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Characteristics of fluctuation of groundwater level beneath an artificial reclaimed land in the Tokyo Bay

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Port of Tokyo, that is situated in the innermost of Tokyo Bay, is composed of artificial reclaimed lands that were mainly built since the beginning to middle of the 20th century. In these reclaimed lands, precipitation cannot flow to deep part because of the existence of freshwater-seawater boundary and cannot affect groundwater environment beneath the lands. On the other hand, groundwater in this area has been developed for industrial use in the middle of 20th century. We focus on the present condition and processes of groundwater environment change beneath the port to understand the transport processes of groundwater and solutes from land to sea and to evaluate the effect of human activity to groundwater environment in this area. We carried out an all-core boring and groundwater sampling. Also, groundwater level is monitored. Groundwater chemistry was already reported by Hayashi et al. (2009). In this presentation, characteristics of fluctuation of groundwater level are reported.
The borehole is located in the reclaimed land No.13-2. Depth of the borehole is about 61m and screen section was set at the bottom of the borehole (GL-59.4 to -61m). Groundwater level is monitored every hour. Characteristics of the fluctuation of groundwater level are as follows. Except for the beginning of monitoring, groundwater level is higher than TP 0m. That is, hydraulic potential is higher than sea level. There is no correlation between precipitation and the fluctuation. In short term, the fluctuation is strongly affected by tide level, and phase difference is about one hour (peaks in groundwater are later than peaks in tidal change). However, the fluctuation intermittently showed different pattern with tide. Difference was mainly found in daytime. In the long period, groundwater level gradually fluctuate at intervals of several months. This trend is not consistent with seasonal fluctuation of tide. Therefore, this result shows that there is (an) another reason(s) for fluctuation of groundwater level. Considering the groundwater development in this area and around the port, groundwater withdrawal is a promising cause.

Keywords: Tokyo Bay, groundwater level, urbanization, coastal area, artificial reclaimed land