Emerging Environmental Issues and Policy Gap Feedback

Environmental Issues in Homeland Security

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Problem Statement/Issue

- **National Strategy for Homeland Security identifies thirteen Critical Infrastructure sectors that must be protected.**

- **Six of these sectors directly impact the Environment.**

- **Agriculture, Food, Water, Energy, Public Health, Chemical Industry and Hazardous Materials**

Project/Study Overview

- **Background**
- **Discussion**
- **Military Impact**
- **Recommendations**

Agriculture

- **Breadbasket of the World**
- **USDA Homeland Security Efforts**
- **Military Impact**
- **Recommendations**

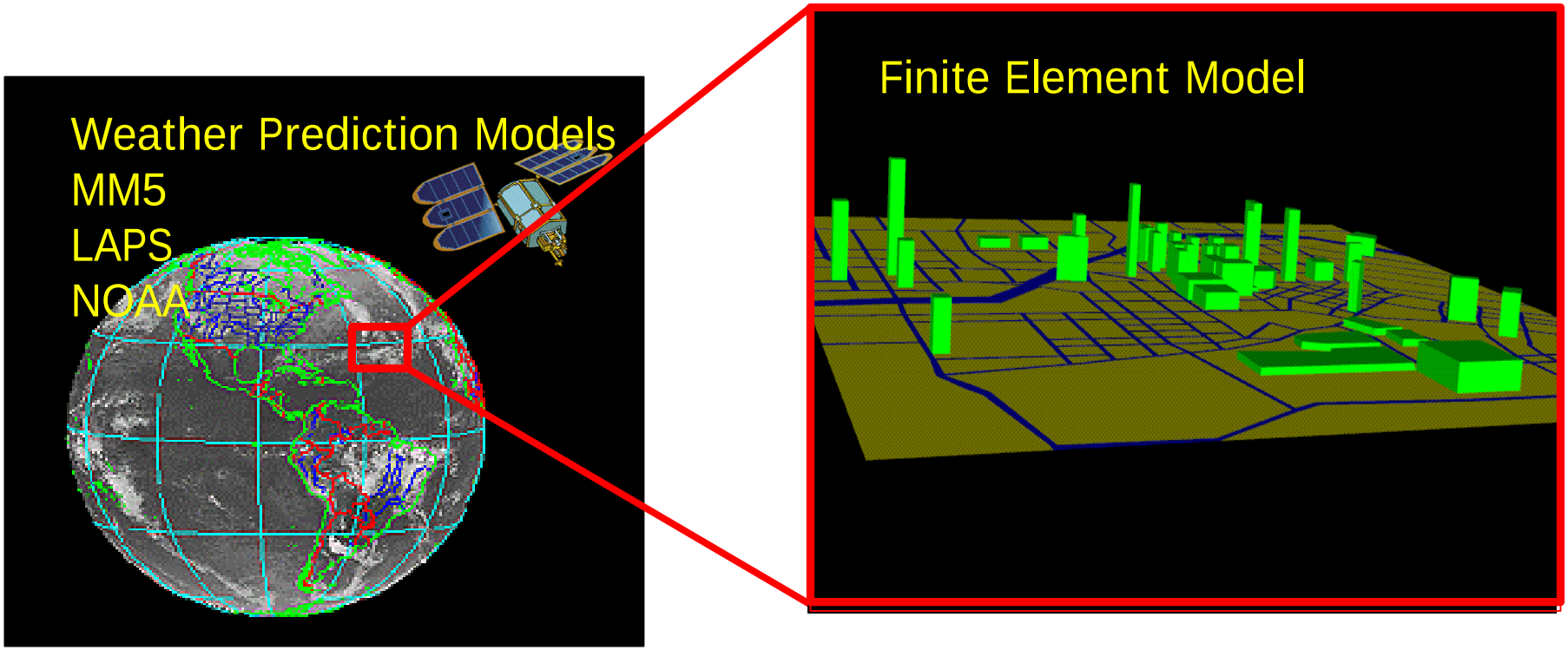
Chemical Industry/ Hazardous Materials

- **15,000 Chemical Facilities**
- **National Contingency Plan**
- **Military Resources**
- **Computer Dispersion Simulation Modeling**

Boundary and Initial Conditions

- Weather Prediction Models (order of *kilometers* resolution)
- Finite Element Models (order of *meters* resolution)

Least Square Projection from Weather Prediction Models



Governing Equations

$$\nabla \cdot \mathbf{u} = 0$$

$$\rho\left(\frac{\partial \mathbf{u}}{\partial t} + \mathbf{u} \cdot \tilde{\mathrm{N}}\,\mathbf{u}\right) = -\rho\,\mathbf{N} + \rho\,\mathbf{g} - \frac{G_r}{R_e^2}\,\rho\theta\,\mathbf{n}_g + \tilde{\mathrm{N}} \cdot \mathrm{s}$$

$$\frac{\partial \theta}{\partial t} + \mathbf{u} \cdot \tilde{\mathrm{N}}\theta = \frac{1}{R_e P_r}\,\tilde{\mathrm{N}} \times \tilde{\mathrm{N}}\theta\rho + \dot{q} - H\dot{E}$$

$$\frac{\partial \rho_{\mathrm{c}}}{\partial t} + \mathbf{u} \cdot \tilde{\mathrm{N}}\rho_{\mathrm{c}} = \frac{1}{R_e P_r L_{e\,\mathrm{a}}}\,\tilde{\mathrm{N}} \times \tilde{\mathrm{N}}\rho_{\mathrm{c}} + \dot{n}_{\mathrm{c}}$$

$$\frac{\partial \rho_{\mathrm{v}}}{\partial t} + \mathbf{u} \cdot \tilde{\mathrm{N}}\rho_{\mathrm{v}} = \frac{1}{R_e P_r L_{e\,\mathrm{v}}}\,\tilde{\mathrm{N}} \times \tilde{\mathrm{N}}\rho_{\mathrm{v}} + \dot{n}_{\mathrm{v}} + \dot{E}$$

$$\frac{\partial \rho_{\mathrm{n}}}{\partial t} + \mathbf{u} \cdot \tilde{\mathrm{N}}\rho_{\mathrm{n}} = \dot{n}_{\mathrm{n}} - \dot{E}$$

Case I