



## XVII<sup>th</sup> World Congress of the International Commission of Agricultural and Biosystems Engineering (CIGR)

Hosted by the Canadian Society for Bioengineering (CSBE/SCGAB)  
Québec City, Canada June 13-17, 2010



### USING EARTH OBSERVATION DATA FOR SOIL DRAINAGE CLASSIFICATION AND MAPPING

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#### CSBE100271 – Presented at ASABE's 9th International Drainage Symposium (IDS)

**ABSTRACT** The potential of earth observation (EO) data for soil drainage classification and mapping has been investigated in a series of research projects using various EO data at different scale. First, soil drainage classification models are developed for specific land use types using optical EO data (ASTER, LANDSAT or IKONOS) for the segmentation of the study area. Afterwards, the relationship between soil drainage classes and EO data (radar and optical) is integrated into statistical models (discriminant analysis, multiple regression, and decision tree) using soil survey information (soil map and soil profile description and analysis). In a study conducted in the Bras d'Henri watershed (167 km<sup>2</sup>) to update and upgrade old soil survey maps, a set of five RADARSAT-1 images, with different SAR configuration, and an ASTER image were used for soil drainage mapping. A supervised maximum likelihood classification was applied on ASTER bands for land use segmentation. Backscattering coefficients from RADARSAT-1 data and spectral indices from ASTER data were evaluated in stepwise procedures using the 1612 soil profiles classified by soil survey experts. Classification accuracy was higher (75-88 %) with the decision tree classifier (DTC) compared to the discriminant analysis classifier (DAC). The soil drainage map produced with the DTC method was more similar to the conventional soil drainage map than the one derived from the DAC method. A study on the digital soil drainage mapping was also conducted in a broader agricultural area (Monteregie, near Montreal, QC) at the regional scale (1:40 000) using archived LANDSAT and RADARSAT-1 images. The usefulness of selected IKONOS images was assessed in mapping soil drainage and related soil properties (surface texture). Finally, the potential for soil drainage classification and mapping of the fully polarimetric RADARSAT-2 images is actually under investigation using various decomposition algorithms. Classification results will be presented.

**Keywords:** Soil drainage, Remote sensing, RADARSAT-1, RADARSAT-2, ASTER, IKONOS images.