

Methane measurements sites in Russian Federation



Fig. 1. Actinometrical pavilion of the Voeikovo settlement

In a pavilion the gas analytical lab is located, where the continuous measurements of methane in ambient air and measuring of concentration CO_2 and CH_4 in samples of air from distance stations are carried out. Voeikovo is located in 14 km on the East from administrative boundary of Saint-Petersburg. Western urban quadrant at observations from pavilion is in range of directions of vector of a wind from 230° up to 310° . In east quadrant of directions of a wind from 0° up to 160° a clean region locates. All territory of the region occupied by wood and practically free from anthropogenic sources.



Fig. 2. CO_2 gas analyzer system

The system is created on the basis of NDIR gas analyzer URAS-2T (Hartmann & Braun, Germany). Gas analyzer is calibrated against the standard gases provided by NOAA and AES (Canada). The precision of CO₂ concentration measurement is 0.5 ppm. The detail comparison program with AES was made in 1992-94.



Fig. 3. An automated gas chromatograph (GC) system for CH₄ concentration measurements in the ambient air

The installation is created on base of chromatograph TSVET-500M ("Chimautomatic", Dzerginsk, Russia). Calibration of GC system is performed against the reference gas (dry air with the CH₄ concentration of 2025 ppb) provided by the Institute for Umweltphysik (IUP), University of Heidelberg. The relative random measurement error is 0.1-0.2%. An inter-comparison between the GC system of RC ARS and IUP laboratory of Heidelberg has been made. The concentration differences did not exceed 6 ppb. Mean and standard deviations of the differences were 0.5ppb and 2.4 ppb, respectively.



Fig. 4. Teriberka methane measurement site

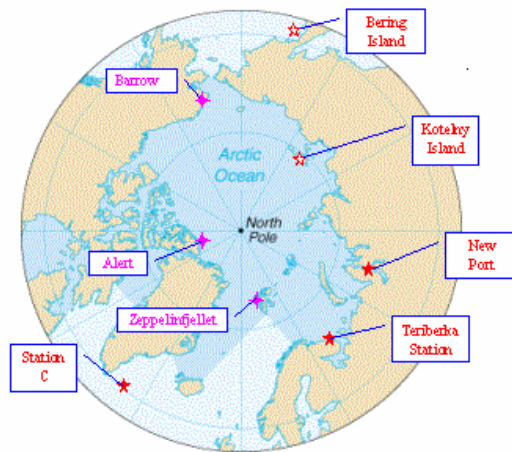


Fig. 5. Location of the monitoring stations of greenhouse gases in the North

- ★ - CO₂ and CH₄ monitoring sites of Main Geophysical Observatory (MGO, Russia)
- ☆ - CO₂ monitoring sites of MGO operated from 1983 to 1994
- ✦ - WMO GAW stations of NOAA (USA), AES (Canada), NILU (Norway)

