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Results of the modelling exercises in COST Action ES1006: local-scale models for accidental releases in built environments

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In the frame of the COST Action ES1006 a main research task is the evaluation of atmospheric dispersion models by their comparison against test data from qualified field and laboratory experiments and by a model inter-comparison. Three case studies were carried out as modelling exercises for the evaluation activity: (1) the Michelstadt exercise, based on flow and dispersion data gathered in a wind-tunnel experiment where an idealized Central-European urban environment was modelled and both continuous and puff releases were reproduced; (2) a real-field campaign with continuous and puff releases in an European harbour, named as CUTE 1 case, which was also reproduced in the wind tunnel, named as CUTE 3, and (3) a real industrial accident occurred in an European Country, named as AGREE case. In all cases, ‘blind tests’ were conducted, that is only the minimum flow information was provided to the modellers. It was assumed that a typical emergency response model has already been validated for local-scale dispersion modelling and the existing model evaluation and validation strategies are extended towards task- and application-specific measures for accidental release scenarios. In case of continuous release, maximum concentrations, dosages and the area affected by values above a relevant threshold are usually the information expected from an emergency response model. In case of one or several puff releases, additional information may be of interest, e.g. the arrival time of the puff at given locations, the duration of the puff passage there, the peak concentration values. The applied models ranged from Gaussian type, to Lagrangian and advanced Eulerian CFD models.
The model comparison and evaluation performed for the three cases is presented, addressing the performance of the different modelling approaches, quantifying the scatter of results when different models are applied and assessing the effect of uncertainties in input data.

Key words: model evaluation, accidental releases, emergency response, air pollution