EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

Author: Dr. Jean-Francois Hamel
NGC Aerospace Ltd., Canada, jean-francois.hamel@ngcaerospace.com

Mrs. Amélie St-Amour
NGC Aerospace Ltd., Canada, amelie.st-amour@ngcaerospace.com
Dr. Jean de Lafontaine
NGC Aerospace Ltd., Canada, ngc@ngcaerospace.com
Mrs. Marleen van Mierlo
Canadian Space Agency, Canada, marleen.vanmierlo@asc-csa.gc.ca
Mr. Brian Lawrence
Canadian Space Agency, Canada, brian.lawrence@asc-csa.gc.ca
Dr. Linh-Ngo Phong
Canadian Space Agency, Canada, linh-ngo.phong@asc-csa.gc.ca
Mr. Timothy J. Lynham
Natural Resources Canada, Canada, Tim.Lynham@NRCan-RNCan.gc.ca
Mr. Joshua M. Johnston
Natural Resources Canada, Canada, Joshua.Johnston@NRCan-RNCan.gc.ca
Mr. Jeff Cain
COM DEV Ltd., Canada, jeff.cain@comdev.ca
Mr. Martin Lihou
COM DEV International, Canada, martin.lihou@comdev.ca
Mr. Denis Dufour
INO, Canada, denis.dufour@ino.ca
Dr. Alain Royer
Université de Sherbrooke, Canada, alain.royer@usherbrooke.ca
Dr. Mike Flannigan
University of Alberta, Canada, mike.flannigan@ualberta.ca
Mr. Grant Bonin
Space Flight Laboratory (SFL), Canada, gbonin@utias-sfl.net
Mrs. Sylvie Gravel
Environment Canada, Canada, Sylvie.Gravel@ec.gc.ca
Mr. Didier Davignon
Environment Canada, Canada, Didier.Davignon@ec.gc.ca

THE INNOVATIVE MICROSATELLITE-BASED CANADIAN WILDLAND FIRE MONITORING SYSTEM

Abstract

Over the past 30 years, a gradual increase in both the frequency and intensity of forest fires has been observed. In Canada alone, the last ten years show an average of 6,113 fires burning 1.875 million hectares annually. Due to direct dangers and socio-economic costs associated with large fires, most countries have

adopted policies of aggressive fire suppression and fire exclusion. Fire managers implementing these policies require accurate and frequent information about active forest fires. Most of this information is currently provided by ground-based or airborne systems. However, space-based remote sensing is becoming a more and more cost-effective tool for fire management and research, by providing continuous monitoring (even in remote areas), a short response time and accurate data on fire intensity, growth, location, fuel type and air quality.

In an effort to answer the needs of the fire management and research community, the Canadian Space Agency has initiated the development of the Canadian Wildland Fire Monitoring System (CWFMS) microsatellite mission concept. This concept is intended to provide frequent information about forest fire locations, power, rate of spread and burned areas in order to support the detection and monitoring needs of the forest fire community. The high-level objectives of the mission are to provide:

1. Reliable fire radiative power and released energy estimates
2. Hotspot locations to show active fire perimeter maps
3. Rate of spread measurements
4. Burned area mapping

The proposed mission concept is a Low-Earth Orbit microsatellite constellation, designed to provide several daily observations of the complete Canadian territory. The constellation provides measurements in the Mid-Wave Infrared, Long-Wave Infrared, Near Infrared and Visible wavelengths. The main advantage of the mission concept with respect to the other existing or planned missions resides in the combination of a small measurement ground resolution (500 m) and a short revisit time (3-4 visits per day), while providing accurate measurements of high temperature events without saturation of the detectors.

The mission concept is made possible by the use of an innovative uncooled microbolometer detector technology. This technology has proven to be the candidate of choice for microsatellite missions, because of its reduced mass and power requirements.

The paper will highlight the main mission requirements and will present the proto-operational microsatellite mission concept put forward by the project team to meet the requirements, taking into consideration the constraints of microsatellite platforms.