Stratigraphy of Cored Sediments from North of the Irosin Caldera, Sorsogon, Philippines

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Received November 30, 2012

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Abstract

A 9.5-m sediment core was obtained from site IrBH-1 in Juban, Sorsogon, located north of the Irosin caldera, southern Luzon, Philippines. Systematic meter-scale logging and documentation were performed to describe and interpret the sedimentary stratigraphy. The core sediments were divided into three layers based on sedimentary facies: (1) Layer A (surface to 3.0 m depth) consists of a mixture of pumice and lithic fragments in a silty matrix. It is composed of a brownish layer with a silty matrix containing coarse and fine pumice grains. (2) Layer B (3.0 to 6.3 m depth) consists of a mixture of pumice and lithic fragments in a silty matrix. The pumice grains contain phenocrysts of cummingtonite, which is an important key mineral. (3) Layer C (6.3 to 9.5 m depth) contains dense volcanic rocks ranging in size from pebbles to boulders.

Key words: Irosin caldera, Bulusan volcano, core drilling, stratigraphy

Introduction

The Irosin caldera, located in the province of Sorsogon southern Luzon, Philippines (Fig. 1) represents the largest extrusion of a highly silicic magma in the Bicol arc (Delfin et al., 1993; McDermott et al., 2005; Catane et al., 2005) and was formed approximately 41 ka (Ozawa et al., 2004; Mirabueno et al., 2007). The caldera belongs to the Bulusan Volcanic Complex (BVC), which consists of domes, stratovolcanoes and the active volcano, Bulusan (Fig. 2). The formation of the caldera represents the second stage of the three-stage eruptive history of the BVC. The first stage is cone-building episode, which commenced at 1.10 Ma. After the second stage, subsequent volcanism formed the post-caldera andesitic volcanoes, cones and stratovolcanoes including Bulusan Volcano. We have conducted core drilling in and around Irosin caldera to reveal the volcanism of the third stage of the BVC. This paper presents the description of core sediments outside the caldera at site IrBH-1 in Juban, Sorsogon (Fig. 2).

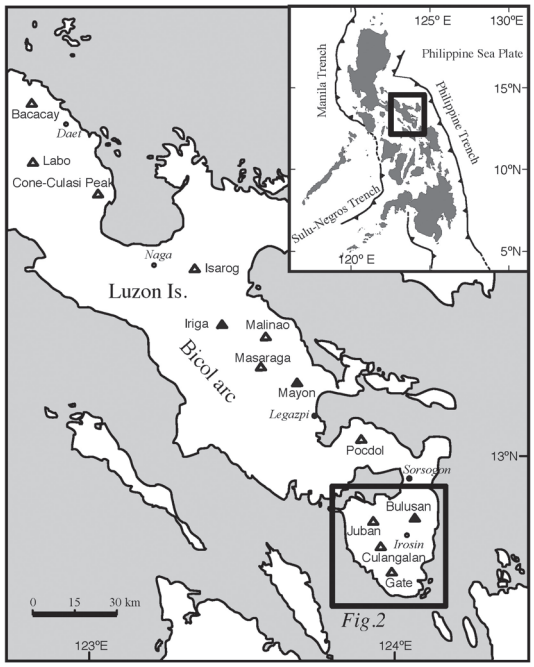

Fig. 1. Maps showing the volcanoes in the Bicol arc (modified from PHIVOLCS, 2002). Solid triangles denote active volcanoes. Inset shows a map of the Philippines; box in the inset map approximates the Bicol arc.

