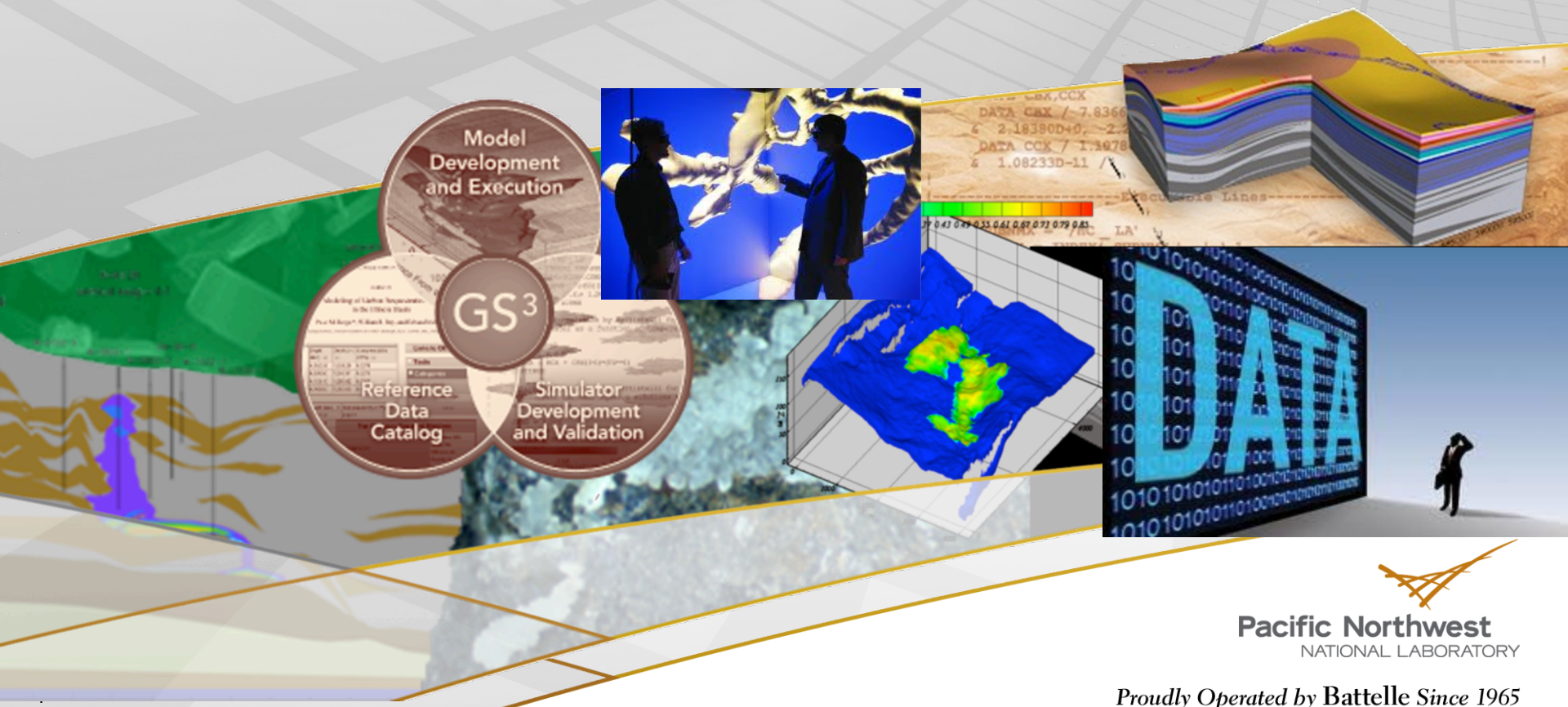
Velo: Knowledge and Tool Integration for Collaborative Scientific Projects

Carina Lansing, Kerstin Kleese van Dam



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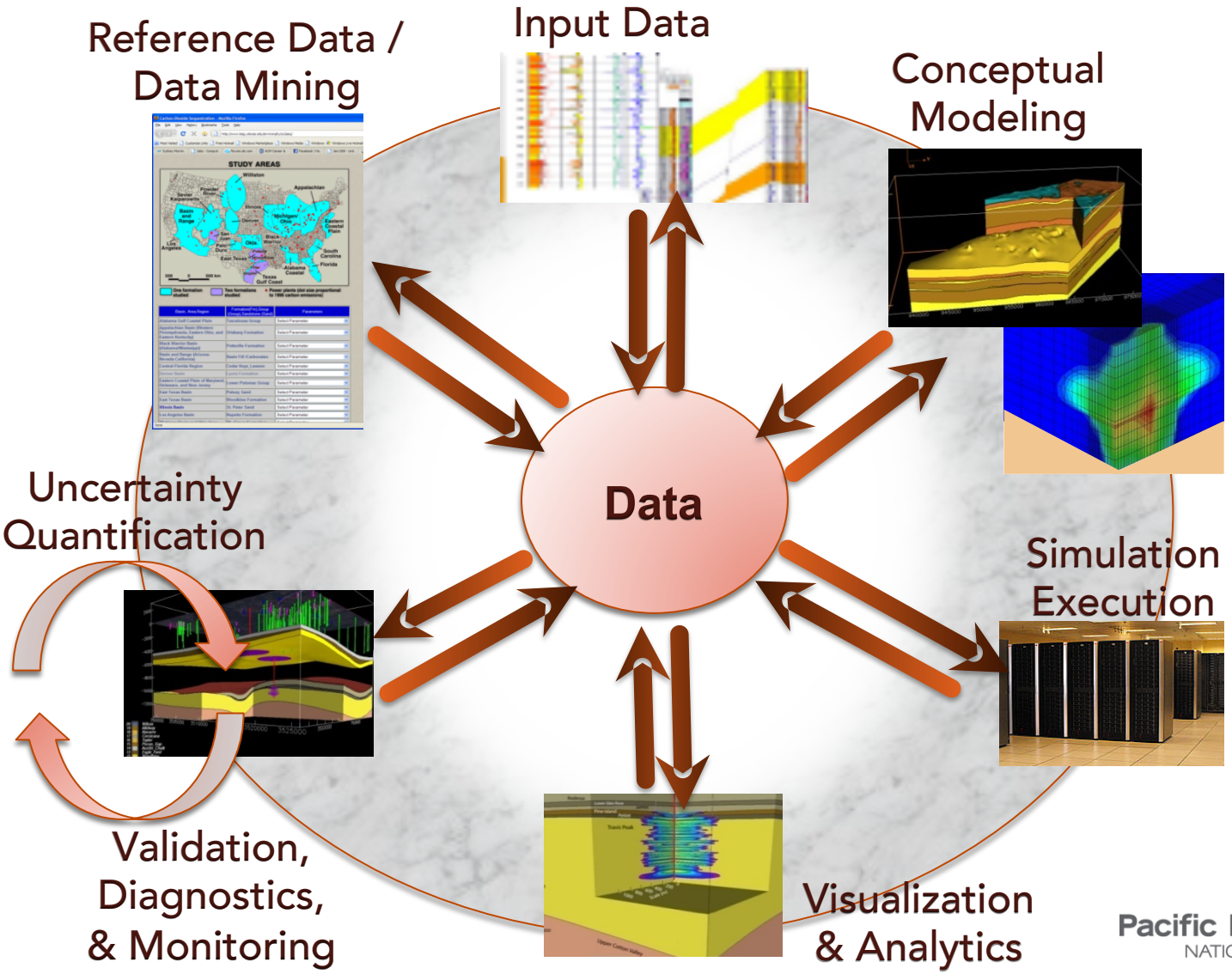
Scientific Project Life Cycle



