Inundation and Damage by Run-up Tsunami of 2011 in the Sendai Plain, Japan

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ABSTRACT

After the tsunami of the 2011 off the north-east Japan Earthquake, a survey of the disaster in the residential area of the coastal plain of Miyagi Prefecture was carried out. The damage of structures is explained by photos. It emerges that the tsunami height is more than 8 m on the shore, the inundation depth decreases along the run-up distance as far as 4 km inside from the coast and the state of the houses in the Yuriage town changes at 1.2 km from the coast from destructed into surviving. An experimental record of run-up tsunami suggests that a velocity at the front of tsunami is very strong at a shoreline.

KEY WORDS: Tsunami; run-up; inundation; depth; velocity; house; destroyed.

INTRODUCTION

On 11th March, 2011, the magnitude 9.0 earthquake occurred off the coast of north-east Japan and the huge tsunamis attacked the coast and run up so that about twenty thousand people were lost as well as many structures on land. The tsunami had grown up to about 10m high on the coastline of the Sendai plain and run up onto the ground. This earthquake was named “The 2011 off the Pacific coast of Tohoku Earthquake” by the Japan Meteorological Agency (JMA). Hereinafter, we call this “The 2011 Tohoku Earthquake” for short. Tohoku is the district name from Fukushima Prefecture to the northern end of the Honshu Island which is the main island of Japan.

As the damage by the tsunami of this time is huge, drastic measures should be taken to reduce a tsunami disaster that will attack us again. A survey on the coastal area of the Sendai plain was carried out on 29th March, 2011 because investigation on how the tsunami had invaded the land and destroyed things is important.

In this study there are explanations about the earthquake and photos showing the state of the damage in the area surveyed. And changes of inundation depths as tsunami invading and the rate of surviving houses are analyzed. Lastly velocities of a run-up tsunami by a wave tank test are presented for consideration on the destructive power of this tsunami.