



Geomorphic impacts of the 2011 tsunami on the lower reaches of the R. Natori, northeast Japan

H. Shimazu

Rissho University, Geography, Japan (shimazu@ris.ac.jp)

The tsunami caused by “the 2011 off the Pacific coast of Tohoku Earthquake” attacked Japan’s east coast and inundated a large extent of the lowlands. The strong flood flow went upstream in the lower reaches of the rivers. The lower reaches of the rivers in Japan usually have unprotected dry riverbeds separated by dykes from floodplains where people live. The tsunami went upstream not only in the channels but also in the dry riverbeds. There is 1 kilometers wide unprotected dry riverbed in the lower reaches of the R. Natori, northeast Japan and they were used for vegetable farmlands. This study aims to discuss the geomorphic impacts of the tsunami on the dry riverbed in the lower reaches of the R. Natori. Surface sediments, micro-landforms and damages to agricultural facilities such as small poly tunnels, plastic mulches and support posts were examined to reconstruct the geomorphic impacts. Fieldworks were carried out at the beginning of May, 50 days after the tsunami disaster, and the end of August.

Height of the tsunami near the river mouth was estimated over 3 meters. The flood flow went upstream to the sites at an elevation of 4 meters, 9 kilometers from the river mouth in the channel and 6.5 kilometers in the dry riverbed. Because the tsunami deposits are light colored sand and silt containing salinity, they could be distinguished from brown cultivated soil easily. The geomorphic impacts on the dry riverbed changed longitudinally. In the lowest 2.5 kilometers reaches strong flood flow and ebb flow caused strong erosion. It accounted for thin tsunami deposits with seashells and beach gravels, eroded scar, and dunes of downstream direction in the dry riverbed. In the next 1.5 kilometers reaches agricultural facilities were washed away or fell over upstream direction. Although the flood flow was still devastating, strength of the ebb flow gradually weakened. In this reaches dominant sedimentation process caused the tsunami deposits over 10 centimeters thick. In the reaches at about 5 kilometers from the river mouth, weakened and shallow tsunami flow went upstream through the relatively lower part. in the dry riverbed. Islands surrounded former channel courses were not damaged by the tsunami and vegetables in them grew as usual. The tsunami flooding at 6.5 kilometers from the river mouth inundated the dry riverbed and only thin deposits were left on it.