

Three-dimensional models of alluvial plain considering sedimentary facies: an example of Kumamoto Plain

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Most alluvial plains in Japan are located in oceanfront areas, which are areas of high population density. Recent studies of alluvial plains have focused on the construction of three-dimensional geological models and geotechnical maps in these areas because such regions include geotechnically soft ground. Eto et al. (2008) constructed three-dimensional geological and geotechnical models of incised-valley fills beneath the Tokyo Lowland by using a method that requires neither an expert interpretation nor specialist knowledge. Although evaluation of lithologic continuities should be included in the construction of such models, this factor has not been considered in previous studies. Continuities of lithology are strongly affected by the sedimentary processes represented in the sedimentary facies. Therefore, three-dimensional models considering sedimentary facies will lead to improvements in model accuracy.

The Kumamoto Plain distributed in the Kumamoto Prefecture, Kyushu Island, is located in a downstream area of the Shirakawa and Midori-kawa rivers originating from the Aso Caldera. Alluvial deposits in this area include the Shimabarakaiwan Formation and the Ariake Clay Formation in ascending order. Lithofacies of the Holocene Ariake Clay Formation include channel-fills and flood plain deposits of an inland bay area and coastal delta deposits in Shimabara bay (Hase and Iwauchi, 1996). In this study, we characterized the lithological distributions of the alluvial deposits by analyzing borehole data in the Kumamoto Plain, and we applied an improved construction method of a three-dimensional geological model to the alluvial deposits. As a result, the Ariake Clay Formation well continuing from the bay to the inland areas is clearly visualized.

Keywords: alluvial plains, borehole database, continuities of lithology, The Kumamoto Plain, sedimentary facies, three-dimensional geological model