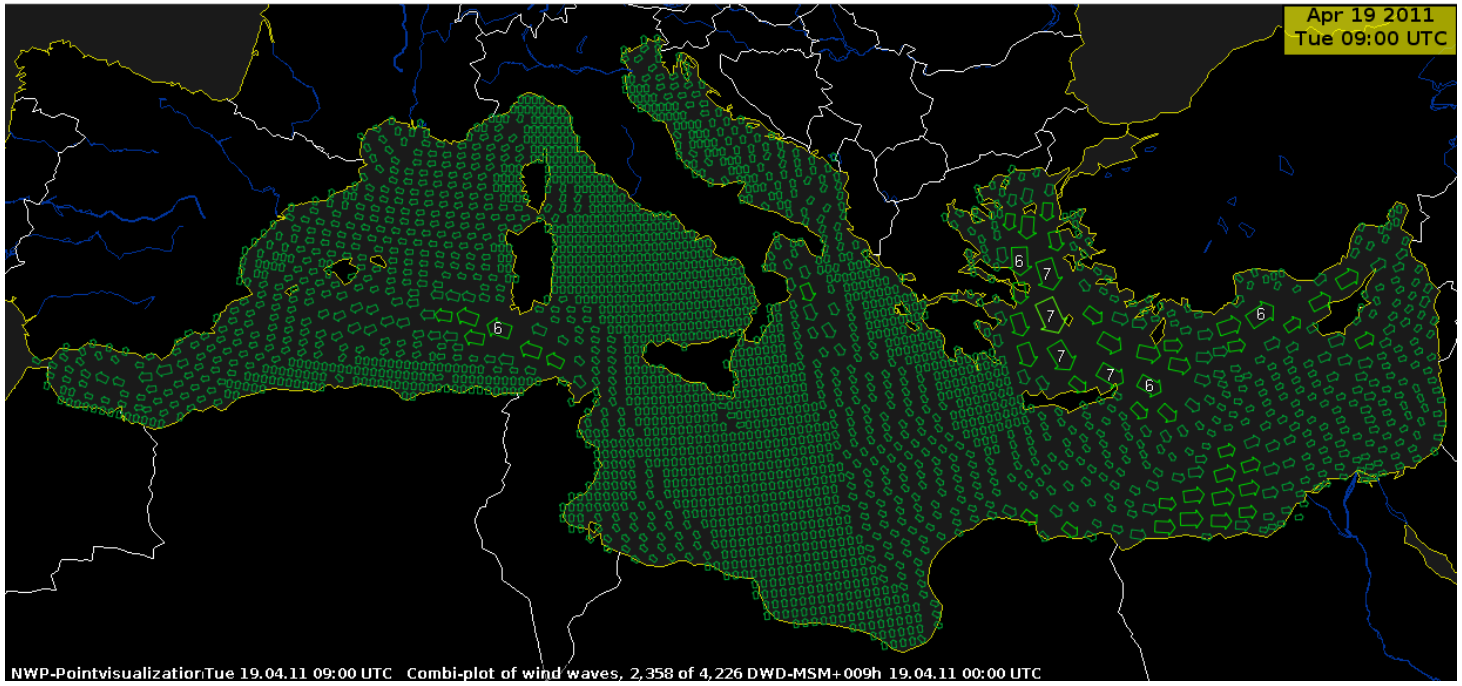
ADWICE data: icing scenario prognosis



Met-element „Precipitation, clouds and blue sky“, combined with convective clouds base height

NWP Point Layer

- arrow visualistion of windwave and with size of arrow defined by wave height
- if an arrow is large enough the wave period is shown as number inside the arrow
- dynamic thin out depending on the available space

