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Preliminary results of geophysical survey in the middle Okinawa trough during GH11 cruise

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Back-arc basins are extensional basins formed behind subduction zones by seafloor rifting or seafloor spreading. Back-arc seafloor spreading process is considered as similar to those of mid-ocean ridges. Likewise, back-arc rifting process is considered as similar to mid-ocean rifting but is not clear because there are few examples of the back-arc rifting in the present. The Okinawa Trough is a back-arc rifting basin of the Ryukyu arc, extending between the southwest Kyushu and north Taiwan. Several evidences of magmatic activity such as dike intrusions and/or oceanic crust, and hydrothermal activities were found in the trough, but it is still not clear when these magmatic activities were initiated and how they proceed during seafloor rifting.

We carried out marine geophysical survey in the Middle Okinawa Trough during GH11 cruise by R/V Hakurei maru No.2 from July 14 to August 15. Sea surface geophysical mapping (bathymetry, magnetics and gravity) was conducted during the survey. The survey area is largely divided into four area; northern area around Tokara Islands, continental shelf area around 27N. We present the preliminary results of the morphological and geophysical characteristics of the survey area and its implications as bellows;

1) In the Northern area around Tokara Islands, the present volcanic front, is located in the survey area. Several seamounts, sea knolls and lineaments trending N60E are vastly distributed west to the Tokara Islands. Positive magnetic anomalies up to 600nT are observed along Tokara Island and the northern part of the middle Okinawa trough where the seafloor is consisted of volcanic structures, suggesting the recent island-arc volcanism and back-arc volcanism by dike intrusions or initial emplacement of oceanic crust, respectively.

2) In spite of the depth deeper than 1000m, high amplitude magnetic anomalies of +-400nT are observed in the area of southern part of Iheya knolls and Izana knolls, also suggesting back-arc magmatic activity.

In combination with the previous geological and geophysical researches, these magmatic activities discovered are not related to so-called seafloor spreading. However, it is still not clear that how these magmatic activities can be interpreted as a whole picture of the magmatic activity in the Okinawa trough. In the presentation, we will integrate the new data with the previous geophysical data to reveal the magmatic activities of the whole Okinawa trough.

Keywords: Seafloor morphology, magnetics, gravity, Okinawa trough