



Climate Program Opening Workshop August 21-25, 2017

Lecture: *Modeling Arctic Sea Ice*

Speaker: Deborah Sulsky

Abstract:

As high-resolution simulations become increasingly possible and favored, questions are being raised about isotropic constitutive models for sea ice that are based on averaging material behavior over 100 km scales. At finer resolutions, it may not be appropriate to average over concentrated deformations which occur in leads and ridges since small regions do not contain sufficient numbers of these features at arbitrary orientations to support the assumption of isotropy. An elastic-decohesive constitutive model for pack ice has been developed that explicitly accounts for leads. The constitutive model is based on elasticity combined with a cohesive crack law that predicts the initiation, orientation and opening of leads.

This presentation shows results of the elastic-decohesive constitutive model applied to sea ice in the Arctic. We show simulation runs for lead openings, effective thickness and ice compactness. Ice compactness and thickness simulations are then compared to observations to validate the model. To this end we develop performance metrics that provide quantitative measures for the comparison. These metrics are easy to read, interpret and implement and show that the model performs reasonably well during winter months but less so during summer months.