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Use of a discrete element model to study failure modes of a sea ice cover

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Sea ice can deform through propagation of fractures, deliniating floes of different shape. The sea ice rheology depends on the shape and orientation of the floes. The fracture can occur through normal or shear failure. We use a discrete element model to study aggregate formation of blocks through different failure modes. The sea ice cover initially consists of polygonal floes connected by frozen joints. Once a critical amount of shear or compressive elastic deformation is reached at the joints, the joints fail. Multiple failure of the joints produce different flow shapes under different failure criteria.