



Exceptional retreat of Kangerdlugssuaq Glacier, east Greenland, between 2016 and 2018

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Kangerdlugssuaq Glacier is one of Greenland's largest tidewater outlet glaciers, accounting for approximately 5 % of all ice discharge from the Greenland Ice Sheet. In 2018 the Kangerlussuaq ice front reached its most retreated position, since observations began in 1932. We determine the relationship between retreat and: (i) ice velocity; and (ii) surface elevation change, to assess the impact of the retreat on the glacier trunk. Between 2016 and 2018 the glacier retreated ~5 km and brought the Kangerlussuaq ice front into a major (~15 km long) overdeepening. Coincident with this retreat, the glacier thinned as a result of near-terminus acceleration in ice flow. The sub-glacial topography means that 2016-18 terminus recession is likely to trigger a series of feedbacks between retreat, thinning and glacier acceleration, leading to a rapid and high-magnitude increase in discharge and sea level rise contribution. Dynamic thinning may continue until the glacier reaches the upward sloping bed ~10 km inland of its current position. Given the complexity and scale of the processes involved, such changes will not be represented in prognostic models of the Greenland Ice Sheet to 2100 and beyond.