

An analysis of tropospheric delays using goGPS software on all GEONET stations during the passage of Typhoon Jebi in September 2018

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Nowadays, tropospheric delays estimated from GPS observations are widely used for studying weather events all over the world. Some meteorological agencies already use Zenith Tropospheric Delays (ZTD), or similar observables, by assimilation into numerical weather prediction (NWP) models; however, the increasing number of satellites from newer GNSS constellations (Galileo, QZSS, BeiDou, IRNSS), the advent of low-cost receivers and the advancement of techniques and models left space for further studies on the topic.

The new version of the open-source goGPS MATLAB software has been written to be a simple tool to perform efficient analysis of GNSS data from both geodetic and low-cost receivers. With its capability to download automatically all the resources needed by the selected algorithms, the relative easiness of use, and its flexibility with the possibility of trying different configurations in a fast way, goGPS presents itself as a convenient tool for students or researches who want to prototype new algorithms or perform studies on GNSS data.

To demonstrate the capabilities of the software, 1312 stations of the Japanese GEONET GNSS network are processed from September 2, 2018, to September 5, 2018, during the passage of Typhoon Jebi.

A 32-core machine running MATLAB 2016a and the latest beta version of goGPS 1.0 is used to process in a single parallel run the entire 4 days of the dataset. The execution performs for all the stations a multi-epoch precise point positioning (PPP) least squares (LS) adjustment in about two hours of computation time. Series of tropospheric delays and gradients are generated and used to produce maps and animations in order to observe the development of the event. Different solutions including multi-constellation results are presented and discussed.

Keywords: GNSS, Troposphere, Software, Typhoon

