Estimation of river water storage variation of Chao Phraya river basin by using EnviSat satellite altimetry data

Keiko Yamamoto[1]; Yoichi Fukuda[2]; Makoto Taniguchi[1]

[1] RIHN; [2] Geophysics, Kyoto Univ.

A project to assess the effects of human activities on the subsurface environment in Asian developing cities is now in progress (Research Institute for Humanity and Nature, 2009). In this project, precise in situ gravity and landwater observations combining GRACE satellite gravity data is proposed to evaluate local groundwater level changes of the developing urban areas in Asia (e.g. Bangkok in Thailand or Jakarta in Indonesia). It is necessary for precise estimation of the local groundwater level changes to separate local signals from regional or global ones, and we intend to use GRACE satellite gravity data for the purpose of estimating large scale groundwater changes. It is well known that GRACE detects about some to several hundred km spatial scale landwater variations including groundwater variations as mass variations of the Earth, and the data is useful for the purpose. However, we cannot separate groundwater components with other landwater components, only by using GRACE data. Supplemental observed data, e.g. soil moisture data, river water storage data, etc. is required to extract groundwater signal from the GRACE mass variation data. In our project, in situ landwater observed data is collected for the purpose. However, most of these data are concentrated to downstream area of each basin and available data is very limited in most of other areas of the basins. Especially, river water storage data of the upstream areas are difficult to collect. In this study, we used EnviSat satellite altimetry data to estimate river water storage of Chao Phraya river basin. The mission period of EnviSat is overlapping with GRACE mission. By combining terrestrial water storage obtained by GRACE, river water storage by EnviSat and in situ data sets, we will assess the groundwater changes in Asian urban developing areas.