# POTENTIALS OF SMOS AND RADARSAT-2 DATA TO MONITOR FREEZING/THAWING CYCLES OVER AGRICULTURAL LANDS IN CANADA

*Louis-Philippe Rousseau*[1], *Ramata Magagi*[1], *Robert Leconte*[2], *Aaron Berg*[3] *and Brenda Toth*[4]

[1]Université de Sherbrooke
Département de géomatique appliquée
Sherbrooke, Québec, Canada
*Louis-Philippe.B-Rousseau@USherbrooke.ca*
*Ramata.Magagi@USherbrooke.ca*

[2]École de technologie supérieure
Département de génie de la construction
Montréal, Québec, Canada
*Robert.Leconte@etsmtl.ca*

[3]University of Guelph
Department of geography
Guelph, Ontario, Canada
*aberg@uoguelph.ca*

[4]Environment Canada
MSC Hydrometeorology and Artic Lab
Saskatoon, Saskatchewan, Canada
*brenda.toth@ec.gc.ca*

## 1. ABSTRACT

In the northern hemisphere and in Canada more particularly, data sets on the spatial distribution of soils freeze/thaw state and on its duration are very important to agricultural research. Indeed, they can be used for the operational monitoring of damages caused by runoff and to plan sowing and harvesting. Microwave remote sensing has shown a great potential for freeze/thaw detection. For the mapping of frozen soil areas with passive microwave data, some researchers used the spectral gradients computed from high frequency SSM/I (Special Sensor Microwave/Imager) or SSMR (Scanning Multichannel Microwave Radiometer) data [1, 2, 3]. In active microwave, past studies used the ratio of the backscattering coefficients measured at the beginning and the end of the fall season [4]. Unlike these investigations, we will develop a new approach that relies on polarimetric information provided by RADARSAT-2. Using the target decomposition technique of Freeman and Durden [5], the surface (Ps) and volume (Pv) contributions will be retrieved from RADARSAT-2 data. Since the signal of bare frozen soils is mainly a volume contribution, the spatial distribution of Pv and Ps will be analysed together with soil temperature variation to discriminate between frozen and non-frozen areas. Key elements related to our methodology are: the signature analyses of RADARSAT-2 in comparison with those of AMSR-E, SSM/I, and ALOS, and an analysis of the information contained in fully polarimetric radar data (ALOS, RADARSAT-2). In order to account for the effect of soil characteristics (type and roughness), the study sites are three agricultural areas located in Canada, Saskatoon (Saskatchewan), Guelph (Ontario) and Lennoxville (Quebec).

## 2. REFERENCES


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