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

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Intended for: Report

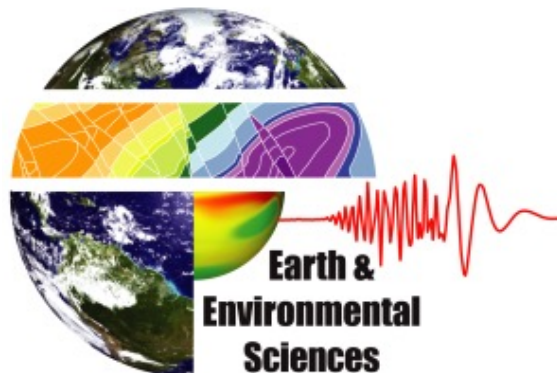
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Predicting Climate Feedbacks and Impacts in the Terrestrial Arctic: w14_terraarctic progress report

Ethan Coon (EES-16, contact)

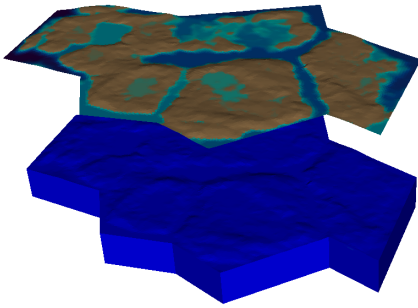


Adam Atchley
Rao Garimella
Dylan Harp

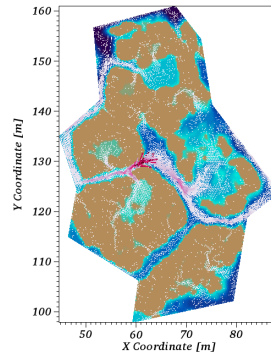
David Moulton
Cathy Wilson
Daniil Svyatsky

Arctic Terrestrial Simulator (ATS)

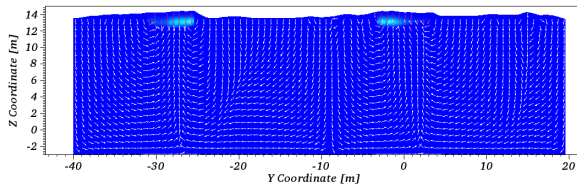
Pseudocolor
Var: liquid saturation (°)
1.000
0.9669
0.9338
0.9007
0.8676
Max: 1.000
Min: 0.8676



Pseudocolor
Var: ponded depth (m)
0.1894
0.1420
0.09470
0.04736
1.456e-05
Max: 0.1894
Min: 1.456e-05

