

Analysis in genesis and pattern of limestone sea notches from Sam Roi Yot National Park, Phrachuap Kirikhan Province, Southern Thailand

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Abstract

Limestone in Sam Roi Yod National Park, Prachuap Khiri Khan Province exhibits spectacular levels of sea notches at the base. Sea-notches here occur at two different elevations. Lower notches can infer the present-day tidal level, whereas the upper notches are smaller and can be used to infer former sea level. Detail measurement in notch revealed that there are both symmetry and asymmetry shapes. As a result, sea notches in this area can relatively be applied to use as indicators of the Holocene sea-level change as mentioned by previous literature.

Key words: sea notche, Sam Roi Yod National Park

1. INTRODUCTION

The evidence of the sea level change including sea notches has been mentioned to explain the evolution of the coastal plain from the Gulf of Thailand (e.g. Choowong, 2002a; Choowong, 2002b). Geological indicators of sea level changes previously mentioned include sea notches, sea cave and arches and relict sand barriers. Biological indicators include palynology, fossil crabs, shell fragments, peats and also oyster attached at the wall of sea notches (Thiramongkol, 1983). The notch that formed in the tidal range can be explained the level of sea-level highstand or the past tidal range. Therefore, it is very important to identify notch types in order to select the best sea notch for inferring former sea level.

This project is mainly focused on the measurement of sea-notches morphology appearing at the base of limestone mountain from Sam Roi Yod National Park, Prachuap Khiri Khan, western Thailand (Fig. 1). The notches here (Fig. 2) are of particular interests in term of how they were formed and whether or not they have close relation to the changes in sea level in the past, particularly during the Holocene period. Despite a large number of publication concerning the formation of sea notches (e.g. Pirazzoli, 1986), there are relatively few previously reported in Thailand referring sea notches as a relative indicator of sea level changes (Choowong et al., 2004; Choowong and Daorerk, 2003). The sea-notches can be classified into several types based on the result of measurement in the radian of cliff, under cutting roof and floor of sea-notches. By measuring these values, we can infer former sea level comparatively to the present high tide.

2. OBJECTIVES AND METHODS

The goal of the project is to systematically measure the shape and elevation of sea notches. Our suggestion is based on sea notches in this area having smooth symmetrical profiles, that they may indicate a former tidal range. In this area, the angle of cliff is straight up almost vertical. Therefore, the notches would be expected to be semi-circular in shape. Additionally, sea-notches generally exhibit two levels; upper notch, and the lower one. We assumed that the upper notch can be used to state former tidal level. The lower notch might be able to state the gradual changes of former tidal level to the present of sea level. The bottom of notch, vertex is acceptable to specify changes in tide level (Pirazzoli, 1986).

3. RESULT AND DISCUSSION

The results from measuring sea notches profiles were applied to correlate level of notches with the present high tide level. Sea notches in this area can be classified into both symmetrical and asymmetrical notches. Level of sea notches are different but in a range of 2.67 meter from the present mean tide level.

One possible way to infer level of the former high tide level is from plotting average level of upper notches into local sea level curve. In this paper, we infer sea level envelop from Choowong et al (2004). As a result, the average height of upper notches (as we infer to be the highstand level) began to form approximately 7,000 years BP and the gradual change in level of lower notches also conform well with the gradual falling of sea level (Fig. 3).

