

Magnetic Survey of Taiwan and Its Preliminary Interpretations

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ABSTRACT

To achieve an improved overall understanding of the tectonics of Taiwan, an island-wide magnetic survey, especially in the mostly inaccessible mountain ranges, was carried out from July 2003 to February 2004. In total, 6063 magnetic points were surveyed at an average spacing of 2 km. After data reductions, a new magnetic anomaly map of Taiwan was constructed. The map shows the range of magnetic anomalies mostly distributing between -400 to 400 nT. Anomalies in the southern part of Taiwan are much higher than those in the north whilst anomalies in the western plains area are higher than those of the mountain ranges.

High-frequency magnetic anomalies, generally more complex and localized, are found in west central (south of 24°N) and southwestern Taiwan. Smooth and gentle magnetic anomalies lie over a major part of the mountain ranges, except in the southern segment of the Central Range. According to the amplitude of magnetic anomalies and their coverage, this implies that a broad extrusive ultramafite body could exist beneath the southern segment of the Central Range.

Key words: Magnetic survey, Magnetic anomaly, Diurnal variation, IGRF

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1. INTRODUCTION

Magnetic anomalies are the result of contrasts in magnetization due to susceptibility contrasts in crustal rocks of different magnetic properties. Comprehensive magnetic anomaly maps are essential for a complete understanding of regional tectonics and geological characteristics.

Magnetic anomaly maps of Taiwan have been constructed previously by the Chinese Petroleum Corporation for oil exploration (Hsieh and Hu 1972; Chang and Hu 1981). In general, their data, however, are restricted to potential oil-reserve areas, mostly over the western plains region. In addition, Hsu et al. (1998) compiled both land and marine magnetic data to illustrate several new insights into the Taiwan-Luzon region. Wang et al. (2002) used this magnetic evidence to describe the formation of Taiwan as a solitary wave along the Eurasian continental plate margin. How-

ever, none of these surveys provided much data on the mountainous regions of Taiwan. Consequently, until a recent comprehensive magnetic anomaly survey, Taiwan's magnetic data was incomplete, especially in the inaccessible mountainous regions.

The comprehensive magnetic survey of the whole island was conducted from July 2003 to February 2004 via a joint effort between the Institute of Geophysics, National Central University and the Institute of Earth Sciences, Academia Sinica. Much thoughtful planning regarding the utilization of instruments, manpower, and survey routes was required to reduce the effects of geomagnetic secular variations. All magnetic points were surveyed with an average spacing of 2 km along highways, byways, and mountainous trails (Fig. 1). This paper describes the magnetic survey and construction of the magnetic anomaly map based on these new magnetic data. In addition, preliminary interpretations of the tectonic significance of these maps are also discussed.

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