

Rare earth and major elements of beach sand in Japan

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Rare earth elements (REE) concentrations in beach sands of Miyagi and San-in area in Japan were determined by ICP-MS to characterize the sound producing sand and silent sand of REE to the parental rock. To investigate the behavior of beach sand, the major element composition and minor minerals are also analyzed with X-ray fluorescence and X-ray diffraction methods. Both sound producing sand and silent sand samples in Miyagi and San-in area contained more than 60

weight % of SiO₂ and are composed of quartz and feldspar. Miyagi sand samples have light REE enriched and flat chondrite-normalized patterns that are similar to local source, sandstone, relative to JG1a (standard granite sample of Geological survey of Japan). San-in area sand samples have high REE content and a large positive Eu anomaly. The sand contain lower REE contents are due to enriched quartz-feldspar content. San-in sand samples have high content of REE and a large positive Eu anomaly as a result of presence of clay minerals (montmorillonite) and a less effect of weathering. The REE pattern for the samples are similar to that for granitic rocks in the district, although light REE enrichment is smaller than parental rock that may be due to the decomposition of feldspar. There is no significant difference of sand samples in major chemical composition but the chondrite-normalized REE patterns in sand samples are different from features of their parental rock. This implying the REE patterns of sand samples are useful for deciphering the source rocks of the sand.