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Combination of model predictions and measurements (big data sets) in various situations
NERIS perspective – scene setting

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Main theme, part 1

- Combination of model predictions and measurements ⇒ "data assimilation", i.e.,
  - Minimize the difference between model predictions & measurements
  - Find optimal values of model input parameters
- Gain:
  - Improved estimation of important parameters (e.g., source term)
  - Improved model prognoses
  - Improved diagnosis

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Main theme, part 2

- Big data sets
  - Large volumes: regarding both model results and observational data
  - Streaming: continuous flow of incoming data (model results and observational data)
  - Variety / heterogeneity: numbers (measurements, model results), text, images, different origin (location), different times, different quality (credibility, uncertainty, …)

Main theme, part 3

- Various situations
  - (Improved) Estimation of unknown parameters (e.g., unknown source location and / or strength)
  - Improved model prognoses (atmospheric, hydrological, ground, doses etc.)
  - Improved diagnosis (current situation of environmental impacts in different aspects)
  - Uncertainties (multiple model results)
  - …

Topics from NERIS Strategic Research Agenda and Gap Analysis

- Key Topic 3: Data Assimilation
  - Subtopic 1: Improved source term estimation
    - unknown sources in large scales or in complex urban environments, model ensembles, …
  - Subtopic 3: Big data, data fusion
    - IT instruments and methods for storing, analysing and combining large volumes of heterogeneous and different-origin data – produced in preparedness or emergency phases – in terms of usability in a real event

Topics from NERIS Strategic Research Agenda and Gap Analysis (2)

- Key Topic 1: Improved modelling
  - Subtopic 1: Atmospheric transport and dispersion modelling
    - Uncertainty quantification (processing of large volumes of modelling data)

Topics from NERIS Strategic Research Agenda and Gap Analysis (3)

- Key Topic 2: Improved monitoring
  - Subtopic 1: Monitoring techniques & strategies
    - Development of processes and tools for integrating the monitoring results from experts and lay people into a common operational picture -monitoring crowdsourcing - Information fusion

Topics from ALLIANCE Gap Analysis

- Methods for treating large amount of data resulting from elaborated and comprehensive transfer assessment, environmental monitoring and improved dose assessment
- Methods to characterise the environmental contamination and its evolution in space and time in order to delineate the multiple-hazard footprint (e.g., geostatistical interpretation of environmental, radiological, chemical data) of a site

Topics from ALLIANCE Gap Analysis (2)

- Methods to identify the most significant sources of uncertainty related to the impact on human and environmental health
- Development and combination of different modelling and monitoring techniques (including data assimilation) to improve dose reconstruction and predictions of the impact of an accident

Conclusions

- Topics of common ALLIANCE – NERIS interest can be identified. Keywords:
  - Large data sets from modelling and monitoring
  - Improved diagnosis and prognosis
  - Uncertainties
  - Data assimilation

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Thank you very much for your attention