



# FUGRO DAM MONITORING, GERMANY

The Ruhrverband operates eight dams and reservoirs, with a total storage volume of 463 million cubic metres. This is the largest multi-reservoir system in Germany. Water levels are monitored with an open source GeODin database.

## RUHRVERBAND

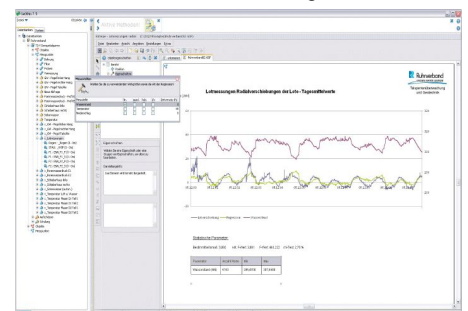
The Ruhrverband supplies water to about five million people. In addition to its eight masonry and embankment dams, the Ruhrverband operates and maintains river and rainfall gauging stations. The dams and reservoirs are supervised by the Reservoir Control Centre in Essen. The control system manages flow rates by maintaining water supply in dry summers with low rainfall and ensuring high water level protection limits are not exceed in winter months. This information is available online at <http://www.talsperrenleitzentrale-ruhr.de/onlinedaten.html>.

## DATA PROCESSING

At the heart of automated data import is a central import directory where all collected data is transferred to the GeODin database once a day. For the acquisition, management and evaluation of survey data, a special recording method with corresponding measured value data types is used. To further enhance data quality and reproducibility of changes to the dataset, GeODin uses a single-core protocol and change tracking. A security report with graphs and statistics is automatically generated by GeODin.

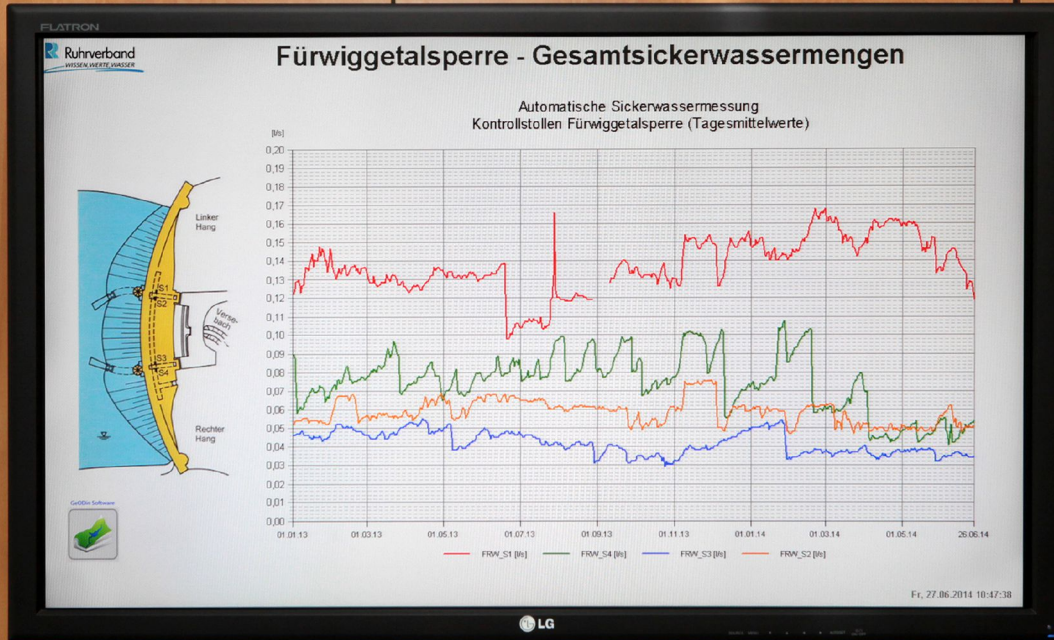


River Ruhr and its tributaries, showing dam locations



Statistical regression analysis in a GeODin template





**DATA INTEGRITY**

At the Ruhrverband, the procedures set out in the official guidelines DIN-Norm & DWA-Merkblatt are implemented on a so-called "6-eyes-principle". Following prompt inspection of the measurement data by the operation centre, an evaluation by the responsible specialist engineer or geologist takes place at regular intervals. A further check takes place during an annual control of the measurement data by the engineer preparing the safety report. Through a documented approval workflow, the integrity of the measurement data is guaranteed. Data from the next level can only be released once the previous level data has been published.

**TECHNICAL DETAILS**

The recommended system requirements for GeODin are PCs running Windows 10 (32- and 64-bit) with 4 GB RAM and a display resolution of 1920 x 1080 px. GeODin may also be run from a Windows 2012 Server or Citrix. Previous Windows operating systems and RAM configurations may work, but these are not supported. When working with client/server databases the appropriate database drivers must also be installed. Please contact your network administrator for further information.

GeODin can be used as a stand-alone program or integrated in a multi-user network. Integrated contextual help is provided in English and German.

GeODin is designed, programmed and distributed exclusively by Fugro. Visit [www.geodin.com](http://www.geodin.com) for further information.