Fukushima-Daiichi: Modelling of Atmospheric Dispersion and Comparison with Measurements

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4. **Results**
   - **Comparison of modeled and measured Cs deposition in the 80-km zone of Fukushima-Daiichi NPP**

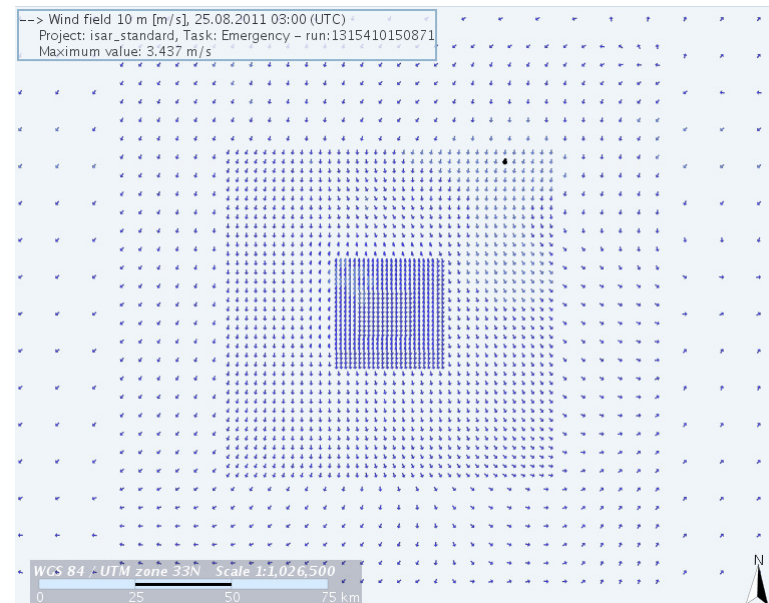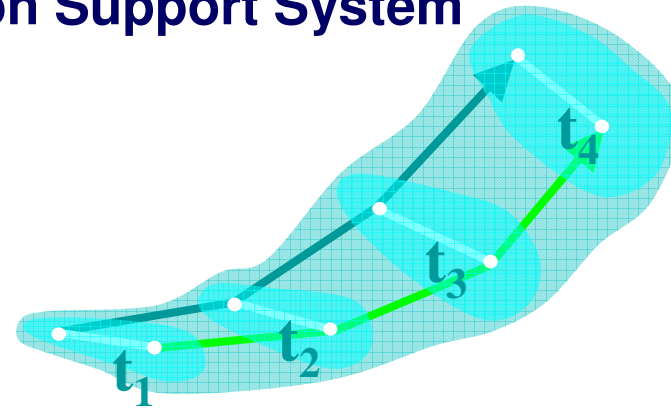Bundesamt für Strahlenschutz

Motivation

— **At the BfS several atmospheric dispersion models are employed for different applications; all related to radioactive releases and the resulting immission in the surrounding of the source(s)**

— **Wish for model validation; how much can we trust in the model results?**

— **After the accident at Fukushima-Daiichi NPP a lot of measurements were carried out and efforts have been made to reconstruct the sourceterm**

