Geophysical Research Abstracts
Vol. 20, EGU2018-18714-2, 2018
EGU General Assembly 2018

Application of a second-order approach for evaluating chemical compounds runoff at the small river catchment using daily water discharge data

Ekaterina S. Zhigacheva (1), Sergey A. Gromov (1,2), Sase Hiroyuki (3), Takahashi Masaaki (3), and Tsuyoshi Ohizumi (4)

(1) Insitute of Global Climate and Ecology Roshydromet & RAS, Environmental Pollution Monitoring Division, Moscow, Russian Federation (sergey.gromov@igce.ru), (2) Institute of Geography RAS, Moscow, Russian Federation, (3) Asia Center for Air Pollution Research (ACAP), Niigata, Japan, (4) Niigata Prefectural Institute of Public Health and Environmental Sciences, Niigata, Japan

Together with regular atmospheric pollution monitoring, catchment analysis studies are performed within EANET region (East Asia) for selected areas. These include evaluation of datasets on measurement pollutants and nutrients in all environmental media within small watersheds. Precise estimation of chemical compound runoff is one of the crucial factors for the adequate evaluation of nutrient/pollutant budgets of small river catchments affected by atmospheric pollution transport or regional climate change. Yet most of monitoring programs based on extensive networks do not allow performing long-term intensive sampling and chemical analyses due to cost effective constrains.

A case in point is the regular sampling of river water at one of EANET monitoring sites, Primorskaya, which is conducted mere five times per year, in compliance with conventional recommendations on inland aquatic monitoring for streams in temperate humid climate. Such temporally sparse data is subsequently processed using the runoff interpolation method (IR) for pollutant runoff estimation, which provide results with a rather low degree of accuracy and often is not enough appropriate for catchment budget calculations.

In this study we estimate an alternative method (LQ) which parameterizes the observed river load (L) and discharge (Q) in form of L = $a{\cdot}Q^b$, where parameters a and b are derived in a custom regression analysis. Compared to the IR method, the LQ method is more appropriate for evaluating nutrient budgets in watersheds, foremost because the latter accounts for changes in nutrient load during rain events (Ide et al, 2003). We present the comparison of the estimates of sulfur and nitrogen compounds discharge in 2005, 2010 and 2015 derived using water discharge and water chemistry data for Komarovka river at the Primorskaya EANET site. Our results indicate that the IR method may substantially underestimate runoff in warm seasons with frequent rain events. We subsequently discuss the application of the LQ method for regular calculations of stream runoff at other EANET sites of inland aquatic monitoring.

References

J. Ide, O. Nagafuchi, A. Kume, K. Otsuki, S. Ogawa, 2003. Runoff nutrients from an afforested watershed of Chamaecyparis obtusa during rain events. Proceedings of 7th International Conference Diffuse Pollution and Basin Management, Dublin Ireland, U.K., 5B, 30-34, 2003.