



## **Estimating dissolved carbon leaching from soils to groundwater: a global database and model**

Joep Langeveld (1), Lex Bouwman (1,2), Wim Joost van Hoek (1), Arthur Beusen (1,2), José Mogollon (1,3), Lauriane Vilmin (1), and Jack Middelburg (1)

(1) Earth Sciences, Geochemistry, Utrecht University, Utrecht, the Netherlands(j.j.langeveld@uu.nl), (2) PBL Netherlands Environmental Assessment Agency, Den Haag, the Netherlands, (3) Institute of Environmental Sciences (CML), Faculty of Science, Leiden University, the Netherlands

The transport of dissolved carbon in water leaching from soils to groundwater, and further to surface waters, may play an important role in connecting the terrestrial and aquatic carbon budgets. However, it has not been previously quantified on a global scale. Therefore large uncertainties remain regarding the size, drivers and global distribution of the dissolved carbon flux from soil solution to groundwater. In order to estimate the fluxes of dissolved carbon leaching from soils, an extensive global database on dissolved organic (DOC) and inorganic carbon (DIC) in soil solution is compiled, including a range of potential drivers. The database is used to construct a globally distributed multi-regression model calculating annual average topsoil concentrations as well as concentration profiles in the subsoil. Dissolved carbon concentrations in soil solution are described as a function of climate, soil type, land use, precipitation and depth. DIC is also constrained by the level of surface CO<sub>2</sub>. Hydrology is provided through a hydrological model, PCR-GLOBWB. We present a global spatially explicit distribution of the annual average DOC and DIC leaching from soils to the groundwater. Our first estimate of the carbon leaching flux from soils enables not only to better understand but also to quantify this ‘missing link’ between the global terrestrial and aquatic carbon budgets.