Earth Observation Satellite Data to Support Wildfire Response: A Case Study of the Fort McMurray Horse River Fire

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ABSTRACT

Wildfires affect many countries and while they have an important ecological role, these wildfires can also threaten communities and public safety, and impact many ecosystem services. The Horse River wildfire in Fort McMurray that occurred in May and June 2016 burned over 600,000 ha and is estimated to be the costliest disaster for insurers in Canadian history. To support wildfire management, numerous multi-resolution satellite data are used by the Alberta Government’s Wildfire Management Branch to provide timely information on the status of the wildfires. This information complements ground and aerial observations for strategic and tactical wildfire responses.

The rate of spread of the Horse River wildfire challenged conventional wildfire monitoring approaches. Earth observation sensors played an important role in the monitoring of the progression of the Horse River Wildfire, particularly during the activation of International Charter on Space and Major Disasters. Various optical and radar satellites operated by the private sector and governmental agencies around the world were mobilized to provide free and immediate release of satellite data over Horse River Wildfire. These data were available through the Wildfire Management Branch to the incident management team in near-real time to help track the wildfire’s progression. This was critical once the wildfire grew in size beyond the feasibility of using aerial surveillance. These datasets were used for hotspot detection (Modis/VIIRS data) and burned area mapping during the wildfire (Landsat 7/8, Sentinel-2, and WorldView-3 SWIR imagery that can penetrate through haze/smoke).

This unprecedented event and response effort led to a number of lessons-learned and opportunities for future improvement in the operational delivery of wildfire mapping using remote sensing data. This paper will first present an overview on how different remote sensing data were used to monitor the progression of the Horse River Wildfire, what lessons we learned and what challenges should be considered for the future.

The potential for radar data to support the wildfire response has not been fully explored. As an end user and partner in a new Canadian Space Agency funded project (Rapid Radar Mapping to Support Wildfire Response and Recovery Operations), the Wildfire Management Branch is collaborating with Hatfield Consultants to evaluate the potential for the integration of Sentinel-2 and RADARSAT-2 data for rapid burned area mapping during a wildfire. This project demonstrates the potential for partnership between industry and provincial and federal government agencies to tackle a significant and growing natural disaster in Canada. A brief overview of this project and preliminary results will be also presented.