European Commission

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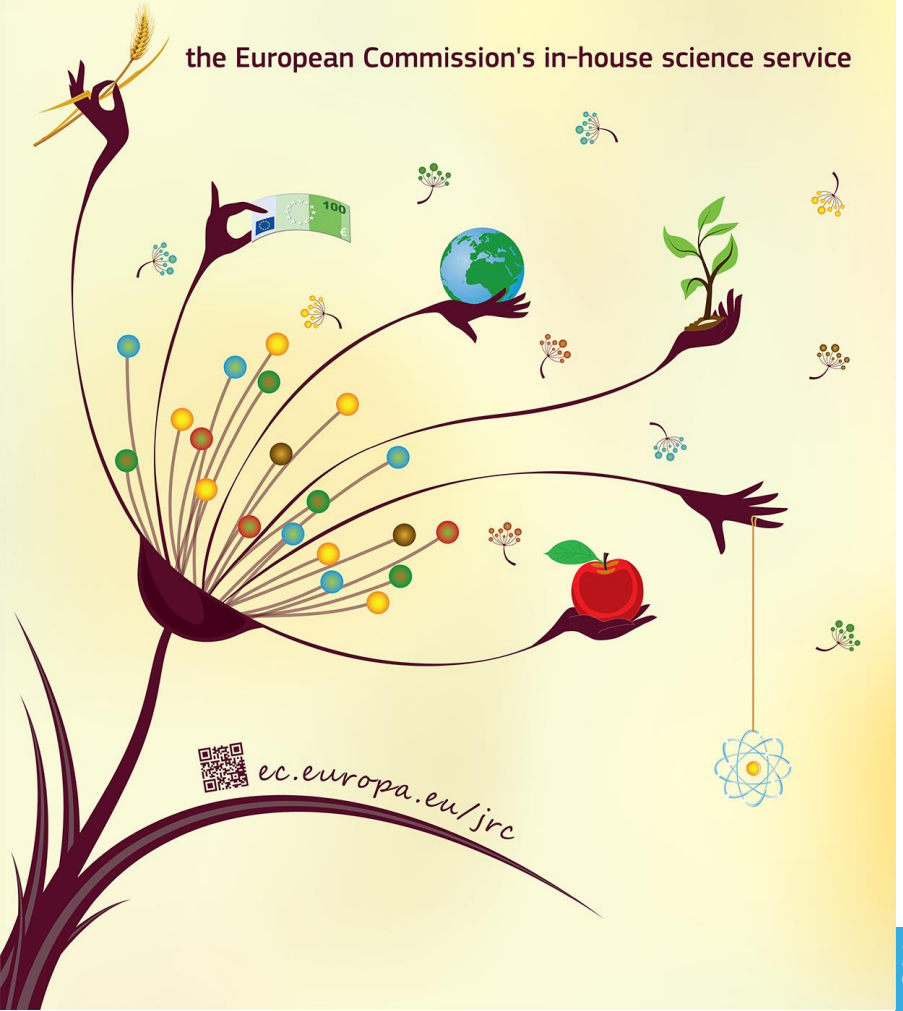
the European Commission's in-house science service



17th conference on "Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes"

Budapest (Hungary)

9 May 2016

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UDINEE project: international platform to evaluate urban dispersion models' capabilities to simulate Radiological Dispersion Device

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and UDINEE modelling community

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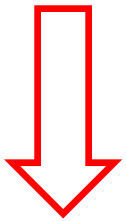
URBAN DISPERSION INTERNATIONAL EVALUATION EXERCISE (UDINEE)



Led by the **EC-Joint Research Centre (DG-JRC)** with the support of the **U.S. Defense Threat Reduction Agency (DTRA)**

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Background

- JRC project: **"Assessment and validation of modelling tools and decision support systems addressing CBRN releases"** (End date: 16 – 07 – 2014)

Internationally coordinated model evaluation activities for urban dispersion models

UDINEE: Objective

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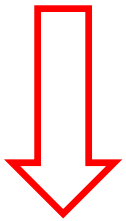
URBAN DISPERSION INTERNATIONAL EVALUATION EXERCISE (UDINEE)



Verify and evaluate the capacities of dispersion models to simulate realistic **Radiological Dispersion Device (RDD)** in **urban environments**

UDINEE: Benefits

- assess the **real capacity** of these systems **to respond to emergency situations**: timeliness of the prediction, accuracy of the prediction, limitations;

- support the use of local models for **decision making and policy development**;

- identify **where should be envisage further research** to complement missing aspects not yet covered by currently available modelling systems.

UDINEE: Tools

UDINEE is based on:

Observational database

Joint Urban 2003 (JU2003) field experiment in Oklahoma City

Web-based platform

ENSEMBLE system

PARTICIPANTS

UDINEE: Participants

Model name	Institution (Country)
Europe (8 models – 6 institutions)	
ESTE CBRN	Abmerit (Slovak)
Parallel-Micro-SWIFT-SPRAY (PMSS)	CEA (France)
microRMS / MSS	CNR-ISAC (Italy)
NAME / NAME URBAN	Met Office (UK)
EULAG	National Centre for Nuclear Research (Poland)
ADREA-HF	National Centre for Scientific Research "Demokritos“ (Greece)
North American (2 models – 2 institutions)	
Canadian Urban Dispersion Modelling System (CUDM)	Meteorological Service of Canada (Canada)
MM5-SCIPUFF/UDM	DTRA (EE UU)

UDINEE: Tools

UDINEE is based on:

Observational database

Joint Urban 2003 (JU2003) field experiment in Oklahoma City

- One of the most comprehensive field campaigns in an urban environment

- Urban field experiment with instantaneous non-buoyant releases (by popping a balloon of SF6) at ground levels (1.5 m) with gas/aerosol mixture - similar to RDD

- Intensive Operational Periods (IOPs) (Day (5) and night (4)) with large set of monitoring observations

UDINEE: Overview

European Commission

UDINEE is based on:

Web-based platform

ENSEMBLE system

http://ensemble2.jrc.ec.europa.eu/public/

What is?

