Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

Developing a new workstation

developments for forecasting at
KNMI

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GLAMEPS - 1

- GLAMEPS = Grand Limited Area Modeling Ensemble Prediction Scheme
- Probabilistic forecasts
- 4 models (EPS, Aladin, Hirlam with 2 cloud schemes)
- Per model: control and 12 perturbated forecasts
- Two runs per day
- Runs at ECMWF
- GLAMEPS project provides some fixed visualisation (glameps.org)

GLAMEPS – 2

• Pilot project evaluating routine application in KNMI's forecasting.
• Work done in pilot:
  – Data preprocessing, NetCDF files of members, means, stdev and probability of exceedance of a set of levels.
  – Ingest in WMS-service
  – Present WMS service through ADAGUC web-interface (zoom/pan/overlaying)
  – Present windroses for any area on the map
  – Persuade forecasters to look at GLAMEPS for evaluation

• Allowed for quick introduction for evaluation in weather room
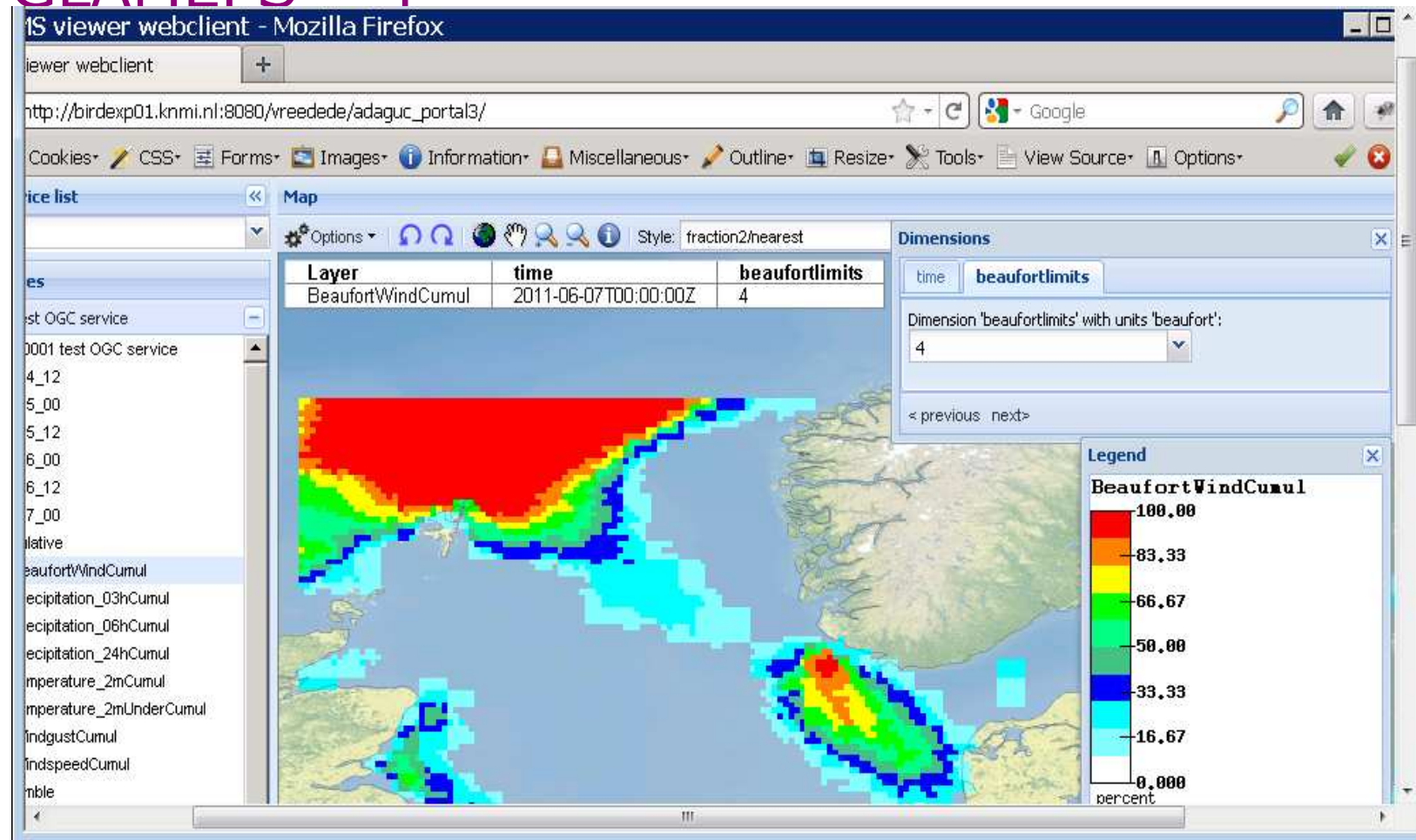• Several months of evaluation were done