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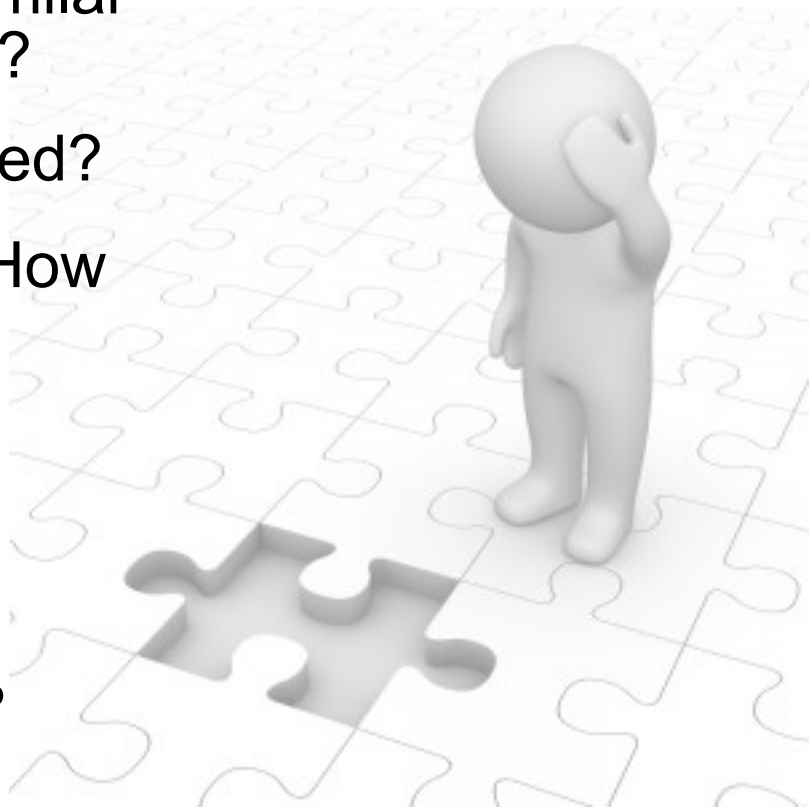
Challenges to Scientists

- Has someone done something similar before? Is there a good example?
- How do I find the information I need?
- What are the best tools to use? How do I use them?
- I have to write another data converter<sigh>
- Can I reproduce my results?
- What did I do and how did I do it?
- How can I share my project "process" and data with others?
- Where is my data?



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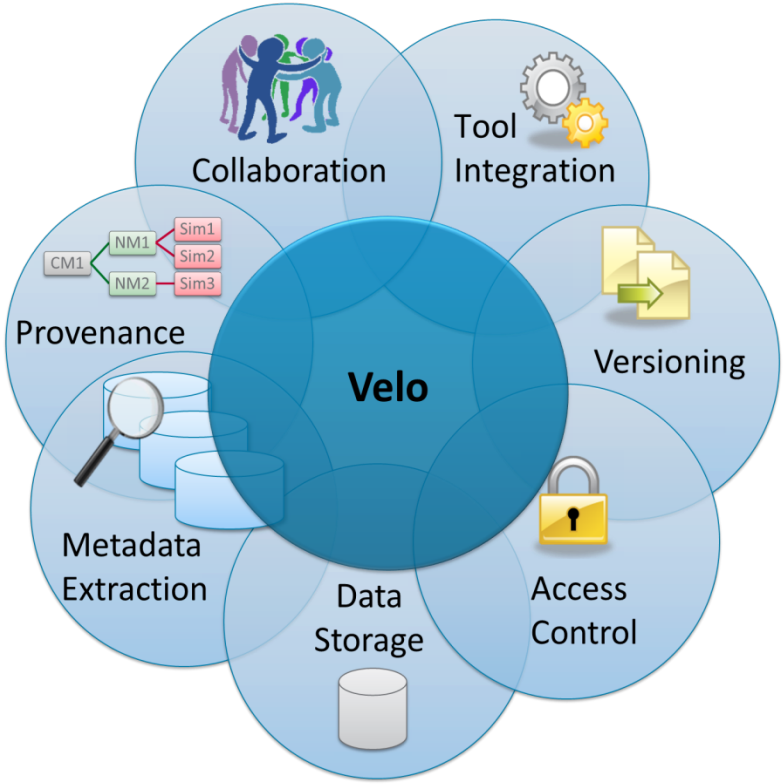
Velo's Solution