Platform where several simulations from many models are uploaded together with observations, and a tool for the simultaneous analysis of the results of several models and for the ensemble analysis.

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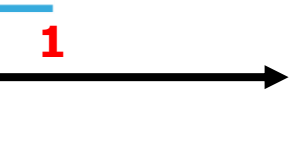
UDINEE: Methodology

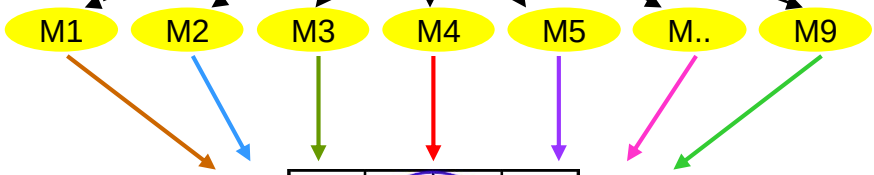
- Definition of the case study (IOPS)
- JU2003 data were uploaded

1



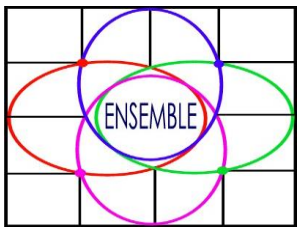
- Modellers produce model results
- Transform them in ENSEMBLE format
- Upload them on the system

2



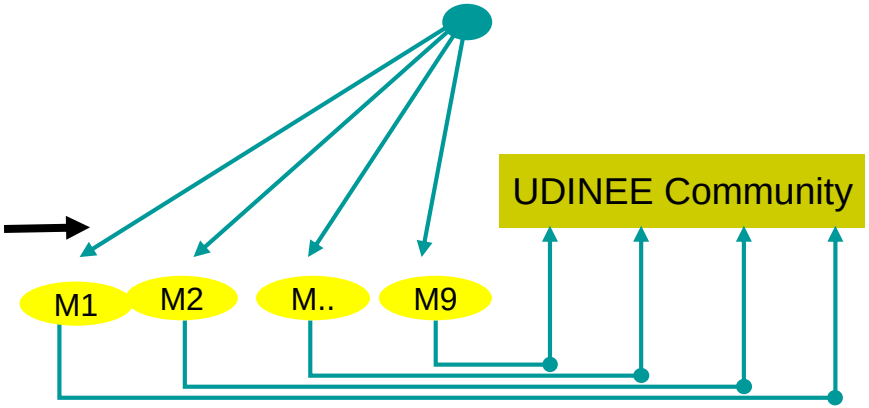
- Results are ready for consultation

3



- Suites of statistical routines available for quantitative evaluation
- Ensemble treatments

4



UDINEE: Deliverables

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a) Time series

a.1) SF6

Sampling sites: 9 (Different locations in each IOP)

Reference height: 2 m

Time resolutions: 0.5 sec

a.2) Meterological parameters

Sampling sites: 20 (Same location)

Reference height: 2 m

Time resolutions: 10 min

UDINEE: Deliverables

b) Grid

Grid: horizontal resolution of 5 m (1.4 *1.6 km) and with 57 vertical levels (from 0 to 402 m)

Time resolution: 1 min

Variables:

- Variable 1 - SF6 concentration (pptv)
- Variable 2 – Average horizontal wind (m / s)
- Variable 3 – Average vertical wind (m /s)
- Variable 4 – Average horizontal wind direction (deg)
- Variable 5 – Turbulent kinetic energy (m2 / s2)

