Towards Efficient Online Deformation Monitoring of Transport Infrastructure using Sentinel-1 Interferometry

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The transport infrastructure is an important basis for the German economy. Therefore, the German land surveying authorities use conventional levelling methods to monitor potential deformations at roads and bridges. So far, the deformation monitoring is time consuming and expensive, making it impossible to cover whole Germany in near real-time. The project SAR4Infra aims at supporting the German land surveying authorities by exploiting the full potential of radar remote sensing. The focus of the project is to develop an operational platform using satellite Interferometric Synthetic Aperture Radar (InSAR) to assess health and stability of infrastructure in near-real time. As the increasing amount of available Sentinel-1 images from the Copernicus program comes with computational challenges for the creation and processing of large interferometric stacks, we implement our development on a cloud computing platform “CODE-DE” provided by the DLR. CODE-DE comes with both all Sentinel-1 images for whole Germany and the required computational power that enable big data applications in remote sensing. In the implementation, we focus on open-source software to make online deformation monitoring affordable for the German land surveying authorities. Here, we present our first results for mapping and monitoring of deformation using CODE-DE and discuss example applications for infrastructure in northeast Germany.