ASCEM

Advanced Simulation Capability for Environmental Management

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SRS CAB FD&SR Committee Meeting
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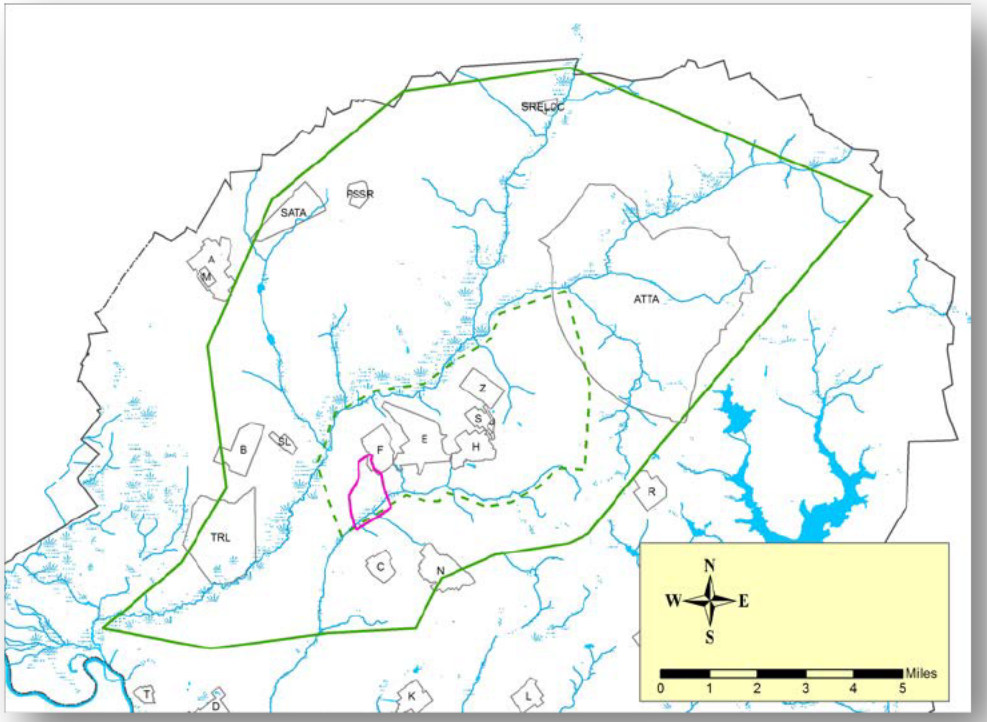
Purpose

- Provide an overview of the DOE-EM sponsored project to develop the Advanced Simulation Capability for Environmental Management (ASCEM) to fulfill a Facilities Disposition & Site Remediation (FD&SR) 2013 Work Plan item



F Area Seepage Basins

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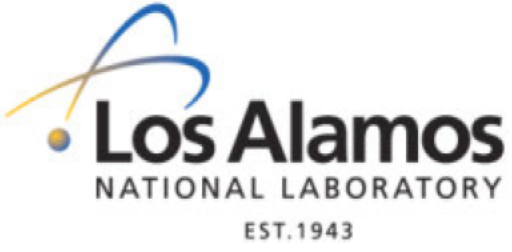
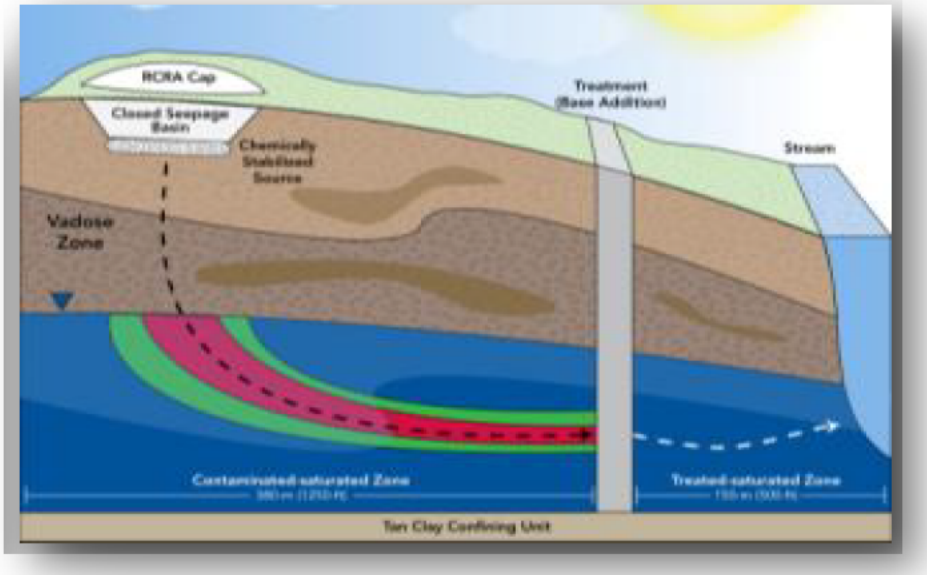
ASCEM Is Delivered Through a National Laboratory Consortium



