Natural Resources Canada
Ressources naturelles Canada

CCRS emergency management activities in Canada

Don Raymond, Lori White, Robert Landry, Vincent Decker, Alice Deschamps, Calin Ungureanu, Goran Pavlic, Vern Singhroy, and François Charbonneau

Primary collaborators: Public Safety Canada, Department of National Defence, Mapping Information Branch (NRCan), Department Emergency Operations Centre (NRCan)

The Emergency Management Team at the Canada Centre for Remote Sensing (CCRS) provides expert support for Natural Resources Canada's (NRCan's) Emergency Management Plan 4: Geomatics Support, which in turn supports the Government of Canada *Emergency Management Act*. CCRS plays a key role in providing methodologies and satellite-derived data products to facilitate emergency response. To date, the vast majority of responses have been for flooding events, though the team is able to respond to a wide range of other emergency scenarios.

Expert flood mapping methodologies have been developed that leverage geographic information systems (GIS) and remote sensing technologies. At present, these utilise primarily Canada's RADARSAT-1 and RADARSAT-2 satellite sensors. Radar backscatter characteristics are used to delineate the flooded areas in a semi-automated manner. The resulting GIS-ready data products are provided in near-real time (typically 4 to 6 hours after satellite image acquisition) and can be used to overlay on pre- and post-flood images or combined with other GIS data.

The data products are delivered to clients on a MapServer (Web-based) or by file transfer protocol (FTP) for ease of transfer and integration. The underlying methodologies and spatial models have been modified recently to ingest other synthetic aperture radar (SAR) satellites such as ENVISAT, ALOS and TerraSAR-X.

Requests for mapping expertise most often come from Public Safety Canada and the Department of National Defence (DND), which use these data to assist in situational awareness for decision support, planning, possible liaison with additional partners and troop deployment purposes.

Emergency response within Canada, 2006 to 2009

Manitoba

Severe flooding occurred along the Red River in Manitoba in March and April 2009. The flood was the result of a heavy snowpack, spring runoff and precipitation. The geo-spatial data products generated by the Emergency Management Team at CCRS were accessed daily and utilised extensively by Public Safety Canada, Manitoba's emergency response and flood forecasting agencies, NRCan's Emergency Operations Centre, DND and other government departments in Canada and the United States.

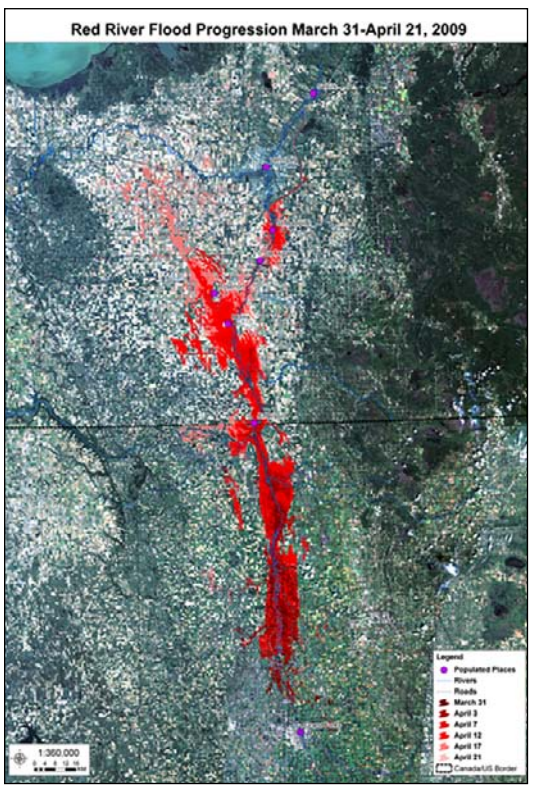

Figure 1. Flooding along the Red River, 2009

A time series of more than 40 RADARSAT frames were processed in near-real time for the emergency response.