- **This is the sort of data set that we can use to run our models**
- **Comparison of model results and measurements is possible**
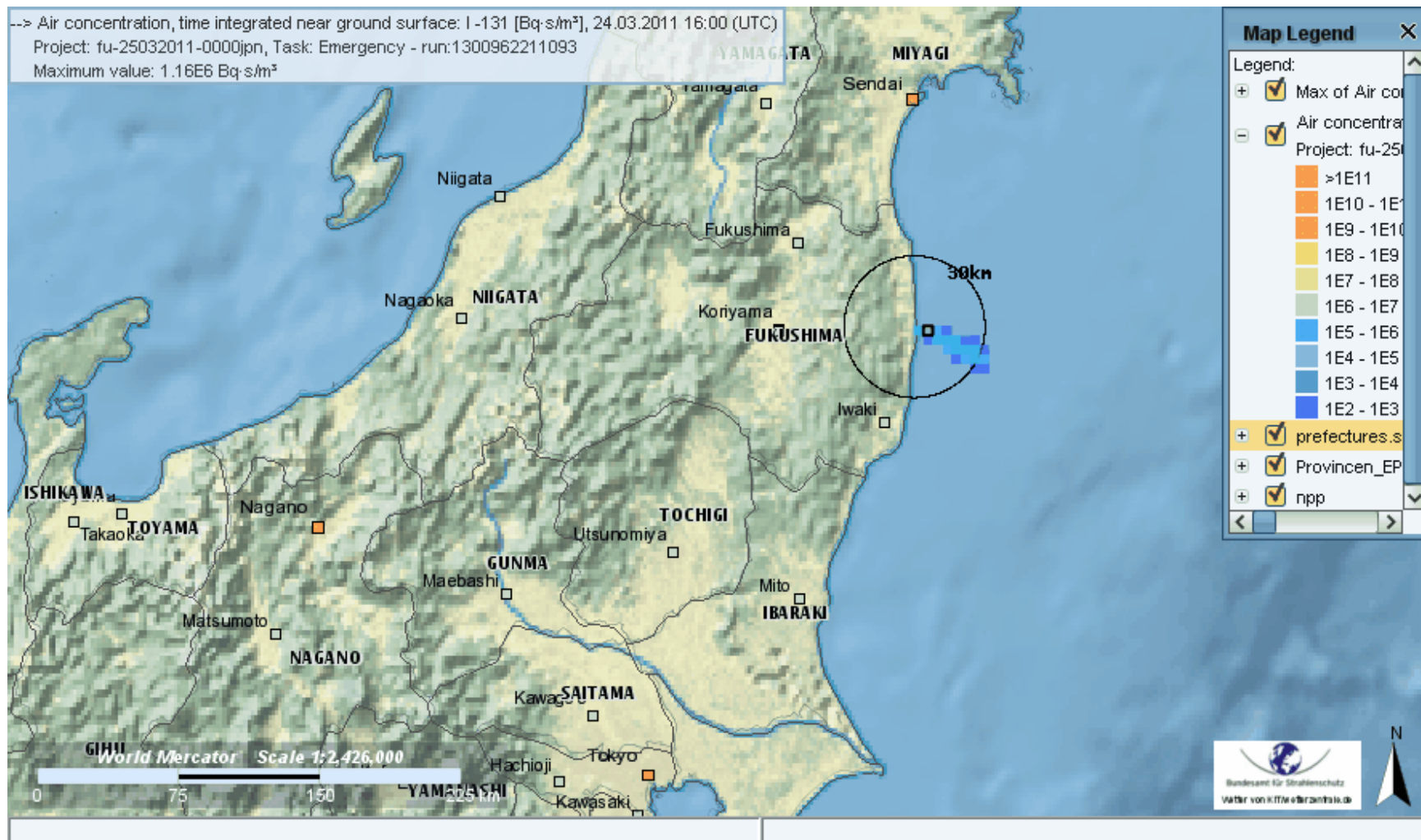
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RODOS – Realtime Online Decision Support System

— **Helps Decision Makers in the case of a nuclear accident with short-term prognosis of expected hazards and possible countermeasures**

  - **Gaussian-Puff-Model ATSTEP**

  - **Model area of 200km x 200 km, resolution decreases from the middle to the outside**

  - **Meteorological data: fields from NWP as well as point-measurements can be used**

--> Wind field 10 m [m/s], 25.08.2011 03:00 (UTC)
Project: isar_standard, Task: Emergency – run:1315410150871
Maximum value: 3.437 m/s

WGS 84 / UTM zone 33N   Scale 1:1,026,500
0   25   50   75 km

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RODOS – Realtime Online Decision Support System

ARTM – Atmospheric Radionuclide Transport Model

— **Developed for the calculation of the maximum dose that a reference person can receive during one year in the surrounding of a NPP**