UDINEE: Preliminary results

IOP3

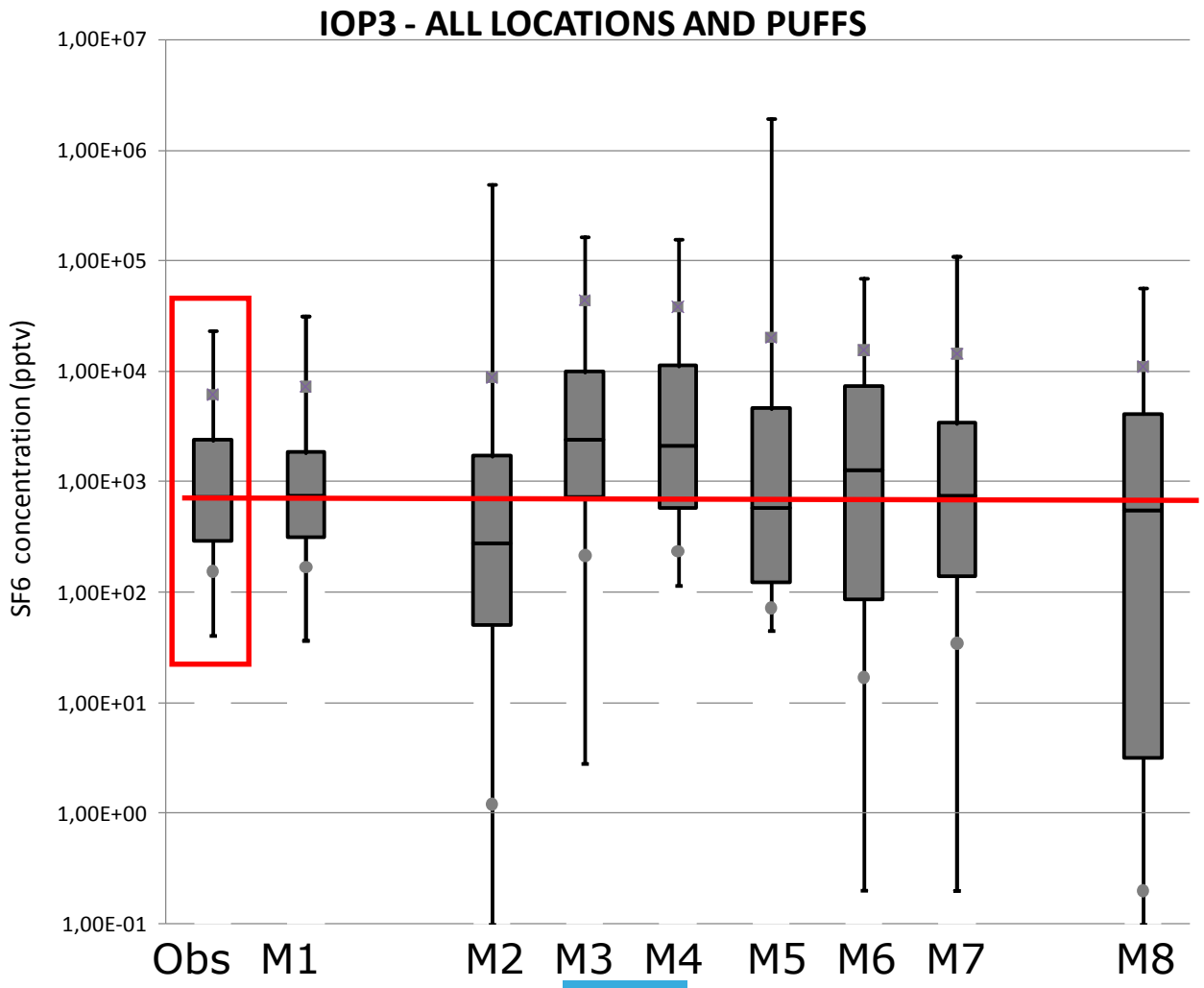
9th July 2003

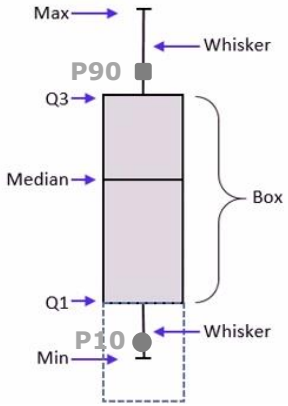
Puff	Release time (CST)	Mass (g)	Wind speed	Wind direction
1	0800	1001	3.7	196
2	0820	1005	3.7	196
3	0840	1000	3.7	196
4	0900	1004	3.7	196

