Identifying paleotsunami deposits in Thailand using geochemical analyses

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Introduction

Paleotsunami research has received considerable attention following the devastating Indian Ocean tsunami of December 2004. Specific questions involve the magnitude, frequency and impact of past tsunamis. Phra Thong Island in the eastern Andaman Sea is an ideal location to study paleotsunami deposits in great detail (Fig. 1A, B). Apart from the 2004 tsunami layer, three more distinct tsunami layers have been identified and dated (Jankaew et al., 2008).

Here we report the initial results of high-resolution XRF elemental data analysis, which provide additional proxy information for ongoing tsunami research on Phra Thong. The XRF data set is supplemented by new δ13C dates and loss-on-ignition (LOI) analysis.

Fieldwork and Analytical Results

In a collaborative project between Stockholm University and Chulalongkorn University, three sites along a coast-inland transect on Phra Thong Island were chosen for detailed geochemical studies and additional AMS 14C dating.

The sampled sediment sequences clearly show three different sand layers separated by dark soils (Fig. 2A, B).

• The new 14C support the ages assigned by Jankaew et al. (2008).
• XRF elemental data show a good correlation between individual paleotsunami layers along the transect (Fig. 3). Si is a good proxy for discriminating sand layers A, B, C and D from the intercalated soils.
• LOI – indicates more carbonates in the sand layers and less organic material than in the peaty soils in which they are embedded.

Outlook

Further work will focus on a detailed geochemical characterization of the paleotsunami and soil layers, and on the influence of soil processes on the geochemical record.

References

Jankaew, K; Atwater, B; Sawai, Y; Chouwong, M; Charoentittitrat, T; Martin, M; Prendergast, A, 2008. Medieval forewarning of the 2004 Indian Ocean tsunami in Thailand. Nature 455, 1228–1231.