Land Cover Attribute Mapping of the Greater Toronto Area in Support of Flood Risk Assessments

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ABSTRACT

In the Great Lakes region of North America, the frequency of severe weather events, capable of generating heavy local downpours, is expected to increase due in part to climate change. Such storms have resulted in numerous localized flood occurrences in the metropolitan Toronto area, particularly in 2000 and 2005. Two critical land cover attributes that can influence flood events are the extent and geospatial distributions of impervious surfaces and forest cover.

This paper presents a discussion of computationally efficient techniques to map these attributes from RapidEye imagery. This data source is particularly attractive for operational use as it provides a high level of detail of urban infrastructure at a modest cost. A hybrid pixel-object based strategy is used that employs a suite of spectral-spatial transforms and a novel thresholding technique to sequentially identify principal land covers in order to resolve interpretation issues such as impervious - bare soil confusion and to infer ground cover type in cast shadow regions. Example classification products have been generated from multi-temporal RapidEye imagery. Comparisons with similar interpretations derived from higher resolution data such as Quickbird and WorldView imagery are presented to evaluate the impact of spectral mixing in complex suburban landscapes on mapping accuracy.