UDINEE: Preliminary results

European Commission

Comparison for all values registered in IOP3

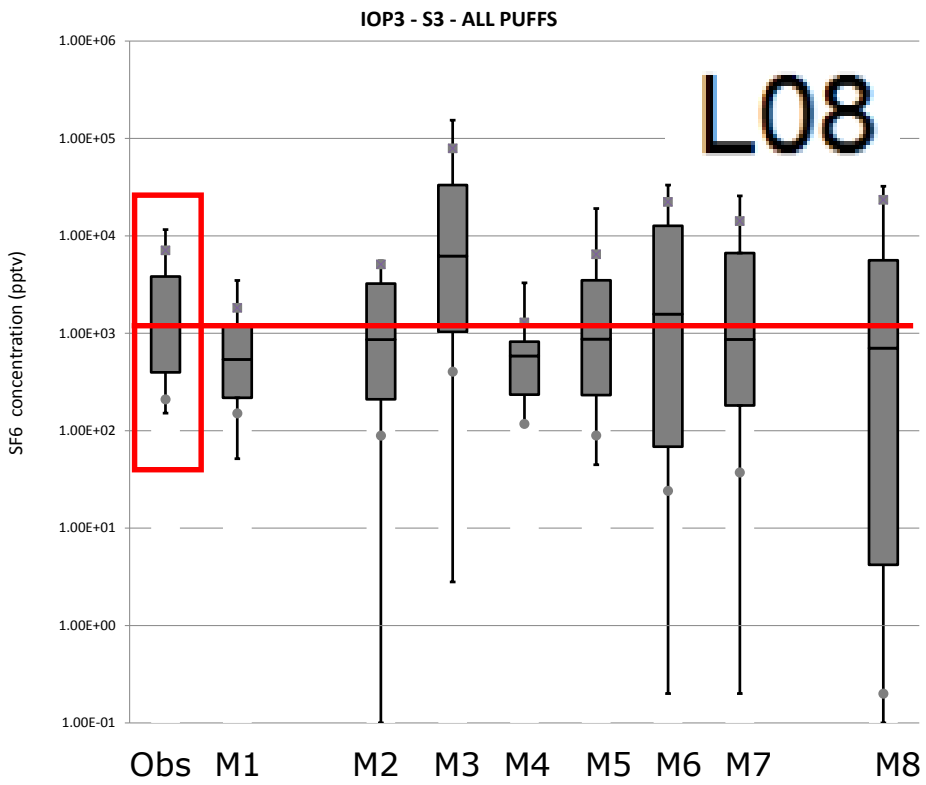


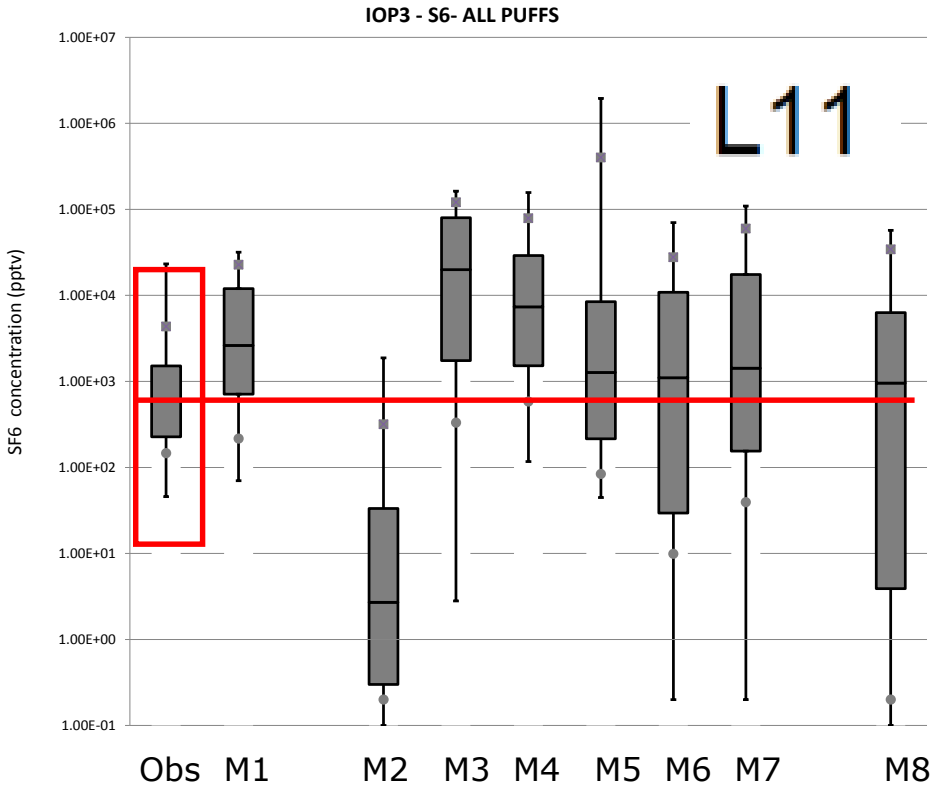


UDINEE: Preliminary results

European Commission

Comparison for all values registered in the same sampling site during IOP3

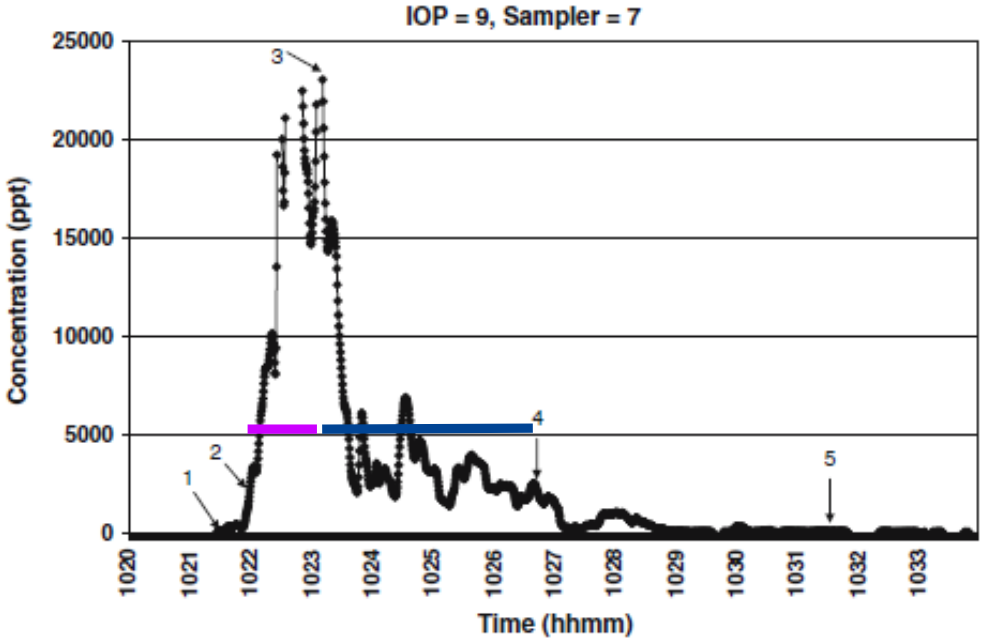




UDINEE: Preliminary results

European Commission

Comparison of parameters characterizing the time series