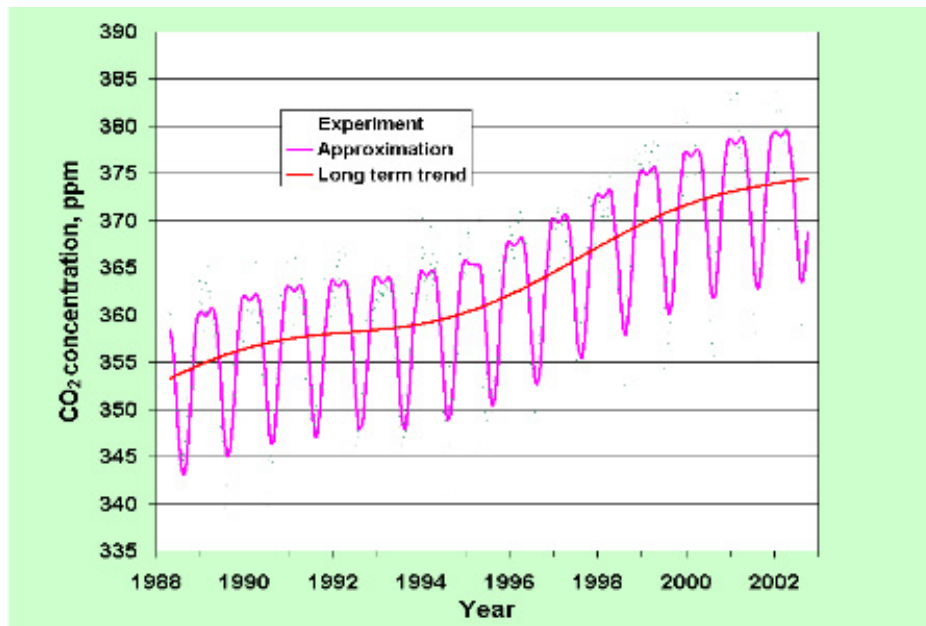
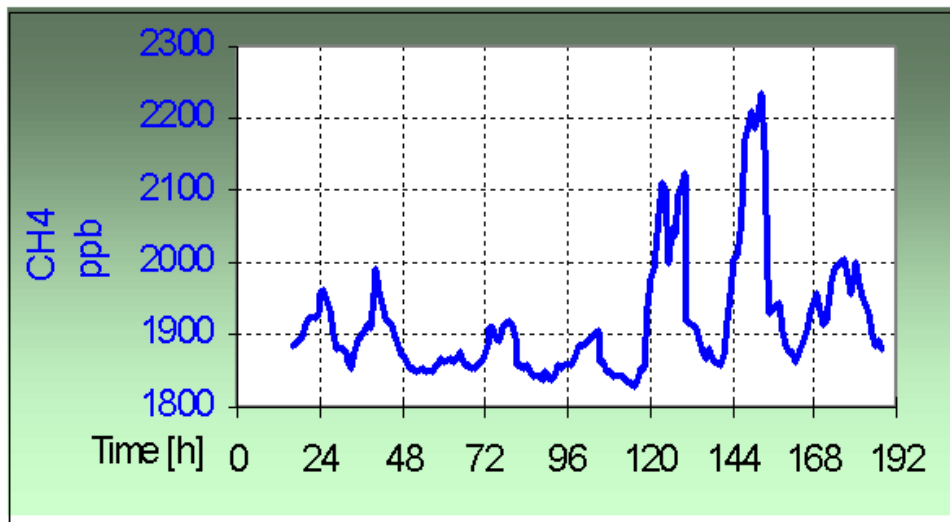
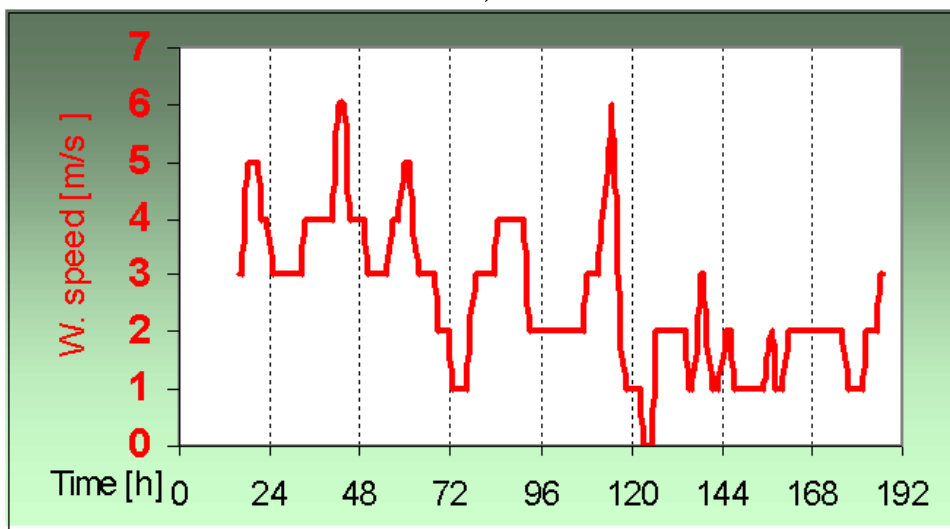


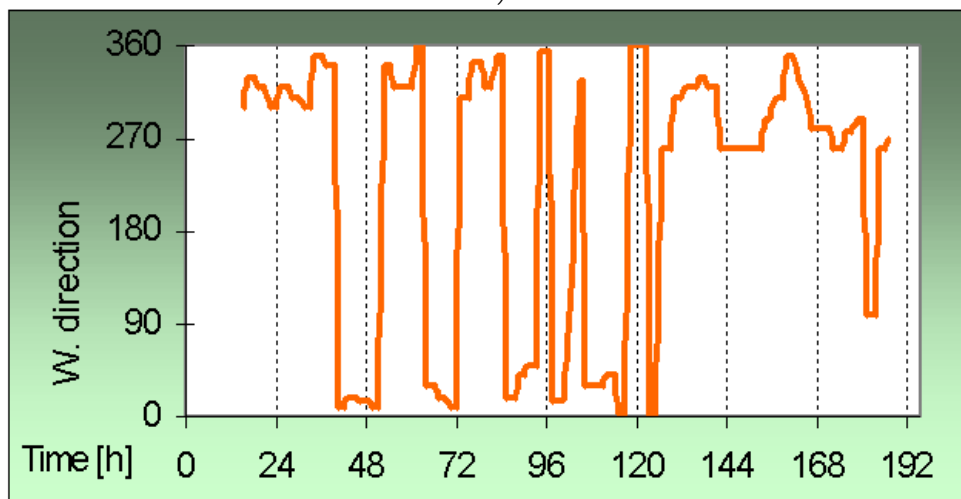
Fig. 6 The CO₂ data from Teriberka station (Kola Peninsula)



a)



b)



c)

