

Numerical Simulations of Collision Process in Eastern Taiwan

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ABSTRACT

In the process of tectonic convergence between the plates, the Longitudinal Valley in eastern Taiwan is located on the suture zone, under the influence of the Philippine Sea plate carrying volcanic ridges in its north-western front. It has been colliding with the Eurasian plate at 7cm/y in the direction of about 315°. The area is thus possessed of its unique tectonic products and motions, and has been investigated in this study. Left strike-slip motions along the fault (in suture zone) have been implanted into the finite element elastic models incorporating with the split nodes. Prediction of tectonic evolution in eastern Taiwan therefore can be made by comparing outputs with observed paleo-stress/strain patterns shown on the island. The results indicate that left-slip motion exerting on the fault plane favors shear-releasing in the oblique convergent process, such that the suture zone might turn eastward at the southern end to avoid stress accumulating in its vicinity. In addition, the process will encourage the Ryukyu trench to bend clockwise relative to its converging direction at a distance of 50-100 km from the collision margin.

1. INTRODUCTION

Taiwan is in the convergent zone between the Philippine Sea plate and the Eurasian plate. The tectonic features shown in that region are believed to result from these two plates having collided obliquely with each other beneath the Longitudinal Valley at a convergent rate of about 7cm/year moving from southeast to northwest (Figure 1) (Karig, 1973; Seno, 1977; Tsai, 1978, 1986; Barrier & Angelier, 1986).

Off southern Taiwan, the South China Sea oceanic plate has been subducted under the Philippine Sea plate along the Manila trench and is underneath the Hengchun ridge where the plate is bent; however, the trench disappears after passing Lat. 21°N northward. To the north an associated eastward dipping Benioff zone exists but becomes hard to be recognized off Taitung offshore around 23°N (Tsai, 1986). This indicates that convergence between the

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