Combination of model predictions and measurements (big data sets) in various situations

NERIS perspective – scene setting

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Combination of model predictions and measurements $\Rightarrow$ “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
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, ...)

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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)
- ...
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
Key Topic 1: Improved modelling

○ Subtopic 1: Atmospheric transport and dispersion modelling
  • Uncertainty quantification (processing of large volumes of modelling data)
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
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
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
Topics of common ALLIANCE – NERIS interest can be identified. Keywords:

- Large data sets from modelling and monitoring
- Improved diagnosis and prognosis
- Uncertainties
- Data assimilation
Thank you very much for your attention