



Combining airborne thermal infrared images, radium isotopes and radon to study Submarine Groundwater Discharge along the French Mediterranean coastline (Côte Bleue)

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Submarine Groundwater Discharge (SGD) is now recognized as an important vector for many chemical elements that may impact the quality of the coastal environment and marine ecosystems. Although these fluxes have been investigated in many places of the world, few studies have been conducted along the French Mediterranean coastline. In this study, we report airborne thermal infrared (TIR) images that allowed us to locate several freshwater inputs along the “Côte Bleue” located west of the city of Marseille. We used salinity, radon and radium isotopes to confirm that the TIR signal could be related to SGD. Radon was analyzed *in situ* along the coastline on board a rubber boat. The four radium isotopes (^{223}Ra , ^{224}Ra , ^{226}Ra , ^{228}Ra) were analyzed in samples collected in the coastal waters characterized by a strong TIR signal, as well as along transects conducted on board RV Antedon II between the coast and offshore (between 200 m and 8 km). We also analyzed nutrient (nitrates, phosphates and silicates) and mercury concentrations in the water samples. Radium isotopes were thus used to quantify SGD fluxes and to determine the fluxes of nutrients and mercury associated with SGD along this coastline.