- **Model area typically 15km x 15km**
- **Nested grids possible**

- **Lagrangian particle model**
- **Diagnostic wind model to account for orography**
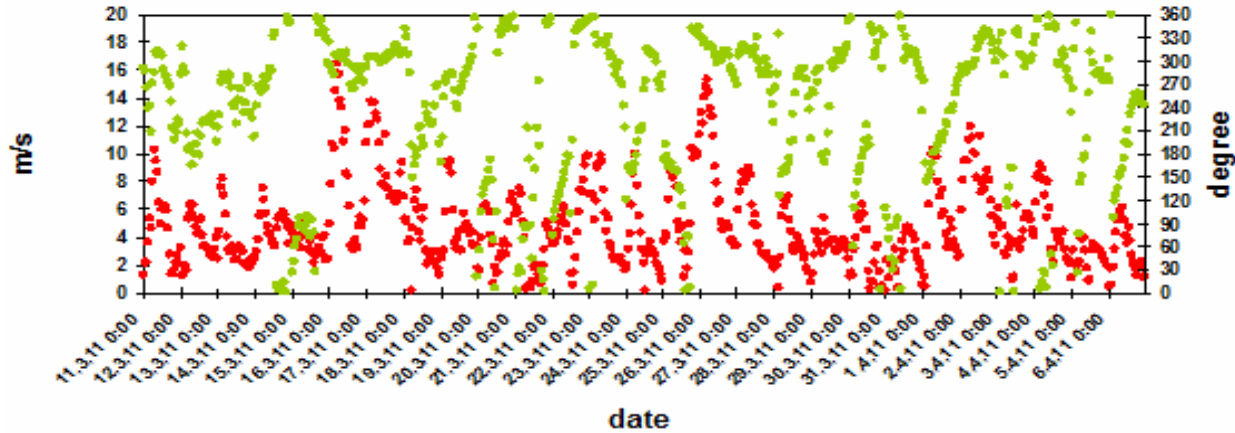- **Boundary layer flow model**

    + post-processing dose modul

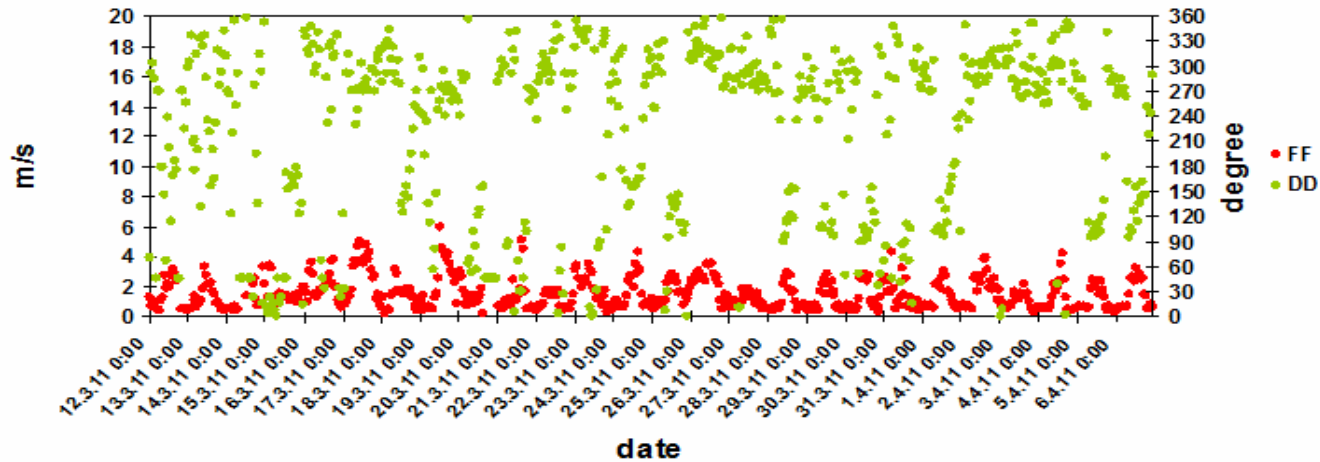- **Only single-point input for meteorological data possible**

(free download at http://www.grs.de/content/ausbreitungsmodellierung)

