



## **Operation Integration of Earth Observation Technology and Ice Modelling for Flood Forecasting**

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Many northern rivers developing ice covers during the winter season are prone to ice-related flooding. In order to assess flood risk and mitigate its impact, it is imperative to monitor the development of ice covers throughout the ice season, with particular emphasis on the freeze-up and break-up periods. Key parameters required to assess the danger of flooding due to ice jams include location, extent and structure of the ice field. However, a systematic determination of these parameters is difficult to achieve using conventional, field-based and aerial surveillance methods. In remote and inaccessible areas, frequent surveillance can be prohibitively costly. Under these conditions, earth observation (EO) has emerged as a promising tool to collect information on river ice development over large areas repeatedly and consistently throughout the ice season.

This study presents experiences gained in the satellite-based monitoring of river ice on the Exploits River, Newfoundland. Since 2003, RADARSAT and ENVISAT synthetic aperture radar (SAR) imagery has been used routinely to monitor ice conditions near the town of Badger in near real-time. The observation and modelling of ice development on the Exploits River was enhanced significantly by the use of EO data. The accurate location of the ice front reduced the uncertainty associated with the timing of flooding, and integrating satellite imagery into the forecasting process was material in estimating the 2004 flooding event to within two days. The importance of SAR imagery for accurate location of the ice front cannot be overstated: it represents a major improvement in the flood forecast for the residents of Badger, and SAR will continue to be needed in the future for accurate location of the ice front.