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Observed rift propagation in the Larsen C Ice Shelf from Sentinel 1-A radar data

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The Larsen C Ice Shelf is the most northerly of the remaining major Antarctic Peninsula ice shelves and is vulnerable to changes in both to ocean and atmospheric forcing. It is the largest ice shelf in the region and its loss would lead to a significant drawdown of ice from the Antarctic Peninsula Ice Sheet. There have been observations of widespread thinning, melt ponding in the northern inlets, and, in the northern part, a speed-up in ice flow, all processes which have been linked to former ice shelf collapses. Previous studies have also highlighted the vulnerability of Larsen C Ice Shelf to specific potential changes in its geometry including a retreat from the Bawden and Gipps Ice Rise. In a change from the usual pattern, a northwards-propagating rift from Gipps Ice Rise has recently advanced towards the center of the ice shelf. It is now more than halfway towards calving a large section of the ice shelf and continues to widen. We followed the rift propagation on MODIS and Landsat imagery and, during the austral winter 2015, on Sentinel-1A radar data. Due to the very cloudy weather conditions during the austral Summer 2015 / 2016 the Sentinel data became an essential part of the monitoring. By calculating differential interferograms it was possible to clearly identify the active tip of the rift, which was not always obvious on the Landsat images. Further, surface velocities were derived from recent Sentinel-1A acquisitions by means of offset intensity tracking. In order to investigate a possible speed-up of the ice shelf we extended the study area to the north including Bawden ice rise.