Examining marine controls on focused submarine groundwater discharge off west Maui, Hawaii

P. W. SWARZENSKI[1], C. D. STORLAZZI[1], O. M. CHERITON[1] AND K. D. KROEGER[2]

[1]USGS, Pacific Coastal and Marine Science Center, Santa Cruz, CA

[2]USGS, Woods Hole Coastal and Marine Science Center, St. Woods Hole, MA

Submarine groundwater discharge (SGD) is now recognized as an important material vector that can directly impact nearshore ecosystems. The flow of groundwater into coastal waters responds to both marine and terrestrial controls, yet the mechanisms that drive this flow remain poorly understood. To address this uncertainty, an easily accessible offshore groundwater vent field off west Maui was investigated using a combination of oceanographic instruments and geochemical tracers. High resolution, time- series measurements of the coastal water-column structure were examined to assess water exchange rates relative to tides and waves. This oceanographic data was coupled with radioisotope data to assess SGD rates and controls. Redox controlled Mn-oxide deposits at the groundwater vent site preferentially concentrated radium, which in turn provided a point source for radon (222Rn, t1/2 = 3.8 d) and thoron (220Rn, t1/2 = <1 min). Time-series of these two isotopes yielded information on groundwater discharge rates. A better understanding of the controls on how groundwater discharges and mixes with the ocean is essential given expected climatic, land-use, and sea-level changes.