

## The lithostratigraphy and geological structure of The Himenoura Group in Makishima and Yokourashima Islands of Amakusa area

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Himenoura Group, exposed in Makishima and Yokourashima Islands of Amakusa area, Kumamoto Prefecture, is assigned to Santonian to Campanian in age according to previous biochronological studies. It is underlain nonconformably by granitic and metamorphic rocks of the Higo Belt and unconformably by the Lower Cretaceous Gosyura Group, and is overlain unconformably by the Paleogene Miroku Group on the west. The Group in this area strikes NE and dips 30-80°NW with some local undulations of the trend in the northern part of Makishima and Yokourashima Islands. An anticline could be inferred in the central part of Yokourashima Island.

Lithostratigraphy and geologic structure of the Himenoura Group in Makishima and Yokourashima Islands were described through precise mapping and logging of facies succession along the coasts. In Makishima Island, the Group consists of a variety of coarse- to fine-grained sandstones interbedded with mudstones, and subordinate of small amount of pebbly mudstone, slump deposits and tuffaceous beds. This study reveals that the Himenoura Group of Makishima Island is divided lithostratigraphically into 5 units in ascending order, as follows: The first unit (200m+ in thickness) is characterized by thin-bedded fine-grained sandstone and mudstone. The second unit (about 180m in thickness) is composed of sandstone-dominant alternating beds of sandstone and mudstone in the lower and upper parts and of thin-bedded sandstone and mudstone couplets in the middle part. The third unit (about 170m in thickness) consists of thin-bedded fine-grained sandstone and mudstone in the lower and sandstone-dominant alternating beds of sandstone and mudstone in the upper. The fourth unit (about 170m in thickness) is made up of thin-bedded fine-sandstone and mudstone in the lower and sandstone-dominant alternating beds in the upper. The fifth unit (80m+ in thickness) is exposed as thin-bedded fine-sandstone and mudstone in the lower and sandstone-dominant alternating beds of sandstone and mudstone in the upper part. Each of the third, fourth and fifth units shows a similar facies succession that begins with mudstone-dominant interbeds of thin-bedded sandstone and mudstone in their lower parts and passes to thick- and intermediate sandstones with mudstone beds in their upper parts.

Intermediate- to thin-bedded sandstone beds show largely grading so that they are comparable to turbidites. Some thick to intermediate sandstones exhibit internally a structure-less or dish and convolute structures diagnostic features of fluidized flow or grain-flow deposits, and show an amalgamation with mud clasts due to hydraulic fracturation frequently. This study recognized a similar cyclic sedimentation at interval of 100 to 180meters for the upper half of the second unit and the third, fourth and fifth units in which a coarsening- and thickening-upward cycle was formed commonly as facies succession. Each cycle boundary is represented by a remarkable facies change from thick-bedded, medium- to coarse-grained sandstone to mudstone.

The lithofacies of the Himenoura Group in the Yokourashima Island located on the southwest of Makishima Island is similar to that of the Makishima Island. However, the lithostratigraphic correlation between both islands has not been made clear because of regional facies change, lacking of marker beds and fold structure in Yokourashima Island.

Although the channel facies was not confirmed in this study, the depositional environment of the Himenoura Group is comparable to the lobe and lobe fringe of deep-sea fan system doubtlessly. Further research on paleocurrents should be necessary to clarify the relation between the cyclic sedimentation and basin evolution.