GLAMEPS - 3

- A lot of use was made of WMS custom DIMs: categories for exceedance prob., model number, member number
- Custom DIM's could be manipulated in GUI, enabling looking at individual ensemble members etc.
- By clicking on the map an ensemble windrose can be plotted.
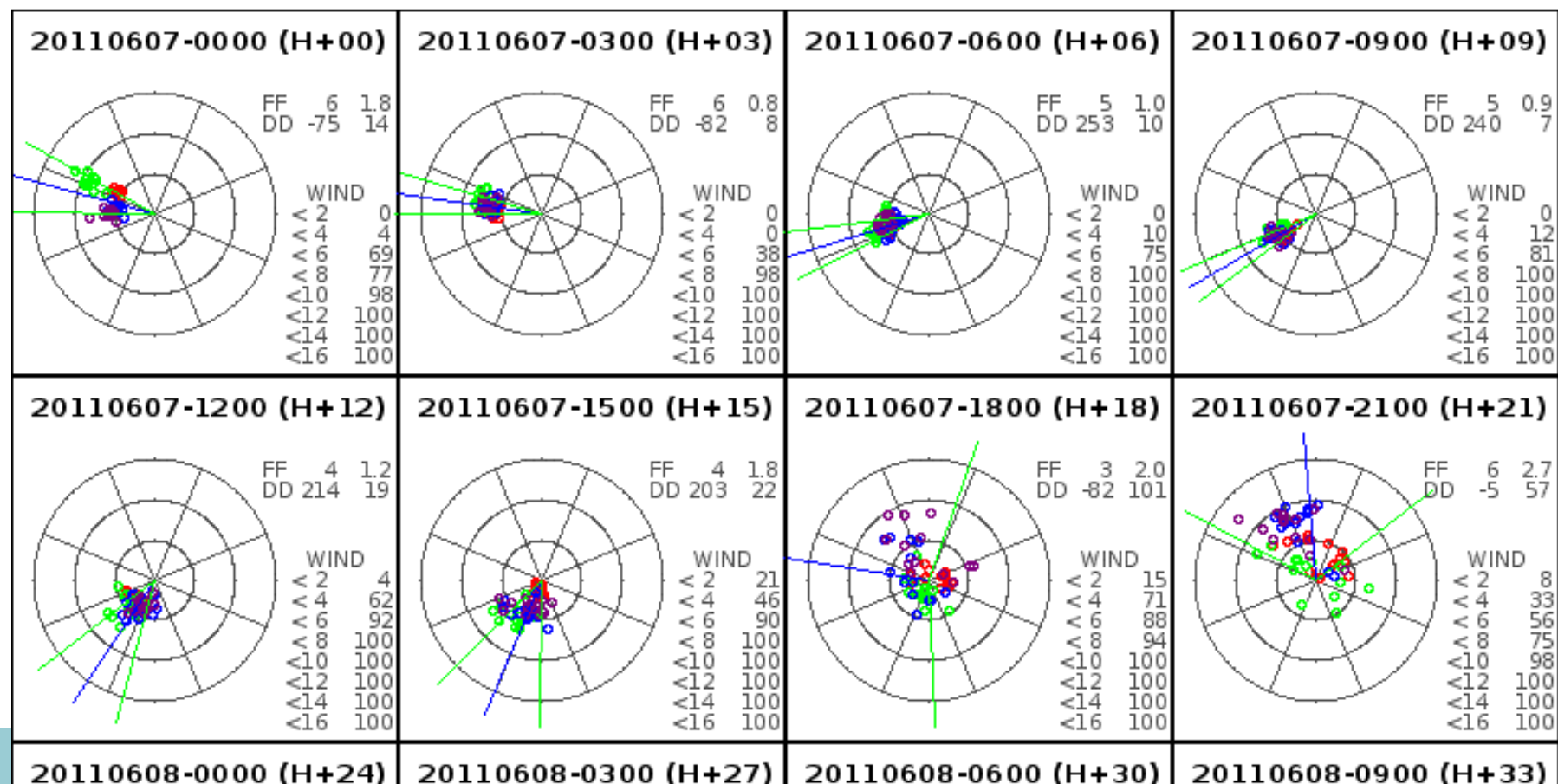
GLAMEPS – 4

