

Possible Mechanism of Radon Concentration Anomalies Relating to 1977 and 2011 Big Earthquakes

Fumiaki Tsunomori*¹ and Shigeki Tasaka²

1. Graduate School of Science, University of Tokyo, Japan.

2. Faculty of Education, Gifu University, Japan.

We share a temporal variation of a radon concentration in groundwater that was monitored at Nakaizu observatory located in central Izu Peninsula before and after the 2011 Tohoku earthquake. The radon concentration was measured by a counter-flow type extractor and a handcrafted radon counter with a ZnS(Ag) scintillator. Observation with those apparatuses was started on October 2010. The groundwater radon concentration increased to 2.8 Bq/L from 1.8 Bq/L for 2 months from December 2010 to January 2011. After 1.5-month-long stable period of the radon concentration, the concentration was sharply increased to 3.5 Bq/L by the 2011 Tohoku earthquake. The radon concentration begun to decrease on June 2011, and a current value has reached to a mean value for 30 years. The first elevation phenomenon has the high possibility of an anomalous precursor of the earthquake. It was difficult to explain the elevation with the original volatilization model proposed by Kuo et. al.(2006), however a modified volatilization model has a potential to describe the variation.

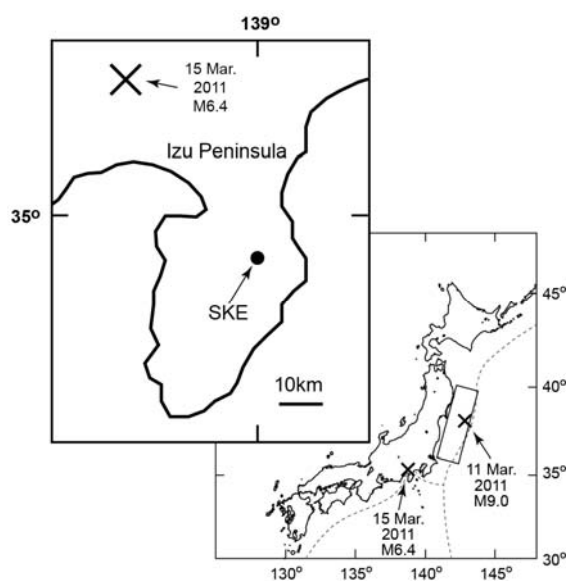


Figure 1. Location map of an observation well, and epicenters of the 2011 Tohoku earthquake and a triggered earthquake in March 15, 2011.

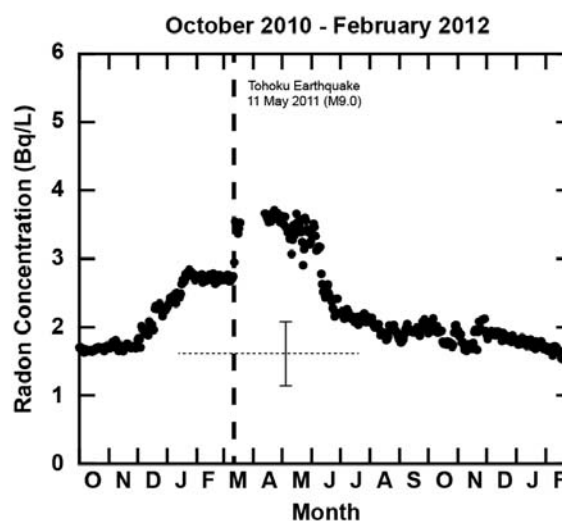


Figure 2. Temporal variation of groundwater radon concentration of SKE observatory. A dotted line indicates a background value for 30 year.

References

- Kuo, T., Fan, K., Kuochen, H., Han, Y., Chu, H., and Lee, Y. (2006) Anomalous decrease in groundwater radon before the Taiwan M6.8 Chengkung earthquake, *Journal of Environmental Radioactivity*, 88, 101-106.
- Tsunomori, F. and Kuo, T. (2010) A mechanism for radon decline prior to the 1978 Izu-Oshima-Kinkai earthquake in Japan, *Radiation Measurements*, 45, 139-142.