SGD21-03   Room:301B   Time:May 23 09:30-09:45

Development of multi-GNSS precise orbit and clock determination tool MADOCA

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Japan Aerospace Exploration Agency (JAXA) is planning to conduct precise point positioning (PPP) experiment by using the LEX (L-band experiment) signal channel of QZSS (quasi-zenith satellite system). The target accuracy of the PPP is under 10 cm RMS. The area of the service is all over the Asia and Oceanian region including the Pacific Ocean side where user can receive broadcasting signals by QZSS satellites. The GNSS for the augmentation will be GPS, GLONASS, QZSS and Galileo. The PPP can provide the precise positioning service to many users in the broad regions without need of any ground stations. A lot of applications like precise farming, Tsunami detection, crustal deformation monitoring and GNSS meteorology are much expected by such PPP technique.

To generate the augmentation information for the PPP service, precise orbit and clock determination of GNSS satellites is necessarily required as well as ground GNSS reference station network. For these purposes, JAXA decided to newly develop a precise orbit and clock determination software for multiple constellation of GNSS from scratch in addition to extending multi-GNSS monitoring network (MGM-net). We call the software "MADOCA" (multi-GNSS demonstration tool for orbit and clock analysis).

In this talk, we will provide the introduction of MADOCA including models and algorithms, technical features, implementation aspects, accuracy evaluation and future plan.

Keywords: GNSS, QZSS, PPP, LEX, orbit determination