



Geochemical evaluation of the land use and human activities at a Medieval harbor site, Masuda city, Shimane Prefecture, Japan

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Large-scale harbor and settlement sites from the latter half of the eleventh through sixteenth centuries have recently been discovered in the northern part of Masuda City, Shimane Prefecture, Japan. The sites were constructed at the river mouth delta of the Takatsu and Masuda rivers, facing the Sea of Japan. In former time, the mouths of the two rivers are thought to have formed a shallow lagoon connecting with the Sea of Japan. The harbor was thus well located for ships sailing along the sea coast, especially for conducting trade with the China mainland and the Korean peninsula. Archaeological investigations have identified over 800 construction pits, blacksmith hearths, harbor structures and numerous fragments of ceramic porcelain originating both from within Japan and from Asia (China, Korea, Vietnam and Thailand). It seems that the maritime trade network operated from this Medieval harbor site by the Masuda Clan was on an East Asian scale. Consequently, the harbor site can be expected to have received a considerable amount of ancient anthropogenic matter. Concentrations of 22 elements in 66 soil samples from the Nakazu Higashihara site were determined by X-ray fluorescence spectroscopy, in order to identify the land use and human impacts on soil chemistry at the harbor site.

The results show that significant differences in geochemical compositional exist between the northern and southern parts of the site due to differences in lithology and land use practice. The south area was a production area of this harbor site. Three different activity areas were recognized within this area (fire pit and charcoal area, building pillars, and a blacksmith furnace area), based on geochemical and archaeological information. Cluster analysis shows a strong relationship exists between As, Pb, Cu, Br, TS, MnO and P₂O₅ in the fire pit and charcoal area. These charcoal materials were likely derived from fuel used in firing and heating. Close relationships occur between Cr, Sr, Sc, F, I, TS, CaO, MnO and P₂O₅ in the building pillar area, probably due to the deposition of residential wastes. High level of As, Pb, Zn, Cu, V, Sc, MnO and Fe₂O₃ are found in the blacksmith area. These enrichments seem related to ancient anthropogenic effects, such as metallurgical activity at the harbor site. Iron melting, including slag, has been identified in the bottom of a furnace (bowl shape slag) in the eastern part of the southern area. A group of elements (Ni, Y, Nb, Zr, Th and TiO₂) do not reflect the anthropogenic history. However, these elements and their ratios can be used to identify element sources, as well as to establish baseline concentrations of other elements which are influenced by anthropogenic and detrital inputs. The northern area of the harbor site contains sandy soils, and is bordered by sand dunes on its seaward side. This area mainly contains post holes from building pillars and ceramic fragments, and can be recognized as a living area for residents. Soils in the northern area are characterized by high Zr contents and relatively low abundances of most other elements (excluding Cr and TS). This enrichment is mainly due to textural differences in the soils, and is probably due to their sandy character.