**PDC-ARGOS**

# An operational implementation of the latest results in Nordic research on uncertainty of atmospheric dispersion prediction

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# Introduction - ARGOS

**A**ccident
**R**eporting
**G**uidance and
**O**perational
**S**upport

Analysis for operational use

- Monitoring
- Measurements
- Modeling
  - Urban/Short-range/ Long-range Dispersion calculation
  - External Dose
  - Food Dose

ARGOS collects data in order to provide

**INFORMATION**

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# Introduction - AVESOME

Assessment of uncertainties of atmospheric dispersion model predictions.

- Means for source term estimation and inherent uncertainties for different accident scenarios

- Combining effects of
    - meteorological uncertainty
    - Source term uncertainty

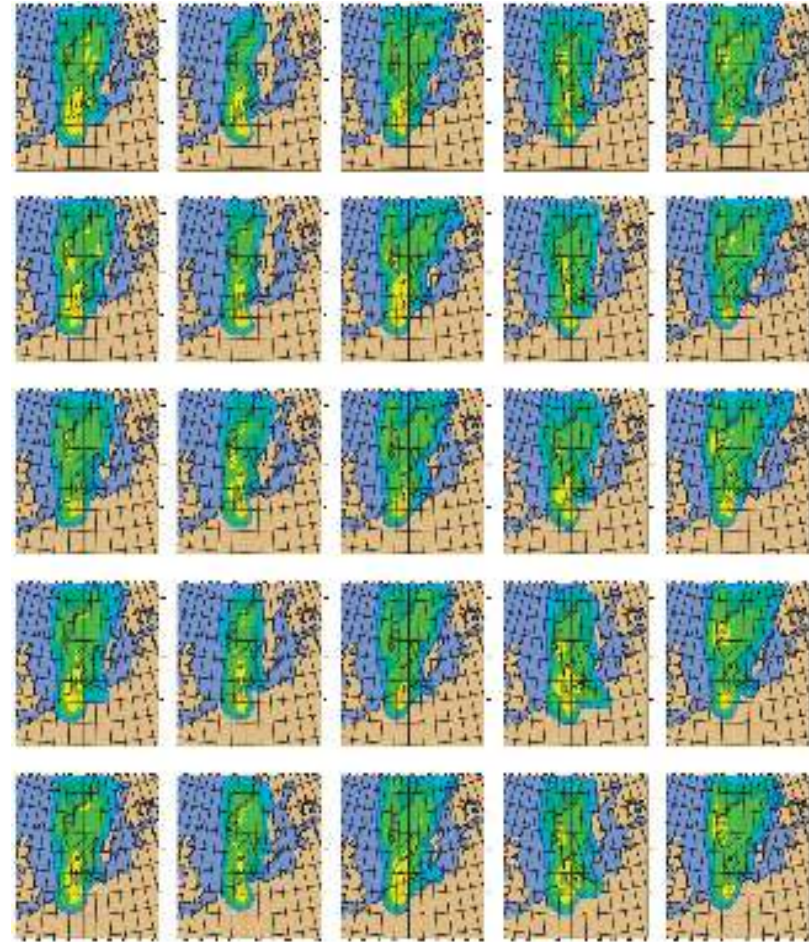- Interaction between DSS and HPC Operability!