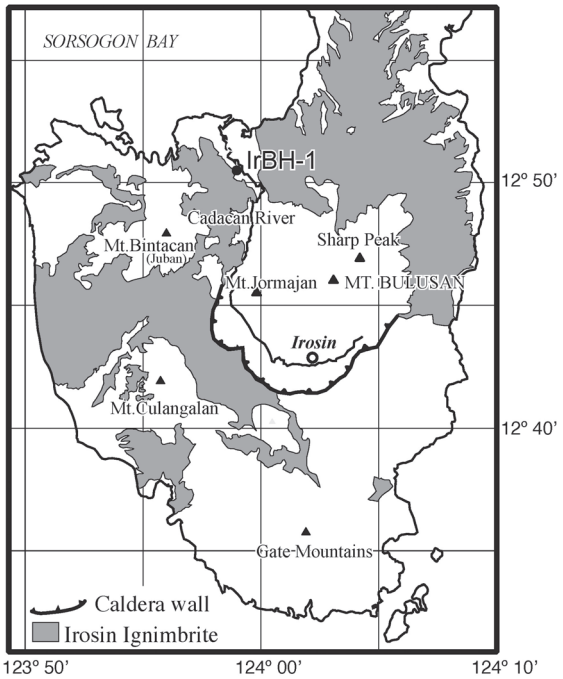

Fig. 2. Map showing the location of the borehole site IrBH-1.

Description of Cored Sediments from IrBH-1

IrBH-1 is located in an alluvial fan along Cadacan River (Fig. 2). Core samples were collected from drilling to a depth of 9.5 m, and came from three layers (Figs. 3 and 4) and these are described as follows: (1) Layer A extends three meters below the surface, and characterized as a cultivated layer, brown silt with coarse to fine pumice grains. (2) Layer B which starts from depth 3.0 m to 6.3 m consists of a mixture of pumice and lithic fragments in a silt matrix. These pumice fragments contain phenocrysts of cummingtonite. The last layer, Layer C, from depth 6.3 m to 9.5 m consists of dense volcanic rock with size ranging from pebbles to boulders.

Discussion

The core drilling at site IrBH-1 outside of the Irosin caldera revealed weathered and reworked tuffaceous deposits and layers of fluvial deposits formed by Cadacan River that drains directly from Bulusan volcano slope.

Based on IrBH-1 core sample, fluvial deposits were distinguished from depth 3.0 m up to 9.5 m below the surface (Fig. 3). This deposit shows normal grading with pebble-rich conglomerate in sandy matrix overlying gravel to boulder deposits. On top of the fluvial deposit is a layer of weathered and cultivated soil. Pumice grains occurred in a silty matrix, and these pumice grains are mixed with lithic grains in Layer B at depths 3.0 m to 5.0 m. The pumice containing phenocrysts of cummingtonite implies that the deposits originated from Irosin ignimbrite (Danhara et al., submitted). Lithic fragments in Layer C are predominantly andesitic in composition suggesting that the materials are derived from andesitic volcanism of the third stage of the BVC (including Bulusan volcano).

Acknowledgements

We wish to thank Dr. Renato Solidum Jr., the director of PHIVOLCS for his valuable advice and encouragement. This study was partly supported by a Grant-in-Aid for Scientific Research (No. 21401005) from the Japan Society for the Promotion of Science