Fig. 7. The data of methane concentrations and meteorological parameters observed at Voeikovo station during August, 14-21, 1997:

- a) The methane concentration time-series.
- b) The wind speed time-series.
- c) The wind direction time-series.



Fig.8. The map of the north of West Siberia region wherein the methane emission studies were carried out. The scale of the map is 1:48000000.

Locations of the observational sites and the borders of the region where the numerical model used

★ - Temporary sites of observation

★ - Permanent sites of observations;

--- Borders of feasibility of the numerical model region.

● Position of the gas fields

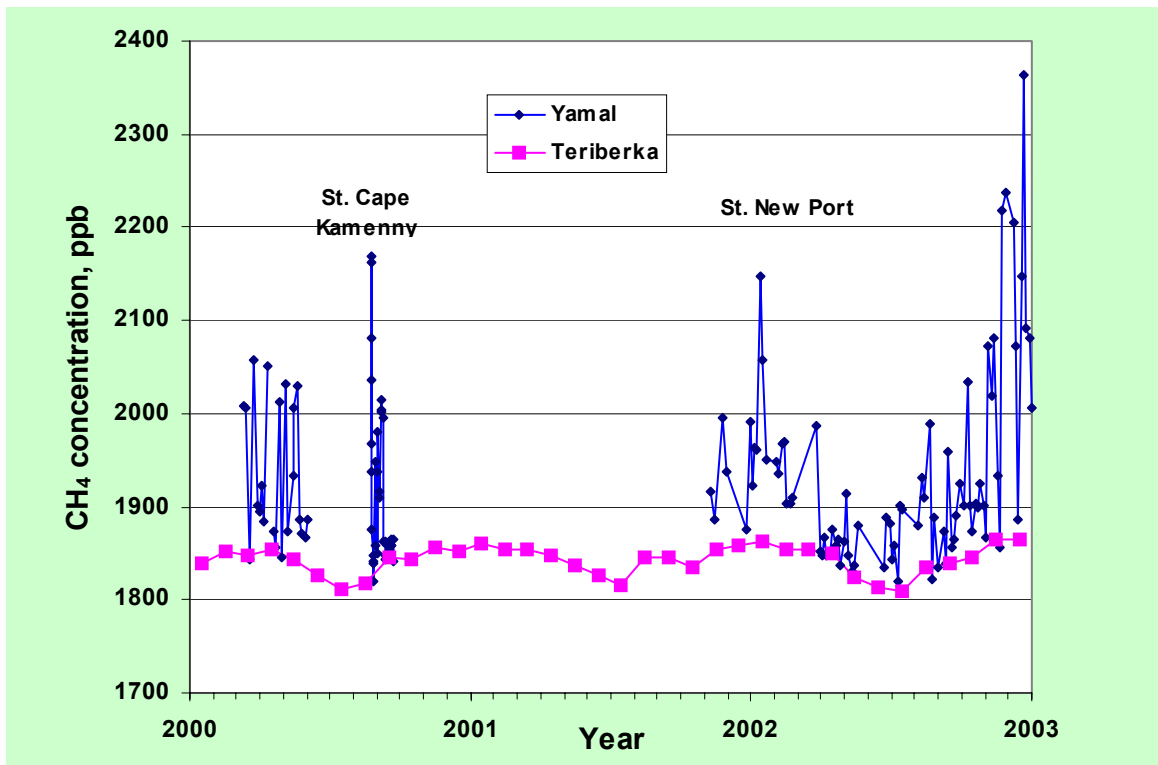


Fig. 9. CH₄ concentration at two sites (Mace Kamenny and New Port) located at Yamal peninsula as compared with the Teriberka station background level.

The higher methane concentrations with the excess up to 200 ppb over the background level were observed for the air masses coming from gas deposits. Arrangement of CH₄ data lets to estimate methane emission from gas fields and wetlands by using the MGO 3D regional troposphere transport model developed to study air mass transfer over West Siberia.