Institut für Photogrammetrie
und GeoInformation

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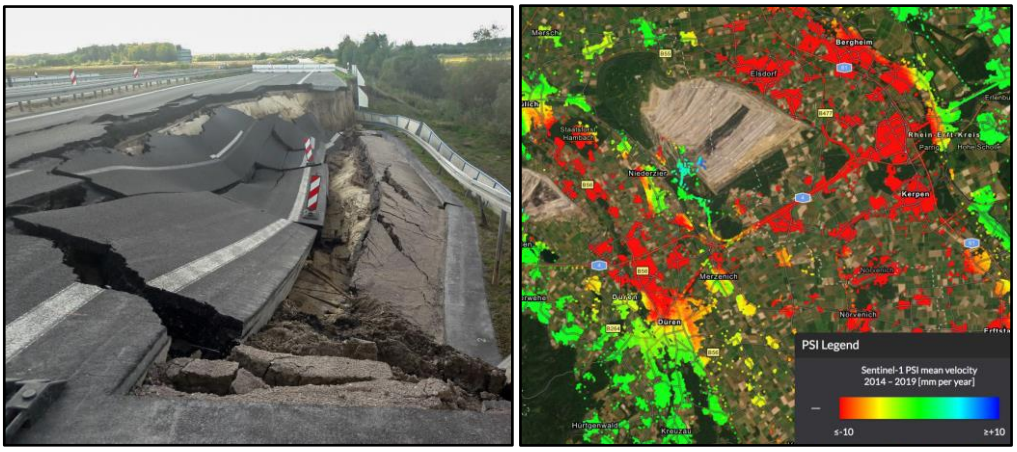
Hazard assessment at traffic infrastructures based on deformation time series

Gefährdungsbeurteilung für Verkehrsinfrastruktur aus Bodenbewegungszeitreihen

Traffic infrastructures are important for freight and passenger transport, but natural hazards threaten the optimal function of the infrastructure and might lead to damages due to ground motion. With spaceborne InSAR we can retrieve deformation time series at traffic infrastructures and help prevent these damages. However, differentiating harmless deformation areas from hazardous deformation areas is still a challenging task.

In this thesis, the assessment of hazards at traffic infrastructures will be investigated. During the literature review, different hazard scenarios will be identified and classified according to their severeness. Further, existing methods for the hazard and risk assessment from InSAR time series will be compared and set into the context of traffic infrastructure monitoring. The main goal of the thesis will be to develop and implement a method for identifying active deformation areas. The method will take the deformation time series from InSAR as input. Spatial clusters will be created and classified into appropriate hazard classes using different temporal and spatial features. Temporal characteristics like the deformation velocity and temporal autocorrelation will be derived from the time series. Moreover, the spatial homogeneity of the deformation and the spatial deformation gradients will be used to form the clusters with similar deformation behavior. The output of the method will be a shapefile with polygons for active deformation areas including their hazard class and attributes summarizing the deformation behavior. The developed method shall be validated on study areas with different deformation scenarios. Deformation time series are available from the German and European Ground Motion Services.

This thesis will be supervised by Andreas Piter.



(Left) Damage at the highway A20 close to Tribsees (photo: Police Stralsund). The goal is to assess the hazard at traffic infrastructures to prevent such damages. (Right) Mean velocity deformation map around the open-pit mine Hambach in Nordrhein-Westfalen, Germany (from BodenBewegungsDienst Deutschland). Strong subsidence is threatening highways and railway tracks in the greater area around the mine.

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