

# Improving Hydrographic PPP by Height Constraining

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## SUMMARY

GNSS PPP (Precise Point Positioning) technique has received a considerable attention to obtain cost-effective and accurate positions. Recently, this technique is one of the most significant techniques to obtain hydrographic information. Since, theoretically, the shallow water resources have a stable water level, the idea of this paper is to improve the 2D positions assuming stable water level. Three hydrographic trajectories are processed in this study, which provided an RMS2D position of 7 cm – 10 cm for the original PPP solution without this assumption. Two different constraining procedures are applied: the first one aims to constrain the whole trajectory at one water level. One hydrographic trajectory, which was surveyed on the Rhine River, is investigated. Due to the variation of the height of more than 60 cm, the solution does not deliver any enhancement in the accuracy. The second procedure purposes to constrain the height for a piecewise stability. The piecewise sessions are automatically detected according to a specific number of epochs and a defined standard deviation. Three hydrographic trajectories are tested; two trajectories were observed on the Rhine River. After height constraining, these trajectories show an improved RMS2D position in between 20% – 35%. The third trajectory was observed on the Nile River. The constraining procedure provides an improvement of the RMS2D position of 16%. Generally, the achieved RMS2D position after applying the height constraining for the three trajectories is 4.7 cm – 8 cm.