

九州南方沖に位置する鬼界カルデラの構造

The structure of the Kikai submarine caldera in the southern off Kyushu, Japan

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1. Introduction

Kikai Caldera (Matsumoto, 1943) is a mostly submerged caldera complex located in the southern Japan 40 km off Kyushu Island. Two islands, i.e. Satsuma Iwo-jima and Takeshima, are the only parts above the sea level while numerous submarine peaks are scattered on and below the sea level.

Kikai Caldera is believed to be the source of Akahoya tephra (Machida and Arai, 1978). The date of the eruption was determined as 7300 cal. BP (Fukusawa, 1995), and that is the most recent VEI-7 class eruption in the eastern margin of Asia. Intense earthquakes (Naruo and Kobayashi, 2002) and tsunami (Geshi, 2009) are presumed to have taken place at the climax of the eruption. There are two other series of giant eruption deposits that are considered to have originated from the Kikai Caldera complex and this indicates that it has been serving as an eruptive center for the past 150,000 years at least.

2. Methods

We conducted a number of seismic reflection observations in two survey cruises (KT-10-18 and KT-11-11) in 2010 and 2011 using a research ship Tansei-maru of JAMSTEC. The sound source was a 150 cubic inches G-I gun with 10 seconds of shot interval, and a 48-channelled streamer cable was used for acquisition. Totally 25 profiles were obtained.

3. Interpretations of the results

First, the entire caldera has an asymmetrical structure with its floor aslant. While a clear, steep normal fault is observed in the west of the southern caldera perimeter, the entire northern part and some parts of the eastern perimeters are collapsed into blocks like slumps.

Second, the central mountainous area seems to mostly consist of pre-caldera body not likely to have been formed by post-Akahoya volcano. It is collapsed northeastward and its deposits are buried by several thick facies of possibly including Akahoya Eruption.

Third, another caldera that has not been hitherto recognized has been discovered. There is a 10 km wide sharp plunge of acoustic basements below the thick deposits in the southeastern end of the Kikai Caldera. Its location matches the circular negative Bouger anomalies (Onodera et al., 2010). The caldera should be formed before Akahoya Eruption because its rim where overlaps present Kikai Caldera perimeter is missing.

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