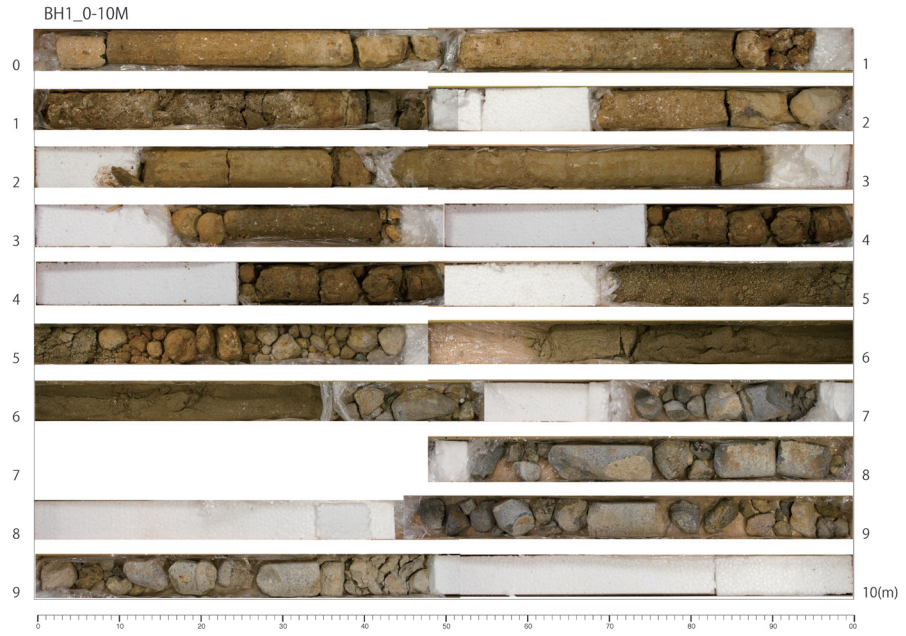

Fig. 3. Photo of core sediments at the IrBH-1.

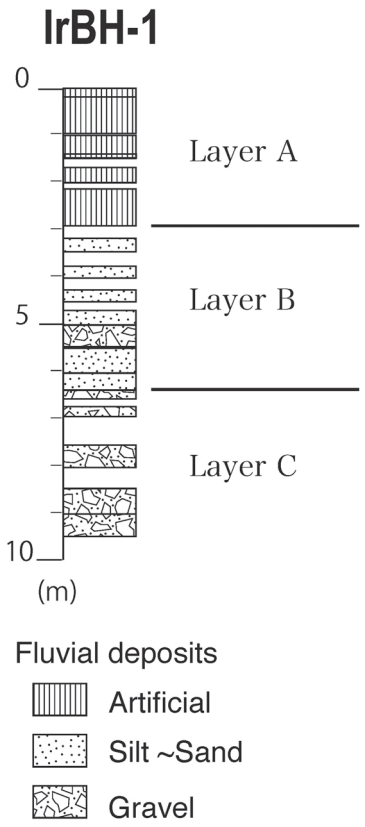

Fig. 4. Columnar section of core samples at the IrBH-1.

（JSPS）and DOST-PHIVOLCS. Critical comments on the draft manuscript by Dr. Jun Aizawa are helpful to develop this paper.

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（要　旨）

鳥井真之・Ma. Hannah T. Mirabueno・Eduardo P. Laguerta・Perla J. Delos Reyes・藤木利之・Ericson B. Bariso・Arturo S. Daag・小林哲夫・奥野 充，2013，フィリピン共和国のイロシンカルデラ縁辺部から採取されたコア試料の層序．福岡大学理学集報，43，83-86.（Torii, M., Mirabueno, M.H.T., Laguerta, E.P., Delos Reyes, P.J., Fujiki, T., Bariso, E., Daag, A., Kobayashi, T. and Okuno, M., 2013, Stratigraphy of Cored Sediments from North of the Irosin Caldera, Sorsogon, Philippines. *Fukuoka University Science Report*, **43**, 83-86.）

フィリピン共和国，ルソン島南東端に位置するイロシンカルデラ縁辺部（ソルソゴン州ジュバン）から深度 9.5m のコア試料（IrBH-1）を採取した．このコア試料は，層相から 3 つに区分することができ，地表から 3.0 m の茶褐色の軽石を含むシルト層（A 層），3.0 m ～ 6.3 m の礫および軽石まじりのシルト層（B 層），6.3 m ～ 9.5 m の巨礫に富む層（C 層）に区分された．これらは河川および氾濫原堆積物と判断され，最上部 A 層は耕作土となっている．A 層および B 層のシルト層には，イロシン火砕流堆積物に特徴的なバブルウォール型の火山ガラスとカミングトン閃石が含まれることから，掘削地点周辺のイロシン火砕流分布域を供給とし，巨礫に富む C 層は Cadacan 川上流に位置するブルサン火山などの後カルデラ火山から供給されたものと考えられる．