

Groundwater-Surface Water Interaction Study for Six Florida Lakes - Lake Newnans, Lake Butler, Clear Lake, Lake Haines, Lake Shipp and Lake Josephine

Natasha Dimova, William C. Burnett, Jeffrey P. Chanton, Elizabeth Corbett
Department of Oceanography, Florida State University, Tallahassee, FL 32306
Richard Hicks

FDEP Ground Water Protection Section, Bureau of Watershed Management, Tallahassee, FL 32399

The water budgets for most Florida lakes include inputs from groundwater. However, it is often difficult to estimate the groundwater contribution due to its patchy, diffusive and temporally variable nature. Our study used natural radon (^{222}Rn ; $T_{1/2}=3.82\text{days}$) as a groundwater tracer for rapid assessment of groundwater inputs. Our goal is to eventually implement this automatic approach into a standardized procedure that can be used to support modeling for the development of Total Maximum Daily Loads (TMDLs) or Basin Management Action Plans (B-MAPs) for impaired lakes.

In the spring of 2007 a joint team from Florida Department of Environmental Protection's Ground Water Protection Section (GWPS) and the Department of Oceanography, FSU conducted a series of field trips to six lakes in north-central and central Florida. We surveyed each lake from a boat with a system of continuously recording sensors for ^{222}Rn , methane (CH_4), temperature, and conductivity, together with logging gps navigation and water depth recording (**Fig. 1**). The 2-3 orders of magnitude enrichment of ^{222}Rn in groundwater over surface waters, its chemically inert nature, and short half life make it an excellent tracer to identify areas of groundwater discharge.

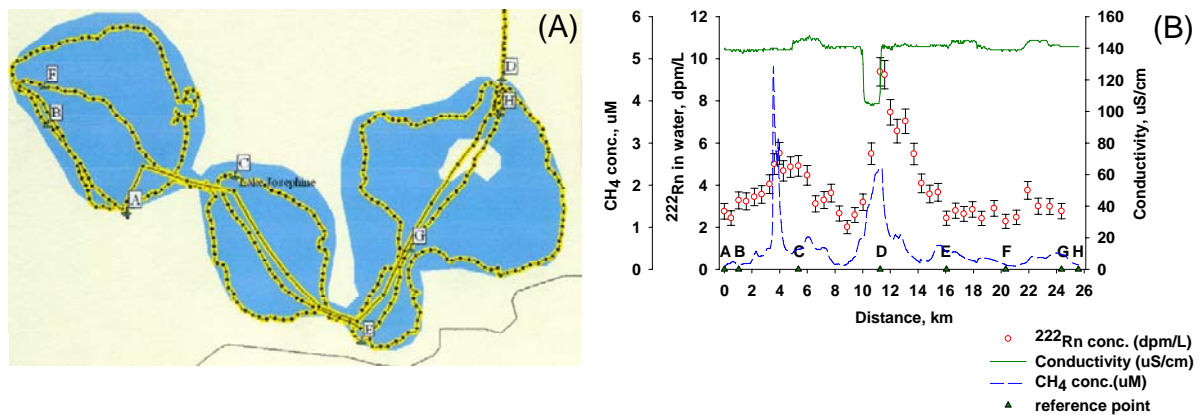


Fig.1 An example of a multi-tracer survey in Lake Josephine, Central Florida, May 2007: (A) GPS tracks; and (B) tracer concentrations. The estimated groundwater discharge in this case was $5.4 \times 10^5 \text{ m}^3 \text{ day}^{-1}$.

Pore water samples were collected by a push-point piezometer and measured for ^{222}Rn , nutrients, and other components. An advection-diffusion box model with a customized graphical user interface was used to estimate groundwater inputs. The results were very encouraging and future work is planned to monitor seasonal variations in Lakes Haines and Josephine in the near future.

Keywords: *Florida lakes, TMDL, radon advection-diffusion model*

Pressing issues: *Nutrient enrichment of surface, ground and coastal waters*