

Remote Sensing Team: Satellite Time Series Provide Broad-Brush Mapping Tool for Well Sites

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Project Summary

For the period 1984-2011, Landsat time series data were used to map newly established well sites both visually and with an automated detection method over a 5000 km² area. The national Canadian Forest Service Composite-2-Change (C2C) change detection protocol was used in which Best-Available-Pixel Landsat image composites were created. Spectral trend analysis using an iterative user-defined threshold was then implemented. The mapping results were compared to randomly sampled, independently generated well site reference data. The highest accuracy reported was approximately 83%, with relatively low errors of omission (13%). Higher errors of commission (up to 37%) occurred, thus limiting the automated method to a regional scale inventory.

Management Implications and Lessons Learned

The Landsat time series approach tested here provided a broad-brush mapping tool that can summarize well site spatial distribution over large areas relatively quickly and with straightforward methods. A pattern of low errors of omission and high errors of commission was noted in automated methods – this means that most actual well sites were mapped, but some areas were identified as well sites that were not, in fact, well sites. Managers may not always be concerned with high errors of commission and can accept the accompanying low errors of omission (i.e., that few actual well sites were missed). To reduce commission error, more advanced image analysis (e.g., using the context of the site, such as linear pipelines and roads) or more detailed sampling in the field and with higher spatial resolution datasets could be used. Finally, a visual analysis by a trained human interpreter was more effective at minimizing both errors of omission and commission when mapping well sites with Landsat time series Best-Available-Pixel composite imagery.

Publication(s)

Wasson, R. 2017. Detection and Classification of Forest Disturbances in the Alberta Oil Sands Region using Landsat Time Series Data. Honours BSc Thesis. Trent University, Peterborough, Ontario, Canada

Wasson, R., and S. E. Franklin. 2018. Detection Accuracy of New Well Sites Using Landsat Time Series Data: a Case Study in the Alberta Oil Sands Region. *Remote Sensing Letters*, 9(2): 160-169.