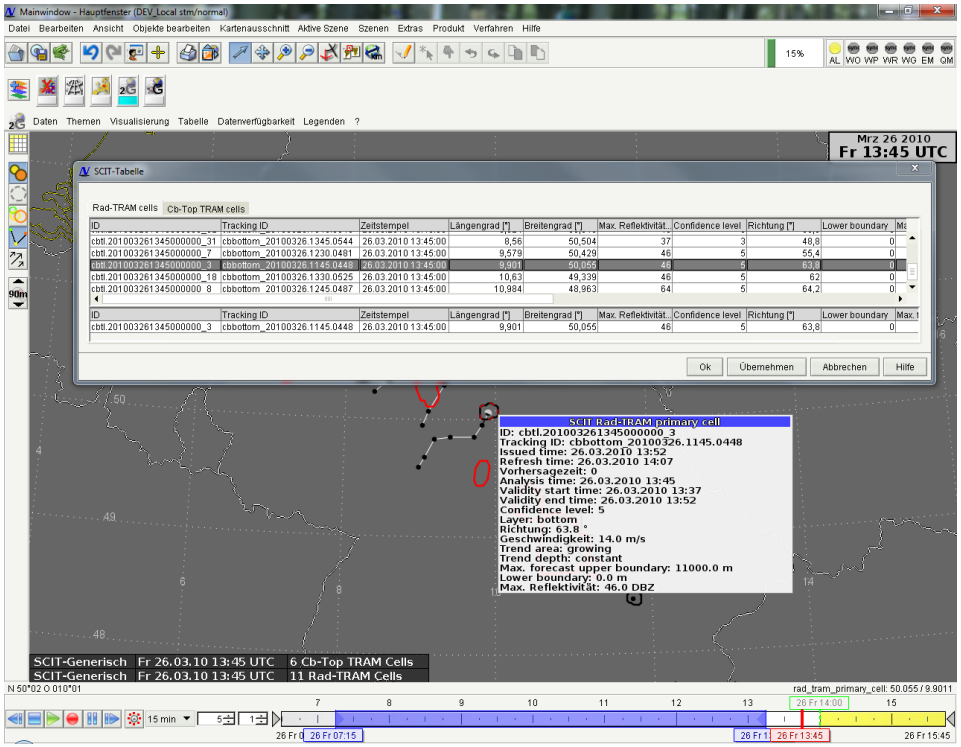


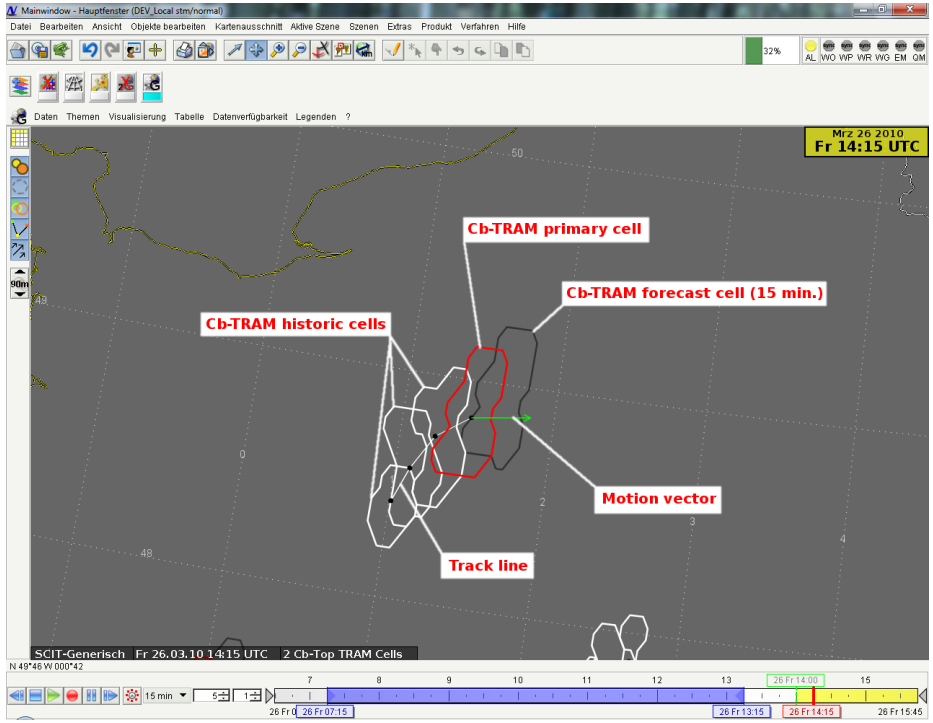
Generic-SCIT layer: Integration of Cb-TRAM and Rad-TRAM data

- Data types:
  - Konrad (no. of radar echo area above ~ 56 dB > area)
  - PU (radial velocity / wind derived from Radar data)
  - CellMOS cells
  - Mesocyclon cells

- TRAM = “Tracking and Monitoring” of severe convection events
  - Cb-TRAM – using MeteoSat-8 data
  - Rad-TRAM – using Radar data
- Algorithms of DLR implemented

Generic-SCIT layer: Integration of Cb-TRAM & Rad-TRAM





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GSCIT layer : Konrad + CellMOS + Mesocylone cells

