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Predicting Climate Feedbacks and Impacts in the Terrestrial Arctic: w14_terraarctic progress report

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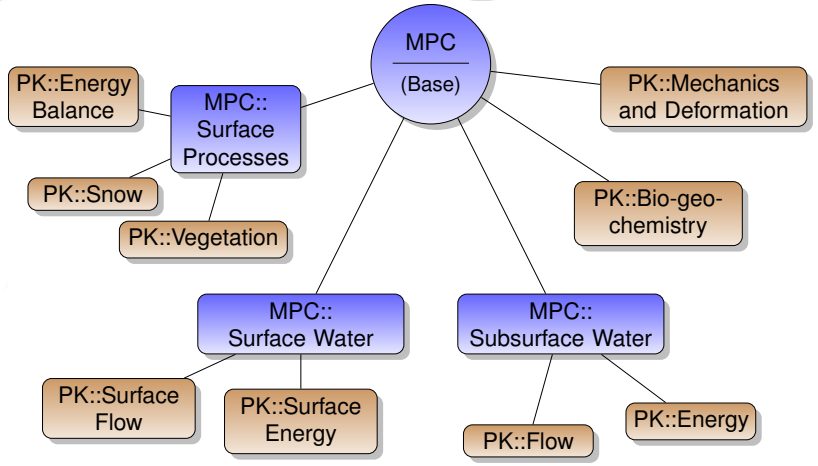
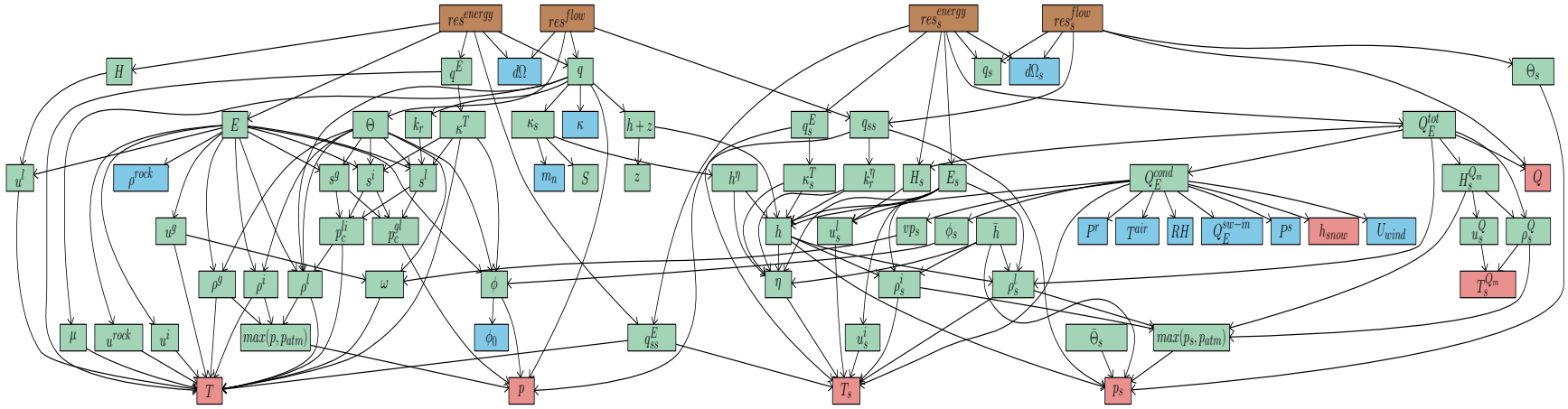
ATS and Arcos: a novel process management system

