Geophysical Research Abstracts
Vol. 12, EGU2010-2786, 2010
EGU General Assembly 2010

Identification and quantification of nitrate inputs into surface water in Flanders, Belgium

Dongmei Xue (1,2), Bernard De Baets (2), Jorin Botte (1), Jan Vermeulen (1), Oswald Van Cleemput (1), and Pascal Boeckx (1)

(1) Laboratory of Applied Physical Chemistry - ISOFYS, Ghent University, Belgium (dongmei.xue@ugent.be), (2) Research Unit Knowledge-based Systems, Ghent University, Belgium (dongmei.xue@ugent.be)

Nitrate (NO3-) contamination in surface water in Flanders (Belgium) is a pressing environmental problem. These NO3- loads are attributed to intensive agriculture, use of fertilizers and manure and discharge of human sewage. The Flemish Environmental Agency (VMM) has an operational network for monitoring surface water quality. An apriori NO3- source classification has been provided based on NO3- concentration variation and land use. The 5 potential NO3- source classes are as follows: greenhouses, agriculture, agriculture with groundwater dilution, households and a combination of horticulture and agriculture. However, NO3- concentration data alone can not fully assess the extent of the input of various NO3- sources, which is a key aspect in monitoring water quality. Hence, this study will apply a dual isotope approach (15N- and 18O-NO3-) and a Bayesian isotope mixing model (SIAR) (http://cran.r-project.org/web/packages/siar/siar.pdf) to identify and quantify NO3- sources in surface water.

Thirty sample points (6 sample points per apriori NO3- source class), distributed over the whole of Flanders, were selected for NO3- source identification and quantification based on monthly measured 15N- and 18O-NO3- data. So far (from October 2007 to March 2009) we observed isotopic values ranging from -9.5 to 28.6‰ for 15N and -9.1 to 51.1‰ for 18O. The output of proportional NO3- source contributions via SIAR revealed that all of the water samples are a mixture of multiple nitrate sources, with manure or sewage as the dominant source. A clear seasonal trend can be found for the greenhouse class shifting from nitrate in precipitation in summer to manure and sewage in winter. Furthermore, the outputs of source contributions analyzed by SIAR are used to redefine the source classes of the 30 isotope monitoring sample points, as some points might be classified into the wrong class only based on expert-knowledge.