

## Characteristic changes of groundwater radon concentration before large earthquakes

# Tadanori Ondoh[1]

[1] Space Earth Environ. Lab.

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The groundwater radon concentration observed at Nakaizu suddenly decreased to a minimum and then rapidly increased to a maximum on Jan. 9, 1978 of 6 days before M7.0 Izu-Oshima-Kinkai earthquake onset of Jan. 14, 1978 (Wakita et al., 1980), one observed at Antung, Taiwan attained to a minimum and rapidly returned to a maximum on Nov. 20, 2003 of 20 days before M6.8 Chengkung earthquake onset (Kuo et al., 2006), and one observed at Nishinomiya suddenly dropped to a minimum and rapidly attained to a maximum of 248 Bq/L on Jan. 8, 1995 of 9 days before M7.2 Hyogoken-Nanbu earthquake of Jan. 17, 1995 (Igarashi et al., 1995).

Since the radon (Rn-222) concentration in the groundwater and atmosphere is in inverse proportion to the groundwater and atmosphere temperature, the rapid decrease of groundwater radon concentration to the minimum may imply an arrival of hot or warm matter such as the magma coming up to the observed region from deep origin. If this is the case, the steep increase of groundwater radon concentration after the minimum may be caused by an interaction of the invaded warm matter with surrounding cool crust in the groundwater. A large amount supply of new groundwater around rock grains will produce more release of radon atoms into the groundwater as well as an increase of contact surface of rock grains with the groundwater due to a reduction of rock grain size caused by rock cracks.