



Horizontal and Vertical Surface Displacements in the Upper Rhine Graben Derived from GNSS and Precise Levelling Data

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At the Geodetic Institute, Karlsruhe Institute of Technology, the Upper Rhine Graben (URG) area is investigated using various geodetic techniques. The recent objective is to gain detailed insight in the horizontal and vertical velocity field of the URG from GNSS and levelling data. In addition, it is planned to integrate InSAR data and to rigorously merge the three geodetic measurement techniques into a combined 3D displacement solution.

For the GNSS part, a transnational network called GURN (GNSS Upper Rhine Graben Network) was established in 2008 in close cooperation with the Institute de Physique du Globe de Strasbourg (France). GURN actually consist of more than 80 permanently operating GNSS sites of Germany, France and Switzerland. A continuous database is existing since 2002. The analysis strategy for the determination of horizontal and vertical displacement rates and first results from up to 10 years long GNSS time series will be presented.

Besides GNSS, the analysis of precise levelling data enables an accurate determination of vertical displacement rates at levelling benchmarks, if repeated measurements at identical benchmarks are available. The levelling measurements in the URG area were carried out by the ordnance survey of Germany, France and Switzerland along levelling lines. These levelling lines were measured up to five times within the last 100 years. Therefore, at discrete benchmarks a detailed assessment of surface displacements could be carried out.

The presentation will compare the results of the two geodetic measurement techniques applied within the research activities in the URG area.

As levelling and GNSS are point-wise measurement techniques, the spatial resolution of estimated surface displacements is poor. Therefore, InSAR data is used to fill the gap in the future. A short outlook will point out possibilities and limitations on the combination of GNSS, levelling, and InSAR data for an accurate solution aiming for horizontal and vertical surface displacements in the URG.