Geophysical Research Abstracts, Vol. 8, 02519, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02519

Hydrologic and water chemistry characteristics of the Reka river and the Padez stream basin

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The forest hydrology studies show a great complexity of interacting influences on the water cycle. Forest systems notably affect the hydrological responses of the basins. In order to understand the formation of forest hydrologic flow paths and the way how these flow paths affect stream chemistry, chemical measurements at time scales that correspond to hydrological dynamics are needed. Conversely, the stream chemistry tracing enables us to decipher the hydrological processes. High frequency chemical measurements are also essential for testing hydrological models. Hydrological data alone are rarely sufficient to test the process assumptions embedded into a typical hydrological model. Both, hydrological and geochemical or other water chemistry time-series data are needed to identify appropriate model structures and constrain their parameters.

In order to trace the hydrological processes, the Reka river basin and the forested Padez stream basin have been equipped with a meteorological station, five rain gauges and four limnigraphs which continuously measure water level and water velocity. The Reka river is the widest known sinking stream of the Classical Karst area in Slovenia, and it has been studied since the Antiquity. The river sinks into the Škocjan Cave system, which was proclaimed by UNESCO as a World Heritage Site in 1986. The Reka river basin is situated in the southern part of Slovenia and has an area of 442 km^2. The basin has a unique geological structure; it is situated on the Brkini syncline Eocene flysch rocks surrounded by a large karstic region. The precipitation area of the Padez stream, the tributary of the Reka river, comprises 43 km^2 and reaches deeply into the Brkini hilly area. The stream network is well developed as the flysch rock structure has very low permeability.

Additionally, the hydrological monitoring of the Padez stream basin has been supplemented with high-frequency measurements of the water chemistry which included tracing of water temperature, nitrate, ammonium, conductivity, depth, dissolved oxygen, total dissolved solids (TDS), oxidation reduction potential (ORP) and pH. High fluxes of the water chemistry parameters were observed during the flood wave in November 2005 which followed a long and dry autumn period. Through the continuous measurements of water chemistry parameters we would like to obtain an insight into the capacity of forested watersheds to control the water chemistry constituent exports and investigate the relations between the forest biotic and hydrologic controls over the dissolved nitrogen inorganic constituents during different seasons.