Abstract

Hemmen Ice Rise, on Ronne Iceshelf, Antarctica, is at the origin of a large field of rifts, which were involved in the calving of iceberg A 38 on October 13th 1998. We use radar interferometric images collected by ERS 1 and RSAT 1 between 1)02 and 2000 to observe the behavior of this field. From the interferograms enerated, we retrieve important kinematic data, which we use to validate a model of ice deformation. This model is based on a viscous behavior of the ice helf in which the rifts propagate according to a Linear Elastic Fracture Mechanics criterion. We then reconstruct the entire sequence of events before the final calving. We are able to reach a good agreement with the observations on several points: 1) The propagation rates and the activity of the rifts are correctly evaluated throughout time. 2) The evolution of the ice flow around Hemmen Ice Rise is mapped adequately and plays a key role in the activation of rifts. 3) The acceleration of the active rifts and the onset of instability are determined with enough precision as to validate the LEFM theory behind our model. These results are an important step towards the setting up of a calving law for iceshelves.

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