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**A CASE STUDY ON MULTI-GNSS
ABSOLUTE PRECISE POINT POSITIONING**

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ABSTRACT:

Recent progress in satellite technologies let the determination high accuracy point positions more economically. The Precise Point Positioning (PPP) approach is one of the consequences of these developments in satellite based positioning techniques. The PPP applications rely on precise position determination of a single station employing the ultra-precise orbit and clock information. Hence this technique gives an alternative to the network based relative point positioning in Geodetic and Earth science purposes. In this study, investigating and analyzing the positioning performances of the PPP method using GPS, GLONASS, GALILEO, BeiDou (BDS) navigation satellite systems individually and in combination was aimed.

For this purpose, the static RINEX GNSS observations at the two stations, which are ISTA IGS station in Istanbul and an RTX point in Çorum from Turkey have been employed. The data of August 2, 2017 (214th day of 2017) were processed and analyzed. Beside of the performances obtained through different GNSS and their combinations (multi-GNSS solutions), also the usability of the internet based GNSS data evaluation services, which are namely the CSRS-PPP, AUSPOS, OPUS, APPS, GAPS, MagicGNSS, SCOUT and TrimbleRTX systems, was considered and discussed in details of this investigation. In addition to internet based online PPP services, also the GAMP software, an open-source software of multi-GNSS precise point

positioning using un-differenced and uncombined observations, was used to investigate the impact of multi-GNSS on PPP performance. The data processing results from each satellite based positioning system and the multi-GNSS solutions (GPS(PPP), GPS/GLONASS(PPP), GPS/GLONASS/GALILEO(PPP) and GPS/GLONASS/GALILEO/BEIDOU(PPP)) on mentioned stations obtained from the PPP technique has been compared and interpreted by means accuracies of position components and convergence time. The results have shown that the multi-GNSS PPP solutions provided improved positional accuracy and convergence time over single constellation PPP solutions.

KEYWORDS: Multi-GNSS, GPS, GLONASS, GALILEO, Absolute Positioning, PPP.

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