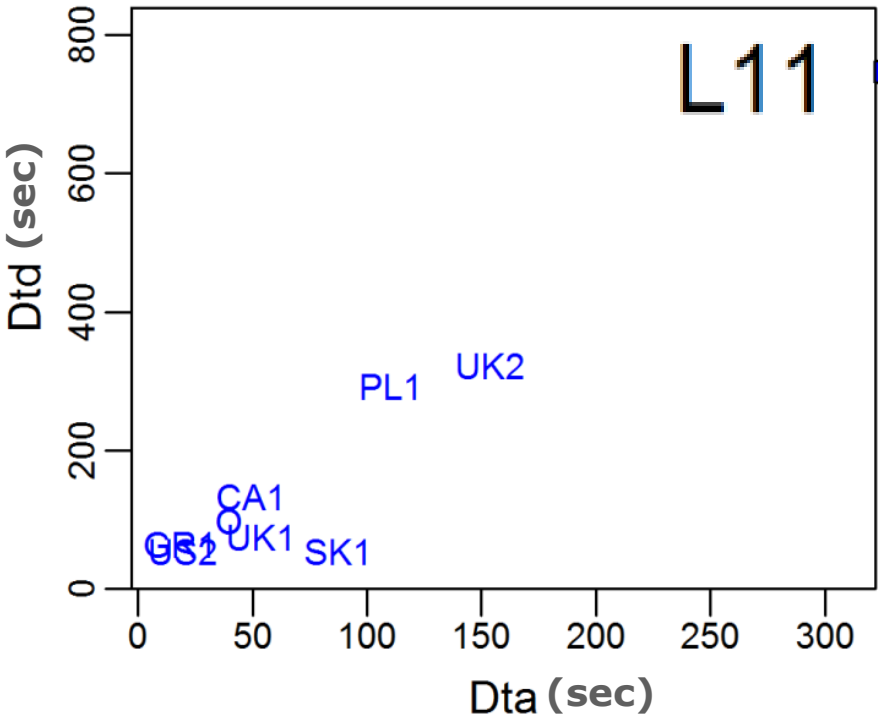
- **Dta=** Time difference between Cmax and time when the concentration is greater than or equal to 0.1*Cmax for the first time

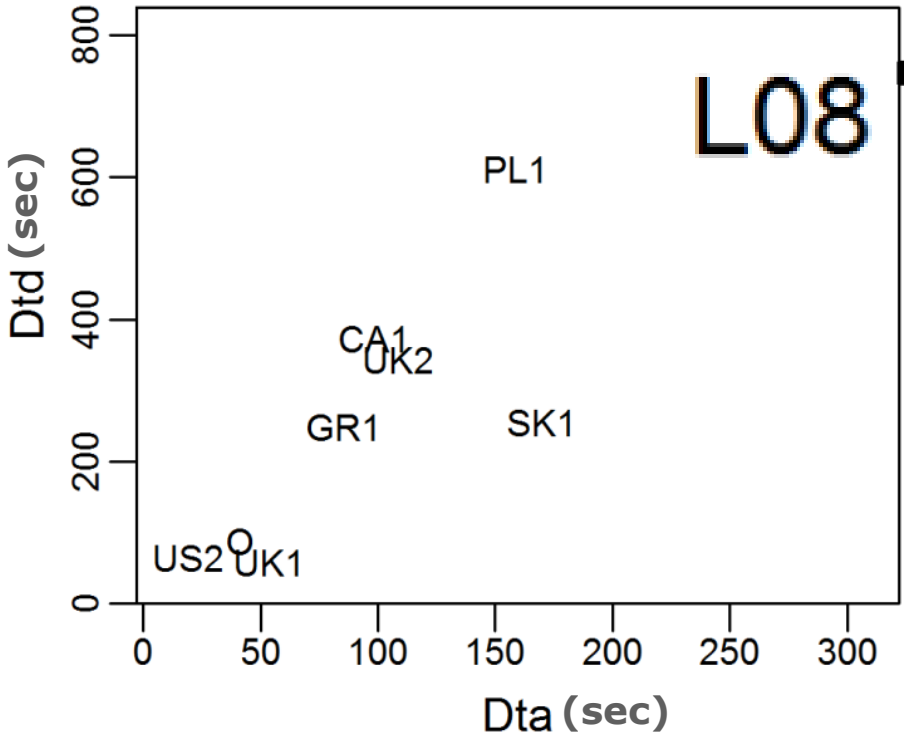
- **Dtd =** Time difference between Cmax and time when the concentration is greater than or equal to 0.1*Cmax for the last time

UDINEE: Preliminary results

European Commission

Comparison of parameters characterizing the time series in different sampling sites



