International GNSS Service (IGS) Troposphere Products and Working Group Activities

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Key words: GNSS/GPS; Positioning; Remote sensing; atmospheric applications of GNSS

SUMMARY

The International GNSS Service (IGS), a federation of 200+ international agencies, pools GNSS measurements, data-processing facilities and scientific expertise to generate the highest-possible-accuracy positioning, timing and geophysical estimates in support of science research needs. One of its major activities is to coordinate the continuous acquisition of GNSS measurements at 350+ carrier-phase GNSS receivers worldwide. Among the geophysical quantities of interest to the IGS is the excess path delay encountered by GNSS signals as they traverse the lower part of the atmosphere, the troposphere, en route to these receivers. The troposphere is associated with meteorology/climate change. The IGS conducts two troposphere-related programs: production of IGS Final Troposphere Estimates and operation of the IGS Troposphere Working Group. These activities have since 2011 been coordinated by the US Naval Observatory (Washington, DC). In this presentation we will provide an overview of the IGS, review the production/availability/applications of IGS Final Troposphere Products, and provide information about the structure, goals and activities of the IGS Troposphere Working Group. The IGS estimates so-called “IGS Final Troposphere [delay] Estimates" for each of its GNSS receivers. Both zenith troposphere delay and north/east gradients are estimated every 300 s. An individual data file providing values for 0000-2359 GPST is produced for each GNSS receiver. The values are provided approximately three weeks after processing because their estimation requires IGS Final Orbits/Clocks/EOPS as input. In 2013, an average of 325 site-files were produced each day; 10.3 million of these files were downloaded. Researchers worldwide perform climate-change, meteorology and remote-sensing studies using these estimates. At some receivers, discontinuities in troposphere-delay values have been observed between the end of one 24-hour file and the beginning of another. These discontinuities are under investigation. The goal of the IGS Troposphere Working Group is to improve the accuracy and usability of GNSS-derived troposphere estimates. It has approximately 50 members worldwide and meets at least twice per year either in person or via online conference. Its current major project is the creation of a database/website performing continuous, automated comparisons of troposphere estimates obtained from independent techniques e.g., GNSS, VLBI, DORIS and radiosondes. Other efforts include the standardization of the so-called “tropo_sinex” file format used to exchange troposphere-delay estimates, and the re-institution of on-going comparisons of GNSS-derived troposphere delays estimated by different institutions for the same locations.