

^{222}Rn concentration distribution in Yatsushiro Sea

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Radon concentrations in Yatsushiro sea were surveyed to examine relationship with the submarine sediments and geological structure such as submarine active faults.

^{222}Rn is a radioactive noble gas and occurs naturally in earth's crust as an intermediate step in the normal radioactive decay chain of uranium series. Radon shows high solubility for water and thus high mobility through groundwater and fluids in earth's crust. Concentration of radon in crustal fluid and groundwater can provide a clue to understand geology of the aquifer and state of crustal deformation as crack formation and change in strain state, because its release rate depends mainly on rock surface area. Recently location of active faults and its activity have been examined by using the method (e.g. Malgrange and Gleeson, 2014, Tsunomori et al., 2017).

A bunch of submarine active faults underlies in Yatsushiro area sea. These faults compose the Futagawa-Hinagu Fault zone which was activated at the 2016 Kumamoto earthquake. To evaluate records of submarine landslides and changes in submarine circumstances due to historical earthquakes, R/V Hakuho-Maru sailed for research expedition (KH-1803) in Yatsushiro sea from 27th to 30th July, 2018. We collected bottom water from obtained multiple cores and piston cores, and pore waters from piston cores for the measurement of the radon concentration in the sample water on board. The results of radon concentration distribution from multiple cores, (MC 1-12), show that higher concentration along the Line Y18a. The radon concentrations from bottom water of piston cores (PC 1-11) also show similar results while the values are larger than the results from multiple cores. A higher radon concentration is attributed to difference in (1) Radium concentration in sediments, and/or (2) properties of sediments such as porosity and/or surface area of grains which are caused by difference in types of sediment or fault activity in sediments. The Line Y18a extends across a major submarine active fault (FA1, Tanoura-Tsunagi-oki-faults) (Kagohara et al., 2011). Such a geological setting suggests that the radon concentration distribution in Yatsushiro sea might reflect the current fault activity. We discuss the contributing factor of the higher radon concentration by comparison with Ra concentration in sediment, sediment properties in each site and geological structure in Yatsushiro sea.

Keywords: Radon concentration in water, Submarine active fault, Yatsushiro sea, γ ray analysis, The 2016 Kumamoto earthquake