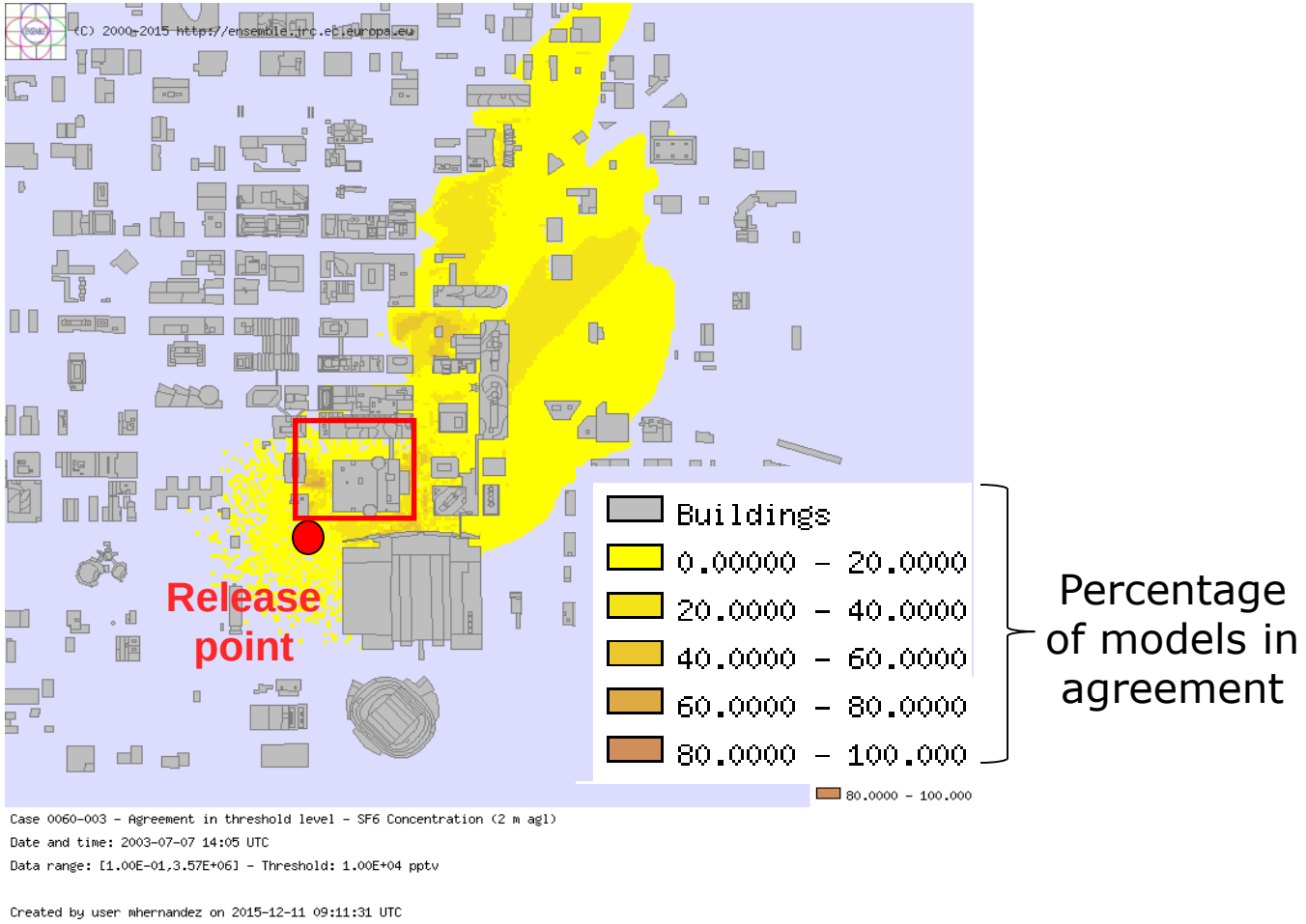


UDINEE: Preliminary results

European Commission

b) Grid (SF6 concentration)

Horizontal dispersion – Horizontal agreement between models;
five minutes after the first release – 2m



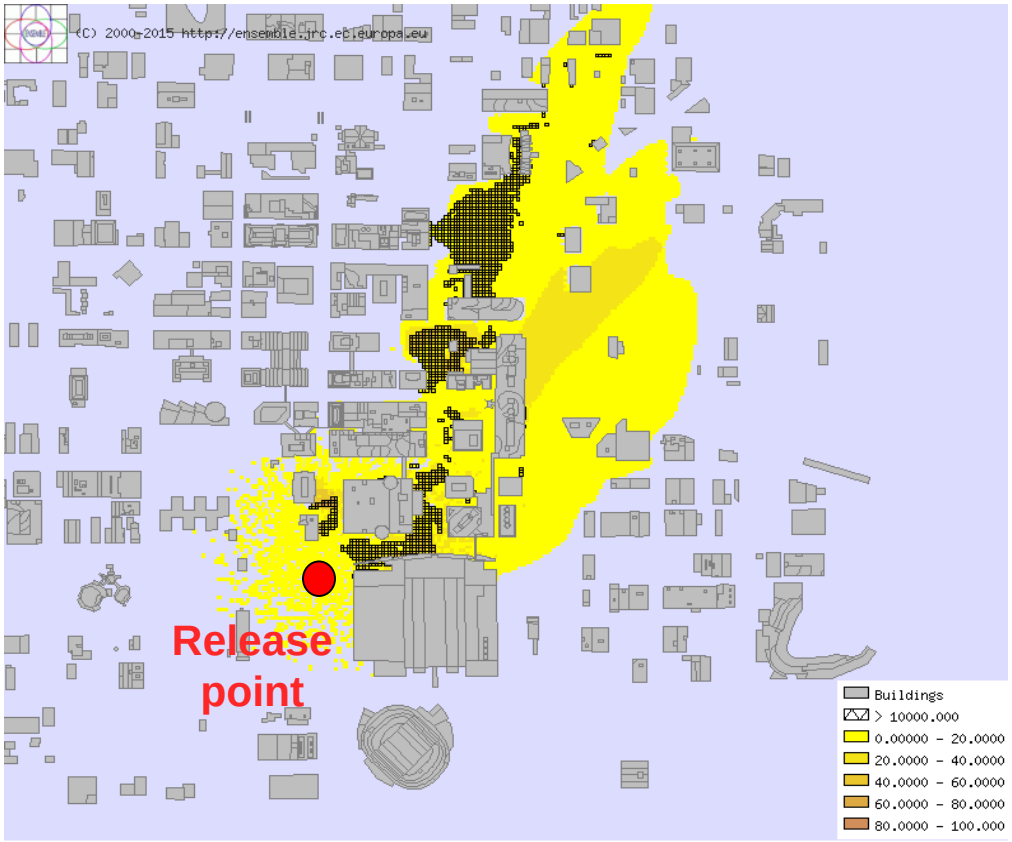
UDINEE: Preliminary results

European Commission

b) Grid (SF6 concentration)

