Summary of Kikai submarine caldera researches conducted by KOBEC (Kobe Ocean-Bottom Exploration Center)

*Nobukazu Seama[1,2], Tetsuo Matsuno[2,1], Koji Kiyosugi[3,2], Satoshi Shimizu[2], Reina Nakaoka[2], Keiko Suzuki-Kamata[2,1], Yasutomo Seto[1], Mamoru Sano[2], Yuiko Morita[4], Hikaru Iwamaru[2], Haruhisa Morozumi[2], Misaki Horiuchi[1], Kimihiro Nishimura[1], Hiroshi Ichihara[5], Kazuki Hayashi[1], Toki Hirose[1], Katsuya Kaneko[1,2], Hiroto Yamaguchi[4], Yuki Okizono[4], Hiroko Sugioka[1,2], Kazuo Nakahigashi[6,2], Yojiro Yamamoto[7], Tatsuya KODA[2], Shuichi Kodaira[7,2], Yoshiyuki Tatsumi[2,1], Scientific party of T/S Fukae-maru Kikai caldera research cruises -

1. Department of Planetology, Graduate School of Science, Kobe University, 2. Kobe Ocean Bottom Exploration Center, Kobe University, 3. Organization of Advanced Science and Technology, Kobe University, 4. Department of Planetology, Faculty of Science, Kobe University, 5. Graduate school of environmental studies, Nagoya University, 6. Tokyo University of Marine Science and Technology, 7. Japan Agency for Marine-Earth Science and Technology

Kikai submarine caldera to the south of the Kyushu Island, SW Japan, had at least three eruptions at 140, 95 and 7.3 ka, and its collapse occurred at 7.3 ka during the latest supereruption (>500 $km^3$of magma) in the Japanese Archipelago. We have conducted series of research cruises using the T/S Fukae-maru in this caldera to understand the melt supply system for the supereruption through tracing past supereruptions, identifying current volcanic activities, and imaging current structure.

The surveys to trace past supereruptions include multi-channel seismic reflection (MCS) surveys, visual observation and sediments sampling using remotely operated vehicle (ROV; SHINDAI-2K), and land observation. The MCS surveys provide high resolution marine seismic reflection images, which are classified into seven seismic units characterized by distinctive seismic facies. We interpreted that the upper most seismic unit should be a candidate layer for Koya ignimbrite due to 7.3 ka Akahoya eruption, because the deposit from the Kagoshima mainland with regressive surface erosion on progradational HST (highstand system tract) locates beneath this seismic unit and the deposit probably corresponds to the last glacial period (18 ka) (Shimizu et al., this meeting). This interpretation is supported by the chemical composition of glass shard samples on the sea floor near the caldera wall, which were obtained by ROV divings. The chemical composition of the glass shards indicates characteristic bimodal SiO_2 contents, which consistent with unique characteristic for the Akahoya eruption (Nakaoka et al., this meeting). This seismic unit distributes around the caldera and its whole volume will be calculated to estimate reliable magma volume during the Akahoya eruption. Further, visual observation of the ocean bottom by ROV (Kiyosugi et al., this meeting) and land observation (Suzuki-Kamata et al., this meeting) suggest eruption styles of submarine volcanoes and ignimbrite deposition modes.

Current volcanic activities and structures are obtained using geophysical approaches. High volcanic activities are identified by five months of seismicity data using five ocean bottom seismometers (OBSs): 1100 volcanic tremor events with its fundamental frequency of 2 Hz, high frequency seismic events with obvious P and S arrival, and monochromatic variation events are detected beneath and/or around the caldera (Seto et al., this meeting). Imaging current structures are provided by multi-beam echosounder mapping with backscatter imaging, gravity analysis, and marine electromagnetic experiment. All these structures outside of the caldera wallshows asymmetric features between the trench side and the back-arc side. The backscatter images show rough morphological features in the back-arc side, suggesting recent local eruptions, in contrast with smooth morphology in the trench side. The gravity analysis indicates that thinner upper crust in the back-arc side than that in the trench side (Morita, 2019). The

electromagnetic field variation data obtained by 10 ocean-bottom electro-magnetometers (OBEMs) observation allowed us to image a 3-D electrical resistivity structure, which also shows asymmetric feature at <5-10 km depths (Matsuno et al., this meeting). These asymmetric features between the trench side and the back-arc side suggest that Kikai submarine caldera formation is basically controlled by the subducting slab.

Keywords: Kikai Caldera, Supereruption, Akahoya eruption