GLAMEPS - 5

GLAMEPS winds 20110607-0000 at [52.0N,5.4E]

(windrose scale: each ring is 5 kts)

GLAMEPS - 6

Findings from pilot:

•Simple web-interface too difficult for operational environment [Lesson: can even ruin a pilot]

•Extra parameters needed from models

•Statistical postprocessing needs to be developed (more objective)

•Training needed for forecasters

•For continuing use on short term:
  – Make quick changes on web-interface
  – Larger parameter set
  – Shift run times at ECMWF
  – Integrate windrose and (probably) plume visualisations in GUI
 – Identify best applications for prob. forecast
  – Training

3D Visualisation - 1

• Developed over the last 3 years

• HIRLAM data in VR

• Based on VTK toolkit/ParaView

• 3D presentation and interaction in a dedicated room

• System consists of:
  – Preprocessing of data
  – Presentation tool (Hirlam 3D Explorer)
  – Screen with two beamers/polarisation filters in demo room

• Aimed at:
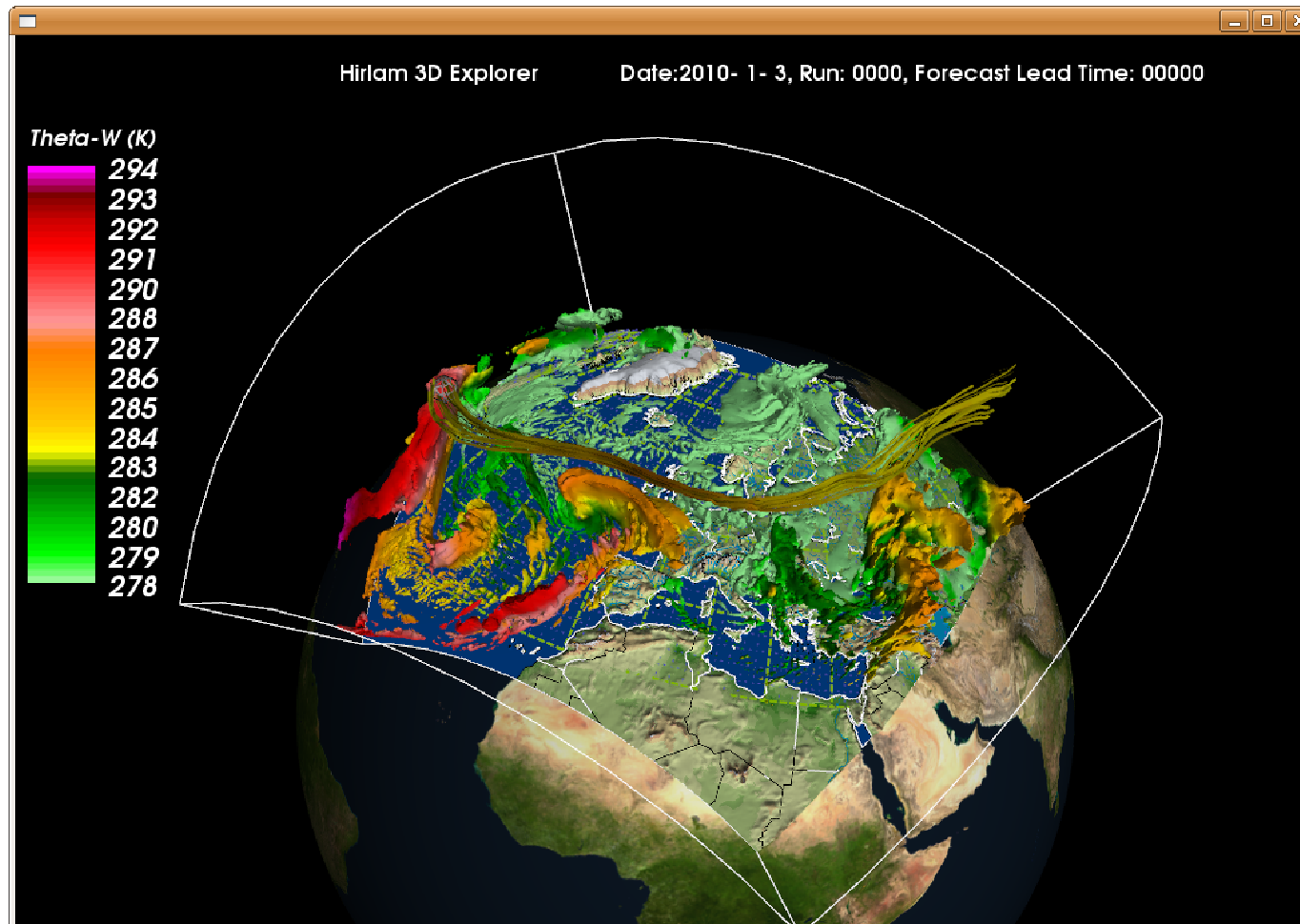 – Researchers
  – Model developers
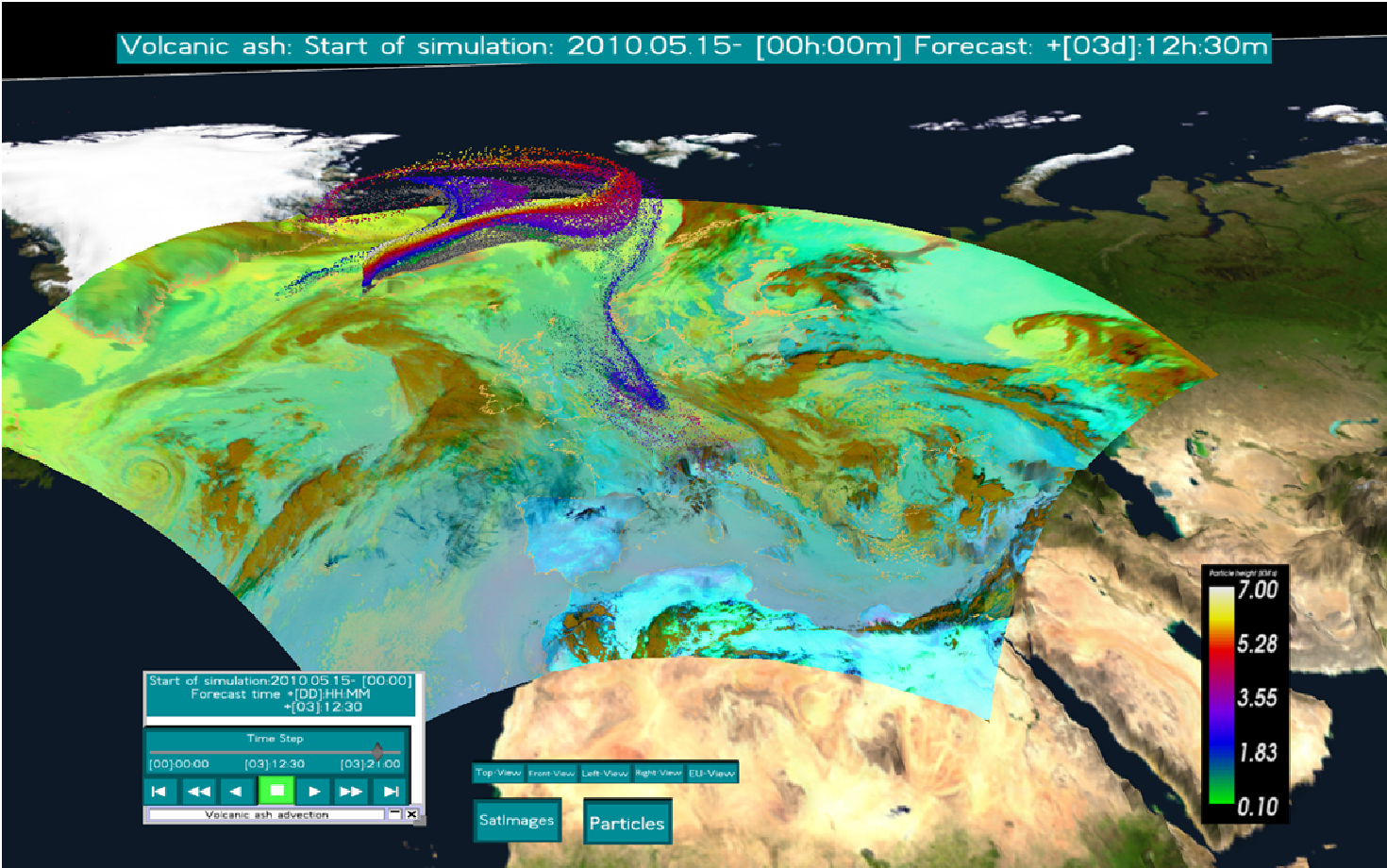 – Forecaster training

