

Neotectonics of the Hengchun Area, Southern Taiwan

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Abstract

The collision process around Taiwan can be distinguished as subduction stage and mature arc-continent collision stage in the south and north of Hengchun area respectively (Fig.1: Reed et al., 1992; Huang et al., 2000). The Hengchun area, therefore, is regarded as a transition zone since the collision migrates southward as previous study proposed (Suppe, 1981; Teng, 1990). The major goal of this study is to understand the transient process through the neotectonic study.

We combine both onshore/offshore geology and geomorphology to establish a spatial and temporal framework. Forty-meter-DEM and aerial photos are used to identify the onshore geomorphic features, and then confirmed by field investigation. We also analyze seismic profiles and bathymetry to look into the details of the submarine structures and landforms. We basically divide our study area into onshore Hengchun Peninsula and offshore Hengchun Ridge, and then integrate our discoveries to form the entire picture.

The most dominant structure in the Hengchun Peninsula is the NW-trending Hengchun Fault (HF) passing through the middle of the Hengchun Peninsula (Fig.1). It is an east-dipping thrust fault evidenced by the topographic high and pervasive marine terraces on the hanging wall. It also has left-lateral component, which is supported by the triangular facets, pressure ridges and offset ridges along the fault trace. To the southern offshore of the Hengchun Peninsula, a clear linear scarp is probably the southern extension of the Hengchun Fault (Fig.1). We analyze two seismic profiles normal to the scarp, and confirm the tectonic origin and recent activity of the offshore Hengchun Fault.

To the west of Hengchun Fault, the east-facing Western Hengchun Tableland is composed of four-step marine terraces, which were dated from Holocene to late Pleistocene (Chen, 1993; Shyu, 1986). From bathymetry, the Western Hengchun Tableland is a NW-trending anticline, which we tentatively named as Western Hengchun Tableland Anticline (WHTA). The seismic profiles reveal a NW-trending fault, named A Fault (AF) tentatively, being developed in the front of the western limb of Western Hengchun Tableland Anticline (Fig.1), with vertical offset ~0.5s. Compiling the above discoveries, we believe that the Western Hengchun Tableland sits on the eastern limb of Western Hengchun Tableland Anticline, and both A Fault

and this anticline have been active at least since the late Pleistocene. The marine terraces mapped on the Western Hengchun Tableland actually reflect the recent activity.

In view of broader regional structural pattern, both South Longitudinal Trough Fault (SLTF) and Chaochou Fault (CF) that bound the Hengchun Peninsula in the east and west are thrust faults with left-lateral component (Fig.1), while the whole Hengchun area seems to be squeezed out in between the two faults, which may reflect the buoyancy of the rifted continent silver beneath (Shyu et al., 2005; McIntosh et al., 2005). The Hengchun Fault and A Fault are also of the same slip sense, and their orientations seem following the Riedel shear direction. As mentioned before, the Hengchun Fault and A Fault possess significant thrust component, which may help the Chaochou Fault and South Longitudinal Trough Fault accommodate the shortening component between the Eurasian and Philippine Sea Plate.

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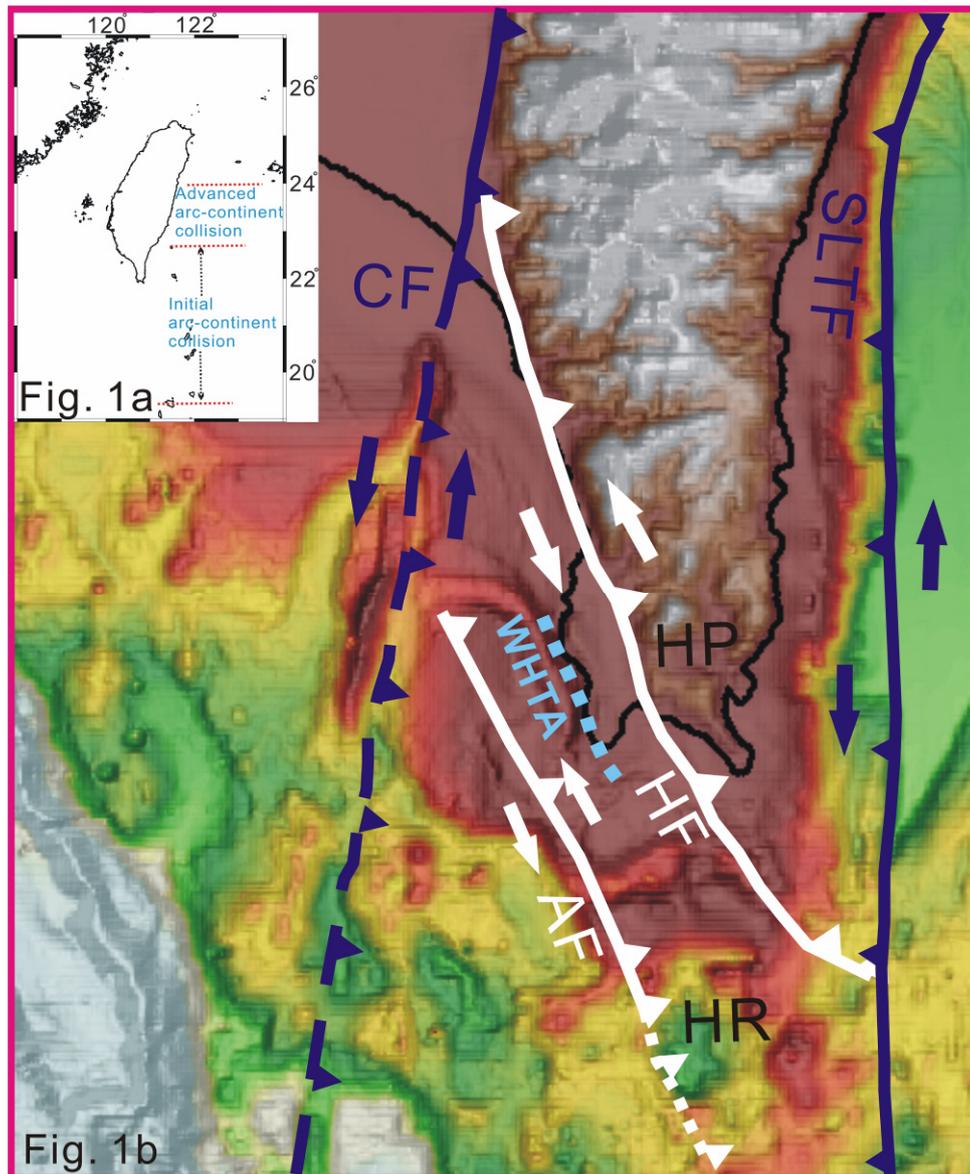


Figure 1. (a) This figure is modified from Huang et al. (2006) showing the different compression stages between the Eurasian and Philippine Sea Plate. The red rectangle points out our study area, the Hengchun Area, and indicates the incipient arc-continent collision stage where the Hengchun Area belongs to. (b) Neotectonic construction of the Hengchun Area. The Hengchun Area is bounded by the Chaochou Fault and the South Longitudinal Trough Fault and transected by the Hengchun Fault and the A Fault. CF, Chaochou Fault; SLTF, South Longitudinal Trough Fault; HP, Hengchun Peninsula; HR, Hengchun Ridge; HF, Hengchun Fault; AF, A Fault; WHAT, Western Hengchun Tableland Anticline.