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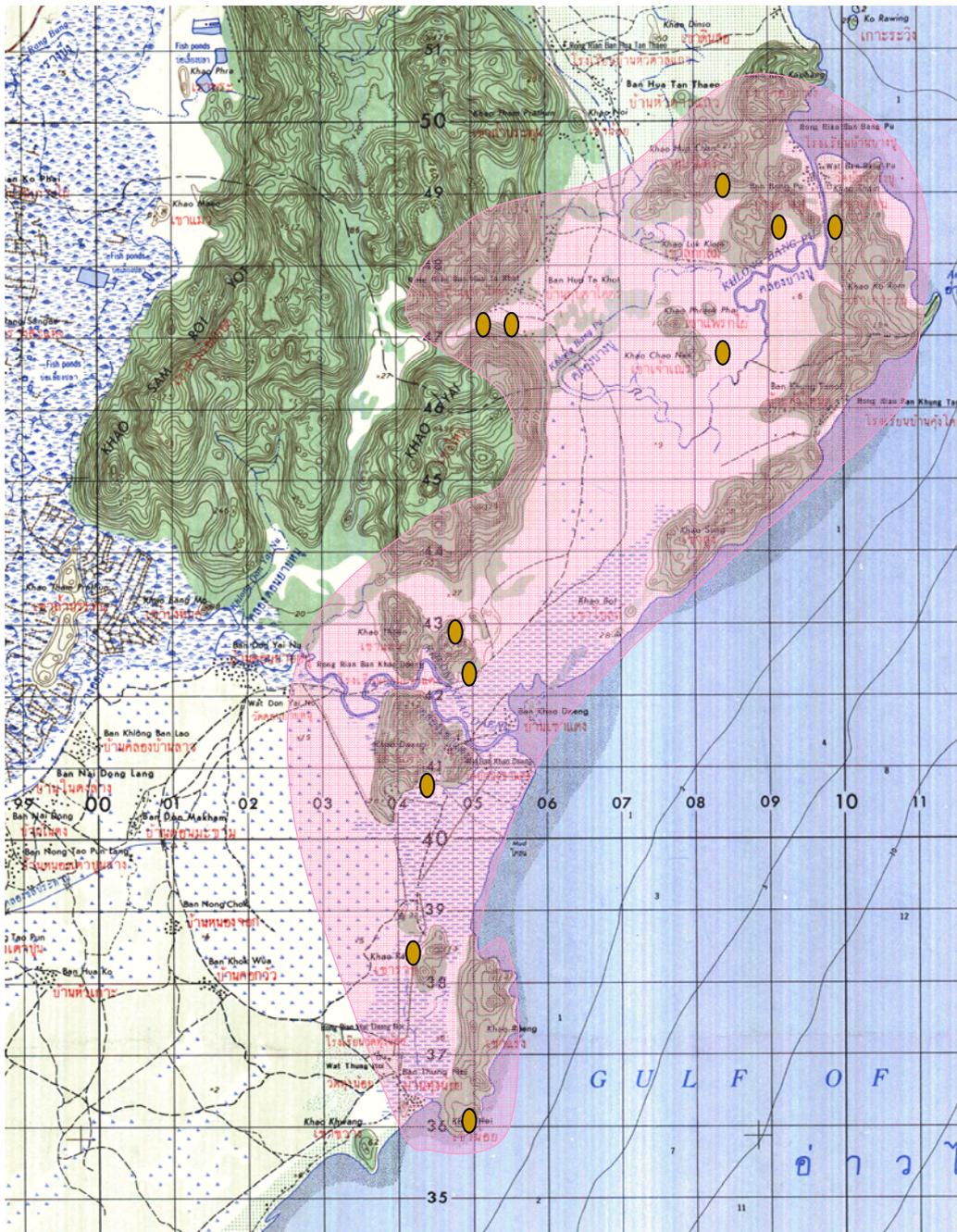


Fig. 1. Topographic map of the study area, Sam Roi Yod National Park showing locations of sea notches measured in this project.

