

Abration process of gravel considered from shape change of beach gravel in Joetsu region, Niigata Prefecture, central Japan

*Jun Matsukaze¹, Masaaki Shirai¹, Takako UTSUGAWA²

1. Tokyo Metropolitan University, 2. Rissho University

Various gravel species are observed on the gravel beach around the river mouths of the Joetsu region in the Niigata prefecture. Although several studies on size distribution of beach gravels and gravel species composition have been conducted, a study how gravels had been transported and abraded from river mouth along the beach were not carried out well. Transport and abrasion of beach gravels have hardly investigated enough. Studies on breaking and abrasion of beach gravels are expected to contribute understanding influence of sediment supply from river on beach processes.

The geologic and topographic features of Joetsu region differ between eastern and western sides of Itoigawa-Shizuoka Tectonic Line (e.g., Nagamori et al. 2010). From several gravel beaches located around river mouths, western sides of the Himekawa, Hayakawa and Nougawa rivers were selected for our study. At each survey site, 50 m long lines were set along the shoreline on the foreshore and the backshore. Along each line, three-axes (long, medium and short diameters) and roundness of “characteristic gravels” were measured. The “characteristic gravel” means unique and distinguishable gravel species; granite, conglomerate and serpentinite (Himekawa River), quartz diorite (Hayakawa River) and rhyolite (Nougawa River) were selected as characteristic gravel species. Mean diameter calculated from cube root of the three axes and shape characteristics of the gravel on the shape classification diagram (Zingg, 1935) were investigated. Roundness was measured based mainly on roundness impression diagram (Krumbein, 1941).

Three axis and average diameter decreased with a distance from the river mouths. Long axis decreases distinctly and short axis decreased slightly and these tendencies accord well to the shape-diameter relationship of gravel which means gravel shape transfer from various to spherical via disk with decrease in gravel diameter.

Results of the Himekawa River in which granite, conglomerate and serpentinite were measured, show that conglomerate easily decreases its size with removal of clasts and consequently it keeps angular shape. In contrast, fine grained serpentinite hardly decreases its size and easily rounded. It suggests that grain/mineral size influence breaking/abrasion process of gravels.

Keywords: Beach Gravel, Particle size, Flatness, Roundness