A geological record of old tsunamis in southern Thailand

An international collaboration revealed recurrent tsunami in Indian Ocean

Predecessors of the 2004 Indian Ocean tsunami left their own geological records in the last millennia, though no such written records exist in the last few centuries either on the devastated coast or within its source area. Here we found probable precedent for the 2004 tsunami from stratigraphy on an island 125 km north of Phuket. The western part of the island consists of former beach ridges that rise 1 m above intervenient swales. The 2004 tsunami inundated this beach ridge plain as much as 2 km inland with sandy deposit. Earlier sand sheets underlie the 2004 tsunami deposit in the swales. In a couple of swales 0.5 km from the modern beach, three sand sheets are interbedded with black peat of 2500-2800 years old and the youngest sand sheet was deposited postdating 550-700 years ago. Because the 1881 Car Nicobar earthquake of magnitude 7.9, which provided a tsunami less than a meter in India, lacks significant sand sheet in the swales, tsunami deposits below the 2004 deposit were originated from recurrent full-sized Sumatra-Andaman earthquakes.

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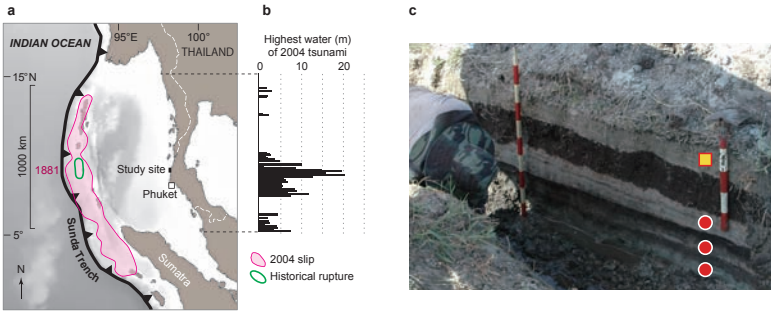

a: Northern Sunda Trench and vicinity. Red part shows a modeled fault slip during the 2004 Sumatra-Andaman earthquake. Green line shows a historical rupture in AD 1881.
b: Heights of the 2004 tsunami along western coast of Thai-Malay Peninsula.
c: Four tsunami deposits in Phra Thong Island, southern Thailand. A yellow square shows the 2004 tsunami deposit. Red circles show tsunami deposits before 2004 (Jankaew et al., 2008; © Nature).

Development of elimination technique of isobaric interference in ICP-MS

Mixed reaction gas technique has expanded application of high-sensitive ICP-MS

Inductively coupled plasma mass spectrometry (ICP-MS) has been widely used in various research fields because of its high-sensitivity, and has played an important role in the certification of fine ceramics reference materials developed in NMIJ, AIST. However ICP-MS often suffers from problems due to spectral interferences; especially the removal of isobaric interference is almost impossible even with high-resolution ICP mass spectrometer. In the precise quantitative analysis of V in fine ceramics using ICP-MS, the isobaric interference causes severe problems because the mass spectra for one of the two V isotopes overlaps with that for ^{50}Ti and ^{50}Cr. The author has developed a new method for determination of V in the presence of Ti and Cr using ICP-MS with a $CH_3F + NH_3$ mixed reaction gas to realize selective separation of V as the form of $[VF_2(NH_3)_4]^+$. This improved method enabled precise determination of V at the concentration level of mg kg^{-1} in fine ceramics. The elimination technique of isobaric interference will expand application of high-sensitive ICP-MS.

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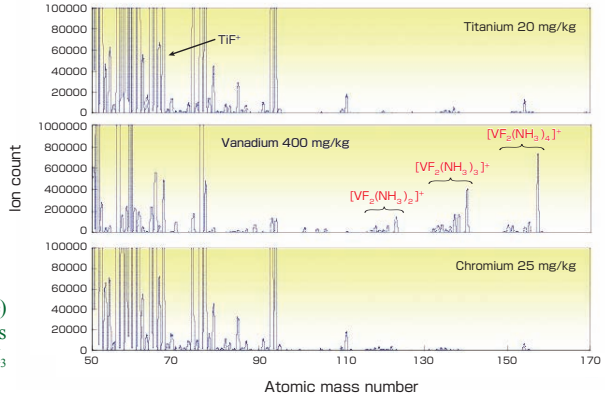

Mass spectra of Ti(upper), V(middle) and Cr(lower)obtained by ICP mass spectrometer equipped with CH_3F+NH_3 mixed reaction gas system