- Full life cycle, integrated support for modeling, simulation, analysis, and visualization at any scale
- Data/metadata/relationship management
- Tool Integration
  - Connect tools to data
  - Chain tools together
- Simulation management, including UQ ensembles
- Collaboration across multi-disciplinary teams
- Provenance – who did what, when
- Open, Extensible, & Customizable



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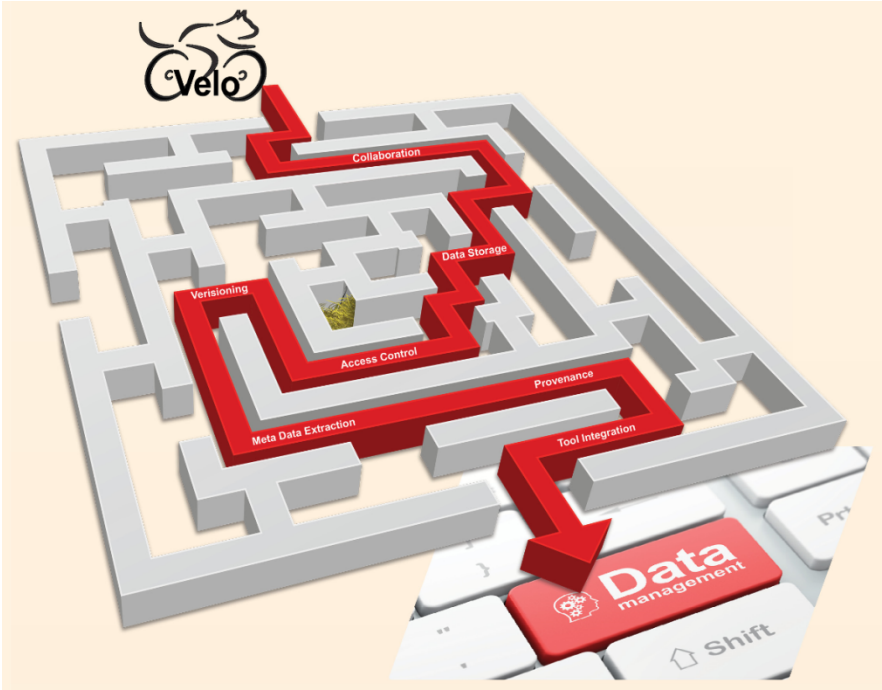
Benefits

- Users can easily keep track of their scientific projects, even if data, tools, and collaborators are geographically distributed
- Low barrier of entry for HPC systems
- Easy to share data and tools (AppStore for science)
- Reproducible results
- Less time spent in data orchestration tasks = more time for science



- Reduce project costs, deploy new sites in weeks

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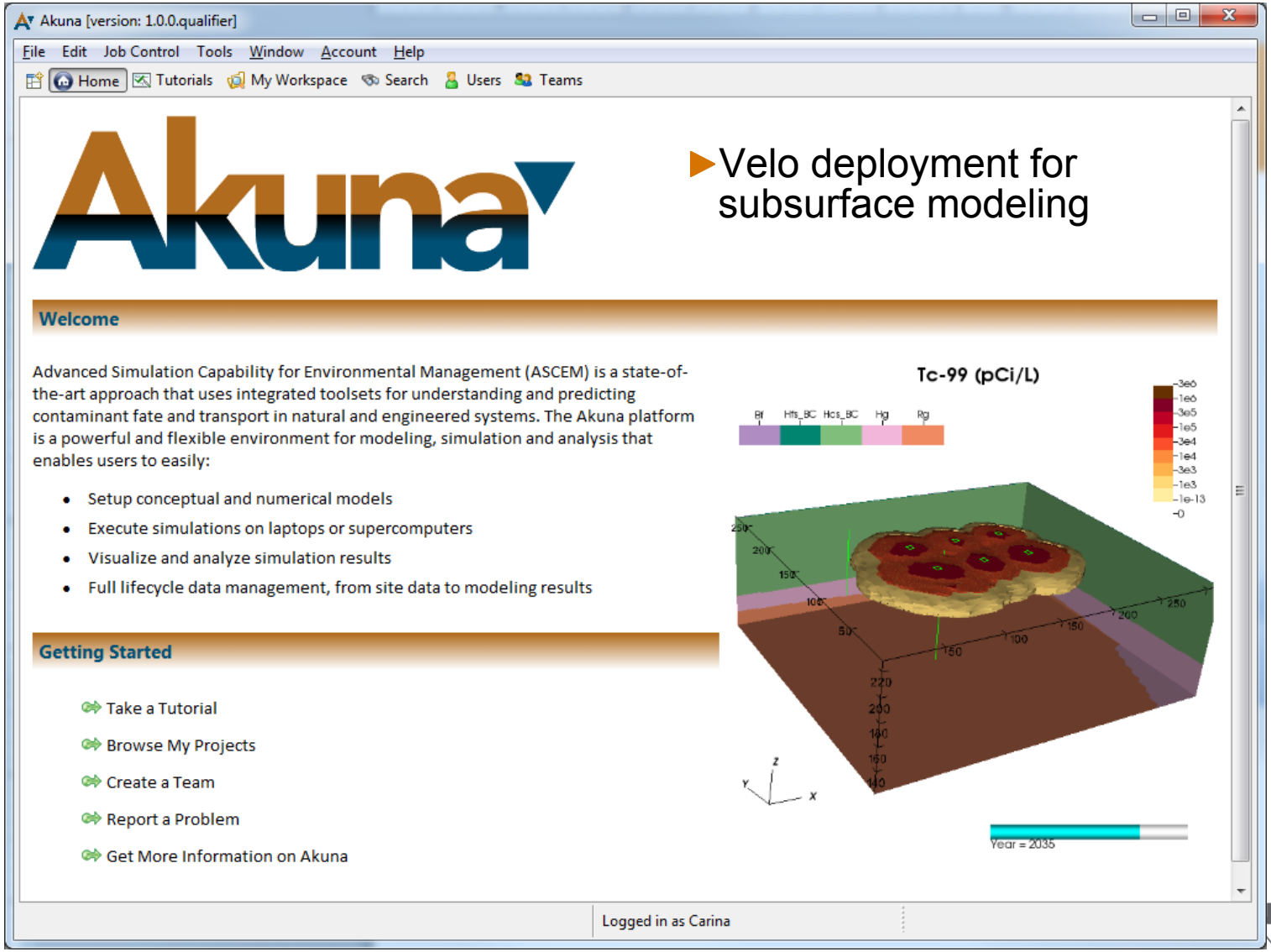
Velo Use Case: Akuna



