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GNSS data quality check in the EPN network

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Global Navigation Satellite Systems (GNSS) are a widely spread cost effective technique for geodetic applications and monitoring the Earth's atmosphere. Therefore, the density of the GNSS networks have grown considerable since the last decade. Each of the networks collects huge amounts of data from permanently operating GNSS stations. The quality of the data is variable, depending on the evaluated time period and satellite system. Conventionally, the quality information is extracted from daily estimates of different types of GNSS parameters such as number of data gaps, multipath level, number of cycle slips, number of dual frequency observations with respect to the expected number, and from their combinations.

The EUREF Permanent GNSS Network Central Bureau (EPN CB, Bruyninx et al., 2019) is operationally collecting and analysing the quality of more than 300 GNSS stations and investigates the main reason of any quality degradation. EPN CB is currently operating a semi-automatic (followed by a manual) data-monitoring tool to detect the quality degradations and investigate the source of the problems. In the upcoming years, this data-monitoring tool will be used to also monitor the GNSS component of the European Plate Observing System (EPOS) expected to include more than 3000 GNSS stations. This anticipated inflation of GNSS stations to be monitored will make it increasingly challenging to select the high quality GNSS data. EPN CB's current system requires time-consuming semi-automatic inspection of data quality and it is not designed to handle the larger amounts of data. In addition, the current system does not exploit correlations between the daily data quality, time series and the GNSS station metadata (such as equipment type and receiver firmware) often common to many stations.

In this poster, we will first present the currently used method of GNSS data quality checking and its limitations. Based on more than 20 years of GNSS observations collected in the EPN, we will show typical cases of correlations between the time series of data quality metrics and GNSS station metadata. Then, we will set up the requirements and design the new GNSS data quality monitoring system capable of handling more than 300 stations. Based on the collected EPN samples and the typical cases, we will introduce ongoing improvements taking advantage of artificial intelligence techniques, show the possible design of the neutral network, and present supervised training of the neutral network.

Bruyninx C., Legrand J., Fabian A., Pottiaux E. (2019) GNSS Metadata and Data Validation in the EUREF Permanent Network. *GPS Sol.*, 23(4), [https://doi: 10.1007/s10291-019-0880-9](https://doi.org/10.1007/s10291-019-0880-9)