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Input Data – Meteorological Data

profiles

+ precipitation intensity

one point observation

no precipitation intensity

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Input Data - Sourceterm

— **Source term constructed from the estimation of JAEA and NSC**

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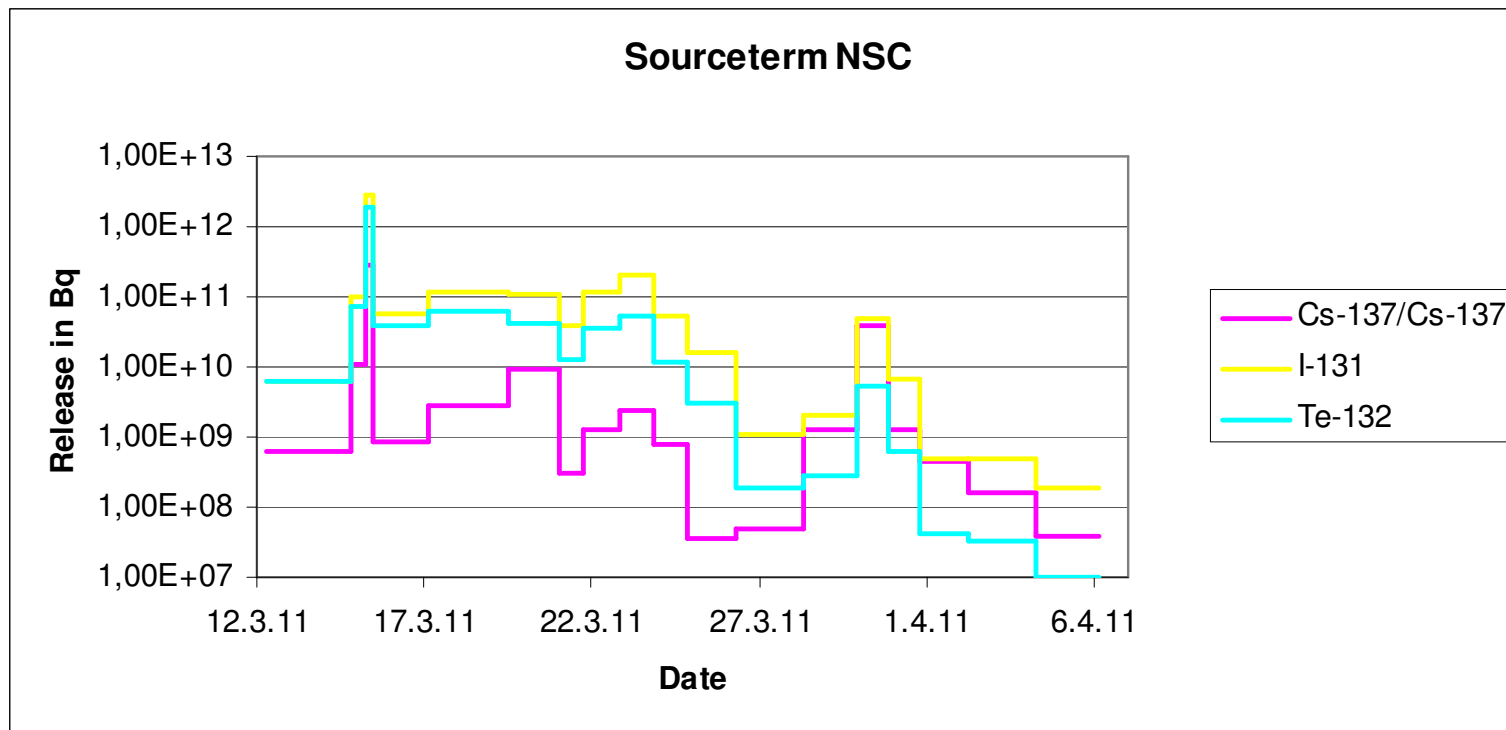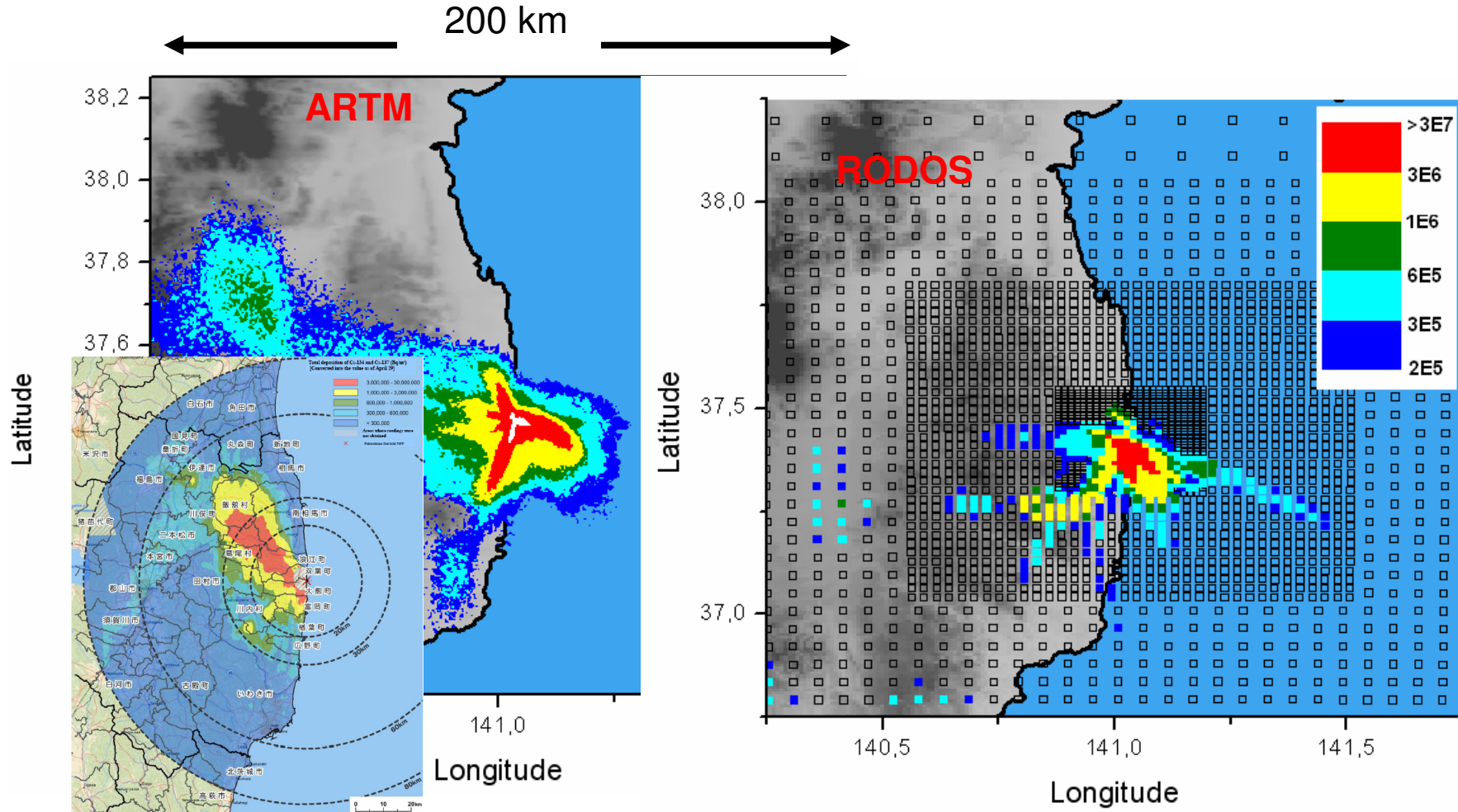
Aerogamma Measurements by MEXT and DOE
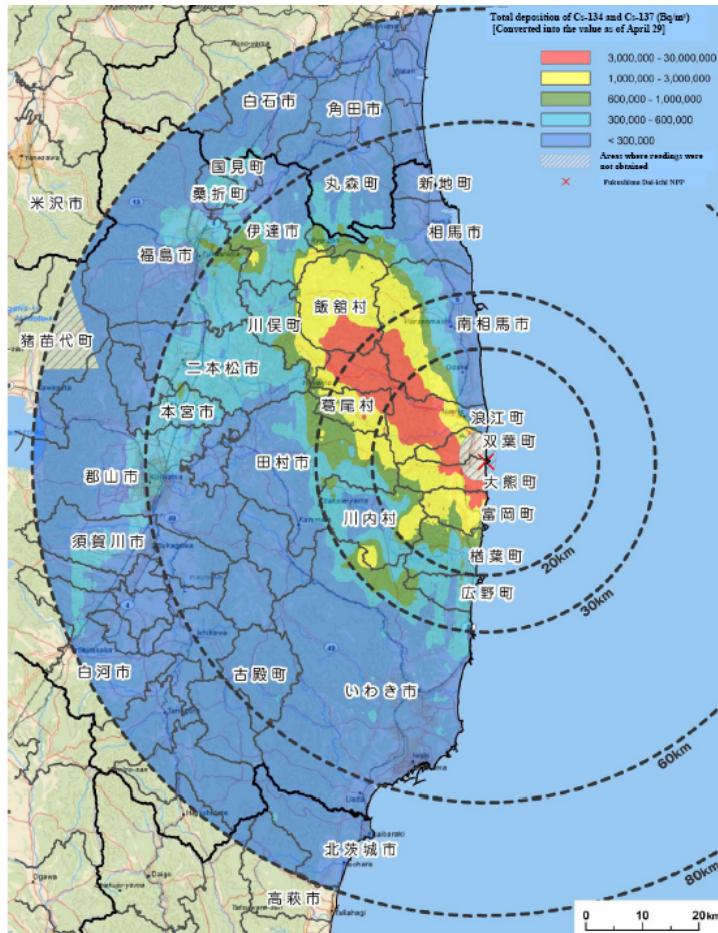
— **Total deposition of Cs-137 and Cs-134 in the 80 km zone around Fukushima-Daiichi NPP**