Previous: MUD, FAUNA, MESO

Reports available from www.nks.org

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# Meteorological Ensemble

- 25 ensemble members from NWP model implies

- 25 ensemble calculations of the dispersion model DERMA

- DERMA delivers ADM and statistical results to ARGOS
  - Probability results
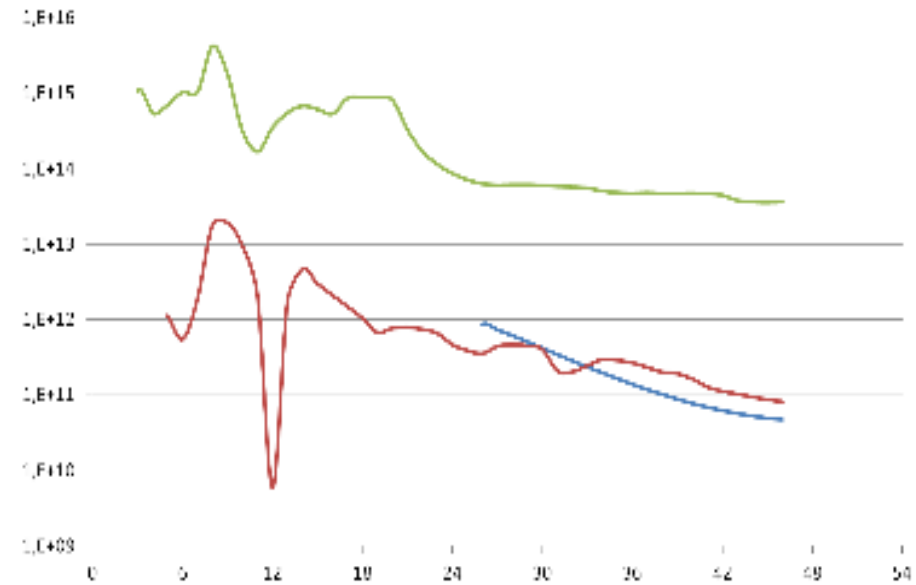  - Percentile results



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# Source-term Ensemble

In the following, a serious accident leading to a core melt-down followed by melt-through is considered.
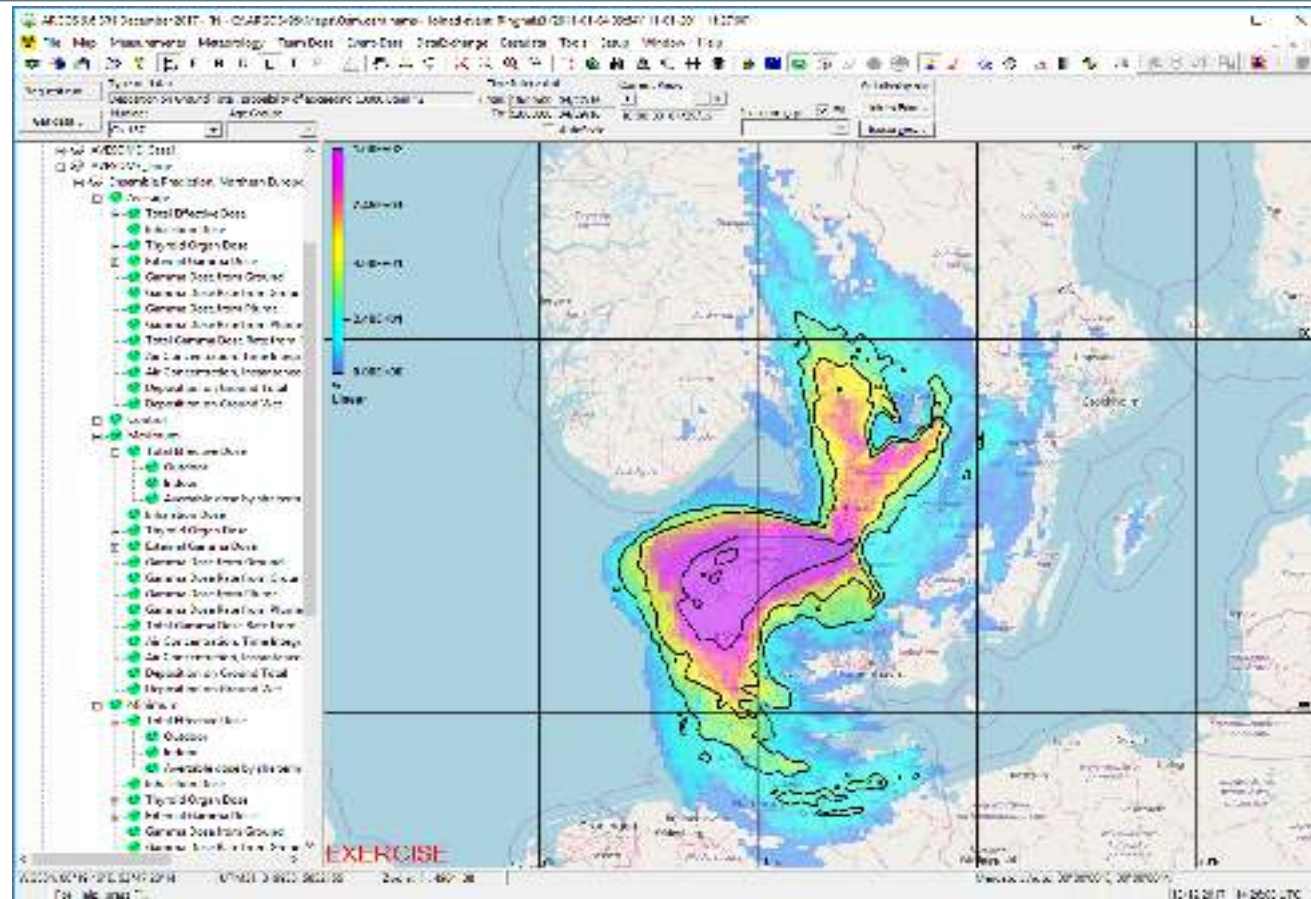
Source-term ensemble covers release scenarios ranging