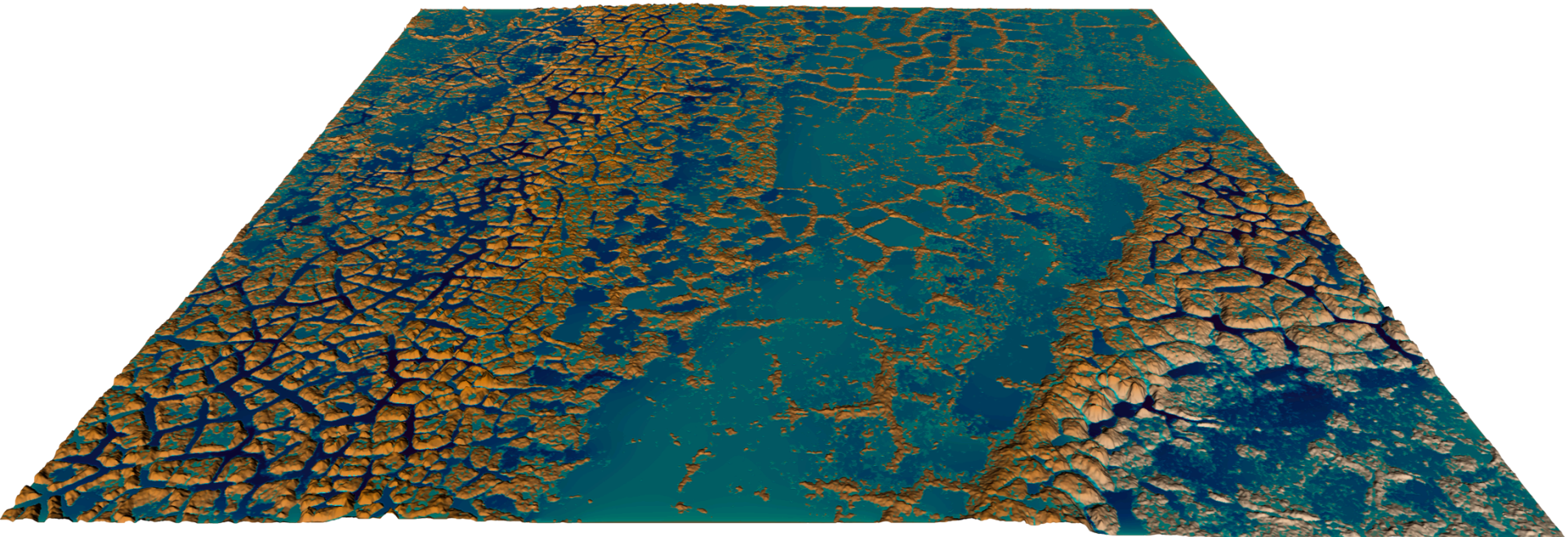


Vector
Var: Darcy velocity (m/s)
2.110e-06
3.227e-12



Previous work solved integrated hydrology (coupled surface/subsurface flow) on multiple polygons, and surface flow over larger domains to guide landscape characterization. Solved thermal hydrology with freeze/thaw dynamics in three dimensions.

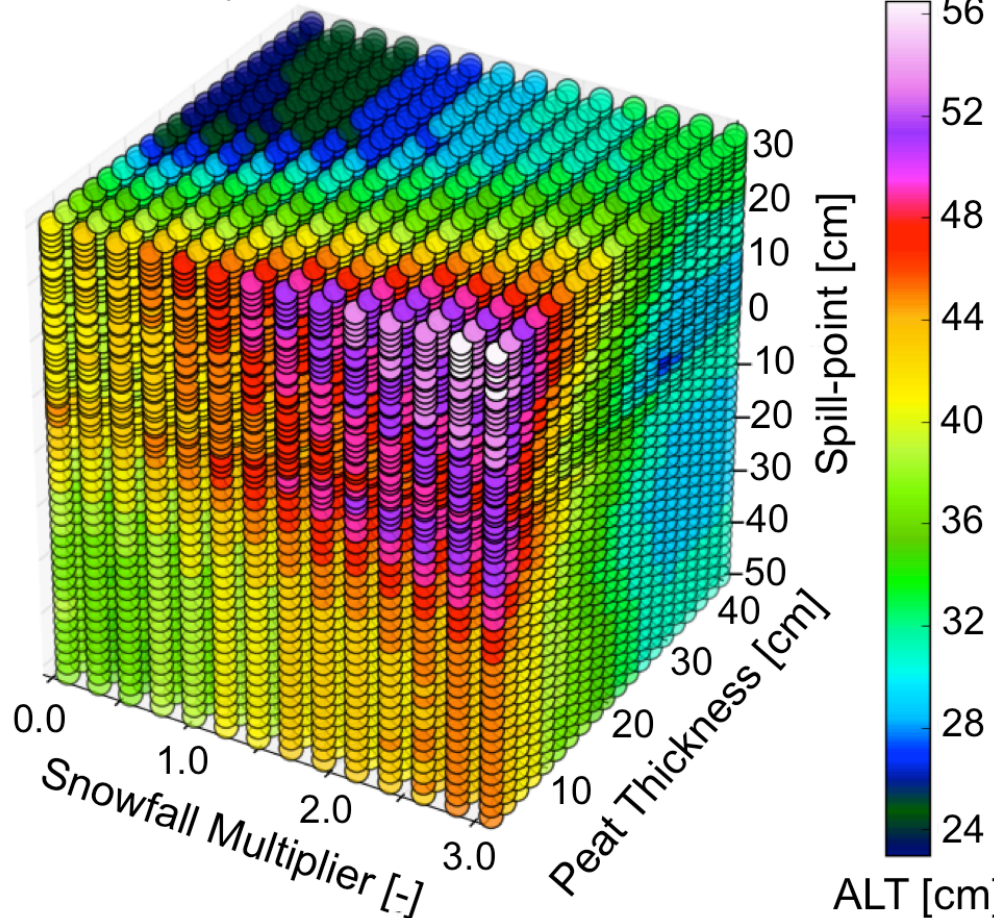
Ongoing efforts apply state of the art thermal hydrology model to complex topography, and include mesh deformation processes.



