Geohistorical Significance in the Dyke and Epiclastic Sediments of Jeju Island Formation Theory

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Ⅰ. Purpose of the Research

Volcano-stratigraphy of Jeju Island is summarized as the basalt, trachyte, trachybasalt, trachyandesite and Seoguipo formation. But dyke and epiclastic sediments indicate the volcano-stratigraphy of Jeju Island are sporadically deposited in Jeju Island. Also in the following, we are studing geohistorical significance of the dyke and epiclastic sediments in Jeju Island formation theory, and comparing of geology between Jeju Island and Taiwan.

Ⅱ. Procedures

This research is to carry out field investigation and laboratory study.

Ⅲ. Data

Ⅲ-1. Geographic Setting and General Geology of Taiwan

One of the festoon islands bordering the western side of the Pacific Ocean is Taiwan, a province composed of 81 islands and islets, geographically represented by the main island of Taiwan, the Tiaoyutai Island, and the two island groups.

The main island of Taiwan can be divided into three geological provinces from west to east: the Western Foothills, the Central Range, and the Coastal Range. All the offshore islands can be related to either of these three provinces on the basis of geological affiliations.

Ⅲ-2. Geographic Setting and Geology of Jeju Island

Jeju Island is a province located at the southwestern entrance *of* the Korea-Tsushima Straits between the Korean Peninsula and the Japanese Islands. The Province of Jeju is composed of 64 islands and islets, geographically represented by the main island of Jeju, Udo and two island groups.

Jeju Island geologically consists of basaltic flows and pyroclastics with small amounts of epiclastic sediments.

Ⅲ-2-1. Epiclastic Sediments in the Study Area

Dodu-bong and Seogundo tuff-cone in this study area were deposited in the early "tuff-cone" stage.

These conglomerate sediments are 1～10m thick and has a lateral persistence of 1～3km. The conglomerate sediments is light gray to light yellow in color and consists of semiconsolidated gravels, sands and muds. Gravels range from 2 to 100cm and are generally well-rounded. Gravels are composed of phenocryst-bearing basalts and trachyte, usually showing well-developed cross-bedding, weakly-bedding and graded bedding.

Scarce volcanic debri flow deposits consists of mixtures of debris and matrix. Debris consist mostly of angular scoria, ranging from 2 to 5 cm in size, but also include rare lava blocks, up to 2m in diameter. The surface of volcanic debri flow deposits is commonly hummocky-shaped, ranging from 5 to 10m in relief, and reflecting appreciable yield strength. The lava blocks and scoria have abundant vesicles and scattered phenocrysts of feldspar.

Ⅲ-2-2. Scale and Feature of Dykes

Dyke of the study area has been 3～18m in height and in 0.5～5m width. A bed of peperite(1～10cm thick) is observed at the boundary of the dykes. The trachyandesite is an intrusive rock characterized by the development of the onion structure and vertical joints.

Vesicles in the dyke are composed of basalt and increase toward the inner part. Basalt contains phenocrysts of plagioclase with a small amount of feldspar and augite.

Ⅲ-3. Geochemical and Clay Mineral Analysis

Based on the total alkalis-silica diagram, the Hangpaduri and 4th Sallok bridge dyke is classified as trachyandesite, a quarry in Donggwangri, Dodu-bong and Seogundo dyke is classified as basalt, Jeju Industry and Information College and Oedo stream dyke is classified as basaltic trachyandesite, and Seokimnyung dyke is classified as basaltic andesite.

Clay mineral analysis was carried out to show that the hydrothermal activity was at it's peak of analsim and was formed in the hydrothermal activity and decrease from contact part to T5.

Ⅲ-4. Volcanic Stratigraphy in the Vicinity of Dykes

Hangpaduri trachyandesite, Oedo stream basaltic trachyandesite, Seokimnyung basaltic andesite, Donggwangri quarry basalt and Y valley basalt intruded into the vicinity of conglomerate sediments. The volcanic stratigraphy in the environs of these areas are summarized as the Pyoseolli basalt group, conglomerate sediments and dykes in ascending order.

Dodu-bong basalt and Seogundo basalt intruded into the tuff-cone. The volcanic stratigraphy in the environs of Dodu-bong is summarized as the Pyoseolli basalt group, Dodu-bong tuff-cone, scoria-cone and Dodu-bong dyke in ascending order. The volcanic stratigraphy in the environs of Seogundo is summarized as the Jungmun trachybasalt group, Seogundo tuff-cone, Seogundo conglomerate sediments and Seogundo dyke in ascending order.

The 4th Sallok bridge trachyandesite and Jeju Industry and Information College basaltic trachyandesite intruded into the vicinity of volcanic debri flow deposits. The volcanic stratigraphy in the environs of 4th Sallok bridge and Jeju Industry and Information College is summarized as the Jungmun trachybasalt group, volcanic debri flow deposits, 4th Sallok bridge, and Jeju Industry and Information College dyke in ascending order.

Ⅲ-5. Geohistorical Significance in the Dyke and Epiclastic Sediments

On the basis of the volcano-stratigraphy of Jeju Island, the 3rd stage of the volcano-stratigraphy of Jeju Island suggested by Yoon(1997) is revised as follows in the discending order:

Late 3rd Stage : Trachybasalt erupted and formed Mt. Halla. Jeju Island major volcano is still rising in the ascending magma, followed by the formation of the epiclastic sediments.

Middle of 3rd Stage : The epiclastic sediments deposited by a river of Jeju Island major volcano rose to 1,000m above sea level, while the gravel formation of Y valley was standard.