The image in Figure 1 shows the flood progression by using a red colour gradient along the Red River from March 31 (darkest red) to April 21 (lightest red). The background image is a mosaic of several Landsat images from 2007 and 2008.

British Columbia

Certain areas in British Columbia are prone to flooding in the spring from rain and snow melt. In June 2007, several areas were flooded because of the rapid melting of a particularly heavy snowpack. At the request of DND and Public Safety Canada, CCRS provided flood mapping products for Terrace, Prince George, Quesnel and the lower Fraser Valley. This information was also used by DND to aid in planning troop deployment.

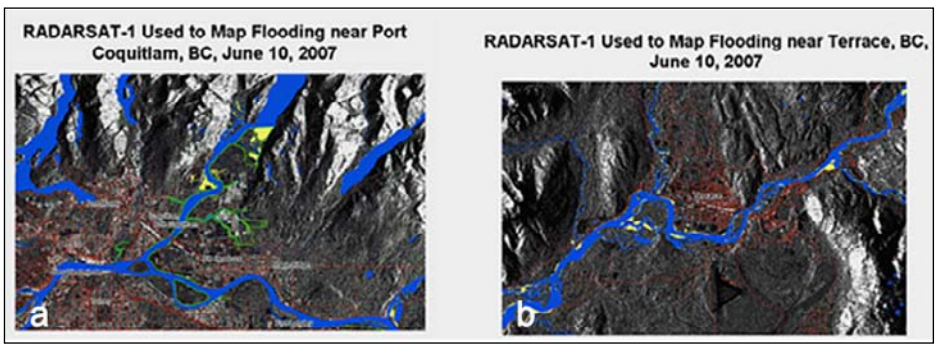

Figure 2. Extent of flooding near Port Coquitlam and Terrace, British Columbia, 2007

Figure 2 shows open water flood polygons extracted on June 10, 2007, at Port Coquitlam on the left and at Terrace, British Columbia, on the right. Imagery is RADARSAT-1, and the flood polygons are shown in yellow and the dikes in green.

New Brunswick

Flooding of the Saint John River in New Brunswick began in late April 2008. As a result, there was extensive damage to homes and other infrastructure (such as roads) along the valley from Fredericton to Saint John. Flood mapping products from CCRS were provided to the Canadian military and other organizations to aid in the emergency response.

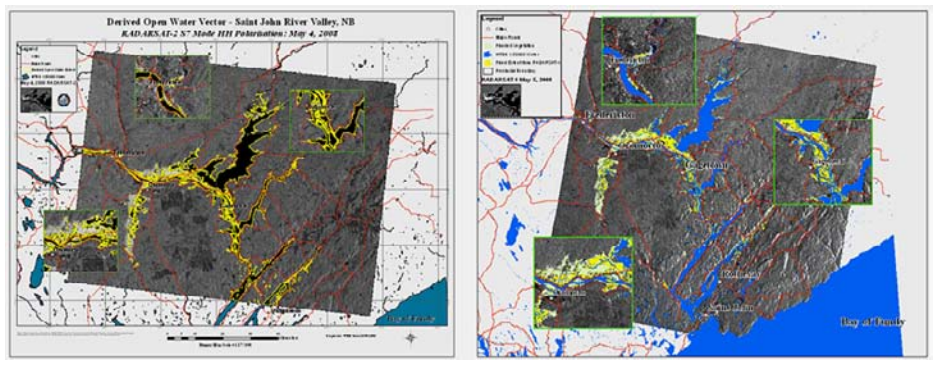

Figure 3. Extent of flooding of the Saint John River, 2008

Figure 3 shows open water flood polygons that were extracted on May 4 and 5, 2008. The imagery on May 4 (on the left) is RADARSAT-2 and on May 5 (on the right) is RADARSAT-1.

Cat. No. M114-15/2011E-PDF (On-line)
ISBN 978-1-100-19026-6

Canada