

The Possible Causes of the Crustal Low Resistive Zone for the Western Foothills, Taiwan

Chien-Chih Chen¹, Chow-Son Chen¹ and Li-Chung Sun¹

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ABSTRACT

This study attempts to discuss the possible causes of the crustal low resistive zone based on the magnetotelluric observations in the Western Foothills, Taiwan. The depth and resistivity of this low resistive zone (LRZ) have the values, on the average, of 9 km and 30 ohm-meters. According to the independently geological data, the possible causes of the LRZ are related to the high CO₂ activity in Taiwan and the dehydration reactions. The existence of a significant amount of HCO₃⁻ in crustal fluid would produce a consequent impact on resistivity.

(Key words: Magnetotelluric method, Electrical structure, Dehydration, Carbon dioxide, Western foothills)

1. INTRODUCTION

The Island of Taiwan is located in the active boundary between the Philippine Sea plate and the Eurasian plate. The relative plate velocity between the Philippine Sea plate and the Eurasian plate is at about 7.1 cm/yr and in the direction of about N50°W (Seno *et al.*, 1993). The overall plate configuration in the vicinity of Taiwan is well defined by seismicity (Tsai, 1986). While the Philippine Sea plate is subducting northwestward from the Ryukyu Trench in the northeast of Taiwan, the Eurasian plate is subducting beneath the Philippine Sea plate along the Manila Trench in the south of Taiwan. Thus, Taiwan lies on the region in which the polarity of subduction changes. The rapid arc-continental collision is responsible for the complex geological setting and the rugged topography. The geology and tectonics of Taiwan can be found detailedly in the two book-length introductions of Ho (1982, 1986).

Due to the rarity of arc-continent collisions among the active orogenic belts in the world, Taiwan possesses tectonically a unique position. Because of its interest as a typical example of an active arc-continental collision, the structure of the active Taiwan mountain belt always catches the scientists' attentions. The readers are referred to the special issue on TECTONOPHYSICS (Lallemand and Tsien, 1997) for a recent progress of the studies on the active collision in Taiwan. Many geophysical investigations, including the analysis of seismicity (Wang *et al.*, 1994), the gravity measurement (Yen, 1991), the seismic tomography

¹Institute of Geophysics, National Central University, Chungli, Taiwan 32054, ROC