

IMPLEMENTATION OF AMBIGUITY RESOLUTION METHODOLOGY IN TAIWAN ONLINE PRECISE POINT POSITIONING SERVICE (TOPS): INITIAL STUDY

*Huai-Chien Hsu*¹, Ming Yang¹, Feng-Yu Chu²*

¹ National Cheng Kung University

² National Cheng Chi University

Ambiguity resolution is the key for precise point positioning (PPP) to shorten its convergence time to achieve centimeter-level accuracies. However, it is difficult to correctly fix the ambiguities to their integer number in PPP due to the satellite phase biases embedded in the GNSS observations. Nowadays, with the help of the satellite phase bias products provided by various analysis centers of the International GNSS Services (IGS), PPP with ambiguity resolution (PPP-AR) is enabled. Taiwan Online Precise Point Positioning Service (TOPS) is a free online service providing automated post-processed PPP. TOPS currently utilize a conventional PPP model for dual-frequency GPS and GLONASS observations. In order to improve the positioning performance of TOPS, the PPP-AR methodology are implemented into TOPS in this study. The satellite products (orbits, clocks, biases) from GFZ are adopted in TOPS, and a modified ambiguity validation procedure combining indices of success rate and ratio test is used. In the analysis, we compare the positioning results of TOPS using PPP and PPP-AR in static and kinematic modes. The results indicate that in static mode, PPP-AR achieves an RMSE of around 1 cm in the East and North directions within 3 hours, while PPP requires approximately 6 hours to achieve the same level of accuracy. However, in the kinematic mode, there is no significant difference in the 95% positioning error between PPP and PPP-AR, both reaching 10 cm within about 1 hour. These test results do not yet meet the AR performance reported in existing studies, and further investigation is needed to explore the underlying reasons for this discrepancy.

Keywords: Precise Point Positioning, Ambiguity Resolution, Online Positioning Service