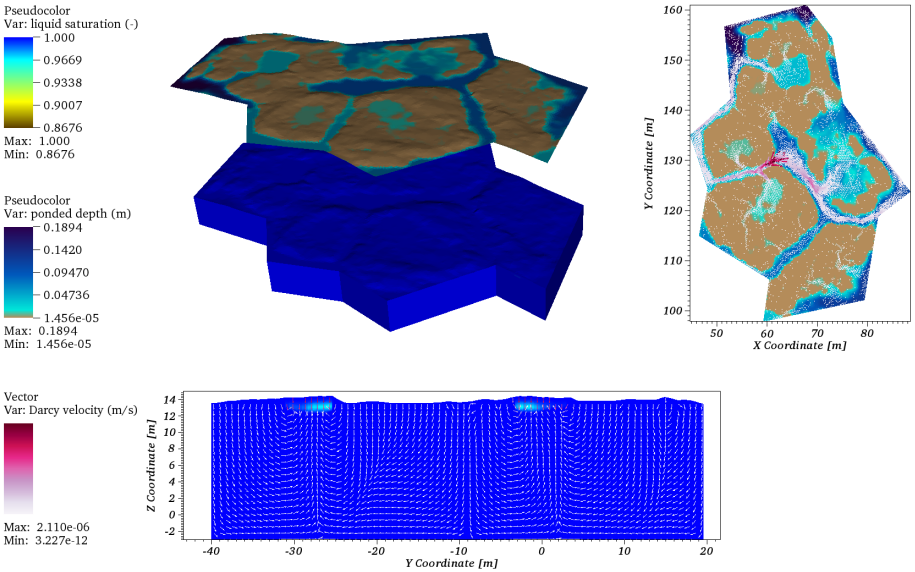


- Process models coded in individual process kernels (PKs) with multiprocess coordinators (MPCs) manage couplings
- Dependency graph allows PKs to register data needs and dependencies at runtime, resulting in a dynamically configured model.



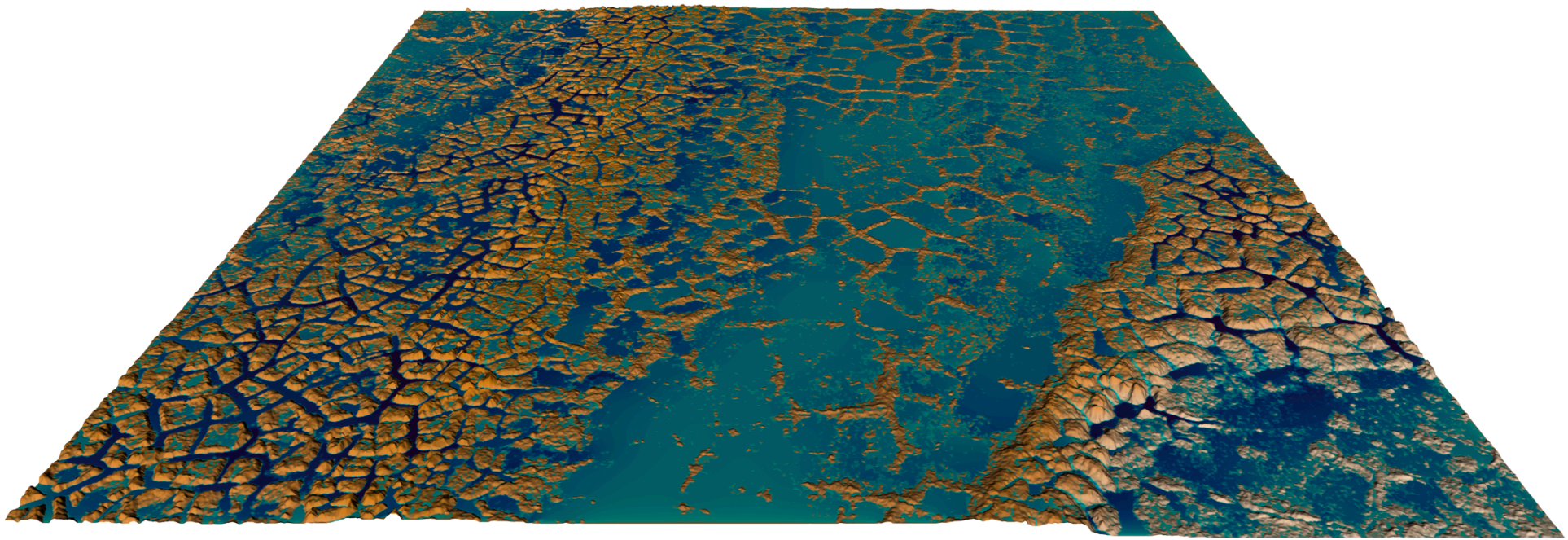
- Pink: Primary variables in a process kernel or evaluator
- Green: Dependent variables in the system (e.g., relative permeability)
- Blue: Input data (e.g., precipitation)

