Session: Ice sheet mass budget
Poster presentation

Comparison of ice-shelf elastic deformation simulations with tidal displacements measured with ERS radar interferometry on Ronne Ice Shelf, Antarctica

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Multiple radar interferograms from the ERS satellite, maybe used to eliminate the influence of the long-term velocity of an ice shelf to isolate the deformation signals associated with the cyclic, vertical motion of the ice shelf under the influence of tidal forcing from the ocean. A series of many 1992, 1995 and 1996 ERS images acquired around Hemmen Ice Rise, along the western flank of Berkner Island, in the Ronne Ice Shelf, Antarctica, are used to produce a time series of tidal observations, with different temporal baselines. A finite element model of the ice shelf predicts independently elastic deformation of the ice shelf under various types of tidal forcing (e.g., semidiurnal and diurnal Kelvin waves, ice-front trapped vorticity waves, Poincare modes). New information about the tidal regime of the ice shelf and the perturbing influence of Hemmen Ice Rise is then gained by comparison between the model predictions and interferometric observations. The method makes it possible to estimate important glaciological parameters, such as the elastic rigidity of the ice, to determine the possible resonant modes of oscillations of the ice shelf and their possible influence of the formation of cracks leading to icebergs, and to elucidate the possible role of tidal current and sea-surface tilt on the tidal deformation of the ice shelf.