Radon tracers of submarine groundwater discharge in Jamaica

STIVALY PAULINO[1], DEBBIE-ANN GORDON-SMITH[2], DAYNE BUDDO[3], HENRY BOKUNIEWICZ[1] JOHN RAPAGLIA[4], LUCA ZAGGIA[5]

[1] School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY stivaly.paulino@stonybrook.edu, henry.bokuniewicz@stonybrook.edu

[2] Department of Chemistry, University of the West Indies,Mona, Jamaica debbieann.gordonsmith@uwimona.edu.jm

[3] Discovery Bay Marine Laboratory and Field Station, Centre for Marine Sciences,University of the West Indies, Jamaica WI dayne.buddo@uwimona.edu.jm

[4] Department of Biology, Sacred Heart University, Fairfield, CT rapagliaj@sacredheart.edu

[5] Institute of Marine Sciences - National Research Council, Venice, Italy luca.zaggia@ve.ismar.cnr.it

To aid ecosystem management in fish sanctuaries along the northern coast of Jamaica, WI, it is necessary to locate and categorize submarine springs. Continuous shoreline surveys of ^{222}Rn were conducted in Discovery Bay (18.469;-77.415), Turtle Crawl (18.176;-76.422) and Cold Harbour (18.174;-76.404) with simultaneous aerial thermal infrared imagery. Elevated ^{222}Rn activities corresponded with plumes of cooler water at the shoreline indicative of submarine groundwater discharge (SGD), both from diffuse sources and from submerged springs. Distinct plumes of cooler water were not associated with stream discharge and measured 2 to 5^{o} C cooler than ambient surface seawater. Elevated ^{222}Rn activities of 570 Bq m^{-3} in the plumes could be enriched over ten-fold above ambient open water activities of about 30 Bq m^{-3} but plume values were only about a tenth of endmember concentrations which were measued at ~5700 Bq m^{-3}. Heterogeneous and variable SGD, and any associated contaminant load, has the potential to impact water quality in marine parks, conservation areas and marine and fish sanctuaries. A Joint UWI-SUNY Initiative in the Institute for Leadership and Sustainable Development.