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| Title | Uncertainty assessment of a polygon database of soil organic carbon for greenhouse gas reporting in Canada’s Arctic and sub-arctic | | |
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| Abstract |  |
| Canada’s Arctic and sub-arctic consist 46% of Canada’s landmass and contain 45% of the total soil organic carbon (SOC). Pronounced climate warming and increasing human disturbances could induce the release of this SOC to the atmosphere as greenhouse gases. Canada is committed to estimating and reporting the greenhouse gases emissions and removals induced by land use change in the Arctic and sub-arctic. To assess the uncertainty of the estimate, we compiled a site-measured SOC database for Canada’s north, and used it to compare with a polygon database, that will be used for estimating SOC for the UNFCCC reporting. In 10 polygons where 3 or more measured sites were well located in each polygon, the site-averaged SOC content agreed with the polygon data within ±33% for the top 30 cm and within ±50% for the top 1 m soil. If we directly compared the SOC of the 382 measured sites with the polygon mean SOC, there was poor agreement: The relative error was less than 50% at 40% of the sites, and less than 100% at 68% of the sites. The relative errors were more than 400% at 10% of the sites. These comparisons indicate that the polygon database is too coarse to represent the SOC conditions for individual sites. The difference is close to the uncertainty range for reporting. The spatial database could be improved by relating site and polygon SOC data with more easily observable surface features that can be identified and derived from remote sensing imagery. | |

**Please specify which Sustainable Development Goal (SDG) (s) falls under your research:**

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| Goal 1 | No Poverty | Goal 2 | Zero Hunger |
| Goal 3 | Good Health and Well-Being | Goal 4 | Quality Education |
| Goal 5 | Gender Equality | Goal 6 | Clean Water and Sanitation |
| Goal 7 | Affordable and Clean Energy | Goal 8 | Decent Work and Economic Growth |
| Goal 9 | Industry, Innovation and Infrastructure | Goal 10 | Reduced Inequalities |
| Goal 11 | Sustainable Cities and Communities | Goal 12 | Responsible Consumption and Production |
| **Goal 13** | **Climate Action** | Goal 14 | Life below Water |
| Goal 15 | Life on Land | Goal 16 | Peace, Justice and Strong Institutions |
| Goal 17 | Partnerships for the Goals |  |  |