

# The BfG-GNSS Monitoring Network – Delivering a Continuous Georeferencing Service for Waterway Management Tasks

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## SUMMARY

The Department M5 - Geodesy and Remote Sensing - of the Federal Institute of Hydrology (BfG) operates its own Global Navigation Satellite Systems (GNSS) monitoring network. Currently, 43 stations on the North Sea coast are equipped with a permanent GNSS receiver, an extension by 6 more stations on the Baltic Sea coast is planned for this year and planning for a demand-oriented equipment of the inland gauges will start in 2022. The observations are regularly processed by the Federal Agency for Cartography and Geodesy (BKG) in an international framework. The results are up-to-date coordinates, especially heights, in both an international (global) and a national reference frame.

Continuous data from the GNSS network is the basis for modern waterway management tasks and a smart alternative to conventional terrestrial level measurements. Major task is locally comparable water level at the coast. Thus, GNSS stations are typically located at tide gauges to georeference the sensors. Also, the data of the BfG-GNSS monitoring network and their temporal analysis will provide important basic information for adaptation to climate change.

In the German Adaptation Strategy to Climate Change (DAS) "Climate and Water" service, the BfG is, among other things, charged to realize the module "Land Movement". This involves the investigation of the causes of regional sea level rise (sea level variations vs. land subsidence). Furthermore, several other waterway management tasks can benefit from the continuous data provided by our network, e.g., geodetic surveys of locks or an improved georeferencing for marine navigation.

Trial and test phases of the monitoring network have been completed, so that it is officially in operation since July 30, 2020. Data transmission, processing and the annual provision of the current

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gauge fixed point heights are running, so that currently, in addition to the expansion of the network, further analysis and research regarding the development of models for geodetic time series analysis are taking place. In this contribution, the BfG-GNSS monitoring network will be presented, products will be shown and first results and methods of time series analysis will be discussed.

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