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Dispersion modeling of accidental releases of toxic gases – Comparison of the models and their utility for the fire brigades.

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In the case of accidental release of hazardous gases in the atmosphere, the emergency responders need a reliable and fast tool to assess the possible consequences and apply the optimal countermeasures. For hazard prediction and simulation of the hazard zones a number of air dispersion models are available. The most model packages (commercial or free of charge) include a chemical database, an intuitive graphical user interface (GUI) and automated graphical output for display the results, they are easy to use and can operate fast and effective during stress situations. The models are designed especially for analyzing different accidental toxic release scenarios ("worst-case scenarios"), preparing emergency response plans and optimal countermeasures as well as for real-time risk assessment and management. There are also possibilities for model direct coupling to automatic meteorological stations, in order to avoid uncertainties in the model output due to insufficient or incorrect meteorological data.
Another key problem in coping with accidental toxic release is the relative width spectrum of regulations and values, like IDLH, ERPG, AEGL, MAK etc. and the different criteria for their application. Since the particulate emergency responders and organizations require for their purposes unequal regulations and values, it is quite difficult to predict the individual hazard areas. There are a quite number of research studies and investigations coping with the problem, anyway the end decision is up to the authorities.
The research project RETOMOD (reference scenarios calculations for toxic gas releases – model systems and their utility for the fire brigade) was conducted by the Central Institute for Meteorology and Geodynamics (ZAMG) in cooperation with the Vienna fire brigade, OMV Refining & Marketing GmbH and Synex Ries & Greßlehner GmbH. RETOMOD was funded by the KIRAS safety research program at the Austrian Ministry of Transport, Innovation and Technology (www.kiras.at). One of the main tasks of this project was
1. Sensitivity study and optimization of the meteorological input for modeling of the hazard areas (human exposure) during the accidental toxic releases.
2. Comparison of several model packages (based on reference scenarios) in order to estimate the utility for the fire brigades.
This presentation introduces the project models used and presents the results of task 2. The results of task 1 are presented by Baumann-Stanzer and Stenzel in this session.
For the purpose of this study the following models were tested and compared: ALOHA (Areal Location of Hazardous atmosphere, EPA), MEMPLEX (Keudel av-Technik GmbH), Breeze (Trinity Consulting), SAFER System, SAM (Engineering office Lohmeyer), COMPAS. A set of reference scenarios for Chlorine, Ammoniac, Butane and Petrol were proceed in order to reliably predict and estimate the human exposure during the event. The models simulated the accidental release from the mentioned above gases and estimates the potential toxic areas. Since the inputs requirement differ from model to model, and the outputs are based on different criteria for toxic areas and exposure, a high degree of caution in the interpretation of the model results is needed.