Optical and Radar Multi-Sensor Integration for Historical and Near-Real Time Surface Flood Water Mapping

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ABSTRACT

Mapping the historical occurrence of flood water in time and space provides information that can be used to help mitigate damage from future flood events. Within the Emergency Geomatics Services (EGS) at the Canada Centre for Remote Sensing, operational flood mapping has been performed mainly from RadarSat imagery in near real time to enhance situational awareness during an emergency, and more recently from Landsat to examine historical surface water dynamics from the mid-1980s to present. Current work seeks to integrate the two data sources for both operational and historical flood mapping. The main challenges of a multi-sensor approach for mapping historical surface water include ensuring consistency between surface water mapped from sensors that fundamentally interact with the target differently, particularly in areas of flooded vegetation. In addition, automation of work flows that previously relied on manual interpretation is increasingly needed due to large data volumes contained within satellite image archives. Despite differences between data received from both sensor types, common approaches to surface water and flooded vegetation extraction including multi-channel classification, single channel thresholding, region growing and smart sieving are applied with sensor-specific adaptations for each approach. This presentation will show previous work on inundation frequency from Landsat imagery over a number of floodplains in Canada that are prone to seasonal flooding, including St-John, Richelieu and Red Rivers, and future directions towards multi-sensor integration using Landsat and RadarSat 1 and 2 image archives to reliably and automatically map surface water both in near real time for EGS operations, as well as historically. Advantages of each sensor type for mapping surface water and flooded vegetation with respect to revisit time, coverage and cloud penetration will be discussed with the merits of multi-sensor integration combining the best attributes of both.