Geophysical Research Abstracts
Vol. 17, EGU2015-9113, 2015
EGU General Assembly 2015

A new emission-based approach for regulation of N losses from agricultural areas to surface waters

Jane Rosenstand Poulsen (1), Brian Kronvang (1), Niels Bering Ovesen (1), Kristoffer Piil (2), and Søren Kolind Hvid (2)

(1) Aarhus University, Bioscience, Silkeborg, Denmark (jpo@bios.au.dk), (2) SEGES, Skejby, Denmark

Demands for a reduction and hence regulation of nitrogen (N) emissions to streams, lakes and coastal areas are a central part of many river basin management plans under the EU Water Framework Directive. Therefore, large focus has been placed on exploring different mitigation options that can assist in reducing the N emission from agricultural areas. However, the spatial variability in landscape, geology and hydrology entails significant differences in the vulnerability of catchments to intense agricultural activities. Hence, if rigid regulations of N emissions are applied without considering this variability, it will not necessarily lead to an optimum balance between applied fertilisers, yields and loss of excess N to the surrounding surface waters. Therefore, the overall purpose of this pilot study is to develop a concept for regulation of nutrient emissions to surface waters based on a comprehensive stream monitoring design in order to measure the temporal and spatial transport of N at sub-catchment scale. The purpose of such a monitoring design is twofold: i) quantification of the actual N emissions from a given agricultural sub-catchment or even individual farms; ii) quantification at sub-catchment scale of nitrate retention that may ultimately lead to a more precise regulation of N emissions from agricultural areas to surface waters.

In order to investigate down to which scale it is feasible to quantify N emissions to surface waters and to develop the best monitoring concept, three catchments subdivided into several sub-catchments in Denmark will be studied during the period 2014-2017. The catchments represent different landscapes and geological settings as well as three different hydrological regimes. In the three catchments, hydrometric stations have been established at the outlet of the drainage networks where continuous measurements are made of water stage. In addition daily water samples and weekly grab samples of water are taken and weekly discharge measurements conducted. The selected catchments are subdivided into sub-catchments where weekly grab samples of stream water are taken and biweekly discharge measurements conducted for calculation of daily flows. The water samples are analysed for different N forms, allowing quantification of the total emission of N from the catchment or sub-catchment. Knowledge of point source discharges, background N losses and N retention in surface waters makes it possible to conduct a load apportionment for calculation of N emissions from agricultural fields. It is expected that the first results from the stream monitoring can give an overall picture of the spatial and temporal variability of the N loads within each catchment and between catchments and constitute a platform for evaluating the measurement setup.