A Relationship between Grain Size Characteristics and liquefaction Degree on Awaji Island Coastal Sand Beach

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ABSTRACT
On the coastal part of Awaji Island, there was a storm surge caused by typhoon 21 in 2018. In addition, there are concerns about the damage of the coastal zone due to the occurrence of the Nankai Earthquake. If such a large-scale earthquake occurs, the existing coastal structure may collapse due to liquefaction of the sandy beach.

In this study, we aim to grasp the spatial features of the coastal beach on Awaji Island by analyzing the image to understand the characteristics of the particle size and shape of the coastal sandy beaches of Awaji Island and considering the liquefaction characteristics by shaking table experiment.

From the results of this study, as a spatial feature of the coastal sandy beach of Awaji Island, sand with large particle size is distributed on Osaka bay side, but the shape is rounded as a whole. Also, there was a tendency to liquefy as it approached a true circle. Especially, sand on the Kii Channel side is easier to liquefy than sand in other areas.

KEY WORDS: sandy beach; earthquakes; image; analysis; liquefaction; shaking table experiment

INTRODUCTION
The coastal area of Awaji Island is feared to be damaged by a Nankai Trough megathrust earthquake. In the event of such a large-scale earthquake, the existing coastal structures (Fig.1) such as coastal embankments, revetments and wave-dissipating blocks will subside and collapse due to the liquefaction of the sandy beach. It is expected that the function may not be fulfilled. Furthermore, storm surge damage caused by Typhoon No. 21 in September 2018 was observed along the coast of Awaji Island. It is thought that when a large shear force is repeatedly applied to the sandy ground, which is usually not subject to water pressure due to storm surge, the pore water pressure increases and the ground becomes unstable and liquefies (Kokusho, 2005). In addition, it is predicted that the manifestation of the function is greatly affected by short-term tidal fluctuations and long-term sea level fluctuations, as well as by pore conditions and physical properties of beach sand. While there are concerns about damage caused by these coastal disasters, preserving the natural beauty of the coast of Awaji Island, which is part of the Setonaikai National Park, is also an important issue.

In recent years, society's interest in Ecosystem-based Disaster Risk Reduction (Eco-DRR) functions is increasing as a disaster prevention and mitigation measure that utilizes the ecosystem (Biodiversity Strategic Planning Office, Nature Conservation Planning Division, Nature Conservation Bureau, Ministry of the Environment, 2016). This Eco-DRR does not treat the development of physical measures for disaster prevention and mitigation and environmental conservation as opposing axes, but seeks to make use of the advantages of both (Matushima, 2017). Although it is important, domestic and international research has just started, and it is necessary to collect a lot of knowledge.

In Japan, an island country surrounded by the sea, sandy beaches are important spaces that require maintenance and management from the