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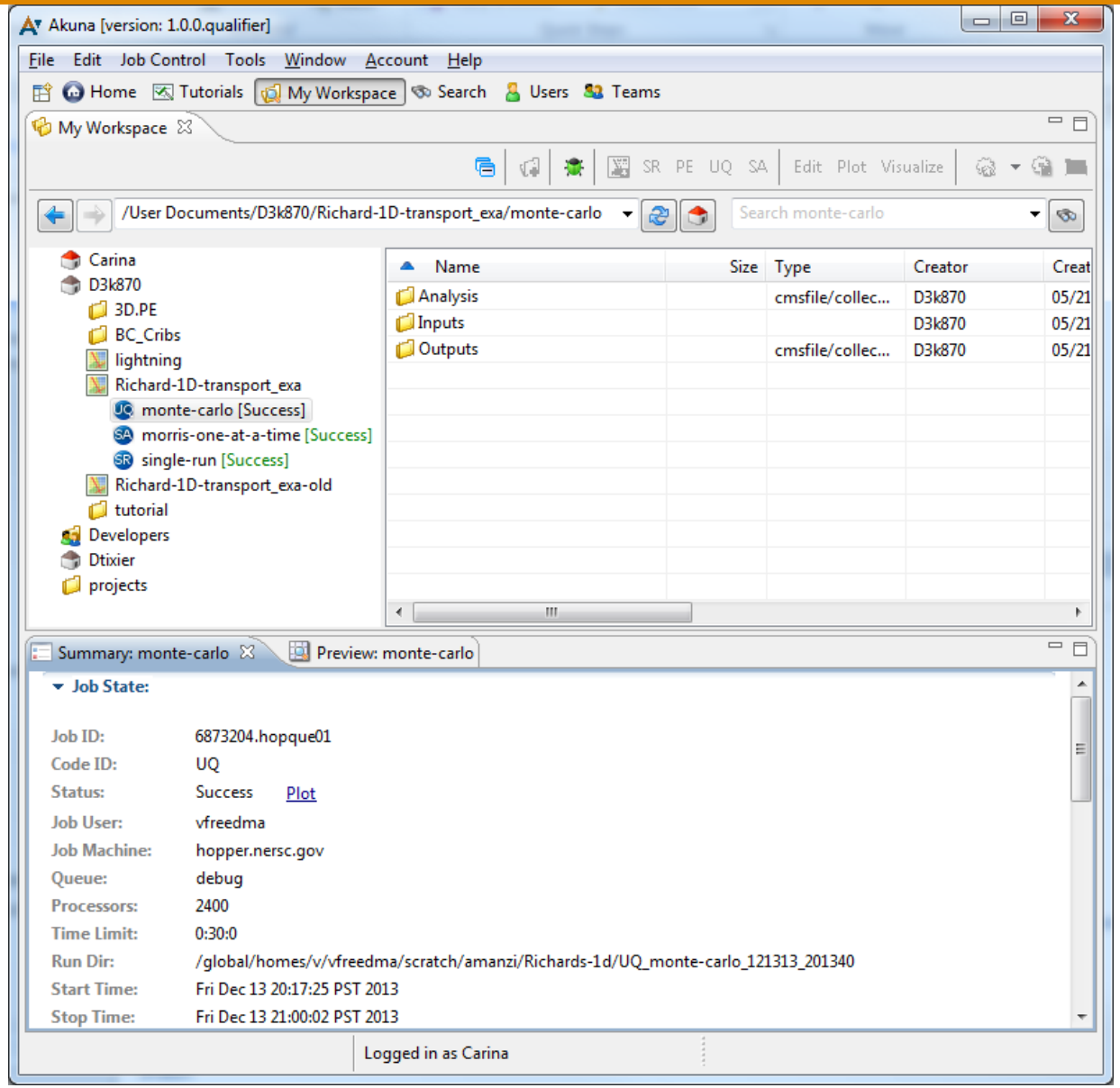

- Manage modeling projects, individual or collaborative
- View provenance information for each simulation run
- Simple explorer-like look and feel

