

Size distribution of sandstone blocks in block-in-matrix fabrics of the Shimanto Belt, southwest Japan

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Block-in-matrix fabrics in accretionary complex are formed by slope failure, tectonic compaction, or injection, and are a key structure to solve material recycling and tectonic deformation. We need quantitative criterion because discussion of origin is difficult to unclear the whole structure. We focus on size distribution of block. For example, the size distribution of fraction such as intrafault materials by brittle failure is power law (e.g., Shimamoto and Nagahama, 1992). But, there is no study example that intend size range few cm to 10 m. We investigate to difference of size distribution that is measured researched block-in-matrix fabrics, and discussion these factors.

Object regions are five areas in the Shimanto Belt. Geologic body of three areas (the Neogene Sarashikubi Formation, the Paleogene Muroto Formation, the Cretaceous Ukibuchi Formation) is thought slope failure deposits, and that of two areas (the Cretaceous Mugi Mélange, the Cretaceous Nonokawa Formation) is thought deformed by tectonic compaction. Sandstone block is surrounded by mudrock matrix in these areas. These areas are suitable for the measurement because around bedding dip slant high angle. Measurement used by photographic image taken at various heights (1.5–50 m). We checked cumulative size distribution from 400–4000 block-size data, in addition inputted data is over 20 pixels.

The result of size distribution shows different trend according to origin. We approximate size distribution by power law, and calculated determination coefficient (R^2). R^2 values of failure deposits (the Sarashikubi Formation, the Muroto Formation, the Ukibuchi Formation) are 0.993, 0.984 and 0.997, respectively. On the other hand, R^2 values of boudinaged body (the Mugi Mélange and the Nonokawa Formation) is 0.980 and 0.897, and lower than one of failure deposits.

Size distributions of failure deposits are judged power law distribution by R^2 values. Size distribution in the Ukibuchi Formation is power law in the range of 10^{-3} to 10 m from other heights data. Block of failure or sedimentary deposits is sorting by transportation. The failure deposits measured by this study keeps size distribution when slope failure because transport-distance is short. On the other hand, R^2 values of boudinaged body are relatively lower than those of failure deposits, because ratios of thickness and viscosity of strata make specific size blocks.

In conclusion, size distributions of failure deposits and boudinaged body are different trend. Then, determination coefficient may be effective as index for judged origin in mappable scale.

Keywords: size distribution, block-in-matrix fabric, accretionary complex, Shimanto Belt, mélange