Why Do We Use Models?

Improve our understanding of system behavior

- Projecting future migration of contamination (10s, 100s or 1,000s of years)
- Managing uncertainties – identifying what is important
- Prioritizing data collection and monitoring activities
- Evaluating potential effectiveness of remediation and closure options
- Optimizing designs
- Regulatory compliance



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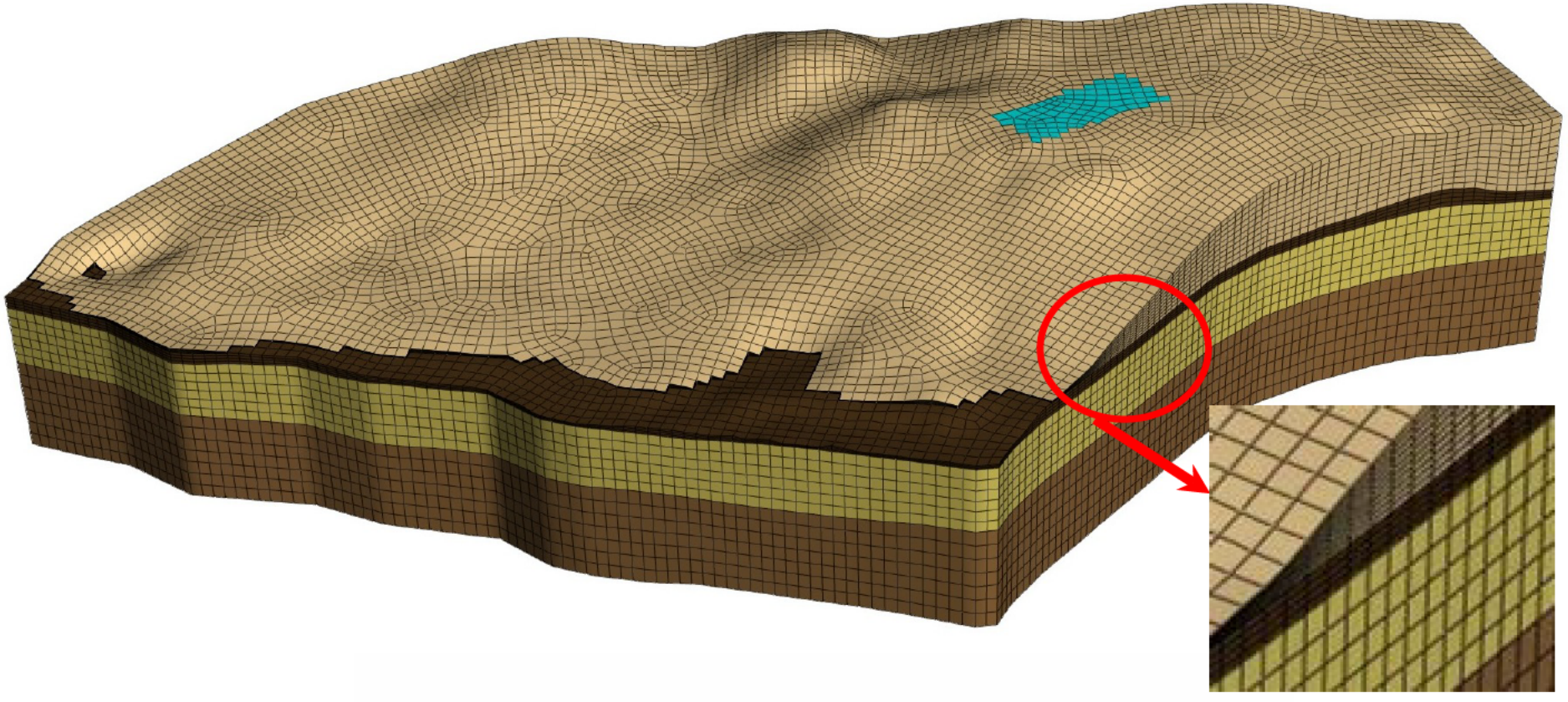
Modeling Example



