

OPPORTUNITIES OF TROICA TRAIN EXPEDITIONS IN VALIDATION OF SATELLITE OBSERVATIONS

O.V. Postilyakov, A.S. Elokhov, I.B. Belikov, A.I. Igaev, N.F. Elansky
A.M.Obuhov Institute of Atmospheric Physics, RAS, Moscow, Russia, ovp@ifaran.ru

Several expeditions TROICA on atmosphere investigation over Russian railways has been carried out using mobile carriage-laboratory in zonal (between Moscow and Khabarovsk) and meridional (between Murmansk and Kislovodsk) directions.

The first measurements of gas profiles aboard a carriage-laboratory were performed in the scientific expeditions TROICA-4 (April 1997) along way Moscow-Khabarovsk-Moscow. To determine the ozone and nitrogen dioxide profiles, the express Umkehr method [1,2] and zenith sky twilight measurements were used, respectively. The UV and visible spectra was recorded with an MDR-23 spectrophotometer aboard the moving carriage-laboratory coupled just behind an electric locomotive of a passenger train. Data on the total content and vertical profiles of impurities are obtained. These data reflect mainly the large-scale impurity distribution influenced by planetary waves. Significant variations in the total content and vertical distribution of impurities in the cross-section of a deep low representing a part of a circumpolar vortex are analyzed. The results of measurements are compared with the data obtained by TOMS, GOME and ground-based stations. This comparison allows conclusion on effectiveness of using a moving laboratory of such a kind for validation of network and space observational data.

A new carriage-laboratory has been equipped by optical remote sensing system based on image spectrometer Oriel MS257. It is capable to measure UV and visual spectral radiance incoming from several directions to determine the slant columns of ozone, nitrogen dioxide and other small gases. Using observations at a few wavelengths and several solar zenith angles vertical distribution of gases is retrieved. The first expedition (TROICA-8) of a new carriage-laboratory with the new optical remote sensing system started on March 22, 2004.

Results of previous expeditions as well as the first results of TROICA-8 will be presented. Effectiveness of using a moving laboratory of such a kind for validation of space and ground- network observational data is discussed.

- [1] **N.F. Elansky, I.V. Mitin, O.V. Postilyakov.** Investigation of maximum accuracy opportunities for measurements of ozone vertical distribution by Umkehr method using Brewer spectrophotometer. *Izvestiya Akademii Nauk, ser. Fizika Atmosfery I Okeana (Atmospheric and Oceanic Physics – English translation)*, 1999, v.**35**, n.1, p.73-85.
- [2] **Postilyakov O.V.** Radiative transfer model for use in inverse problems of atmospheric optics with calculation of weighting functions and air mass factors. *Izvestiya Akademii Nauk, ser. Fizika Atmosfery I Okeana (Atmospheric and Oceanic Physics)*, 2004, 40, 3, 319-334.
- [3] **Postilyakov O.V.** Linearized vector spherical radiative transfer model MCC++ for application to remote sensing and modeling of spectral observations. *This issue*.