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A study on effect of accuracy of topographical information to flood risk assessment in urban lowland: Barajima district

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A number of cities in Japan are located in plains and lowlands. Recently, many municipalities publish flood hazard maps because it has become hard to control flood disasters in urban regions with banks and so on. The manual that describes how to make a flood assumption zone map (basic map of flood hazard map) specifies the basic size of a ground height data to 50m grid (Flood Control Division, River Bureau, MLIT, 2005). Although, this size is not enough to depict topography of an area, especially in lowland. On the other hand, a flood assumption zone is highlighted in a flood hazard map. However, it is necessary to show flood risk including population, land use and others. From the above, this study aims to verify the accuracy of ground height data used in a flood hazard map and to clarify its effect to a flooding area or depth in Barajima district in Akita city, Akita prefecture. Barajima district is located along the Omono River and is in the lowest area of Akita city. In this district, elevation is relatively high in the central part and is relatively low in the western and eastern part. Land use of this district is composed of industrial area (western part), commercial area (central part) and residence area (eastern part). The Authors reconsidered several previous flood hazard maps and reassessed flood risk including land use and others in Barajima district.

To verify the accuracy of the 50m grid data used to make the Omono River flood assumption zone map that was the basic map of the flood hazard map of Akita city, the authors made a new TIN surface model by using a city planning maps with a scale of 1 to 2,500 and fieldwork. Then, we evaluated the differences about the area and the depth of flooding between the Omono River flood assumption zone map and new TIN surface model. ArcGIS 9.3.1 was used to analyze.

As a result, there were some differences between the Omono River flood assumption zone map and the new TIN surface model. This difference was considered to be caused by the accuracy of ground height data and procedure of surface modeling of the map. Thus, the flood assumption zone in the map had a margin of error, and there was a possibility that the residents and employees in industries misunderstood the flood risk. Considering that the factories and houses in Barajima district were concentrated in the relatively low altitude area and were much vulnerable to flood damage, residents and industrial activities will be damaged seriously by a flood and inundation.

Keywords: urban flood disaster, risk assessment, flood hazard map, DEM, land use, GIS