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Challenges

- Move towards more **standardized and consistent** environmental modeling approaches across the DOE Complex
- Improve model support for **decision-making and demonstrations of regulatory compliance** during and at the conclusion of assessment efforts
- Provide tools that help to **explain complex information in an understandable way**
- Provide capability to **explore problems in greater detail**, where needed to address the most challenging remediation/disposal efforts

Active DOE-EM Sites

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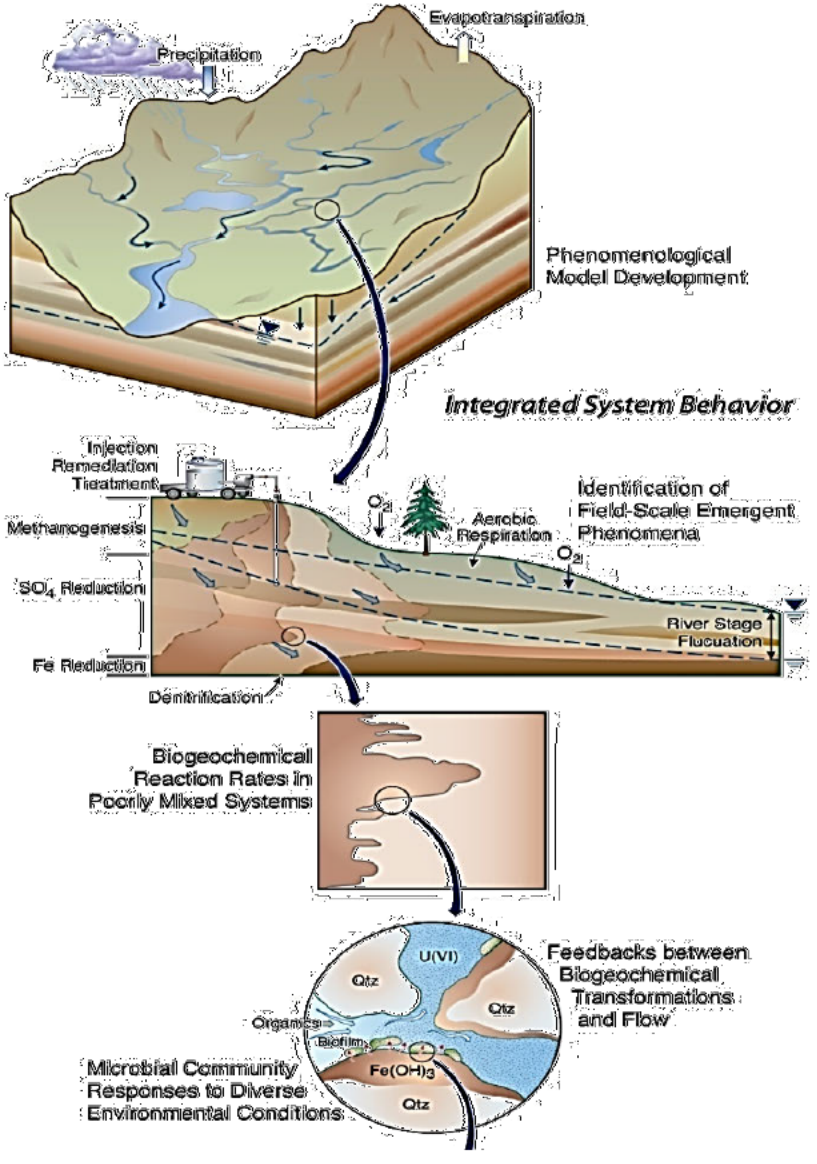
Advanced Simulation Capability for Environmental Management (ASCEM)