SCIT Table

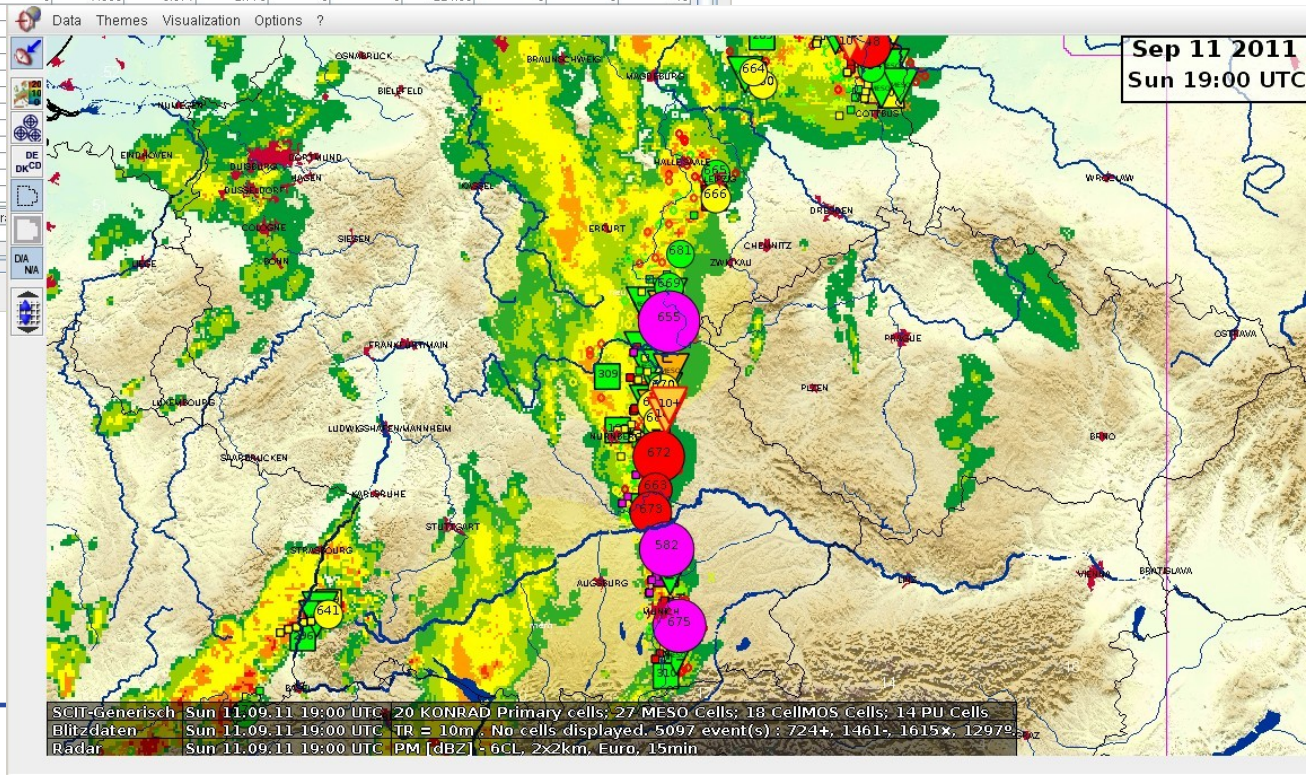
KONRAD primary cells | Mesocyclone cells | CellMOS cells | PU cells