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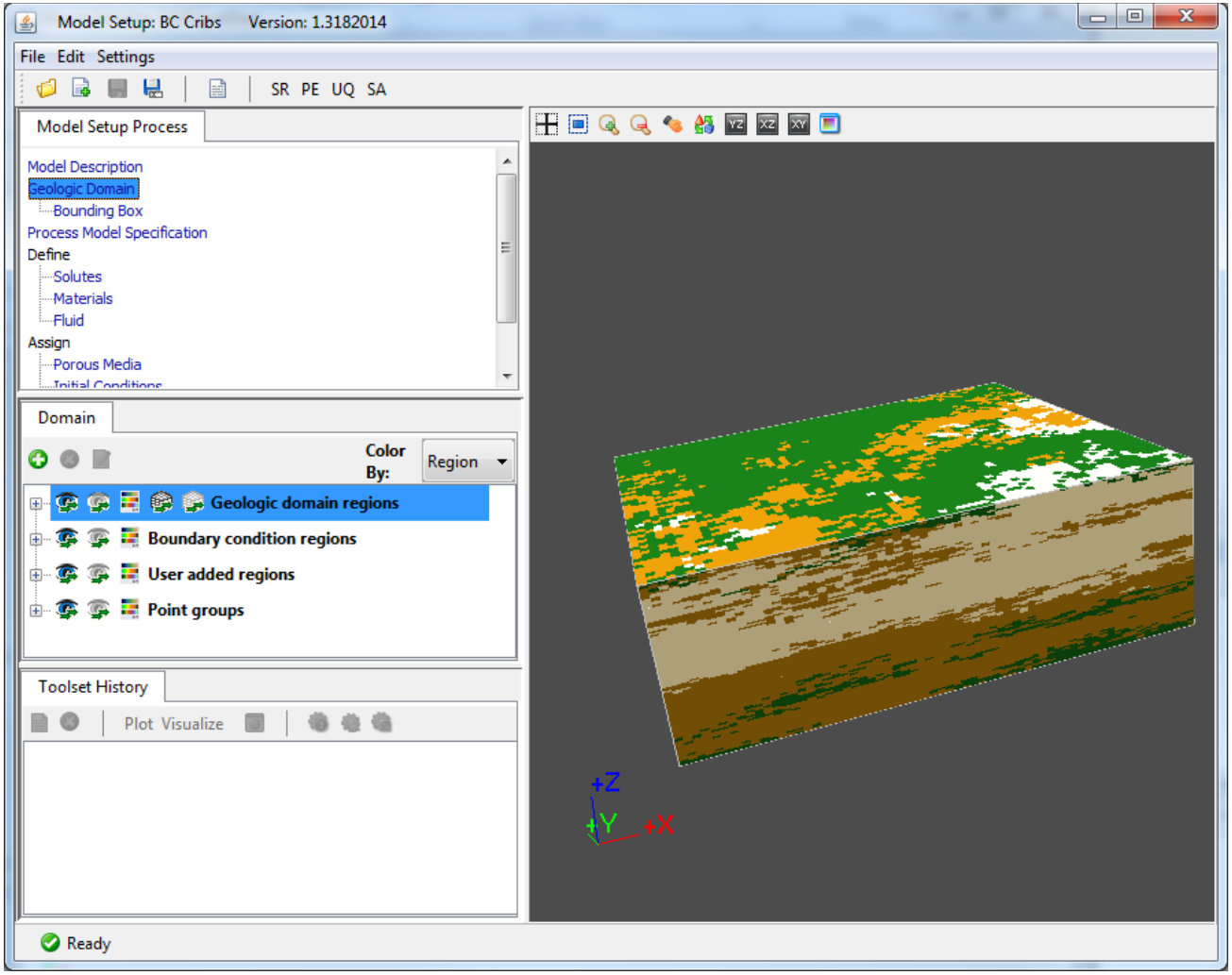

- Integrate 3D setup tools for defining conceptual model and input parameters
- Includes mesh generation
- Alternatively can define setup via input files for advanced users

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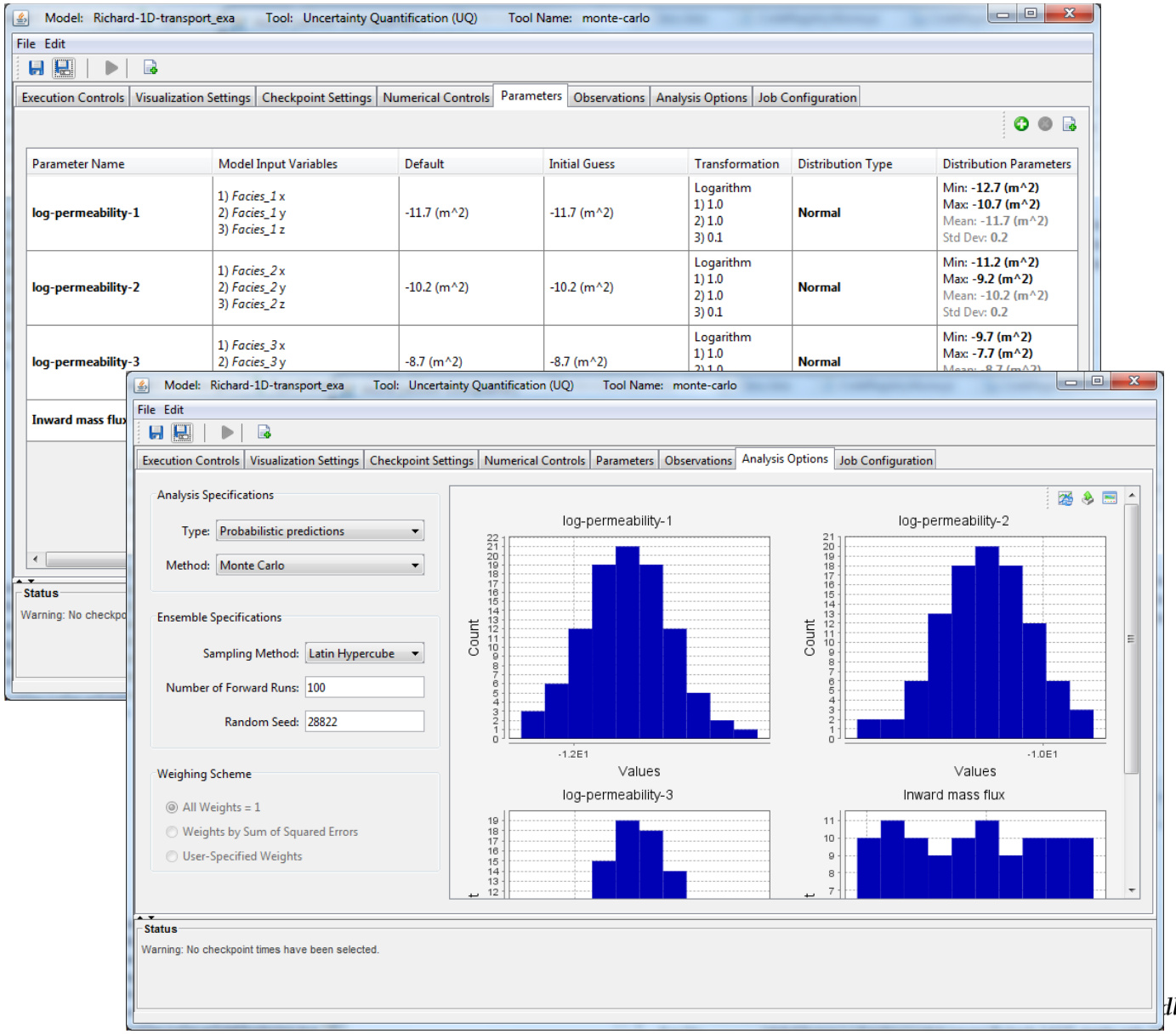