- A **State-of-the-art tool** for predicting movement of contaminants through natural and engineered systems
- Freely available and expandable to incorporate existing modeling tools
- Designed to take advantage of modern computing architectures (e.g., multi-core) from laptops to supercomputers

Wide Range of Platforms



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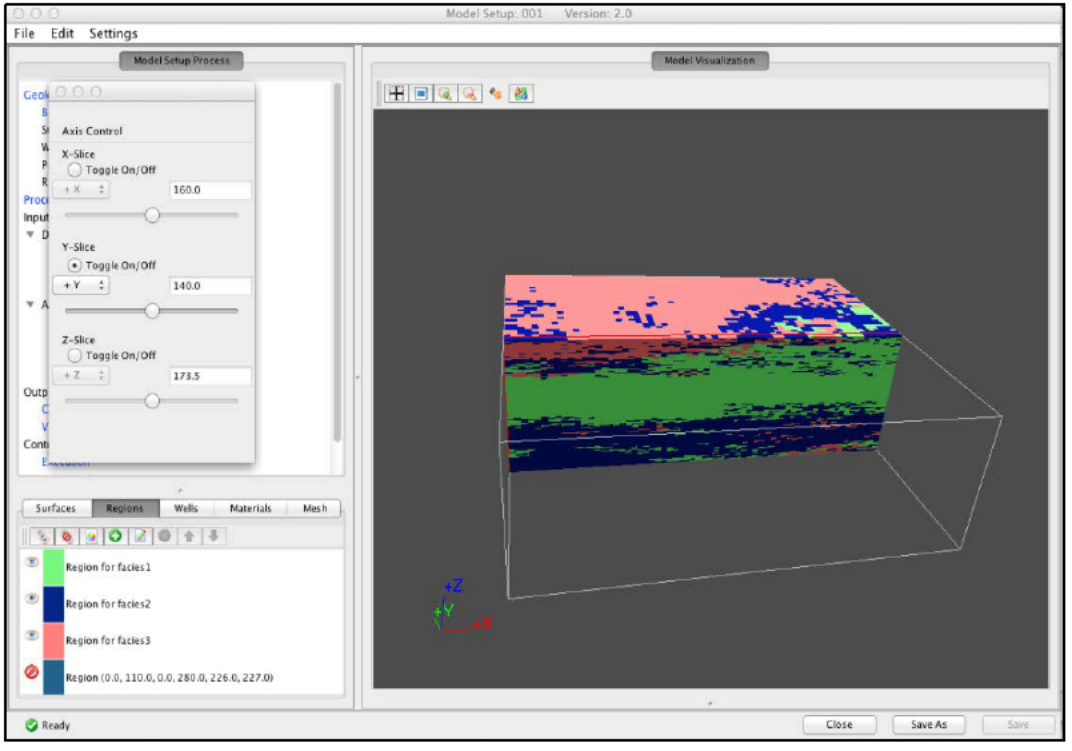
User Interactions Helped Shape ASCEM Development

- **The ASCEM team has actively reached out to a variety of potential users around the DOE Complex for suggestions, including regulators, programmatic/management, and modeling practitioners**

- **Used recommendations as input to requirements**
  - A **Graded Approach** is needed to allow the use of the appropriate level of complexity to support a given decision.
  - Consider role of modeling as input for regulatory **decision making**.
  - Take advantage of new tools to reduce reliance on simplifications.
  - Recognize increased data needs as model complexity increases.

