

Geochemical properties and elemental behavior of sound producing and silent sands in Aoya, Tottori Prefecture, Japan

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The sound producing sand beach is a unique phenomenon occurring around the world. It is something for which Japan is well-known. Aoya is one of twenty-nine sound producing beaches in Japan. Aoya Beach is located in the Sannin district along the Sea of Japan. Approximately half of its beach sand makes sound. The remainder is silent. Tests on the mineralogy, major and minor element compositions of major and minor, and trace elements were performed to identify the differences between sound producing sand and silent sand samples. The grains, with and without sound, are fine and mostly composed of quartz and feldspar. Hornblende, monazite and biotite exist as accessory minerals. The sand grains have contaminated surfaces. The contaminants include clay as well as a powder made from the repeated rubbing of minerals. The REE patterns of sand have LREE enrichment and a positive Eu anomaly. Principle Component Analysis was carried out to see all elemental distribution. The sand contains abundant base metals including Co, Ni, Cu and Zn. It also includes many other trace elements. The sound producing sand has a correlation of minor elements including monazite, sphene, allanite or phosphate group minerals for component 1 and feldspar as component 2. The silent sand has a correlation as a clay mineral for component 1 and feldspar for component 2. Therefore, the significant difference between the sound producing sand and the silent sand is the presence of clay minerals on the grain's surface. It is inferred that clay makes the sand silent.