Data type	ID	Timestamp	Severity	Spee...	Orientation...	Major axis [...	Minor axis [...	Average sh...	Max. shear...	Height [km]	Height (top...	Num. PV	Average m...	Max. mom...	Diameter [...	Average ref...	Max. reflect...
mesocell_dwd	17	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	17.629	5.282	4.624	3	0	62.874	0	0	40.5
mesocell_dwd	1	Sep 11, 2011 7:00:00...	2	0	0	0	0	0	26.782	13.047	0	9	0	301.593	0	0	54
mesocell_dwd	7	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	8.805	2.031	1.011	4	0	152.681	0	0	51
mesocell_dwd	10	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	13.178	4.747	3.16	4	0	130.481	0	0	42.5
mesocell_dwd	5	Sep 11, 2011 7:00:00...	2	0	0	0	0	0	17.49	10.773	0	7	0	267.384	0	0	49.5
mesocell_dwd	11	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	11.58	6.506	4.877	5	0	199.498	0	0	45
mesocell_dwd	21	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	12.022	7.967	3.837	8	0	354.791	0	0	41
mesocell_dwd	24	Sep 11, 2011 7:00:00...	3	0	0	0	0	0	12.423	7.793	0	4	0	163.316	0	0	53
mesocell_dwd	25	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	11.564	1.892	0	3	0	42.427	0	0	33.5
mesocell_dwd	26	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	11.253	1.961	0	5	0	165.813	0	0	42
mesocell_dwd	27	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	12.479	2.039	0	4	0	157.08	0	0	34.5
mesocell_dwd	31	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	18.731	2.743	1.365	3	0	34.715	0	0	34.5
mesocell_dwd	32	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	8.376	4.799	1.598	6	0	110.741	0	0	41.5
mesocell_dwd	34	Sep 11, 2011 7:00:00...	1	0	0	0	0	0	7.506	5.671	2.778	5	0	224.98	0	0	45
mesocell_dwd	23	Sep 11, 2011 7:00:00...	5	0	0	0	0	0									
mesocell_dwd	30	Sep 11, 2011 7:00:00...	3	0	0	0	0	0									
mesocell_dwd	22	Sep 11, 2011 7:00:00...	3	0	0	0	0	0									
mesocell_dwd	28	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	29	Sep 11, 2011 7:00:00...	3	0	0	0	0	0									
mesocell_dwd	37	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	35	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	36	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	50	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	40	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	39	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									
mesocell_dwd	46	Sep 11, 2011 7:00:00...	1	0	0	0	0	0									

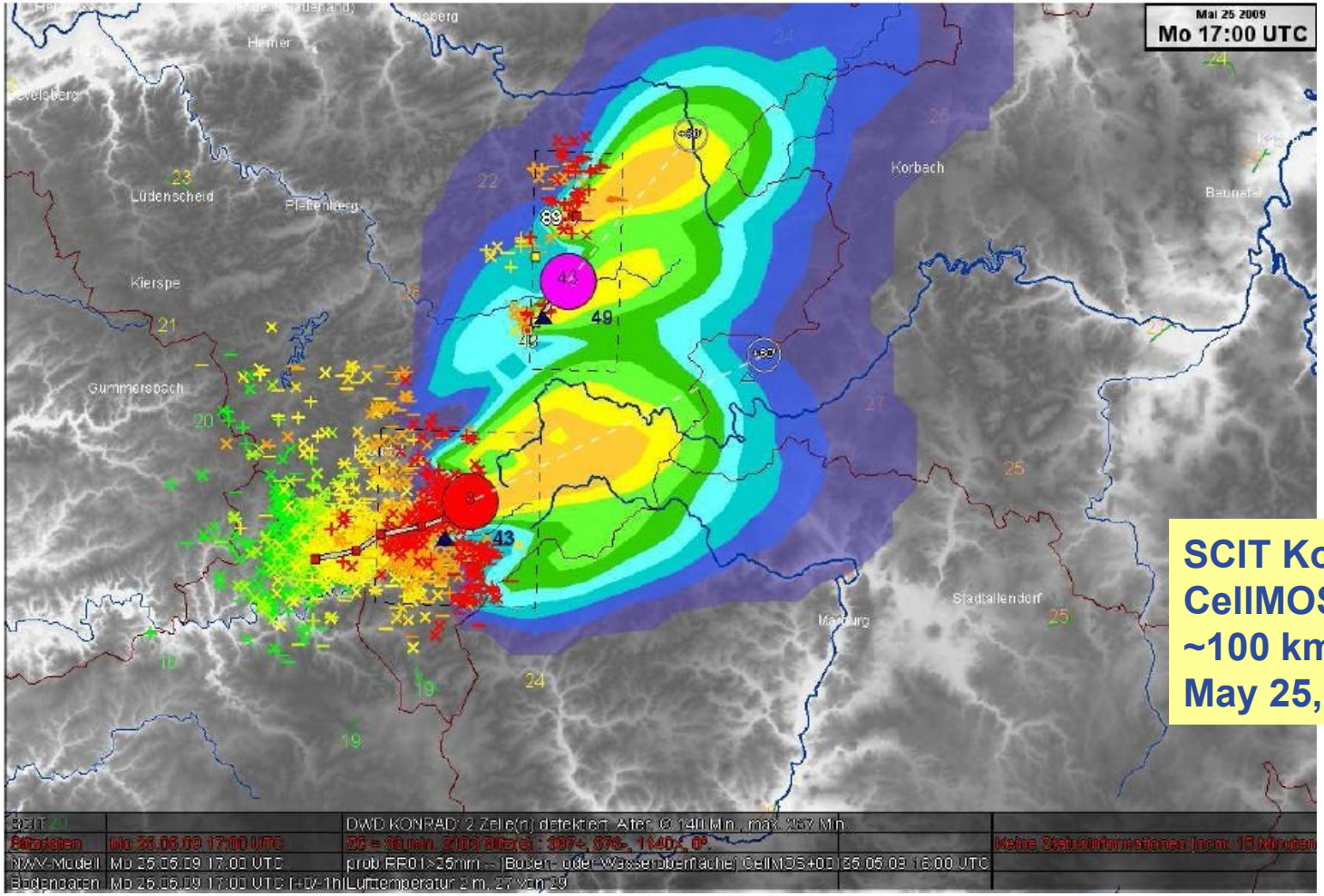
Data type	ID	Timestamp	Severity	Spee...	Orientation...	Major axis [...	Minor axis [...	Aver:

