

## Fluid emission along the Nankai Trough: Insights from noble gases in the sediment pore water

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Noble-gas geochemistry is known to change in response to the terrigenous fluid emission triggered by major seismic events, as observed, for instance, in the recent case of the Tohoku-Oki earthquake occurred in 2011 [1]. Therefore, characterizing the terrigenous fluid emission in tectonically active regions is a prerequisite to understand future geochemical changes.

Here we report the results of the noble-gas and carbon isotope measurements conducted in water and sediment porewater samples collected along the Nankai Trough during JAMSTEC RV Natsushima cruises NT13-08 and NT14-07 using the ROV HyperDolphin.

Sediment cores acquired at active cold seeps at the splay fault offshore Kumano are characterized by the presence of crustal He. The respective He concentration gradients are highly variable within a few tens of meters indicating the presence of preferential pathways for the fluid release. Sediment cores collected at shallower water depths show relatively low He concentration gradients and high <sup>3</sup>He/<sup>4</sup>He ratios suggesting the presence of mantle He.

The fluid transport dynamics in the investigated area are discussed in the light of the new insights provided by the spatial distribution of the fluxes and the isotope signature of terrigenous He provided by the present study.

[1] Sano, Y., Hara, T., Takahata, N., Kawagucci, S., Honda, M., Nishio, Y., Tanikawa, W., Hasegawa, A., Hattori, K. (2014). Helium anomalies suggest a fluid pathway from mantle to trench during the 2011 Tohoku-Oki earthquake. *Nat. Commun.*, **5**.