- Integrated ensemble configuration tools for controlling statistical ensembles such as uncertainty quantification and sensitivity analysis

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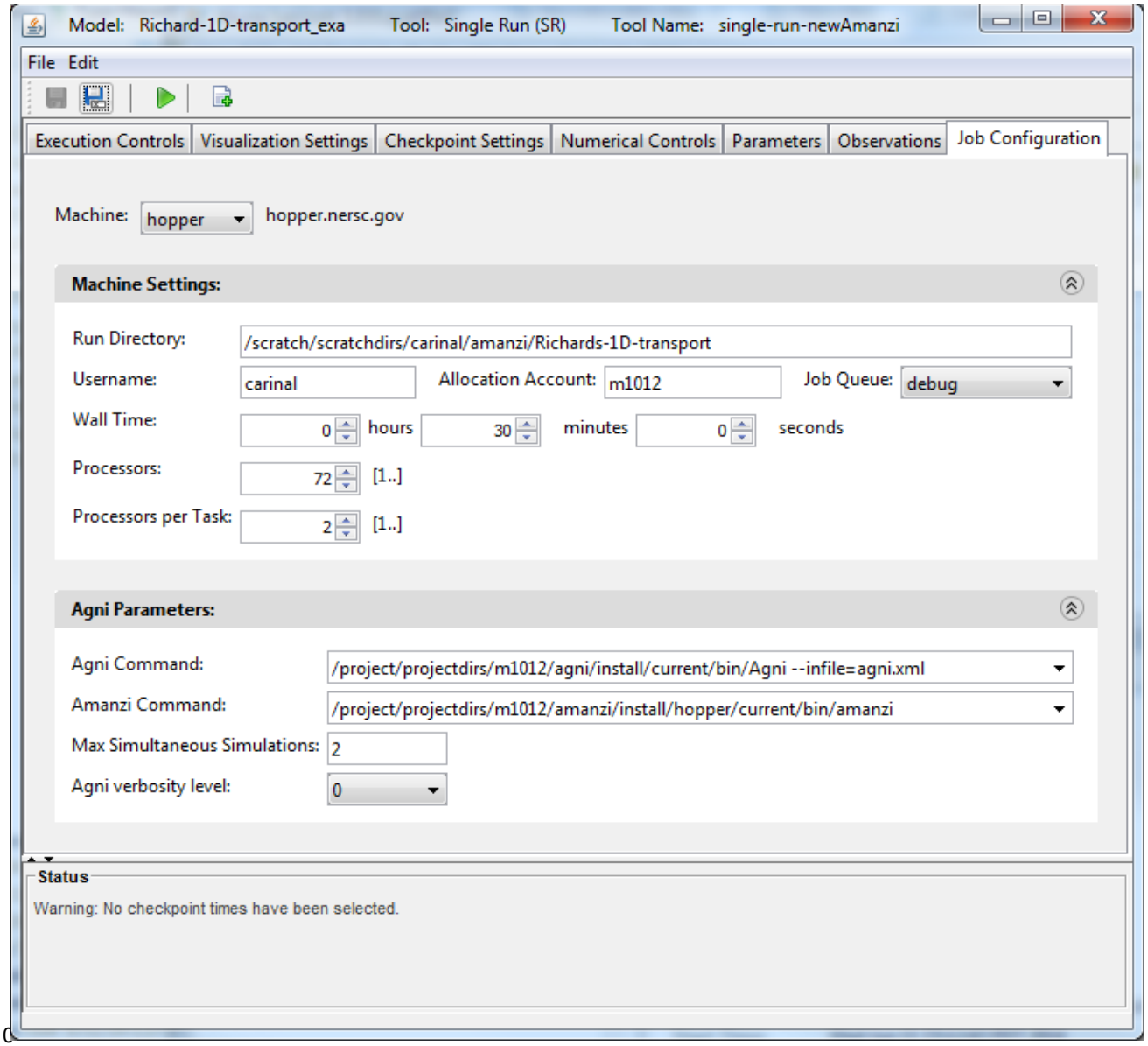

- Integrated HCP job configuration
- Simple user interface – “one click” launch
- Real-time run monitoring
- Automated capture of provenance information and output data
- Integration of outputs into analytic tools

