High-resolution bathymetry and efficient geological survey using submersible SHINKAI 6500 equipped with MBES and SBP in the petit-spot volcanic fields around Minamitorishima Island.

*Junji Kaneko[1], Shiki Machida[2]

1. Japan Agency for Marine-Earth Science and Technology, 2. Chiba Institute of Technology

1.Introduction
Petit-spot volcanoes were first discovered on the old northwestern Pacific plate off Sanriku in Japan (Hirano, N. et al., 2006). Subsequently, it has been reported that such volcanoes were recently discovered on the slope of the Chile, Java trenches and southeastern of Minamitorishima Island (YK10-05 cruise report). The common feature of these areas is the stress field of plate tectonics, where is the plate flexes and fractures before the subducting area. It is necessary to obtain the high-resolution topography and detailed geological structure of regional Petit-spot lava fields to define the relationship between the regional stress field and petit-spot volcanism.

2. Method
We conducted the research cruises (YK18-08, YK19-05S) using submersible SHINKAI 6500 on the southeastern of Minamitorishima Island, where around the petit-spot volcano field. During the research cruise, a broad-area geophysical survey was conducted by R/V Yokosuka. Based on these broad-area geophysical data and previous research data, then the dive point was determined. The submersible SHINKAI 6500 equipped with Multibeam echo sounder (Seabat 7125) and Sub-bottom profiler (Strata Box) to collect detailed topographic and stratigraphic data. The principal results of the dives are summarized as follows.

3.Result
The dives were conducted six times (YK18-08: Dive1520,1521,1522, YK19-05S: Dive1542,1543,1544) and all dives were confirmed to be the petit-spot volcanic field. Four dives were conducted seamount, Dive1521 and 1544 dive points were a place where topographical elevation and large-scale outcrop were not observed by the shipboard survey. Dive1521, condition of the seafloor of landing point was flat, acoustic basement reflection was confirmed below the seafloor. Following the reflection, small outcrops (approximately 1 m) were confirmed. Dive1544 was performed by a one-man pilot dive (one pilot and two observers). During the first half of the dive, a box survey was conducted at an altitude of 50m above the seafloor to map each outcrop and collect geological data between the outcrops. In the latter half, observations and sampling were performed in sequence through the mapped outcrops. Acoustic survey near the seafloor collected high-precision and high-density seafloor topography data including the outcrop and acoustic basement data under the seafloor. SHINKAI 6500 equipped with an acoustic survey system provided efficient and effective dive and we obtained the data to define the relationship between stress field and petit-spot volcanism.

Keywords: high-resolution bathymetry, acoustic survey, petit-spot volcano, minamitorishima Island, submersible SHINKAI 6500, MBES and SBP