GIS-Based Planning and Management Support System for Emergency Events involving Atmospheric Releases of Hazardous Materials

Nilesh Lahoti, Sai Tong, Sastry Isukapalli and Panos Georgopoulos • Computational Chemodynamics Laboratory (http://www.ccl.rutgers.edu)

Environmental and Occupational Health Sciences Institute, a Joint Institute of UMDNJ-Robert Wood Johnson Medical School and Rutgers University, Piscataway, NJ

Summary

Numerous atmospheric dispersion models, with a wide range of features, are available for assessing potential emergency response situations. A rational planning decision support system for emergency events must be organized and displayed logically to support the scope of emergency management programs. The GIS-based planning and decision support system presented here can utilize alternative models to characterize the spatial extent of a hazardous release under plausible scenarios, and enable easy comparison and sharing of results. Models in this system include ALOHA, ISC, AERMOD, CALPUFF, and HPAC. Model platform dependent issues are mitigated using a GIS-based front and visualizer different model outputs in a consistent manner.

Multiple Scales/Layers of Atmospheric Dispersion Models for Emergency Response Support

Problem:
• Emergency event response planning typically requires multiple planning and decision support system presented here can utilize alternative models to model simulations to generate possible outcomes for various scenarios. The GIS-based
• Substantial time and effort savings by replacing manual input of recurring combination of keystrokes and mouse events with a script

Solution:
• Systematic automation of several GUI-based dispersion models

Modeling Results Obtained with an Automated GIS-based Planning and Management Support System

Web-based Map Servers Supported: ArcGIS, MapLayer, etc.
• Allow visualization of spatially-based modeling results through web browser
• Provide development interfaces that can be used to create additional web-based analysis and visualization tools

GUI Automation Sub-System

Problem:
• Emergency event response planning typically requires multiple model simulations to generate possible outcomes for various scenarios.
• A series of repetitive commands need to be executed manually for models that are purely GUI-based, without a scripting interface.
• These increases chances for human error, and could hinder the decision-making process, especially when time is limited.

Solutions:
• The Graphical User Interface (GUI) automation sub-system will facilitate systematic execution of several GIS-based dispersion models.

Potential area of buildings on plume dispersion in urban areas: for the same prevailing wind characteristics and chemical release, the plume profile can be significantly different, depending on the building profiles around the release location.