Landsat ETM+ Classification of Fluxnet-Canada Flux Stations

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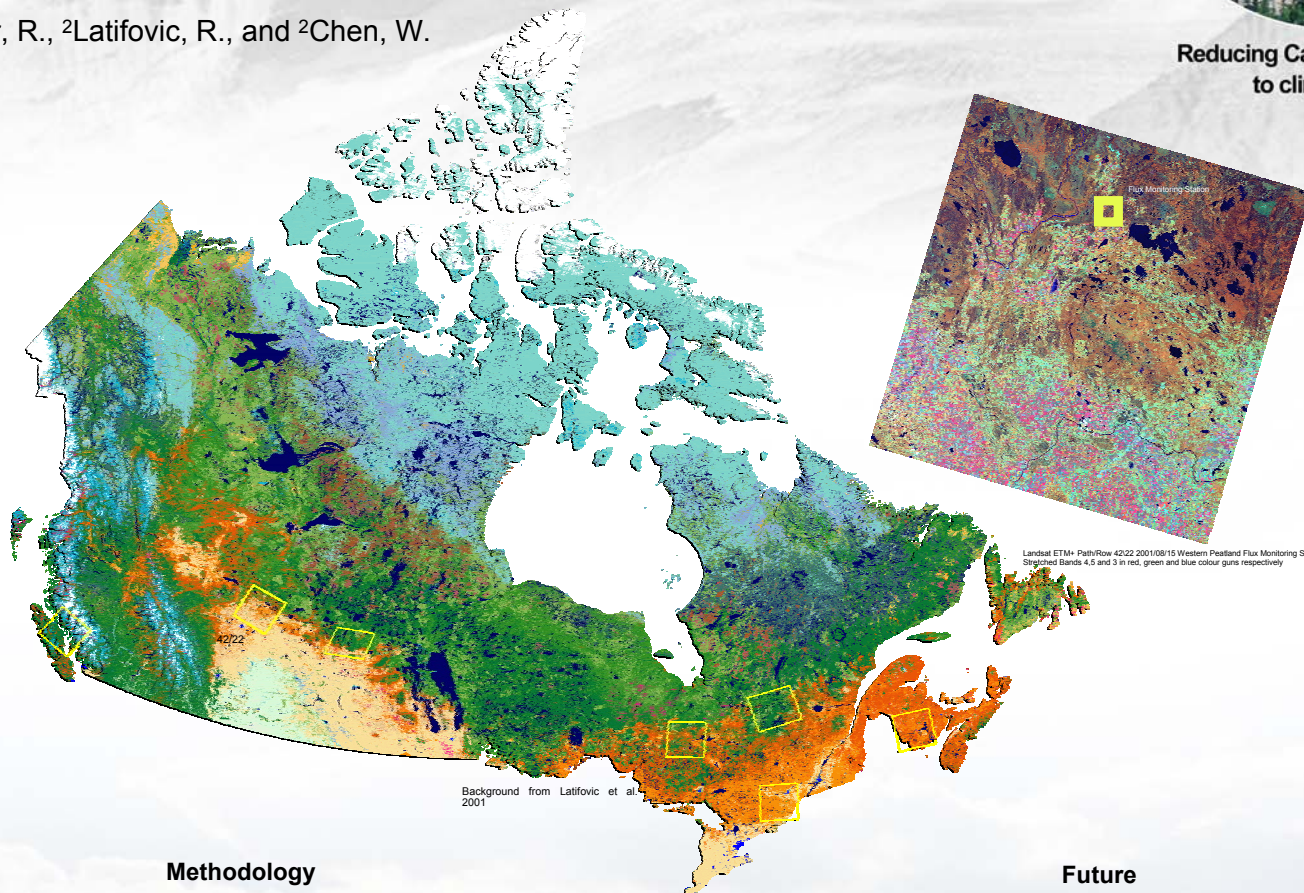
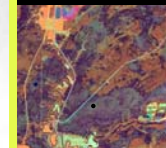**Reducing Canada's vulnerability to climate change**

Introduction

Human enterprise has had a significant impact on the global carbon cycle, while evidence is growing that these changes will affect Earth's climate. Changes in land use / cover and natural disturbance are major controls of the dynamic sink/source balance of the immense terrestrial carbon stock.
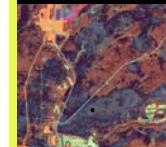
The purpose of the present work was to create large-area land cover classifications from satellite imagery to support Fluxnet scaling studies. The methodology presented by Cihlar et al (2003) was implemented on seven Fluxnet monitoring sites across Canada. As explained in Cihlar et al (2003) the key features of this approach are an increase in the ratio of computer to human analysis and automation for high data volume or large area processing. Thus making the methodology the perfect candidate for the present study. The current project provided a practical test of the methodology as a classification was required for all sites, often in less than optimal situations with limited ground truth.

Landsat ETM+ Path/Row 42/22 2001/08/15 Western Peatland Flux Monitoring Station
Stretched Bands 4,5 and 3 in red, green and blue colour guns respectively
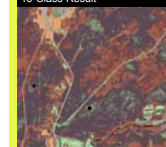
Background from Latifovic et al. 2001

42/22

150 Cluster K-Means Result

50 Cluster CPG Result

16-Class Result

View from Tower Mast

Objective

The purpose of this set of satellite-derived land cover maps is to meet the mid-resolution mapping needs of scientists and others interested in land cover distribution across the Fluxnet-Canada study sites by providing a set of classified images representing the Fluxnet sites throughout the Canadian landscape.

Methodology

• A Landsat ETM+ image covering each site was clustered to 150 classes using an unsupervised K-Means classification prior to 50 cluster merging through classification by generalization (CPG).
• The resulting clusters were merged to 16-class landcover maps through interactive labelling using cluster bitmaps to create spatial context for the 50 clusters. The bitmaps aided the analyst when ground data was scarce or nonexistent.
•The products have been sent to Fluxnet-Canada site managers for ground validation and will be refined according to the feedback provided.

Future

• CCRS leaf area index (LAI) algorithms will be applied to the scenes and the final landcover classification maps and LAI maps will be delivered to the Fluxnet site managers.
• The final Fluxnet land cover classifications will be valuable for scaling the results of site-specific measurements to the larger region surrounding each site.

References
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Natural Resources Canada **Ressources naturelles Canada**