Arctic Terrestrial Simulator



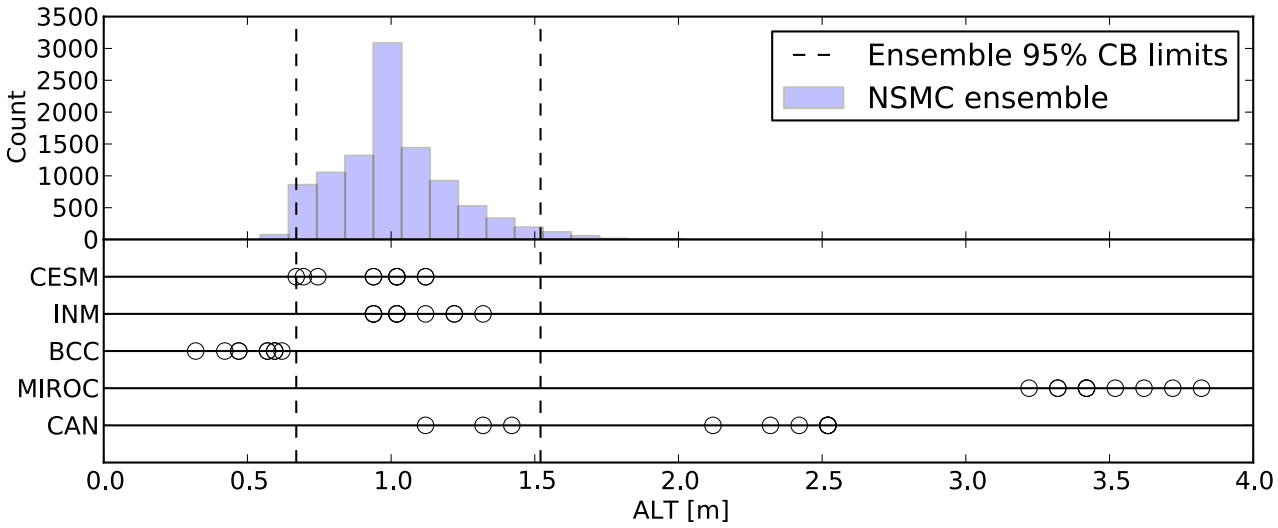
Previous work solved integrated hydrology (coupled surface/ subsurface flow) on multiple polygons, and surface flow over larger domains to guide landscape characterization.

Ongoing efforts extend these to thermal hydrology with freeze/thaw dynamics in three dimensions.



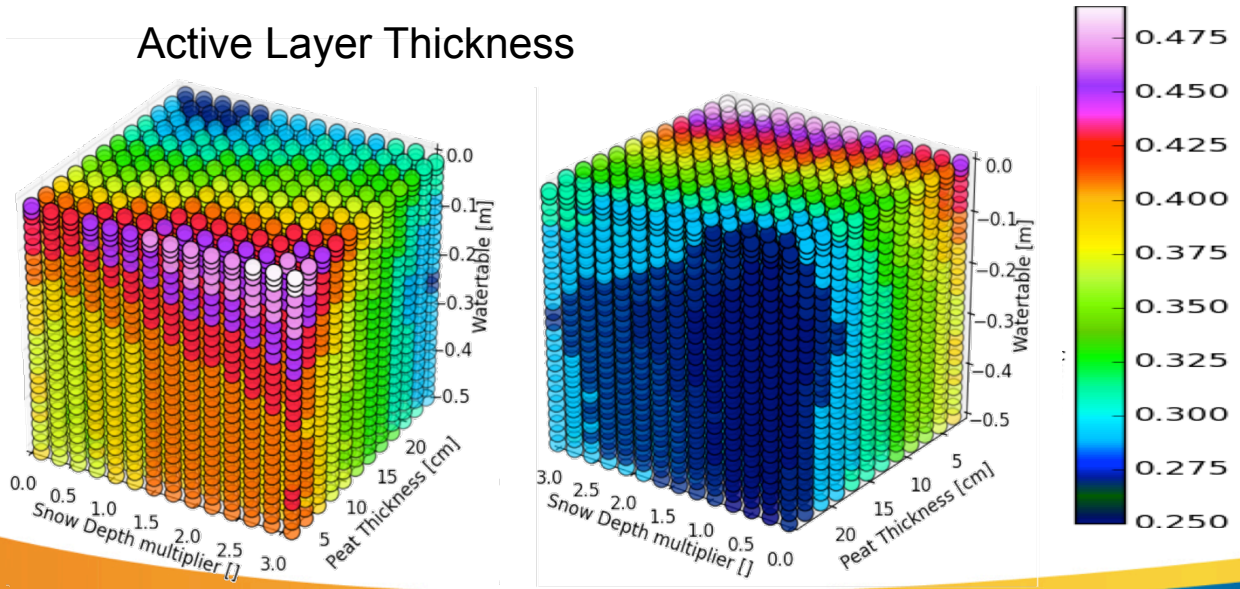
Arctic Terrestrial Simulator

This year's publications and products



- Null-space Monte Carlo study of sensitivity of Active Layer Thickness (ALT), the depth of soil which thaws each year, to observation-constrained parameter variability.
- Systematic understanding of environmental controls on ALT.

Active Layer Thickness



Results: two papers in review, a third in preparation, and a "featured highlight" for DOE/ BER sponsors.