3D Visualisation - 2
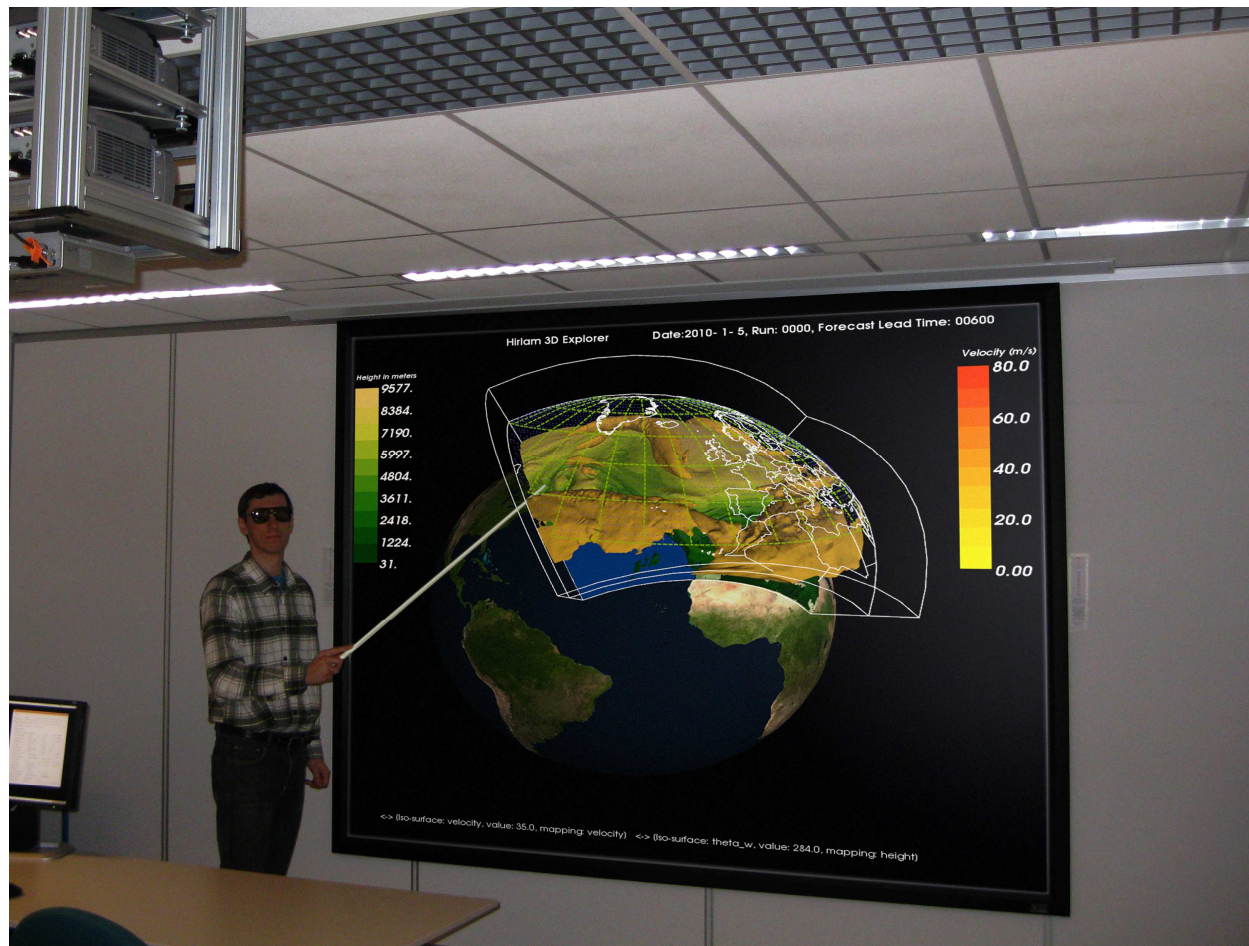
3D Visualisation – 3

