

## **ELEVATED ACTIVITIES OF RADIUM ISOTOPES IN COASTAL WATERS OF RIO DE JANEIRO STATE**

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Elevated Activities of Radium Isotopes in Coastal Waters of Rio de Janeiro State  
1PATCHINEELAM, S. R. and 2MOORE, W. S. 1Departamento de Geoquímica, Universidade Federal Fluminense, Niterói, Brazil ;2Department of Geology, University of South Carolina, Columbia, SC, U.S.A. In fresh waters, most of the radium is bound to particles. Cations like  $Ra^{+2}$  adsorbed on the particles are desorbed in high ionic strength waters by ion exchange processes. Therefore radium isotopes are used as tracers to study estuarine processes, exchange of water masses, identification of rain-freshened plumes and submarine groundwater input into the coastal ocean. The activities of four radium isotopes were measured from several samples of ground water, river water, spring water and bay water. A well-type intrinsic germanium detector for  $^{226}Ra$ ,  $^{228}Ra$  and a delayed coincidence counter technique for  $^{224}Ra$  and  $^{223}Ra$  were used to measure the activities after pre-concentration with Mn-fiber. The coastal waters of Rio de Janeiro state exhibited elevated activities of  $^{228}Ra$  and  $^{224}Ra$  compared with other coastal areas. As these two radionuclides belong to the thorium decay series, their source should be related to Th containing minerals. Allanite belongs to the epidote family with a hardness of 5-6, with more than 1.2%  $ThO_2$  often in the metamict state, is a common accessory mineral in the granitic rocks in the south of Rio de Janeiro state. Probably this mineral is responsible for the continuous supply of  $^{228}Ra$  and  $^{224}Ra$  into the ground waters and subsequently into the bay. The ground water samples of the north of the state, where monazite as a common mineral in placer deposits, exhibited similar activities as in the south with allanite.