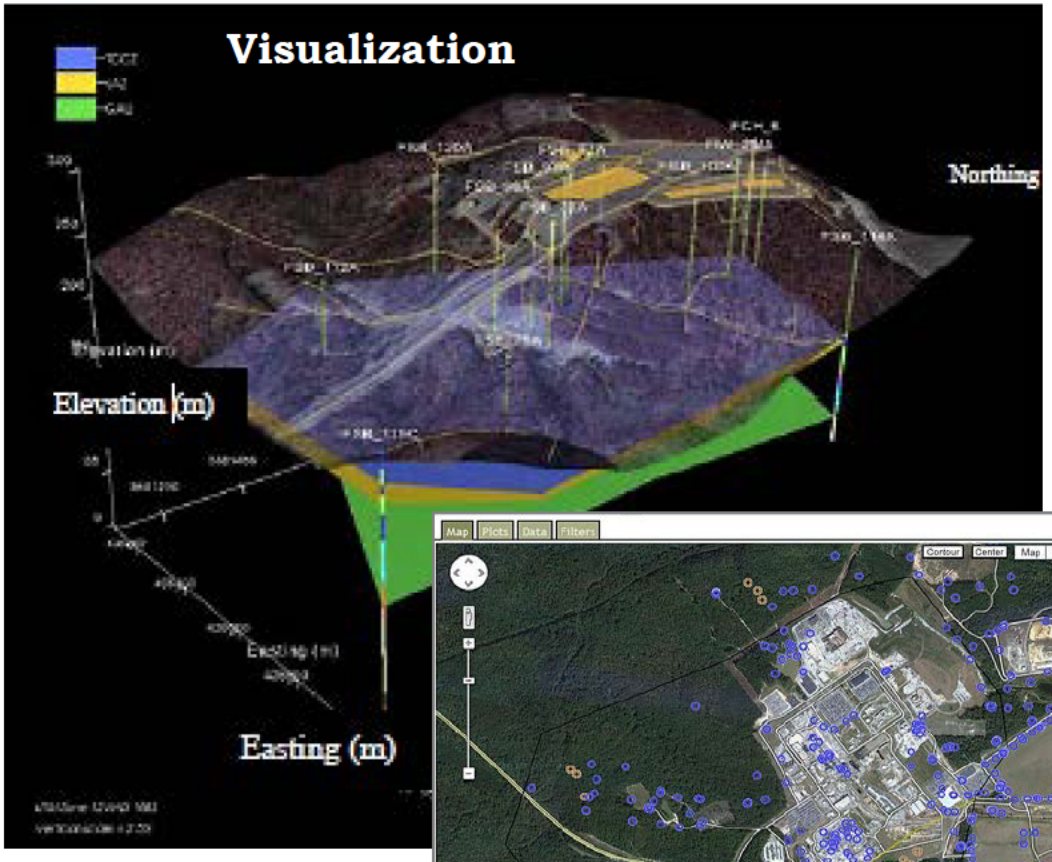
ASCEM Key Components

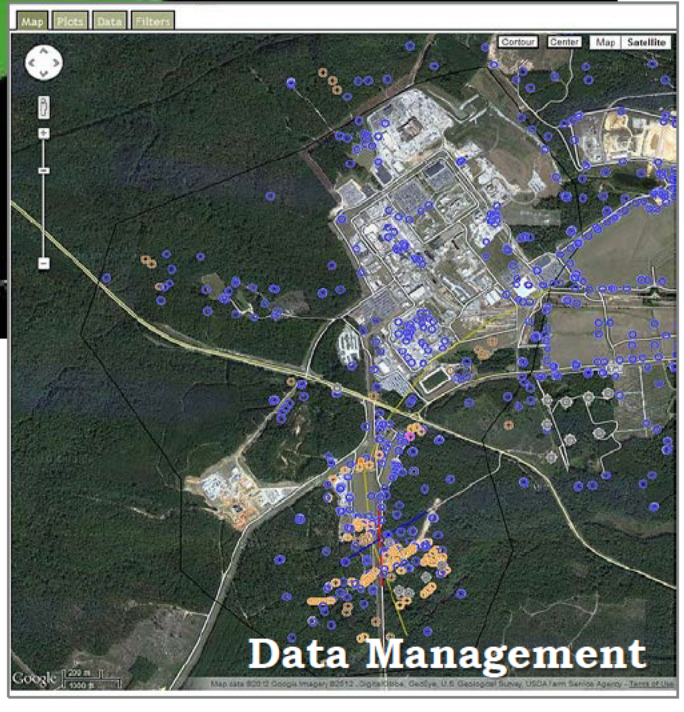
- **Akuna** – The graphical user interface and platform with the tools to help manage data, setup and run models, and process results from simulations
- **Amanzi** – The computational engine that solves all of the equations needed to model movement of water and contaminants in the environment
