



## “Stretching from Land to Sea”

**Abstract:** Ms. Elizabeth O’Connell, St. Francis Xavier University

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### ***Mapping Gas Variability for Energy Development Monitoring***

(E. O’Connell, D. Risk, W. Laybolt, J. Hurry)

Monitoring of energy developments helps improve public acceptance of such projects, while protecting the integrity and safety of the industry. In this study, a soil and atmospheric gas survey was conducted to characterize variability in key gases used for monitoring of carbon capture storage and coal bed methane operations. Baseline monitoring data is critical for leak detection. In the New Glasgow, Nova Scotia area, we collected soil gas samples at 70 locations using a drive in gas sampler within a 117m<sup>2</sup> plot. A similar survey, of smaller extent was carried out in Estevan Saskatchewan at Aquistore, a carbon capture and storage facility. Soil gas was analyzed for methane, carbon dioxide, nitrogen and oxygen by gas chromatography. These soil gas studies were supplemented with vehicle-based sampling of the lower atmosphere. Atmospheric carbon dioxide, methane, and  $\delta^{13}\text{C}$  (of methane or carbon dioxide) were measured simultaneously by a Picarro analyzer. Contour maps were created to characterize the variation and abundance of each gas species. Gas relationships are used to determine the most suitable methods for leakage detection and future monitoring. Results show higher than expected natural abundance of soil methane, localized in the southern area of the New Glasgow study plot. Associated anomalies of CO<sub>2</sub> were also found in this same region. The elevated concentrations could be resulting from an underlying fault in the area, potentially acting as a natural escape route for subsurface gases. Atmospheric surveys highlighted variability between sites, which is largely attributed to the different season and location of drive around surveys. Further background monitoring is recommended at both locations to better quantify seasonal and long term variability for use in monitoring of energy developments in these areas.