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## Accurate continuous observations of carbon dioxide and methane dry mole fractions in the arctic atmosphere near the Dikson settlement, Siberia

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Measurements of the atmospheric sources and sinks of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) in the pan-Arctic domain are extremely sparse that limits our knowledge of carbon cycling over this dramatically sensitive environment and making predictions about a fate of carbon conserved in currently frozen ground. Especially critical are the gaps in the arctic latitudes of Siberia, covered by the vast permafrost underlain tundra, where only few continuous atmospheric observation stations are currently operational.

We present the first two years of accurate continuous observations of atmospheric CO<sub>2</sub> and CH<sub>4</sub> dry mole fractions at the new atmospheric carbon observation station located near the Dikson settlement (73.33° N, 80.34° E) on the seashore of the western part of the Taimyr Peninsula in Siberia. Data quality control of trace gas measurements is achieved by regular calibrations against WMO-traceable reference gases from pressurized dry air tanks filled at the Max Planck Institute for Biogeochemistry (Jena, Germany). Associated meteorological variables permit evaluation of the climate variability of the local environment and provide a background for screening and interpreting the greenhouse gases (GHG) data records. Here we summarize the scientific rationale of the new site, give technical details of the instrumental setup, analyse the local environments and present CO<sub>2</sub> and CH<sub>4</sub> fluctuations in the arctic atmosphere. Along with the temporal variability of GHG's, we provide an overview of the angular distribution of detected GHG signals in the region and their input to the atmospheric fluctuations on the measurement site. Observation records deal with the daytime mixed layer and may be considered as representative throughout the vast area (~500–1000 km), and cover the period from September 2018 to September 2020.

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