- Akuna and Amanzi integrate many tools that have been developed through other activities



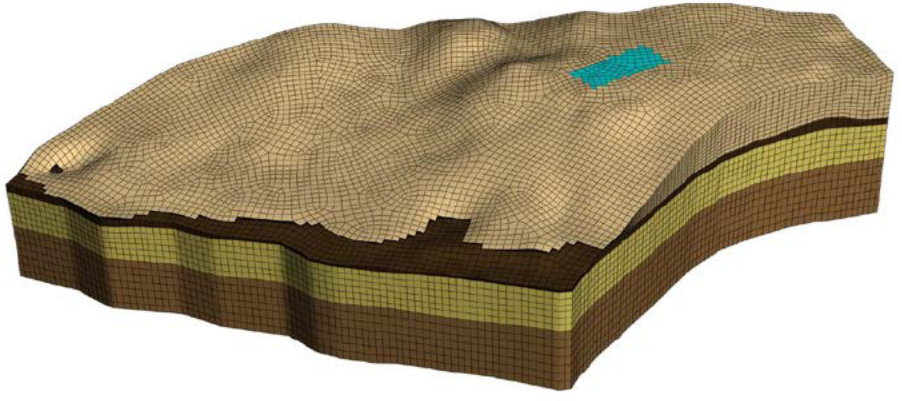
Mac/Windows Interface

Example Akuna Tools

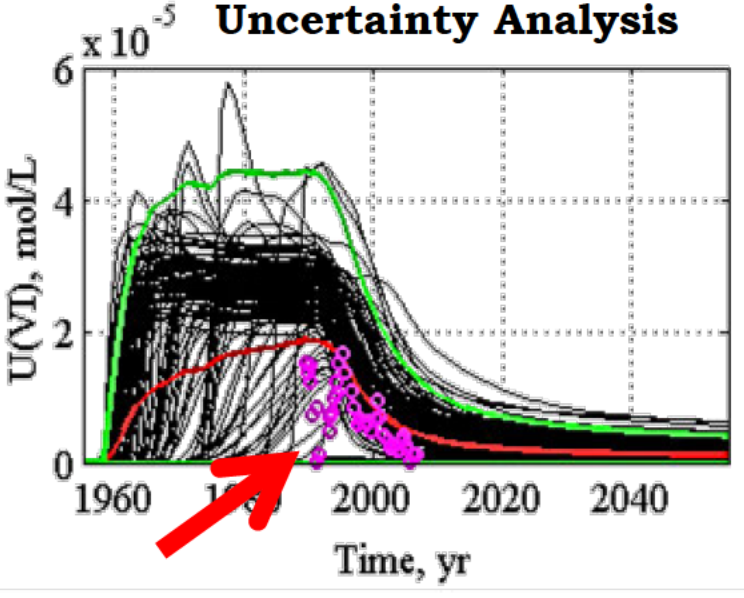




Mesh Generation



Uncertainty Analysis



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Example Amanzi Results