

Can Co-Location and Community CORS Add Value to GNSS Data?

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SUMMARY

What is the value of Global Navigation Satellite System (GNSS) data? It depends on the data quality. Continuously Operating Reference Stations (CORS) are categorized in a 4-Tier hierarchy. The highest quality Tier 1 and 2 stations are built with station-spacing between 100-1000km for geodetic and other scientific purposes. Tier 3 and 4 sites densify station-spacing between 20-100km to provide commercial real-time positioning services and datum connection to end-users. Higher density co-location and community CORS have to-date been largely hidden from the scientific community with questions around quality, stability, and permanence. However, tens of thousands of stations are currently operating as Real-time kinematic (RTK) bases or geotechnical monitoring sensors. Even more operate as ‘low-cost’ GNSS receivers in co-location, community networks, and Token Incentivized Physical Infrastructure Networks (TI-PIN) with applications in GNSS and other disciplines. Together, these networks make up over 100,000 sites that are ready or can be easily upgraded to provide trusted GNSS CORS data. This paper presents a data valuation method that can be used by network operators to assess site value based on GNSS data quality, security, density, cost and performance for network RTK services. Validating untiered station data can serve existing geodetic applications and realize the increasing value in new industries (transport, telecommunications, consumer) and ‘alternative’ uses in GNSS-Reflectometry, atmospheric monitoring, interference monitoring, integrity monitoring, and multipath characterization. We evaluate the GeodesyML, RTCM standards and Findable Accessible Interoperable and Reusable (FAIR) principles for data sharing in a GNSS CORS data marketplace. This approach to crowdsourced GNSS data aims to support geodesy, the renewal of the profession, and the Sustainable Development Goals (SDGs). Further work will incorporate other citizen science projects using mobile phones and crowdsourced GNSS data for scientific and industry applications.

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