

## Relationship between the development of the Goto Submarine Canyon and the Okinawa Trough rifting

hisashi Oiwane<sup>1\*</sup>, Satoshi Tonai<sup>2</sup>, Hidekazu Tokuyama<sup>3</sup>, Yasuyuki Nakamura<sup>3</sup>,  
Shoichi Kiyokawa<sup>4</sup>

<sup>1</sup>National Institute of Polar Research, <sup>2</sup>AIST, <sup>3</sup>ORI, University of Tokyo, <sup>4</sup>Kyushu University

The Goto Submarine Canyon is the largest submarine canyon in the northern part of the East China Sea. It is believed to have developed in close relation with the tectonic block boundaries that was active during the Japan Sea opening in the Middle Miocene (Katsura, 1992). The canyon pores into the northernmost Okinawa Trough, which is an incipient back-arc basin that has been rifting since the late Miocene (Letouzey and Kimura, 1986). Thus the incision of the canyon should be started after the inception of the Okinawa Trough rifting. However, no study was conducted that focused on the relationship between the canyon development and the Okinawa Trough rifting. Here we show the latest result of detailed bathymetry, reflection seismic, and the submarine observation surveys to reveal the relationship between the canyon incision and the rifting of the Okinawa Trough.

### 1) Reconstruction of the northern Okinawa Trough rifting

We identified the synchronous change of the fault and the depositional system based on the seismic reflection survey, which is interpreted as the regime change of the rifting. Thus, two-phased rifting of the northern Okinawa Trough is identified. We tried correlating stress regimes and ages of each phase to the geologic evidences in the surrounding land area. The phase 1 started about 7 Ma with WNW-ESE trending extensional regime, and the phase 2 started after 1 Ma with almost N-S trending extensional regime and continues until now.

### 2) Reconstruction of the Goto Submarine Canyon

Several kinds of detailed surveys revealed fault- and erosion-controlled development of the canyon geomorphology. The position and the course of the canyon is constrained by some faults. Differential erosion of the dipping strata with variable erosion-resistance caused cuesta-like thalweg geomorphology. The interval of the erosion-resistance was controlled by the sedimentary cycle of the host rock of the canyon.

### 3) Interaction between the Rifting and the Goto Submarine Canyon

Correlating results from these two reconstructions, we identified the interaction of the Okinawa Trough rifting and the development of the canyon. The development of the canyon was constrained by the stepwise fault activities of the Okinawa Trough rifting. Constraints on the position and the course of the canyon, and the dip of strata in the host rock were attributed to the fault activity in the rifting phase 1 of the Okinawa Trough. In the phase 2, reactivation of faults at the canyon may caused incision of the canyon. Adversely, opening of the Canyon may have contributed to the sedimentation of the northern Okinawa Trough, changing the depositional system at the start of the rifting phase 2.

Keywords: submarine canyon, Okinawa Trough, seismic reflection survey, rifting