Early 3rd Stage : The Pyoseolli basalt group erupted out and formed a broad lava plateau.

4th Stage : Jeju Island major volcano formed.

Ⅳ. Conclusions

The volcano-stratigraphy an Jeju Island is summarized as basement rocks, donnaeko basalt, sanghyo trachyte, U formation, Seoguipo formation, Jungmun trachybasalt group, Pyoseolli basalt group, epiclastic sediments, dyke, and Hallasan trachybasalt group in ascending order.

Dykes intruded into the epiclastic sediments in the late 3rd stage.

As a result of clay mineral analysis, analsim is the evidence of intrusion that if going to the contact part of the dykes, it shows a high peak.

Of these stratigraphic units, the conglomerate sediments is only a volcaniclastic deposit which consists mainly of pebble to boulder conglomerates.

Most of the pebbles and the conglomerate are fluvial sediments deposited by a relatively large river.

Rising height of Jeju Island major volcano rose to 1,000m above sea level, when the gravel formation of Y valley was standard.

In the present topography of Jeju Island, such a large river is not distributed, and the epiclastic sediment reflects the older topography of Jeju Island, which was a broad plain.

Jeju Island major volcano is rising in the ascending magma.

Taiwan were formed the kinematics of deformation, uplift and exhumation across an active mountain belt for several reasons.

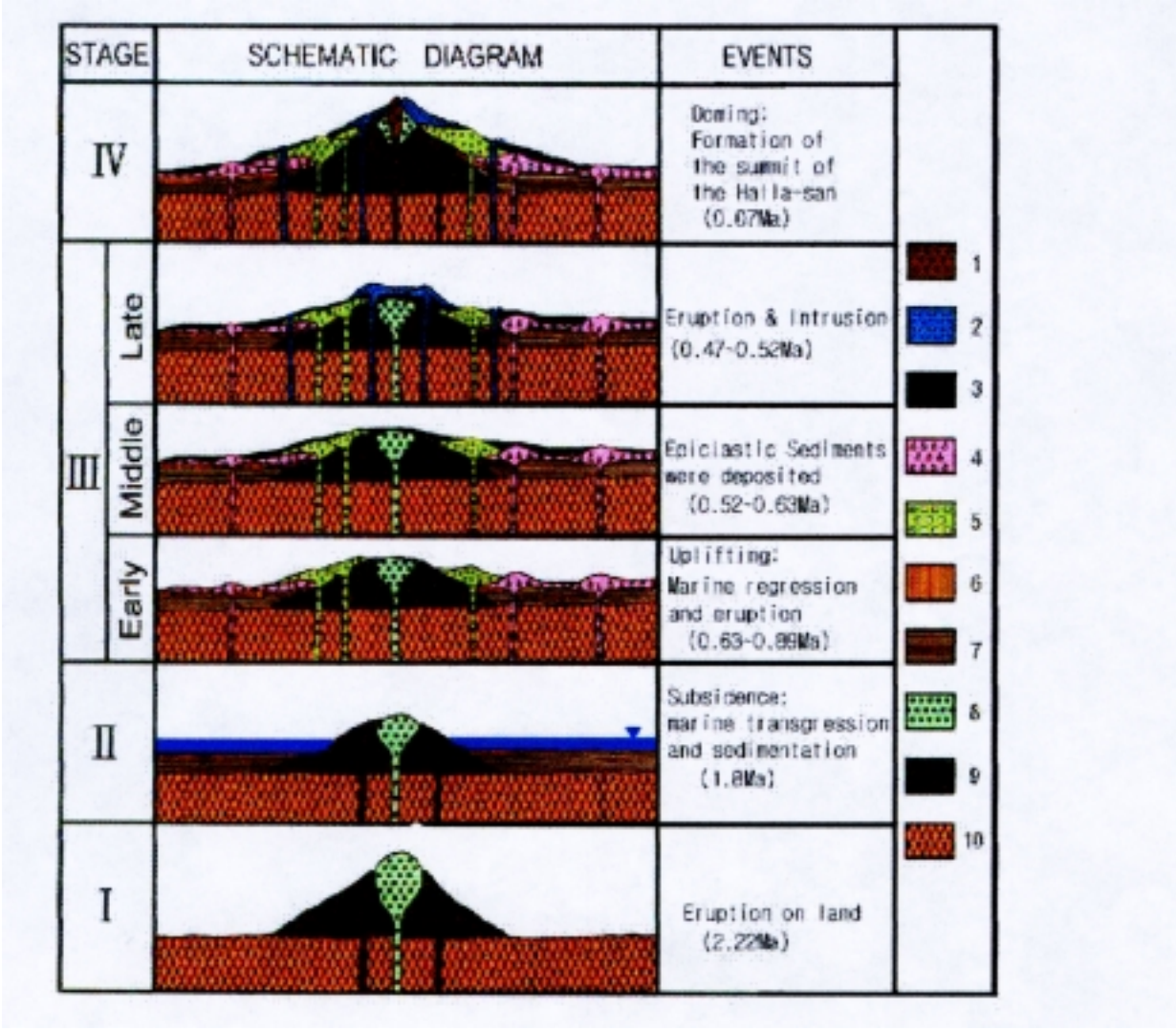

Figure. Schematic diagram of Jeju Island Formation Theory. 1=Baegnogdam Trachyte Group; 2=Hallasan Trachybasalt Group; 3=Epiclastic Sediment Group; 4=Pyoseolli Basalt Group; 5=Jungmun Trachybasalt Group; 6=Seoguipo Formation; 7=U Formation; 8=Sanghyo Trachyte; 9=Donnaeko Basalt; 10=Basement rocks.