Horizontal dispersion – Contribution of each model

five minutes after the first release – 2m



UDINEE: Preliminary results

European Commission

b) Grid (SF6 concentration)

Horizontal dispersion – Contribution of each model

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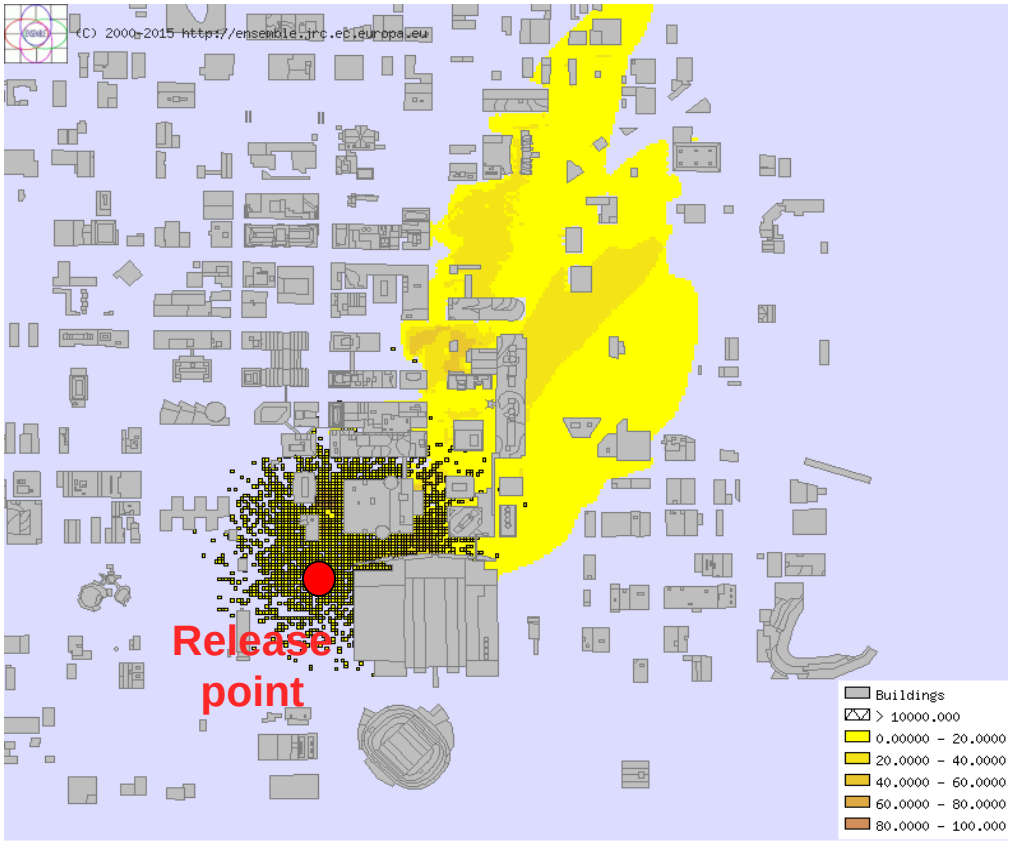