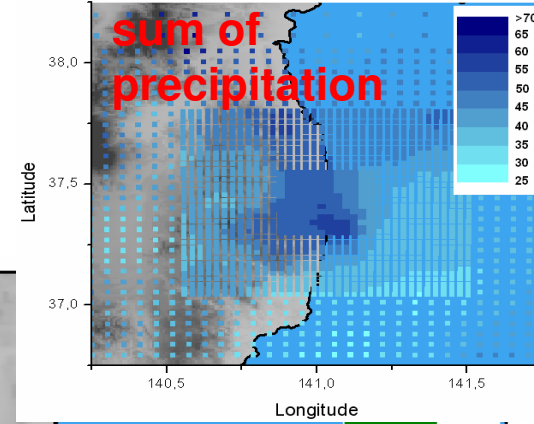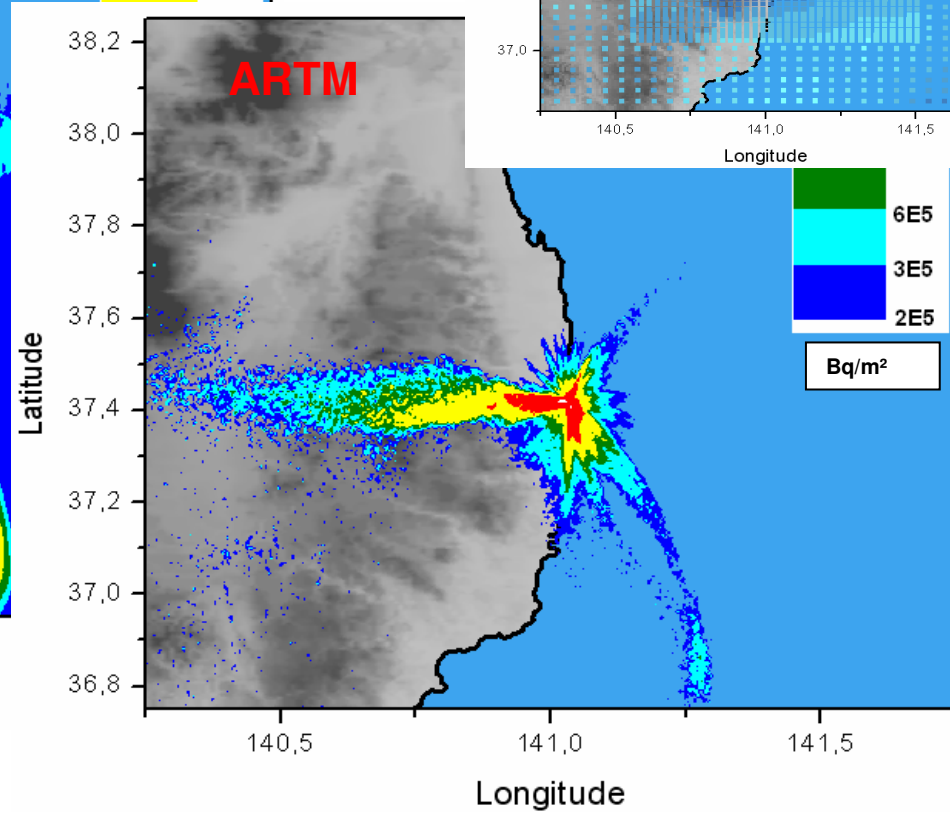• **Measurements between April 6 to 29 , corrected to April 29**