- from a filtered release involving spraying after two hours and a filter factor of 1500 (blue),

- through a medium release involving spraying after 8 hours and a filter factor of 500 (red),

- to the most severe scenario without spraying leading to an unfiltered release (green).



Time-dependent release of Cs-137 for the three selected source terms named "Small", "Medium" and "Large" depicted by blue, red and green curves, respectively. The release rates are given in units of Bq/h, and the time in hours since SCRAM.
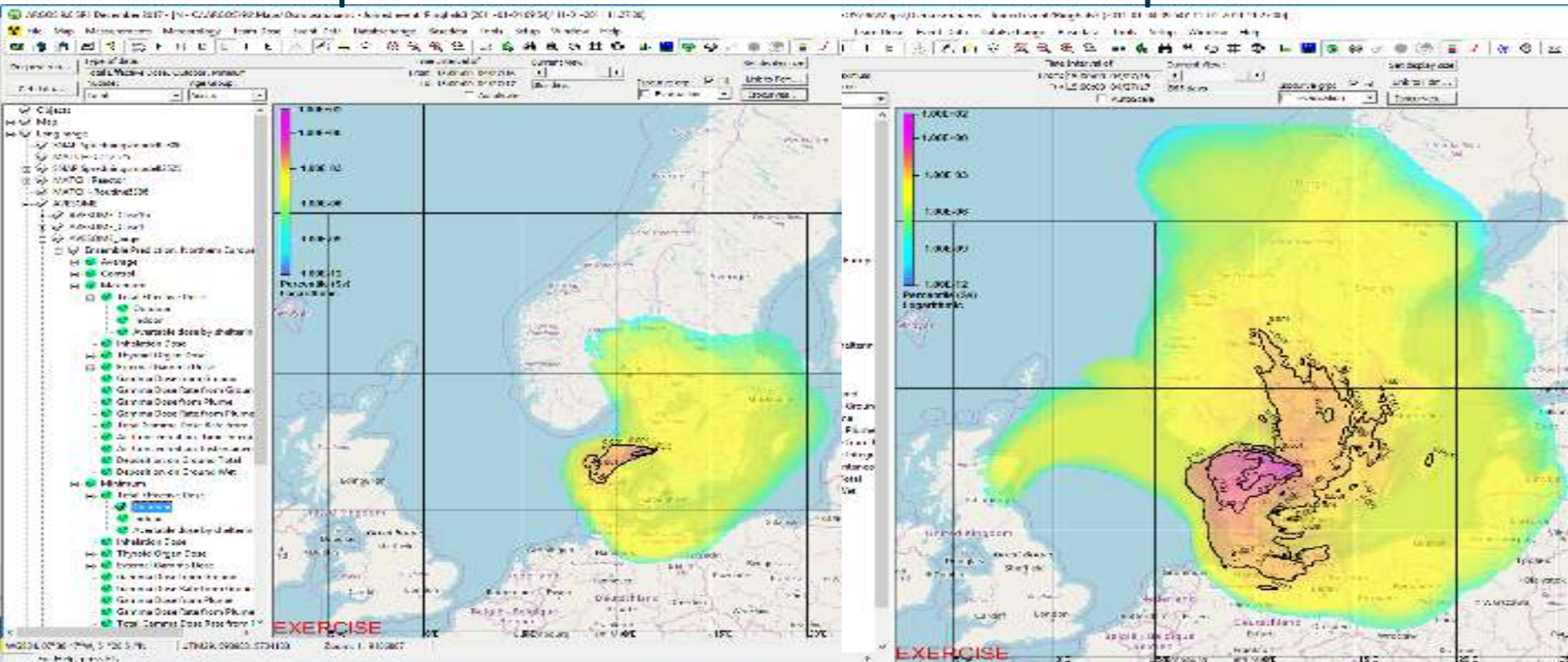
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# Probability plots



