

Measurements of Greenhouse Gases in the Russian Arctic

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Carbon dioxide and methane are significant greenhouse gases and as such, large contributors to global warming. Russia covers about 17.8 million km² of land surface, much of it large expanses of boreal forests and tundra underlain by permafrost and large expanses of swamp land in West Siberia. In addition, extensive natural gas and oil deposits and extraction operations in the high Arctic have great potential to influence local and global atmospheric concentrations of carbon dioxide and methane. Below are presented the results of GHG measurements at the Russian Arctic stations Teriberka (69° 12' N, 35° 06' E) and New Port (67° 42' N, 72° 51' E) during 2003-2008, and data from the “Akademik Fedorov” ship route in the Arctic ocean during IPY cruises in 2007 - 2008. In Fig 1a are presented monthly CO₂ concentrations from the New Port and Teriberka Stations, and global MBL values from NOAA data. The large amplitude of the mixing ratio in the Russian station measurements most likely reflect the oil and gas burning in oil fields located about 1000 km to south. In Fig 1b are presented similar data for methane. The large amplitude of the methane mixing ratio are likely caused by both natural leaks and production in gas deposits located 80 – 250 km to the South. Data from GHG flasks sampled during the “Arademik Fedorov “ transects up to the North Pole are represented in Fig 2a, and data from GHG flasks sampling during a transect from the Western Russian Arctic to Murmansk are presented in Fig 2b.

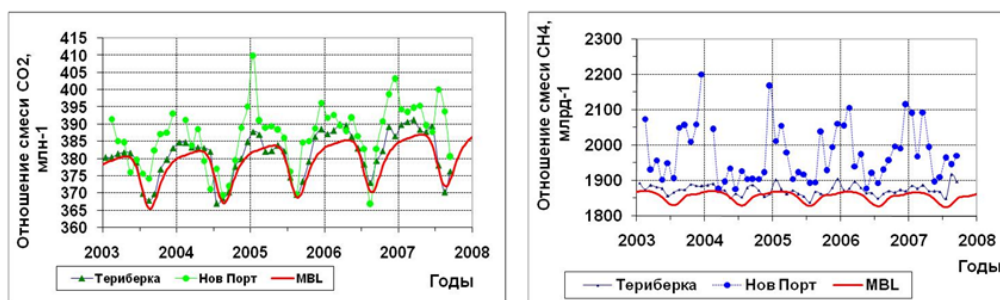


Figure 1. a) Monthly CO₂ mixing ratios at the New Port and Teriberka Stations and in the global MBL. The large amplitude of CO₂ mixing ratio observed at New Port is likely caused by the oil and gas burning in fields located about 1000 km to the south, b) Monthly CH₄ concentrations at the same station are likely caused by CH₄ leakage from a large gas field.

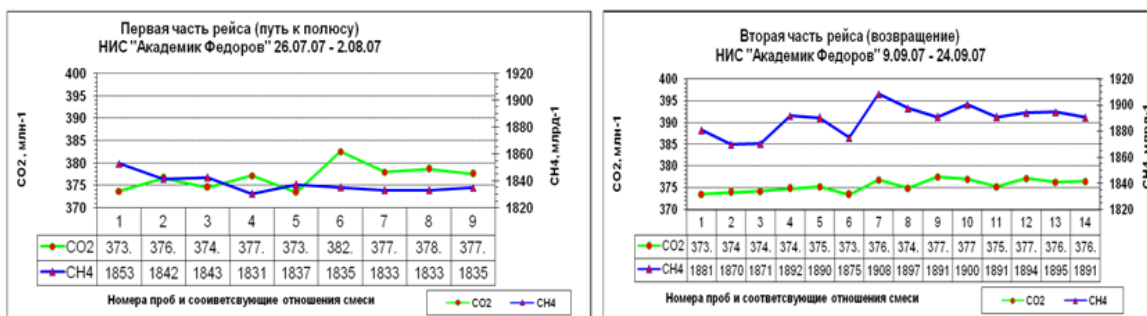


Figure 2. Data for flask sampling analysis at two parts of the “Arademik Fedorov“ ship route: a) Arctic Coast to the North Pole, and b) In the Arctic ocean from 180 degrees west to Murmansk.