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Tepco Single-Point Data

200 km

ARTM

RODOS

	>3E7
	3E6
	1E6
	6E5
	3E5
	2E5

Latitude

Longitude

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DWD Single-Point Data

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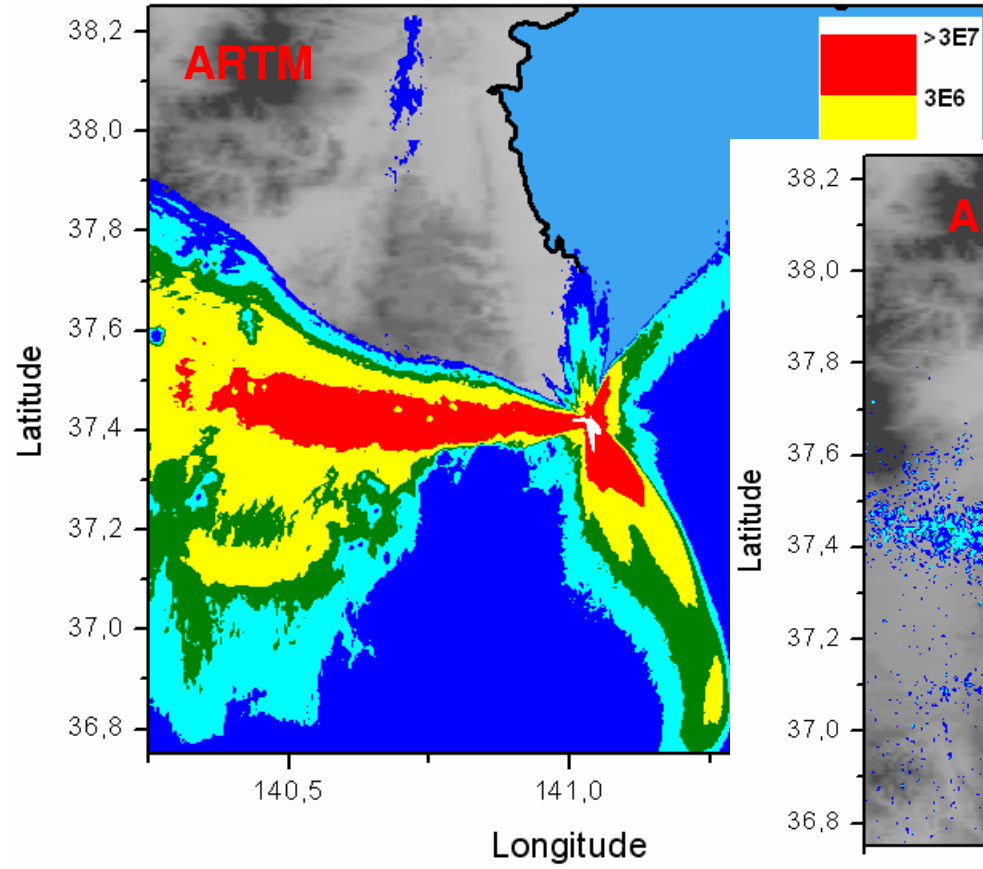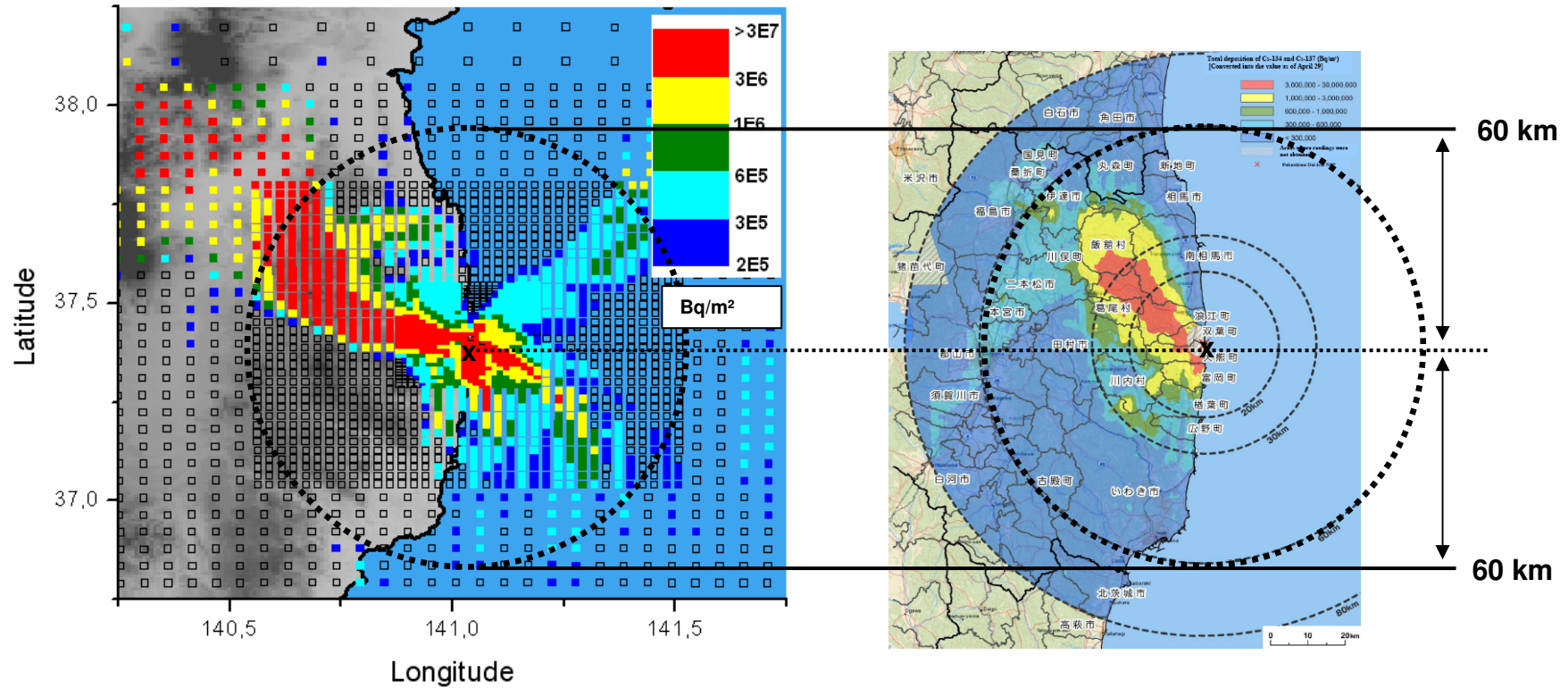
RODOS NWP-Data – Aerogamma Measurements

Deposition of Cs-134 and Cs-137 in Bq/m²

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Conclusions

— **with the information available now, RODOS simulates the observed ground deposition quite well within the 30 km zone, but overerstimates the radial extent of the contaminated area**

— **for immission prognosis on a scale of 100 km, a multi-point meterological input is needed**

— **information on spatial and time distribution of precipitation is crutial for the simulated deposition intensities**

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