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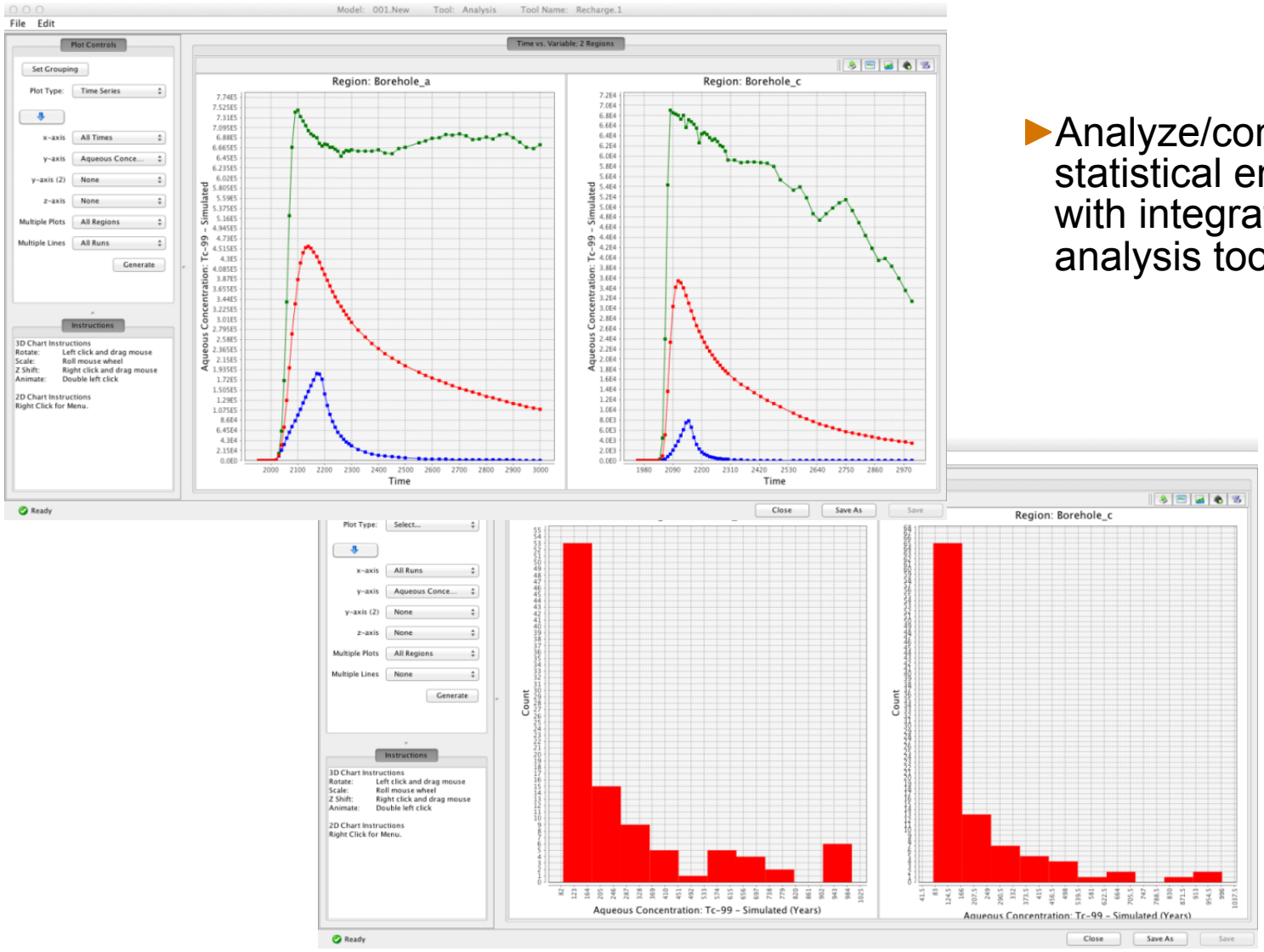

- Analyze/compare statistical ensemble runs with integrated temporal analysis tools

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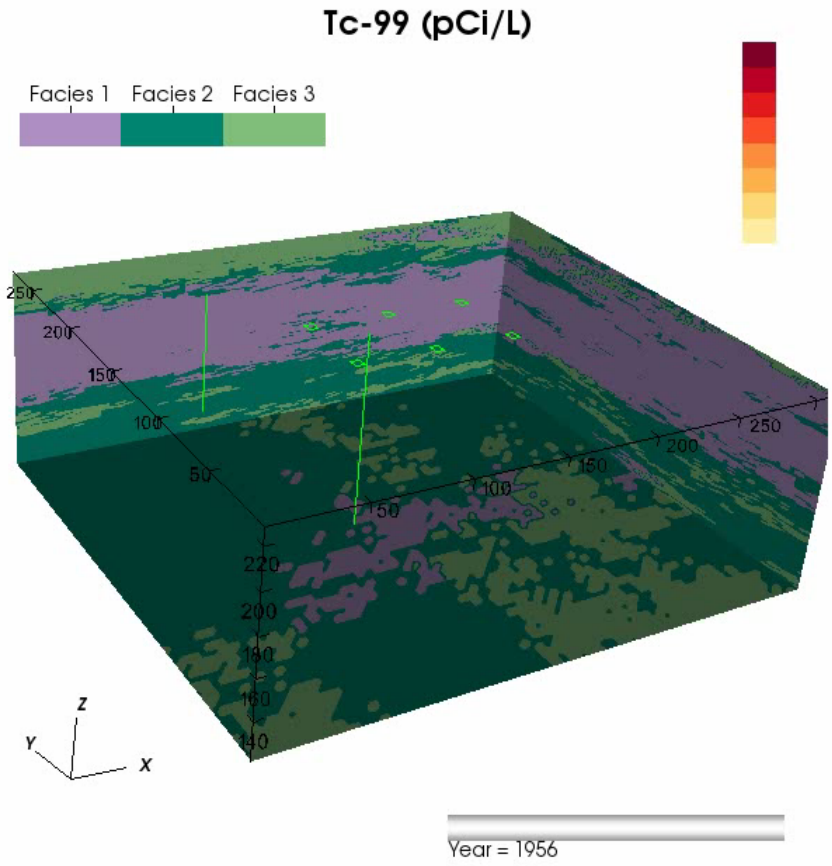
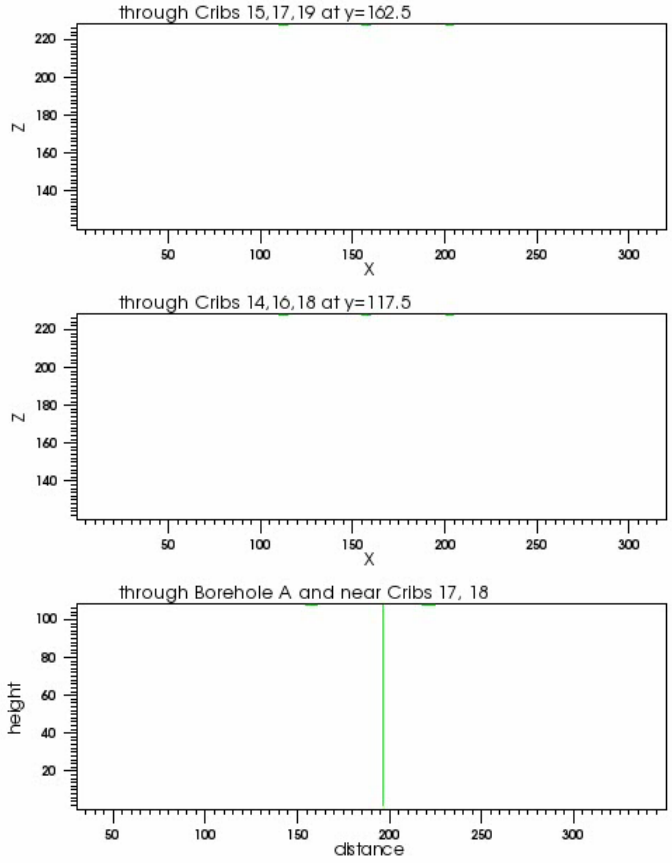
Velo Use Case: Akuna