Below: map display of Radar reflectivity (PM) + GSCIT (4 cell types)

Above: table with Konrad / Mesocyclone / CellMOS / PU cells



GSCIT layer + CellMOS (grid) data

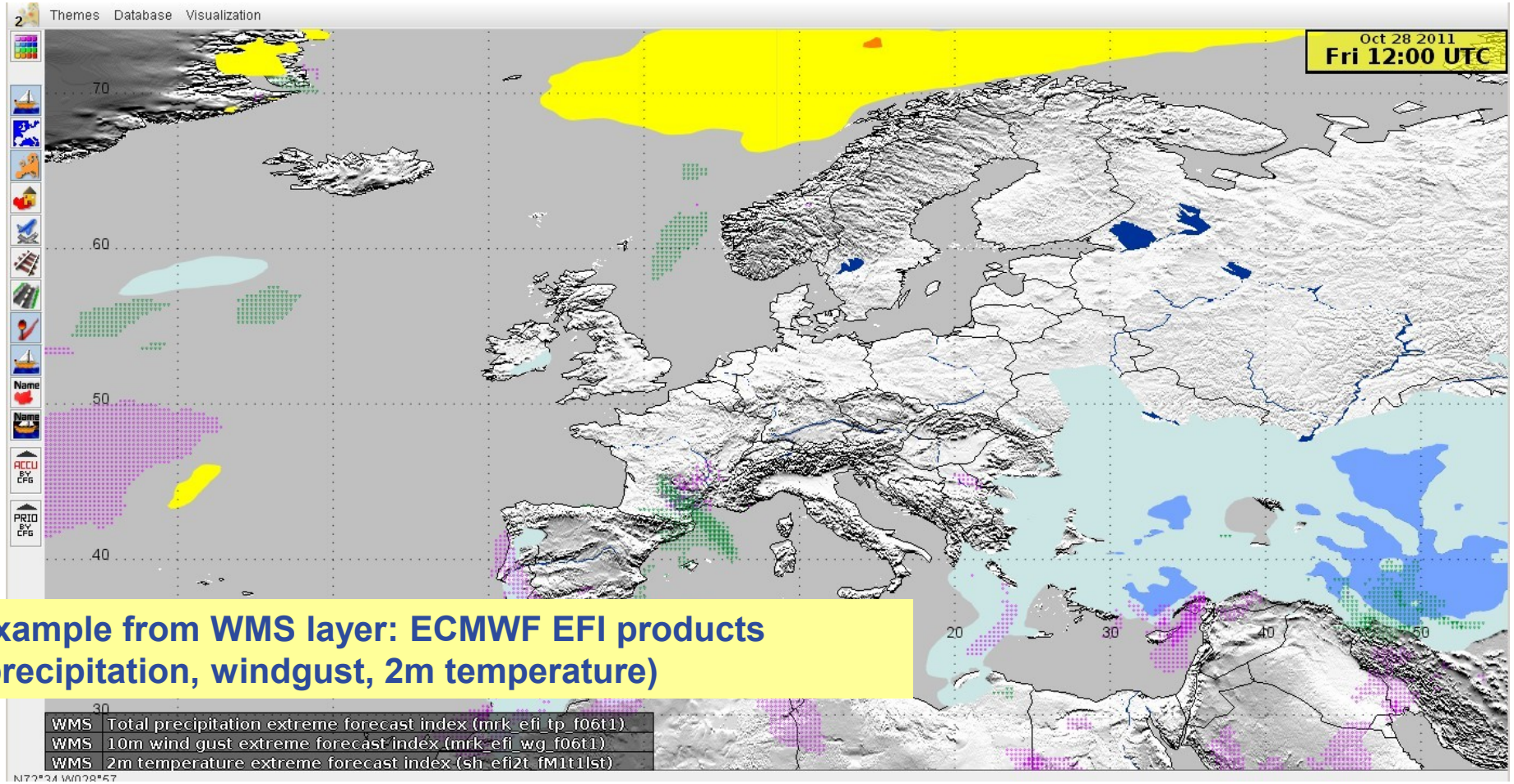


SCIT Konrad + lightning + CellMOS (gridded) data ~100 km east of Cologne, May 25, 2009

Web Map Service (WMS) Layer

