

EGU22-6658

<https://doi.org/10.5194/egusphere-egu22-6658>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Methane and Environmental Impacts of Abandoned Oil And Gas Wells in the North American Arctic-Boreal Region

Louise Anne Klotz¹, Oliver Sonnentag², and Mary Kang¹

¹Civil Engineering, McGill University, Montreal, Canada

²Department of Geography, Université de Montréal, Montreal, Canada

Arctic and Boreal regions are experiencing major natural and anthropogenic disturbances, leading to significant changes in ecosystem composition, structure and functioning in recent decades. Therefore, it is crucial to understand the main drivers of change, as well as the ecosystem impacts on natural and cultural resources, human health and the climate system. Large numbers of oil and natural gas wells are being drilled in Arctic and Boreal regions; however, the number and distribution of wells drilled in these regions over time is not well documented and understood. Moreover methane emissions and relationship with land cover and land cover change have not been analyzed. Using oil and gas well databases from provincial, territorial and state agencies in Canada and the U.S., we analyze drilled oil and gas wells throughout the study period (1984-2014) and in relation to land cover distribution and change across the Arctic-Boreal region of western North America. We find 254,998 wells, mostly located in Alberta (211,747) and British Columbia (35,012), in Arctic and Boreal regions of Canada and the U.S. We characterize the wells, based on data provided in the database, according to well production type (gas or oil and gas) and well abandonment status (active, abandoned, abandoned and plugged) and find that annual well drilling has increased from 269 to 8599 from 1984 to 2014. We estimate emissions from abandoned oil and gas wells in the study domain to be 40 – 148% of Environment and Climate Change Canada's national estimate for methane emissions from abandoned oil and gas wells in 2018. Finally, using the annual land cover maps for 1984-2014, we find the number of drilled wells in each land cover class throughout the years. We identify significant increases in number of wells drilled between 1984-1999 and 2000-2014 in evergreen forest, sparsely vegetated and barren land cover classes.