

GEOCHEMISTRY OF LANHSU ANDESITES¹

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ABSTRACT

The Lanhsu andesites contain phenocrysts of hornblende and plagioclase only occasionally with pyroxene but without biotite. The Lanhsu andesites like the Coastal Range andesites have higher Na, Ni contents and higher $MgO/\Sigma FeO$, Na_2O/K_2O ratios but lower Ca, Fe, K, Rb, Sr contents than Tatun andesites. Consistent variation trends have been found in the plot of MgO , ΣFeO , K_2O , Cr, Rb and Ni vs $MgO/\Sigma FeO$ ratios of the Lanhsu andesites. The westward increase of Sr in andesites from Lanhsu and Coastal Range suggests that the Benioff zone in eastern Taiwan during Miocene might dip toward the continent. The chemistry of Lanhsu andesites can not be obtained by mixing of Philippine sea oceanic tholeiite with deep sea sediments. The Lanhsu andesites might have been formed by partial melting of oceanic tholeiite at the subduction zone at a depth less than 70 Km. The systematic major and trace element variations found in Lanhsu andesites indicate that the rocks might have been involved in crystal-liquid equilibrium after the formation of the initial liquid.

INTRODUCTION

Lanhsu an offshore islet located at 120°30'E and 22°N is composed mainly of andesites and andesitic pyroclastics. Lin (1961) considered the Lanhsu andesite to be Oligocene-Miocene in age while MOEA (1974) suggested that the Lanhsu andesite is Miocene in age. Radiometric dating on four samples of andesites and two samples of agglomerate yield ages scattering from 5.76 to 13.4 M. Y. (Ho, 1975) indicating a spread from Middle Miocene to Pliocene.

The major rocks found in Lanhsu include hornblende-andesite, pyroxene-andesite, agglomerate and tuff with hornblende andesite being the dominant component. MRSO (1972) reported that serpentinite, amphibolite, diorite, gabbro, peridotite and pyroxenite xenoliths have been formed in Lanhsu andesites. These mafic and ultramafic xenoliths may be older than the andesites.

In the present study, thirteen andesites have been chemically analyzed. The chemical characteristics of these andesites have been compared with the Coastal Range and Tatun andesites. It is hoped that the chemical data together with other evidences will shed some light on the origin of these andesites.

CHEMISTRY OF THE ANDESITES

The samples analyzed include twelve hornblende andesites and one hornblende-pyroxene-andesite. Generally speaking the phenocrysts in these rocks consist essentially of hornblende (10-25%), pyroxene (augite, 0-8%), plagioclase (10-30%), and magnetite (0-3%) while the matrix (40-70%) is composed of fine-grained hornblende, magnetite and glass. Secondary minerals include sericite, chlorite, epidote, calcite and pyrite.

The samples used in the chemical analysis were prepared as follows: (1) fresh parts of the

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