

GEOMECHANICS OF THE CRYOSPHERE

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ABSTRACT

Warming in the cryosphere is causing significant changes and leading to increased interest in the polar regions. In particular, Arctic sea ice loss has led to increased maritime activity in the region requiring improved sea ice forecasts. Permafrost thaw has resulted in infrastructure damage and coastal erosion. Melting and calving of ice sheets in Antarctica and Greenland lead to higher sea levels creating risks to coastal infrastructure. Accurate modeling of the thermo-mechanics and dynamics of these cryosphere systems is key to predicting and understanding future changes.

The focus of this minisymposium is on new computational methodologies for simulating cryosphere systems (land ice, sea ice, permafrost, etc.) and their interactions. The goal is to bring together researchers working on a broad range of cryosphere modeling topics to discuss recent advances and identify synergies.

Topics of interest include, but are not restricted to, the following:

- Novel numerical discretizations for ice and permafrost mechanics
- New constitutive models
- Mechanics-based formulations of ice fracture/calving
- Multiscale methods for coupling models with different spatial/temporal scales
- Efficient solvers and methods for improving computational performance
- Advanced analysis techniques including data assimilation and uncertainty quantification
- Data-driven surrogate modeling approaches