- Legends available
- Selection of time-step and other feature via GUI
- Participation at ECMWF interoperabilty experiment
  - see egows presentation

Web Map Service (WMS) Layer

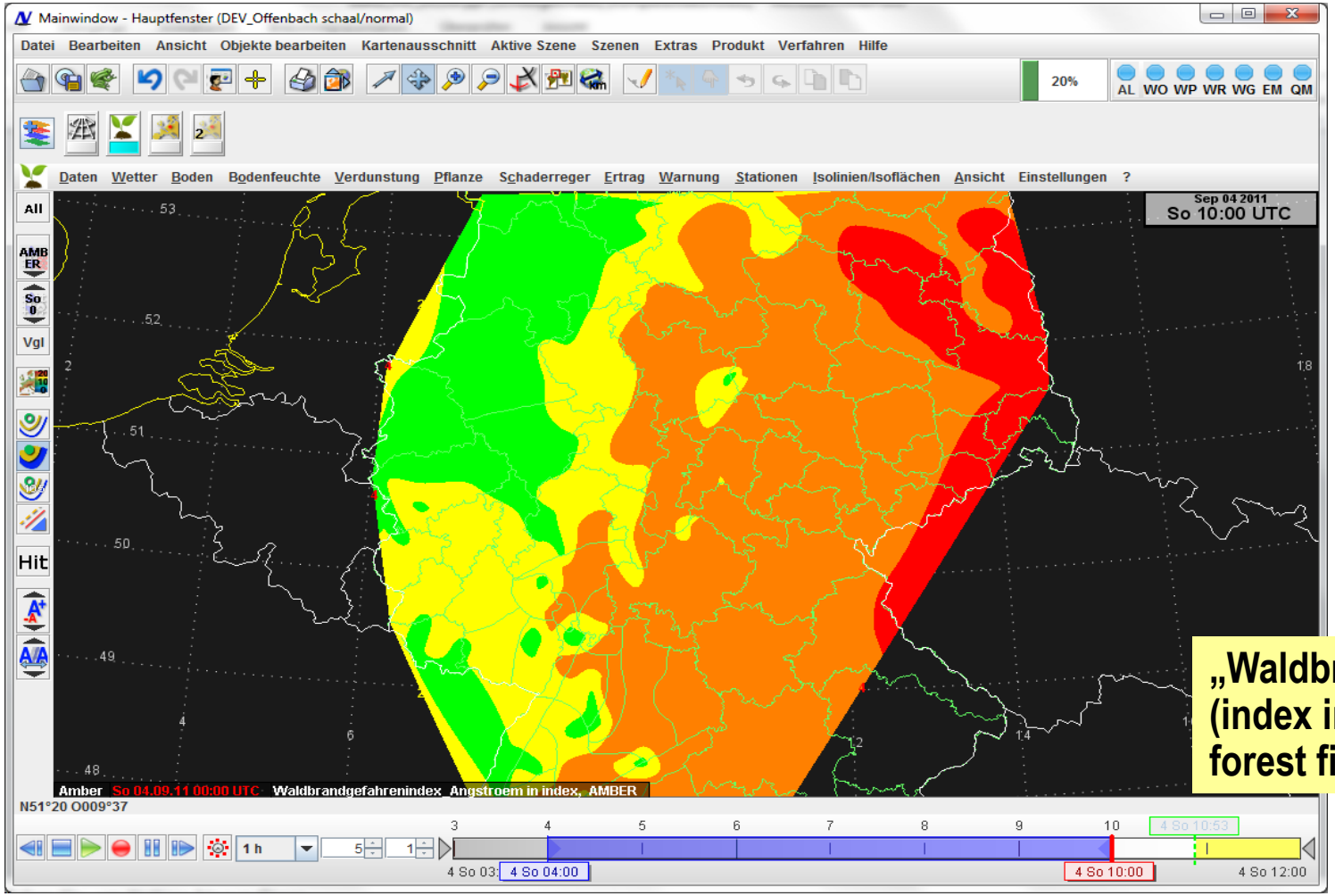


Example from WMS layer: ECMWF EFI products (precipitation, windgust, 2m temperature)

