**Urban River Modeling based on CityGML using**

**Water-borne MMS Point Clouds**

Kantaro Kanai 1, Naoto Kimura1, Masafumi Nakagawa1 ,

Nobuaki Kubo2 , Etsuro Shimizu2

1 Shibaura Institute of Technology, 3-7-5, Toyosu, Koto-ku, Tokyo 135-8548, Japan

2 Tokyo University of Marine Science and Technology, 2-1-6, Etchujima, Koto-ku, Tokyo 135-8584, Japan

\*ah20005@shibaura-it.ac.jp

***ABSTRACT***

CityGML is an open and international standardized data format for 3D urban models, which describes the conceptual structure of geographic objects in XML format. One of the features of CityGML is seamless scale representation to manage, small-scale and large-scale map data simultaneously, based on the concept of Level of Detail for 3D objects. However, in the urban river space, discussion on geographic object modeling has been insufficient to represent 3D maps for navigation of autonomous boats. In addition, the current version of PLATEAU does not provide high-definition 3D map data of rivers because many technical issues such as occlusion exist to be observed by aerial photogrammetry, mobile mapping system surveying, and terrestrial laser scanning. To promote more effective utilization of urban rivers, we focus on autonomous boat navigation technology. To achieve autonomous boat navigation technology, precise GNSS/non-GNSS seamless positioning techniques, autonomous control technology, and 3D maps should be prepared. In this study, we developed a method for 3D modeling and attribute assignment of geographic features in urban river space by point cloud acquisition from water-borne MMS. Moreover, we discussed a description of 3D models based on CityGML, for autonomous boats in urban rivers. The 3D model and maps generated by our proposed method can contribute to autonomous boats and the management of infrastructure around rivers.

**Keywords:** Water-borne mobile mapping, CityGML, 3D modeling,