

Grain fabric analysis of massive sandstone beds of the Upper Cretaceous Himenoura Group distributed in Amakusa-Kamishima Island, Kyushu, Southwestern Japan by Deep Learning Convolutional Neural Network

*Sayo Ishii¹, Hajime Naruse¹

1. Department of Geology and Mineralogy, Graduate School of Science, Kyoto University

The purpose of this study is to clarify the grain fabric of massive sandstones deposited in submarine fans. It has been known that the massive structure is common in submarine sediment-gravity-flow deposits, their formation mechanisms have not been clarified. Rapid deposition from high concentration turbidity currents and en-masse deposition of sandy debris flows are candidates of processes to form massive structure, but it is difficult to distinguish the processes from visible sedimentary structures because they lack characteristic features in macroscopic observation of outcrops. To this end, this study investigated ancient massive deposits by means of the microscopic image analysis. We employed deep learning image analysis for identifying sand particles from rock sections in several tens cm scale. The study area is the Cretaceous Himenoura Group distributed in Amakusa-Kamishima Island, Kyushu, Southwestern Japan. Polished sections of sandstones were scanned by EPSON GT-970 to obtain images. Then the manually traced images were used as teacher images for deep learning. The developed model using Convolutional Neural Network(CNN) automatically distinguishes particles from fine-grained matrix. As a preliminary result, it was revealed that massive sandstones taken from submarine channel-fill deposits and lobe show different features in grain fabric observed at horizontal sections. Preferred orientation of grain long axes tends to vary vertically in channel-filling deposits, whereas those in lobe deposits show relatively stable trends. Future experimental studies may indicate origin of these difference in features of grain fabrics,

Keywords: Massive Sandstone, Turbidite, Grain Fabric