

EGU21-13642

<https://doi.org/10.5194/egusphere-egu21-13642>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



An assessment of the total wet ammonium deposition in the East Siberia of Russia based on monitoring data

Sergey A. Gromov^{1,2}, Dmitry A. Galushin^{1,3}, and Ekaterina A. Zhadanovskaya¹

¹Institute of Global Climate and Ecology (IGCE), Moscow, Russian Federation (sergey.gromov@igce.ru)

²Institute of Geography, Russian Academy of Sciences (IG RAS), Moscow, Russian Federation

³Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Moscow, Russian Federation

Goal of Study: The study focuses on the application of developed spatial interpolation method [1] to assessment of atmospheric pollutant deposition fluxes. This case study was done for estimating the total ammonium wet deposition in the Eastern Siberia region of Russia.

Data: Measurement data for 2017 on the ammonium concentration in atmospheric precipitation were obtained from the stations within the Baikal natural preserved territory thanks to the international EANET network [2] and the Russian national network of precipitation chemistry (PCnet) operated by Roshydromet.

Method: On the first step of the algorithm, we prepare the point data on the concentration of from the measurements of PCnet stations in the region. On the second step, we interpolate the precipitation chemistry data to the meteorological stations located in the study region followed by calculation of deposition fluxes at all these sites. The values obtained are interpolated for the regular grid of 100-km by 100-km cells within region. Finally, the total pollutant wet deposition for whole region is a sum of deposition fluxes calculated for each cell.

Results: We calculated the weighted-average annual concentration (WAC) of ammonium in atmospheric precipitation at 7 stations of EANET and PCnet in the region. We interpolated the WAC data on the grid cells in the Lake Baikal preserved territory (BPT). The variation of ammonium WAC throughout the BPT is 0.9 mg/l (south of the region) to 0.1 mg/l (northwestern part) with average value of 0.34 mg/l for the whole region.

Based on the WAC data and the obtained precipitation amounts at 23 meteorological stations within BPT, we calculated the deposition fluxes for network of more spatial density combined of PC and meteorological stations.

Using the “point” calculation results, we have constructed a two-dimensional spatial interpolation of wet ammonium fluxes per each cell. According to the study results, the total amount of ammonium felt with precipitation out from the atmosphere in the territory around Lake Baikal is 42 thou. ton per year. The value of average deposition per cell of 100x100 km for BPT region is 666 ton while in the surround of the EANET station Listvyanka (west Baikal shore) is 828 ton. The spatial distribution of wet annual ammonium deposition is presented at the map of the region.

This study was carried out in the framework of the Research Projects AAAA-A20-120013190049-4 «Development of methods and technologies for monitoring of environmental pollution under the

influence of transboundary pollutants transport (UNECE: EMEP, ICP IM) and acid deposition in East Asia (EANET)» and AAAA-A20-120020490070-3 «Development and improvement of methods and technologies for integrated background monitoring and comprehensive assessment of the environmental state and pollution in the Russian Federation including their dynamics»

Reference list:

1. Gromov S. A., Galushin D. A., Zhadanovskaya E. A. 2020. Estimation of the total wet sulfur and nitrogen deposition as a part of pollution balance in the south of the Russian Far East based on the monitoring data. - Geophysical Research Abstracts, EGU2020-13871, EGU General Assembly.
2. The Acid Deposition Monitoring Network in East Asia (EANET)- URL: <https://www.eanet.asia/>