Geophysical Research Abstracts
Vol. 15, EGU2013-3646, 2013
EGU General Assembly 2013

Groundwater age dating in the Pampeano Aquifer, Argentina

Daniel Martínez, Orlando Mauricio Quiroz Londoño, Sebastián Grondona, and Melisa Glok Galli
Instituto de Investigaciones Marinas y Costeras – Inst. de Geología de Costas y Cuaternario. CONICET – Universidad Nacional de Mar del Plata.

During Upper Quaternary, an area of about 1, 500, 000 km2 was covered by eolic and fluvio-eolic silt and silt-sandy sediments in the Pampa Argentina, with variable thickness between few meters to 200 meters. These deposits, known as Pampeano Sediments, form an unconfined aquifer that support agricultural and cattle rising activities that contribute to the 60% of the National Gross Product. Taking into account the importance of this resource, mean residence time (MRT) knowledge becomes an important issue for extracting policies.
The unconfined behavior and especially tritium detection demonstrates the groundwater in the Pampeano Aquifer is mostly young water. Nevertheless, tritium cannot be used to obtain apparent ages or MRT because just one GNIP station (Buenos Aires) having incomplete data series is available in Argentina. Then, the applicability of other techniques such as CFCs and 3H/3He are evaluated in this contribution for the Pampeano Aquifer.
The study area is the catchment of the Quequen Grande River (QGR) at the Southeast of the province of Buenos Aires. In a first sampling campaign water samples for CFCs in dark glass bottles and noble gases in copper tubes were taken in boreholes and in streams sections considered groundwater discharge zones. These samples were analyzed at the laboratories of the University of Utah, but 3H was measured at INGEIS laboratory in Buenos Aires. A second sampling was performed on two groups of multilevel piezometers. Noble gases and 3H were analyzed at the laboratories of the IAEA in Vienna, while CFCs were analyzed at Utah Laboratory.
CFCs results appear to be quite consistent. Recharge dates obtained by this method ranges from around 1975 for shallow wells (about 24 m depth) to older than 1950 for deeper wells (about 100 m). The MRT obtained through baseflow sampling give around 30 to 35 years. 3H/3He method applied to the same samples result in much younger ages, around two years. This strong inconsistence has been initially assigned to problems in 3H determination. The first results from age dating in the samples taken in the multilevel piezometers showed some agreement between CFCs and 3H/3He apparent ages, with recharge dates for water at taken at 10 m depth in the year 1976 in the upper zone of the catchment, and around 1965 in the lower zone, which increase about 10 to 15 years for samples taken 10 m deeper.
The main conclusion is on a side, that MRT of some (3 to 5) decades can be typical in the Pampeano aquifer. Moreover, CFCs and 3H/3He techniques appears to be useful in the system, but much effort must to be done to achieve a better understanding of the meaningful of the results obtained from each method.