The retrospective modeling as an approach to cumulative impacts assessment due to operation of scientific stations in the Antarctic

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**Information paper submitted by the Republic of Belarus**

Cumulative impacts onto Antarctic environment belong to less methodologically worked out among the impacts, which should be assessed according to the Protocol on Environmental Protection. The Information Paper is intended to draw attention to supplement to the progress on this issue.

In the late 19th and early 20th centuries, construction of the first stations in Antarctica began. This process accelerated during the International Geophysical Year (1957/1958) and since then, it is believed (Tin et al., 2009) that the intensity and scale of human activity in Antarctica have continued to grow. But quantitative assessment of trends of levels of anthropogenic impacts due to operation of Antarctic stations on the environment are still limited. The atmospheric impact modeling was started on the example of the Vecherny Oasis (eastern part of the Thala Hills) for the period from 1985 to 2015 was continued for a larger area and for a longer period with higher temporal resolution (Kakareka and Salivonchyk, 2022).

The article is devoted to the assessment of trends of atmospheric air pollution and atmospheric impacts on the environment in the oases of the Thala Hills, Enderby Land, East Antarctica. Estimates of annual emission of SO2, NOx, PM10 and CO and their dynamics over 56 years of Thala Hills exploration are given, as well as levels of surface concentrations of SO2, NOx, PM10 and PM10 atmospheric deposition using air dispersion modeling. It is shown, in particular, that average annual emissions of NOx, PM10 and CO peaked in the early 1990s and have decreased 30.9 times by now. Sulfur dioxide emissions were highest in the late 1960s – late 1970s, and decreased 270 times.

Results of comparison of modeled air concentrations and depositions with the available data on measurement of air surface pollutant concentrations and atmospheric depositions are presented. Sources of uncertainties in the estimates of emissions, ground-level concentrations and depositions are described.

Proposed approaches can be used to assess the cumulative impacts of ongoing and planned activities on atmospheric air and on other components of the environment through the atmospheric air in the Antarctic Treaty area.

**References**

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