

Depositional history of Aguni Basin northwest of Okinawa Island

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Marine geological survey of GH09 cruise was carried out in the west off of Okinawa Island during 16 July to 17 August, 2009 for marine geological map.

The survey area are located around the slope between the Okinawa Trough and the Ryukyu Island Arc. The Okinawa Trough is a back arc basin formed behind the Ryukyu Island Arc extends from Kyushu to Taiwan, a distance of 1200 km, along the Ryukyu Trench where the Philippine Sea Plate is subducting beneath the Eurasian Plate.

Based on the 16 ch seismic survey, several normal faults were found in the northwest off of Okinawa Island. The faults strike NE-SW which is parallel to the Okinawa Trough axis and the dip toward the Trough. The maximum vertical displacement reaches to 2.0 seconds in two way travel time (TWT). As a result of movement on these normal faults, sediments around this area are separated into SE-ward tilted blocks. Several half grabens are formed consequently. Aguni Basin is the widest and deepest graben in the survey area. The basin have ellipse shape with 50 km in NE-SW and 20 km in NW-SE. The maximum depth was about 2000 m beside the boundary fault in SE.

Three depositional sequence, unit A, unit B, and unit C in ascending order were recognized within Aguni Basin. Unit A has internal reflections which are continuous and parallel to upper uncoformity. The thickness is 0.5 s in TWT at least. Unit B shows downlap pattern in lower boundary and toplap pattern in upper boundary. The internal reflections are inclined to from SSE to SE. The unit is thicker in SE and the thickness reaches to 0.7 s in TWT just beside the boundary fault. Unit C shows onlap pattern to lower boundary which inclined to SE. This unit is formed by the stacking of subunits which shows succession of erosional surface, chaotic unit, and parallel unit in ascending order. The thickness of unit C is also thicker in SE and reaches about 0.5 s in TWT. According to the seismic facies, unit A is deposited uniformly on deep and flat seabed before rifting of the Okinawa Trough. Unit B is deposited on inclined seabed with sediment supply from NW during doming stage or first stage of rifting of the Trough. Unit C was reworked deposit from the slope in NW part of the half graben as density flow after formation of the Trough. The depositional age was deduced from the change of sedimentary environment and formation process of the Okinawa Trough although age data was lacking.

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