

# **Object-based Wetland classification in Newfoundland and Labrador using Random Forest Algorithm**

**Meisam Amani<sup>\*1</sup>, Bahram Salehi<sup>1</sup>, Sahel Mahdavi<sup>1</sup>, Jean Elizabeth Granger<sup>1</sup>, Brian Brisco<sup>2</sup>**

*<sup>1</sup>C-CORE, Faculty of Engineering and Applied Science, Memorial University of Newfoundland,  
St John's, NL, Canada, A1B 3X5*

*<sup>2</sup>Canada Center for Mapping and Earth Observation, Ottawa, Ontario, Canada, K1S 5K2*

*\* Correspondence: Meisam Amani, Email: [meisam.amani69@gmail.com](mailto:meisam.amani69@gmail.com), Tel: (709) 771 2888*

## **Abstract**

A vast portion of Newfoundland and Labrador is covered by wetland areas. Notably, it is the only province in Atlantic Canada that does not have a wetland inventory system. Wetlands are important areas of research because they play a pivotal role in ecological conservation and impact human activities in the province. Therefore, classifying wetland types and monitoring their changes are crucial tasks recommended for the province. In this study, wetlands in the five pilot sites, distributed across Newfoundland and Labrador, were classified using the fusion of aerial imagery, Synthetic Aperture RADAR (SAR), and optical satellite data. First, each study area was segmented using the object-based method, and then various spectral and polarimetric features were evaluated to select the best features for identifying wetland classes using the Random Forest (RF) algorithm. The accuracies of the classifications were assessed by the parameters obtained from confusion matrices, and the overall accuracies varied between 81% and 91%. Moreover, the average producer and user accuracies for wetland classes, considering all pilot sites, were 71% and 72%, respectively. Since the proposed methodology demonstrated

high accuracies for wetland classification in different study areas with various ecological characteristics, the application of future classifications in other areas of interest is promising.

**Keywords:** Wetland, Remote Sensing, SAR, Object-based classification, Random Forest, Newfoundland and Labrador.