Probability of exceeding 10 kBq/m^2 deposition of Cs-137

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# Percentile plots

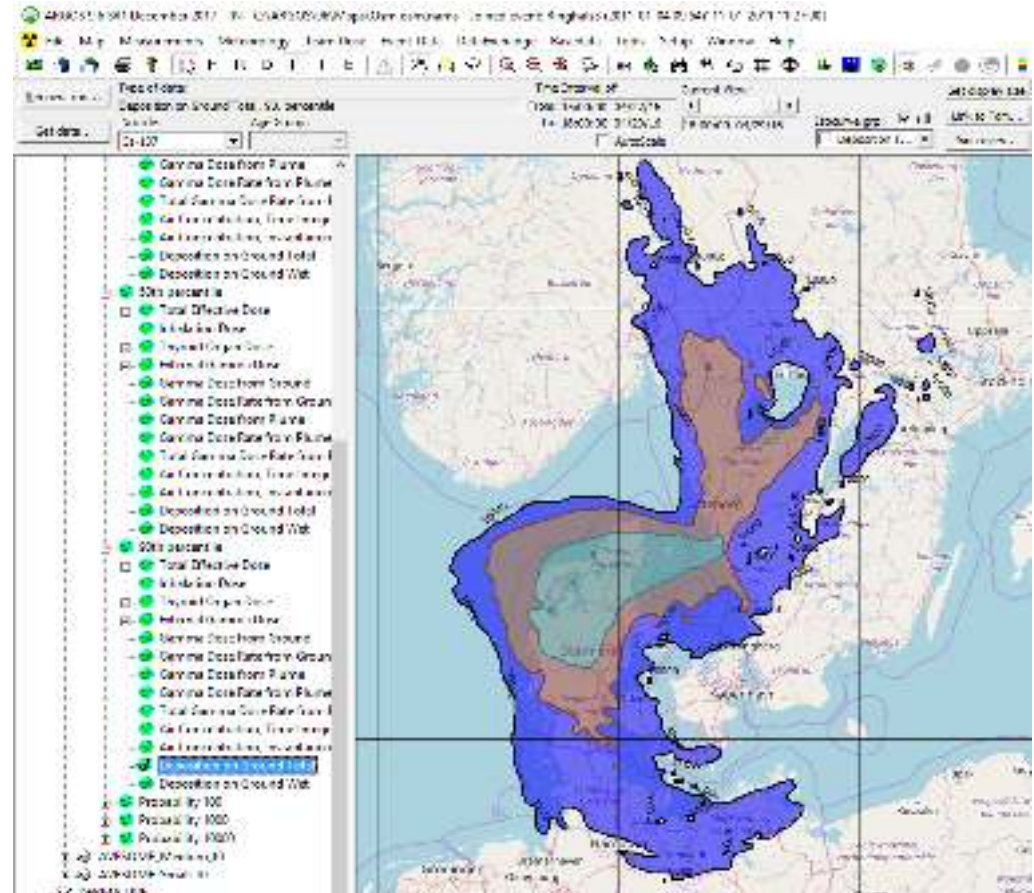## Minimum percentile

## Maximum percentile



Isolines for 1, 10 and 50 mSv Total Effective Dose

# Percentile plots - comparison

Comparison of

10th (green)

50th (brown)

90th (blue)



Three percentiles for 10 kBq/m^2 deposition of Cs-137

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# Limitations

Amount of data and computation is huge!

- Currently all NWP-data resides at HPC facility, and ADM and statistical analysis performed at HPC

- Communication between HPC and DSS limited to (selected) deterministic results and statistical results

- Method testet on short-range ADM (RIMPUFF) Implementation will require ADM to run at HPC

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# Outlook – work in progress

- Introduction of source term uncertainty in DSS
    - Protocol for communication DSS - HPC in place
    - Handling of GUI
        - Importing ensembles of source terms
        - Easy "grouping" of predefined source terms into ensembles
    - The overall aim is to determine risk zones for emergency preparedness and management

Further the use of uncertainties in DSS requires:

- Education/training of emergency response staff

- Careful communication with decision makers

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