3D Visualisation – 4

3D Visualisation - 5

- System now going in operational use
- Large 3D screen in weather room
- Purpose of 3D in operations:
  - Special cases only
  - Gain extra insight in vertical processes
  - Next Icelandic volcano???

- Coming developments:
  - Harmonie data processing and display
  - 3D radar data
  - Adding access to WMS layers, for combining 2D and 3D layers.

A new forecaster workstation - 1

- KNMI about to start development of a workstation based on web services.
- Currently in use for visualisation:
  - MWS: a lot of freedom for visualisation, not all data supported (no RGB for example)
  - CWK/Net: intranet portal to a huge collection of prerendered images; only partly operational. A lot of georeferenced images, but also all sorts of other displays. "Precooked, fast and to the point".
  - Radar application
  - Observation application (AVW)
  - MSG RGB products through CineSat software
- New workstation will replace MWS, most of CWK/Net and CineSat

A new forecaster workstation - 2

Must offer:

- Easy in-house system configuration
- Ease of use: many preconfigured products, like CWK/Net, short menus, not too many clicks etc.
- Adaptable to new data/products; shorten the implementation time of new products/models
- User created profiles, dashboards
- Fast response
- Graphical products, meteorological objects.
- Scalability for implementation at different locations: at KNMI operations, KNMI researcher or at external party (ATC)
- Bringing more of production into a controlled environment
- Focus on presenting probabilistic forecast products like EPS or GLAMEPS (Ideas, anyone?)

A new forecaster workstation - 3

Might offer:

- Scripting by user
- WPS access
- Collaboration tools
- Coupling 2D to 3D visualisation
- …

A new forecaster workstation - 4

- OGC services: Web Mapping Service, Web Feature Service for graphical product/meteorological objects
- WMS can cover field display: model output, satellite, radar etc.
- Additional services will be developed along WxS (OWS) lines for:
  - Time series
  - Vertical profiles
  - Cross-sections
  - Etc.
    These additional services are not OGC!
- Metadata from all these services will be harvested into a bespoke catalog service or registry
- Config database
- Product recipe database

A new forecaster workstation - 5

• Client app will be delivered by web (Java Web Start)

• Why Java? Complex user interactions. Scripting. Drawing tool.

• Client application will configure itself from catalog service, config service and product recipe service.

• Lightweight browser based apps also possible

• Caching where needed

• Visualisation: still considering Magics++, ADAGUC web service

A new forecaster workstation - 6

We are planning an agile development track:

•Parallel tracks of designing and prototyping in the first phase
•Design largely decoupled components for parallel development.
•Accent on GUI design for usability (teaming with forecasters)
•Build a number of components and start configuring them
•Implement first version and evaluate.

•First version should provide: most of CWK/Net and a lot of general visualisation functionality.

•Continue development in a design and implement cycle.

•Tracking OGC developments where applicable

Putting it all together

•GLAMEPS will be implemented in the operation soon, acting as a prototype for visualisation of probabilistic forecasts.

•3D visualisation will use WMS layers from services

•2D workstation will be able to initiate (prepropulate) 3D visualisations

•Planning: not precise yet. Hope to have a solid base in about a year and build on gradually from that.

•Most important aspect: usability for forecasting.

•Current OGC services not fit for every kind of visualisation; we'll try to take a pragmatic approach and track OGC developments.