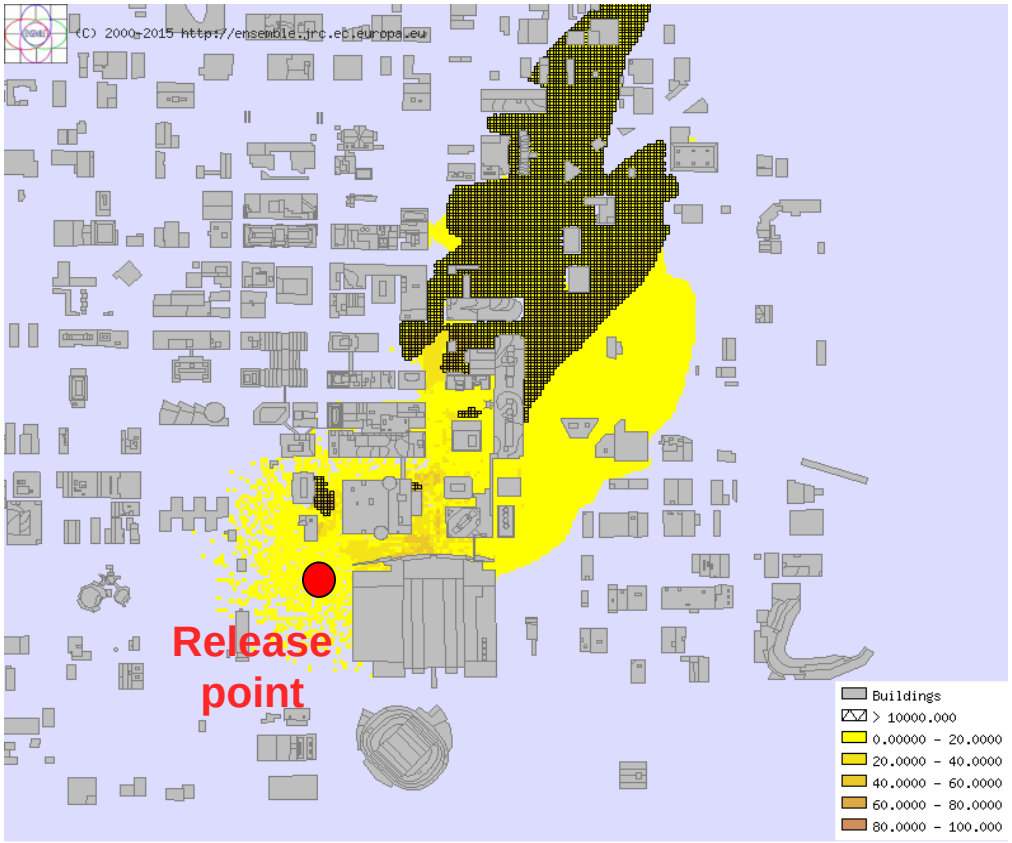
UDINEE: Preliminary results

European Commission

b) Grid (SF6 concentration)

Horizontal dispersion – Contribution of each model

five minutes after the first release – 2m

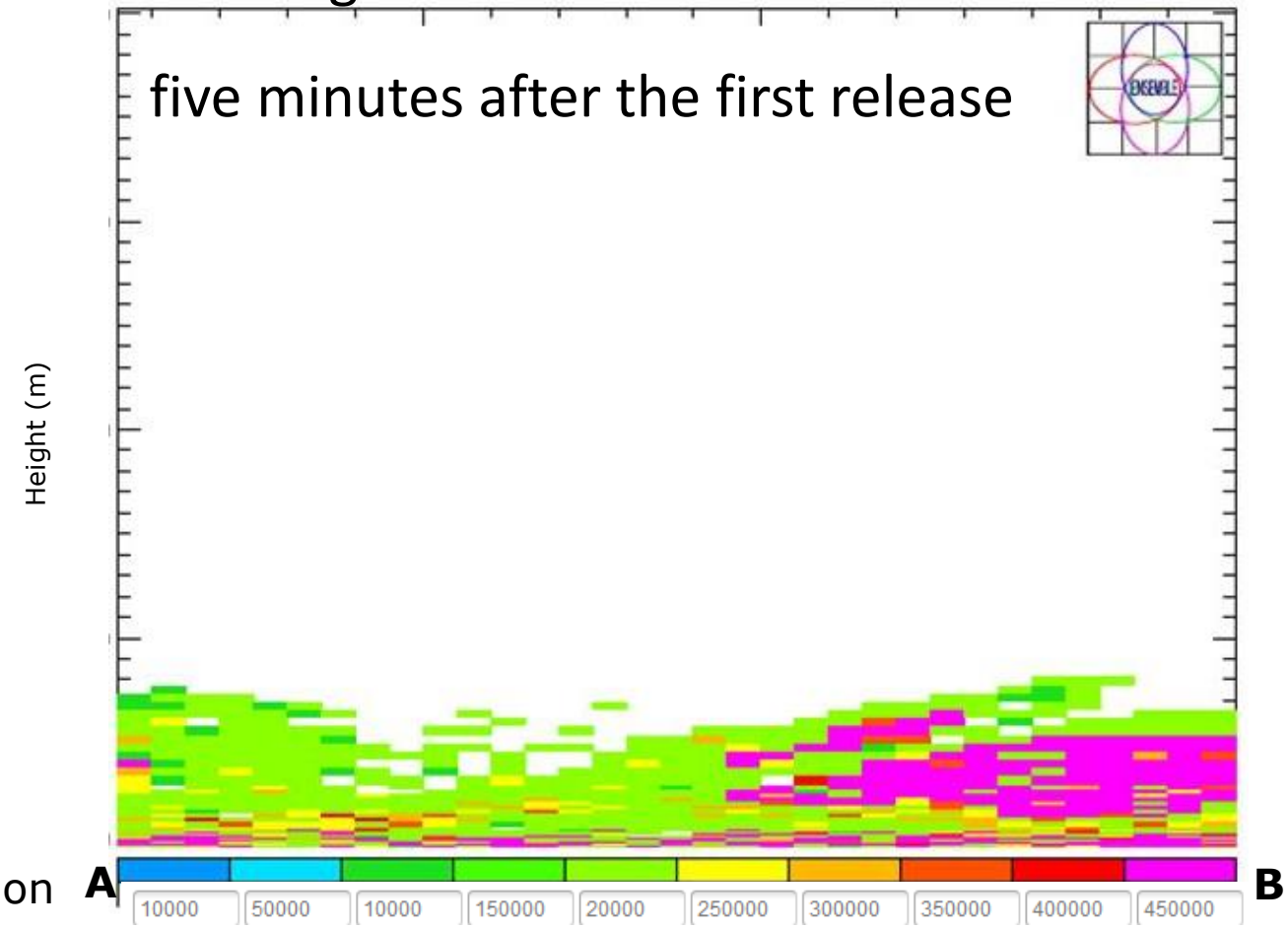


UDINEE: Preliminary results

European Commission

b) Grid (SF6 concentration)

Vertical dispersion – average of models



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UDINEE: Conclusions

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- UDINEE is the first multi-model urban dispersion model comparison for RDD releases;

- Temporal and spatial (horizontal and vertical) evaluation of models is performed;

- The first preliminary results show differences with observations and between model results according to the sampling locations.

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UDINEE project: international platform to evaluate urban dispersion models' capabilities to simulate Radiological Dispersion Device

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