- Analyze simulation results with integrated spatial visualization via VisIt 3D cluster-based visualization





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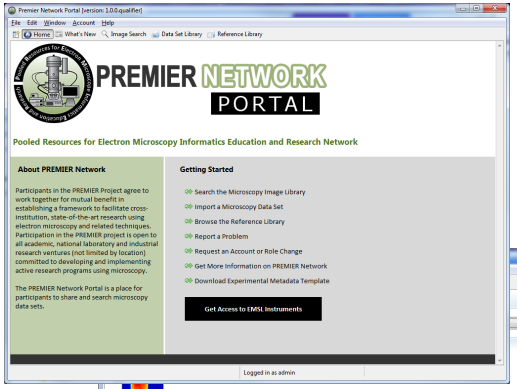
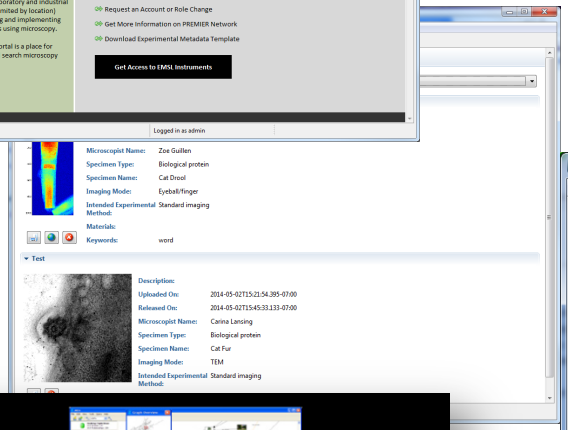
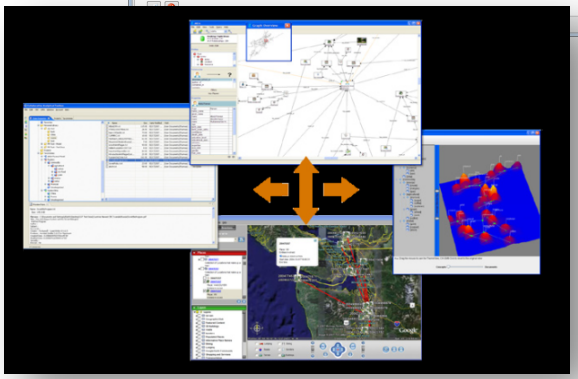
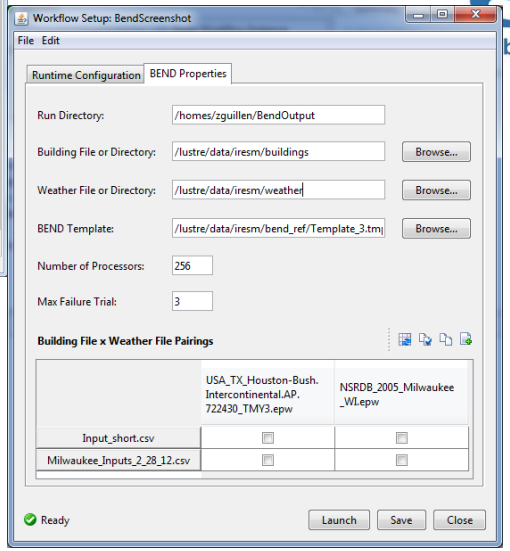
Velo's Different Faces

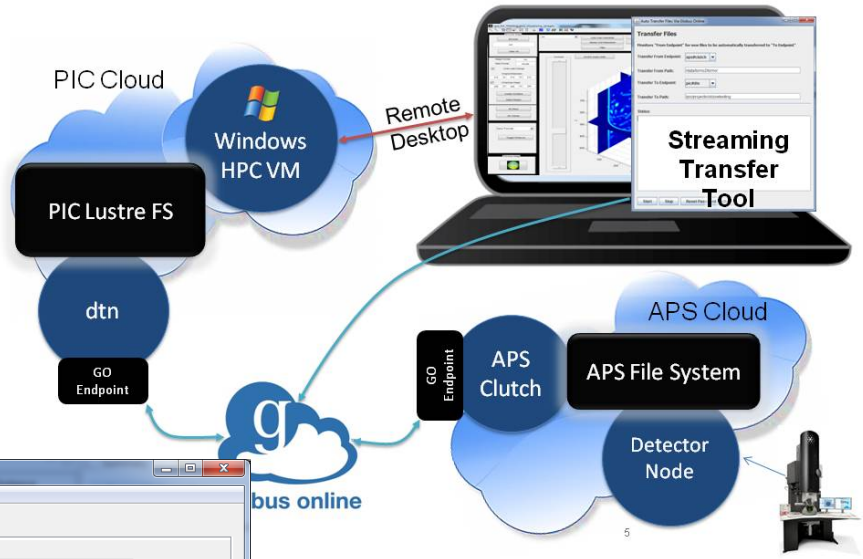
- Velo is highly customizable and each deployment has its own set of capabilities and look and feel, dependent on project requirements

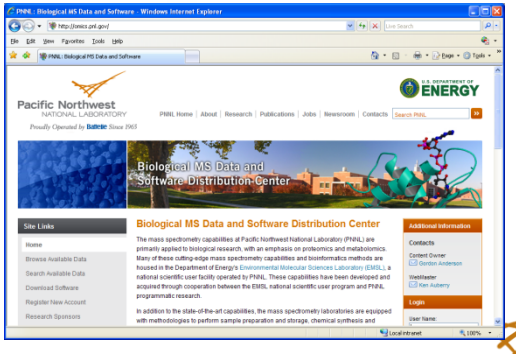












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