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# An online portal for automated SAR and lidar integration for surface water monitoring

Chris Hopkinson (1), Husam Ali (1), Brian Brisco (2), David McCaffrey (1), Josh Montgomery (1), Shane Patterson (3), and Rihana Peiman (1)

(1) Department of Geography, University of Lethbridge, Lethbridge, Canada (c.hopkinson@uleth.ca), (2) Canada Centre for Remote Sensing, Natural Resources Canada, Ottawa, Canada, (3) Government of Alberta, Edmonton, Canada

In preparation for RadarSat Constellation Mission (RCM), and as part of a new regional satellite water monitoring framework, we present automated time-series inundation mapping using intensity and texture-based water classification methods for two Prairie and Boreal Forest landscape end members in Alberta, Canada. Time series HH polarisation high resolution (3m) synthetic aperture radar (SAR) imagery were captured using RadarSat II from 2013 to 2015 and thresholded to produce water masks on a cloud-based platform (SARWATPy) using fully open source routines. Temporal binary water masks were integrated with high-resolution lidar digital elevation models (DEM) for purposes of quality control and water body attributing. Online open source image processing and GIS modeling techniques were used to extract lidar-derived water surface elevations and track variations in water-level, pseudo-depth (above lidar baseline water surface) and pseudo-volume change across the study areas. A new wetland 'hydroperiod' attribute was added to the water body database to provide a quantification of inundation probability through time. Water bodies were assigned unique identifiers so that levels and volumes could be tracked and summarised according to various query criteria. The cloud-based solution is set up to be fully automated using multiple sensor and environmental criteria for internal image processing and database-building quality control but an administrative user can enter the processing workflow should the outputs be flagged as questionable. The platform is designed to be interactive with an end user using a web enabled map browser with multiple query options. The platform is in early stages of development but is intended to support a range of water user needs, such as water resources monitoring, flood hazard assessments, wetland inventory and monitoring. The current temporal frequency of 24 day repeat available with RadarSat 2 will be enhanced to $\sim$4 days with RCM, thus enabling more consistent and reliable surface water monitoring.

The presentation will describe: i) the platform components; ii) a comparison of SAR and optical water masks; iii) seasonal and inter-annual variations in water extent, level and pseudo-volume at the case study sites; iv) possible implementation options; and v) recommendations for baseline bathymetric data collection so that pseudo-depth and volume can be converted to absolute estimates.