Amber (Agricultural data) Layer

- Various data
  - Observations
  - Phenological data
  - Forecasts
- More climatological data to come

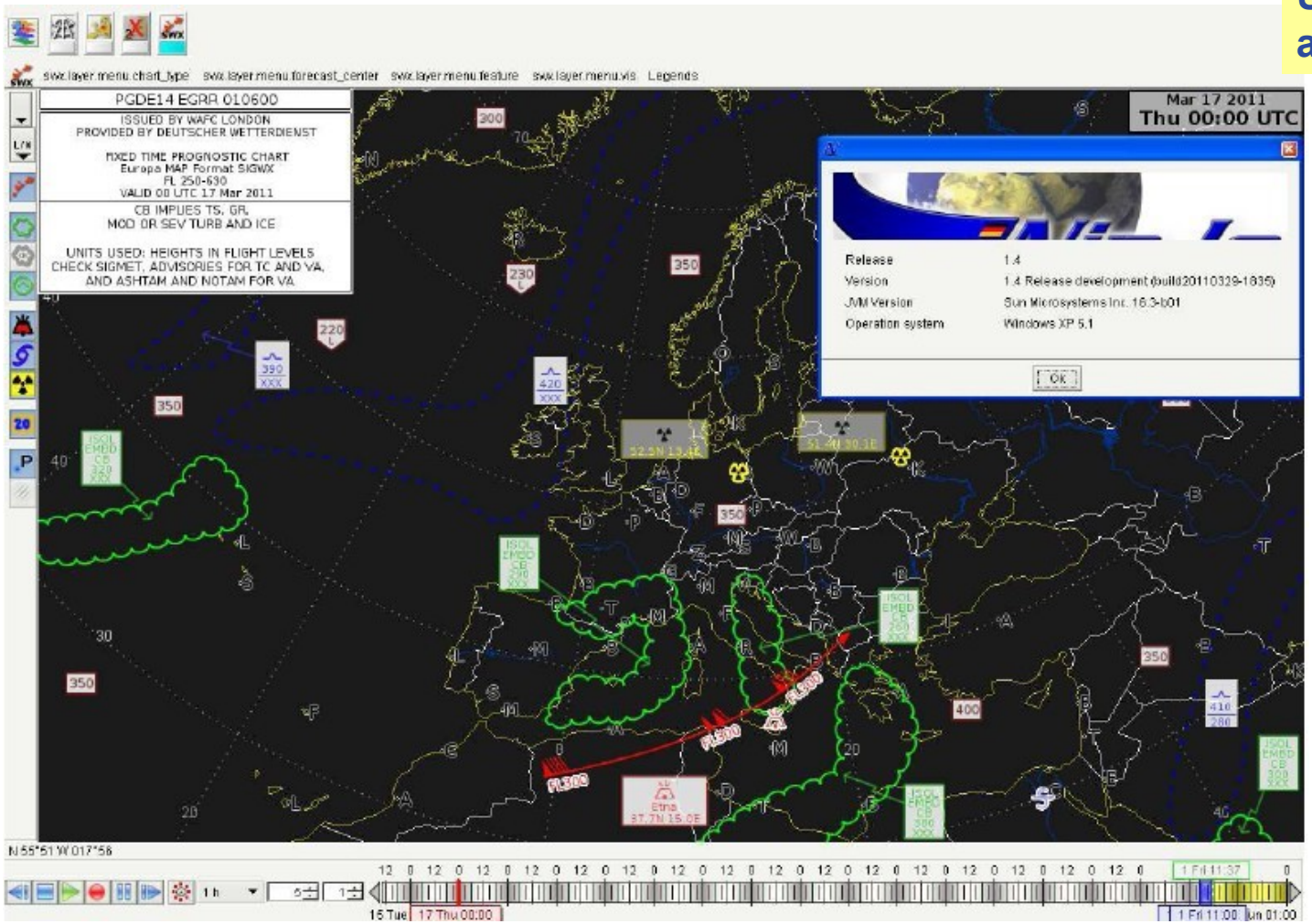
Amber (Agricultural data) Layer



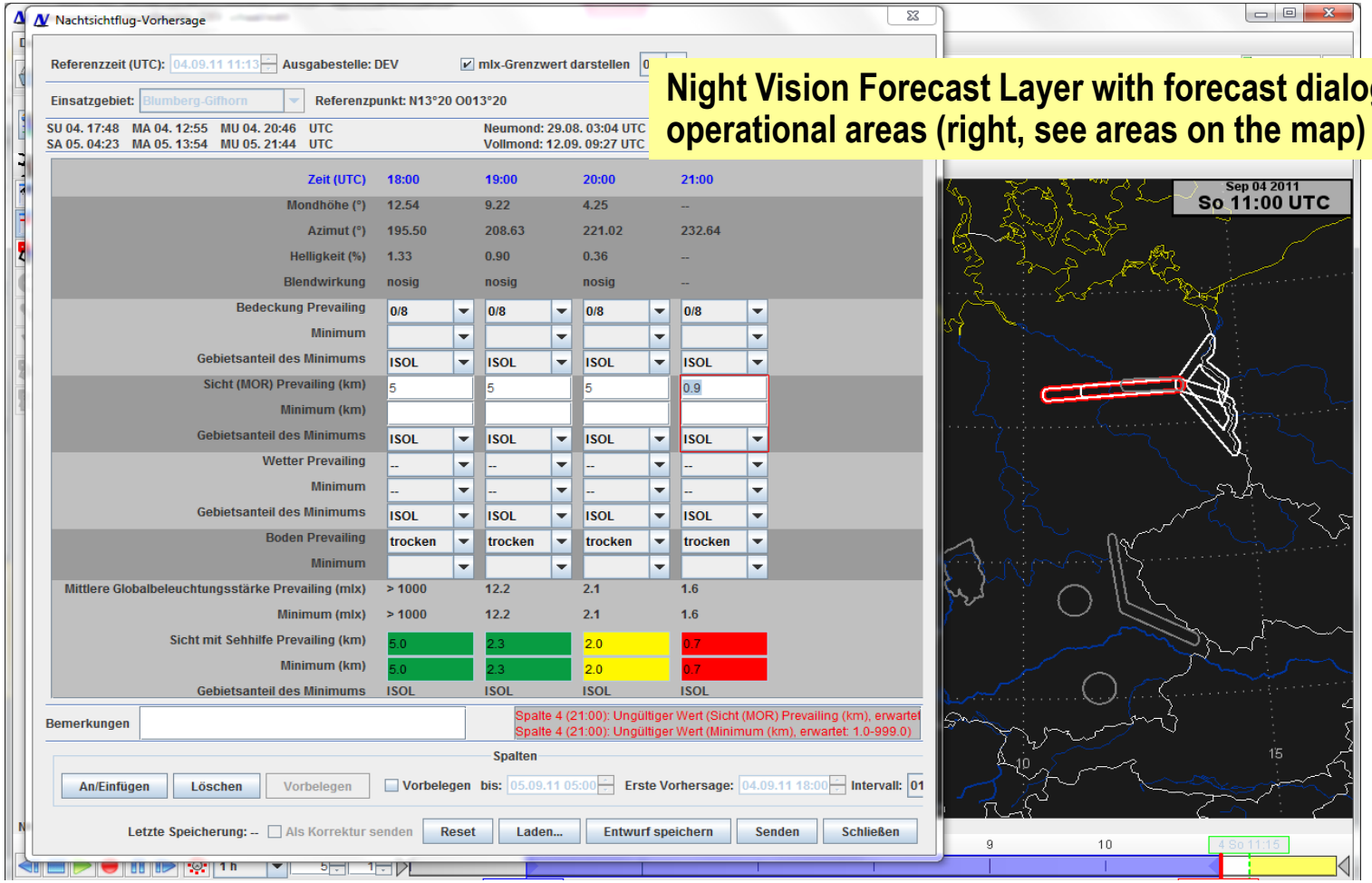
„Waldbrandindex“ (index indicating risk of forest fire)

SigWX mid / high level map production

Under final acceptance tests



Night Vision Forecast layer (under development)



Night Vision Forecast Layer with forecast dialog (left) and operational areas (right, see areas on the map)

Thank you for your attention!

See a presentation of NinJo at Thursday afternoon