RADARSAT-2 DATA UTILIZATIONS AND APPLICATIONS

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1. INTRODUCTION

Users of RADARSAT-2 data can be divided into Canadian Government users and commercial users. Canadian Government users include all users of Canadian Departments as well as the Provincial and Territorial Governments, and researchers sponsored by the Government of Canada. The present manuscript focuses on the use of RADARSAT-2 by Government of Canada.

RADARSAT-2 became operational in April 2008. The Government of Canada objectives in using RADARSAT-2 data are to:

• Generate benefits for Canadians through the development, implementation and use of RADARSAT-2 data for new applications or to improve existing ones;
• Meet international obligations of the Government of Canada.

RADARSAT-2 provides data that support Government of Canada priorities mainly in the areas of:

• Environmental monitoring, especially in Polar regions;
• Security and sovereignty of Canada in the Arctic;
• Resource, land use and coastal surveillance and management.

2. DATA ACQUISITIONS

The total volume of RADARSAT-2 data used by Government of Canada was 9,234 scenes for the first year of operation and up to 20,000 scenes for the second one. About 40% of the scene acquisitions are used to support Research & Development and furthermore, two beam modes were requested for more than half of the acquisitions, i.e. the polarimetric Quad polarization Fine mode and the selective single polarization Ultra-Fine mode.

During the first years of operation, RADARSAT-2 was used operationally by Environment Canada and the Department of National Defence; and experimentally by several Departments, i.e. Agriculture and Agri-Food Canada, Natural Resources Canada, Fisheries and Oceans Canada, Parks Canada, Public Safety Canada, Indian and Northern Affairs Canada and Statistics Canada as well as the Canadian Space Agency and there is more to come. More than 115 research projects, addressed to the national and international Earth Observation community, are supported by the Government of Canada in a wide selection of applications ranging from fundamental to applied research and development activities.

3. DATA UTILIZATIONS AND APPLICATIONS

RADARSAT-2 is used operationally to obtain all weather, all day images of the sea ice and lake ice in order to provide information that is used for safe passage of ships in navigable Canadian waters. Ships are efficiently routed using near real time data from RADARSAT-2 images. RADARSAT-2 imagery has also been used for maritime surveillance applications monitoring shipping approaching Canada's coasts, to detect oil spills and pollution at night and in cloudy conditions. Other significant researches have been done in oceanography. Emerging applications focused on (a) ocean surface waves (b) marine winds (c) ocean features such as oceanographic fronts and specifically sea surface temperatures. Substantial progress has been made in improving the ability to monitor and model these three variables.

RADARSAT-2 data are used to map glacial ice movement to help document changes over ice-covered land masses in the Arctic and also to provide information regarding fresh open water and fresh water ice that contributes to the knowledge of Canada's freshwater resources. RADARSAT-2 imagery was also used to monitor and identify flooding risks on numerous rivers in Canada and also to identify the condition of the ice during the spring break-up and thaw.

RADARSAT-2 images were used to assist in the assessment of forest cover, and change detection e.g., clear-cutting, forest fires and insect defoliation. There is also a great potential for wetland classification. The polarimetric Quad polarization Fine mode was used to provide better information for crop identification. It also proved useful in soil surface roughness studies and crop biophysical parameter estimation. RADARSAT-2 has been used to provide spatial information on what, where and how much cultivated biomass is potentially available for bio-energy development.

RADARSAT-2 provides a complementary source of data for topographic mapping in Northern Canada at the 1:50,000 scale. The application of RADARSAT-2 polarimetric imagery is being evaluated for its role in terrain classification in Canada's north. RADARSAT-2 is a useful tool to contribute to the monitoring of Canada's 42

National Parks and in particular Canada's northern parks in order to assist in their regular comprehensive assessments of the ecological integrity.

The C-band characterization of Antarctica, using RADARSAT-2, is Canada's contribution to the international effort of the Committee on Earth Observation Satellites in elaborating multi-band calibration supersites. Calibrated RADARSAT-2 imagery is also used to monitor the calibration of RADARSAT-1 using a common, well-characterized area in the Canadian Boreal Forest.

The Canadian Space Agency also provided RADARSAT-2 data to a number of disaster areas around the world in support of the International Charter Space and Major Disasters. RADARSAT-2 images were also shared among scientists to support several international initiatives and activities such as the International Polar Year.

4. SUMMARY

RADARSAT-2 operations got off to a good start in the first years. Government of Canada Departments are taking advantage of its many capabilities. Indications in the first years of operation are that the data usage trend will rise in future years.

5. ACKNOWLEDGEMENT

The author would like to expressly thank all Government of Canada Departments for their communications and in helping gathering the information to complete this paper on the usage of RADARSAT-2 for the first years of operation.