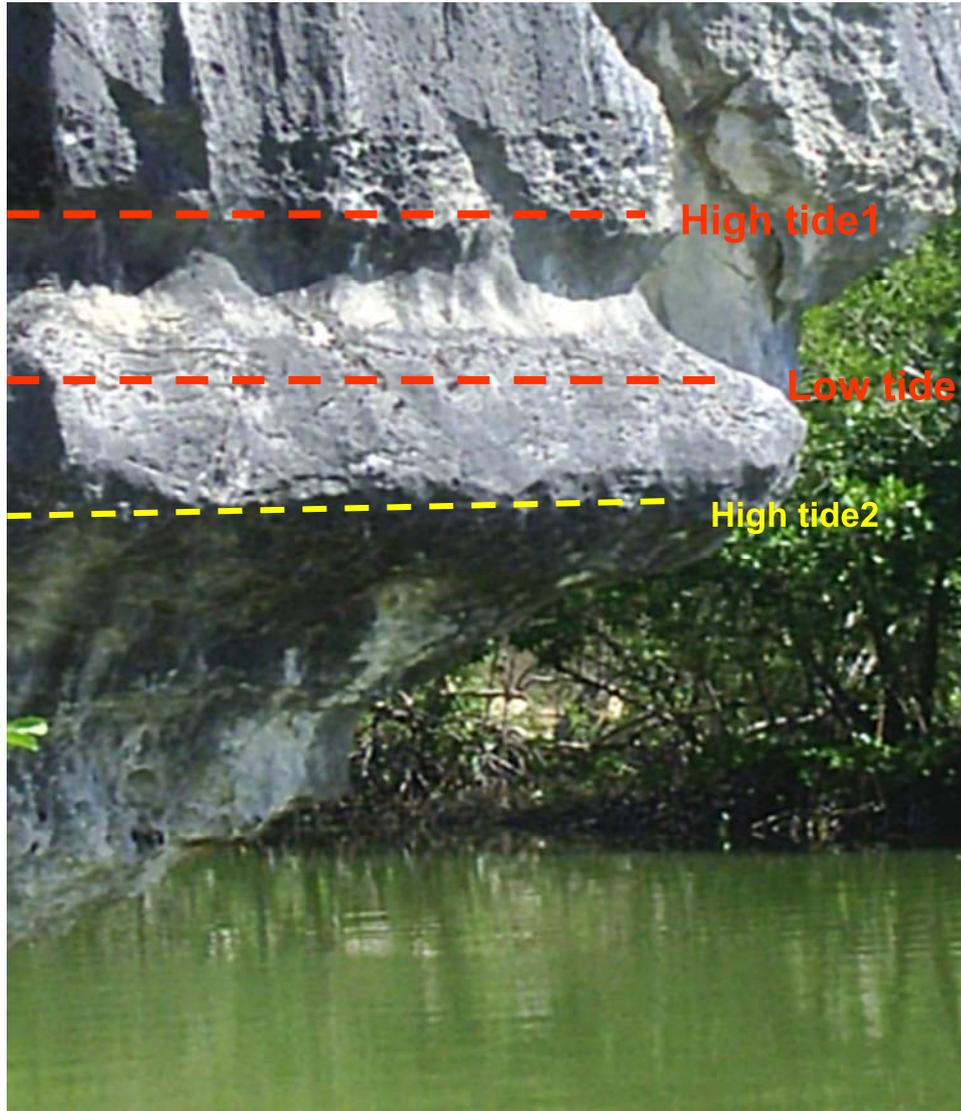


Fig. 2. Sea notches contain two levels of upper notch indicating former tide level (indicate by red dash lines and average highstand in between the lines) and the lower high tide level (yellow dash lines) formed during gradual falling of sea level. This photo was taken at the time of present high tide.

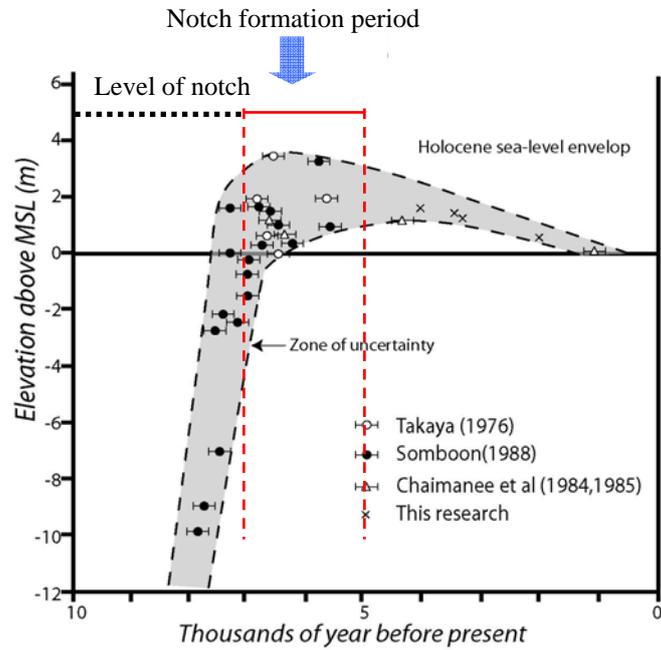


Fig. 3. Plot of average height of upper notches into sea level envelop of Thailand showing the beginning of notch formation at about 7,000 years BP with the maximum height of upper notch at 2.67 m from the present mean tide level (sea level curve modified from Choowong et al., 2004).