Using ATS to test ALT response to dynamic environmental conditions

This year's publications and products

Active Layer Thickness



- 15,960 Ensemble simulations to develop systematic understanding of environmental controls on ALT.

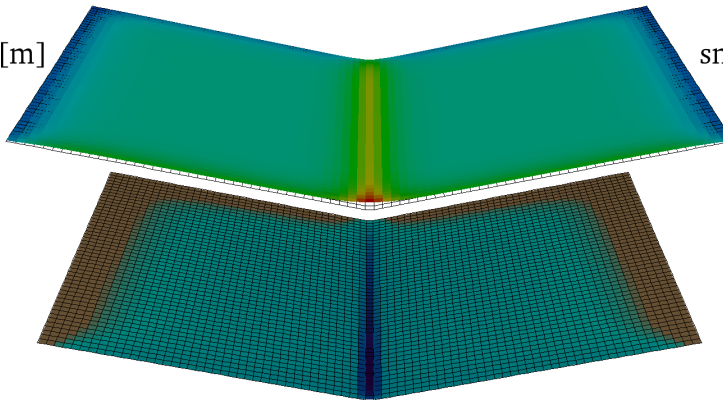
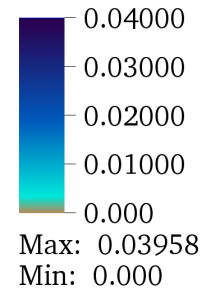
Results: 3rd major publication in a top tier journal, 2nd ensemble based NGEE-Arctic computational derived database, and a 2nd "featured science highlight" for DOE/BER sponsors within 6 months.

Demonstration of ATS – 3D Arctic capability

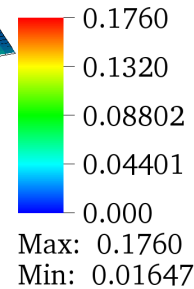
This year's publications and products

May 23

ponded depth [m]

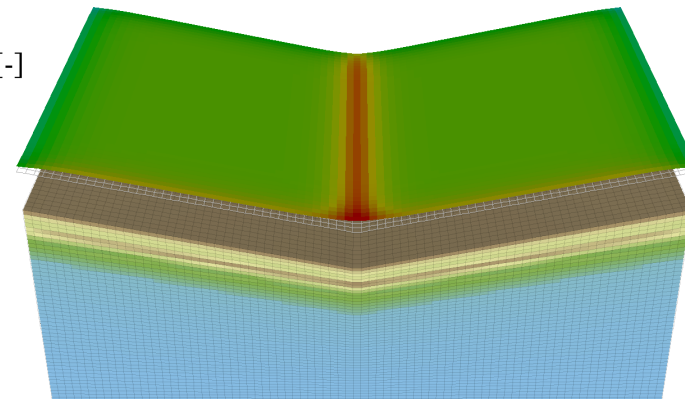
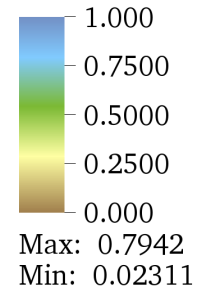


snow depth [m]

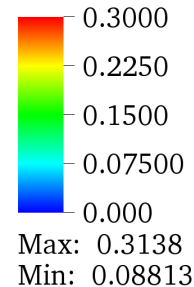


Nov 17

ice saturation [-]



snow depth [m]



- Demonstration of state of the art 3D ice-liquid-gas conditions with coupled surface and subsurface flow and atmospheric conditions.

Results: 4th published paper and demonstration of most technologically advanced simulation of terrestrial arctic dynamics.