

SYSTEMATICALLY DERIVED LEAF AREA INDEX OF THE CANADIAN OILSANDS REGION

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ABSTRACT:

The 140,200km² oil sands region of central Canada has the 3rd largest proven reserves of oil in the world. Currently, surface mining is concentrated in a ~600km² region north of Fort McMurray, Alberta, Canada. A comprehensive monitoring effort led by the Governments of Canada and Alberta is underway to track the status of the ecosystem in the vicinity of this surface mining region. Many of these models require systematically derived time series of gridded land surface parameters at approximately 1km resolution together with quantified uncertainty. Leaf area index (LAI) is one such parameter that is being systematically derived at various spatial and temporal resolutions. In order to validate coarser 1km resolution MODIS and VGT LAI products, a 20 m resolution map of 2012-13 peak season LAI was produced using a combination of in situ LAI estimates and vegetation indices derived from SPOT 5 satellite imagery. A reduced simple ratio vegetation index was produced for each image to be used in the LAI processing. A total of 204 ground plots were sampled across the study area in July 2012 and August 2013 for the purposes of calibration and validation. Additionally, airborne hyperspectral and LiDAR data at approximately 2m resolution were collected for portions of the study area over the summer of 2013 and compared in LAI analysis. Using the 2m and 20m resolution LAI estimates, the performance of coarse spatial resolution but high temporal resolution (i.e. 10 day composite) LAI products were assessed to determine their performance as potential indicators of disturbance from emissions related to mining activities.