

## **SUBSIDENCE MONITORING IN HAMBURG CITY USING ADVANCED INSAR TIME SERIES ANALYSIS**

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Land subsidence monitoring is a prerequisite in this rapid evolution of urbanization and industrialization, especially in urban areas. Subsidence can be provoked by natural-anthropogenic activities which causing damages both economically and socially more than thousand hundreds of Euros in Germany over these years. As one of the largest metropolitan cities Hamburg has experienced rapid urbanization for the past few decades, due to immigration and development in many industrial sectors. The metropolitan city is a home to many sinkholes and has experienced micro earthquakes over these years. Monitoring such ground surface movement more precisely is possible through Interferometric Synthetic Aperture radar (InSAR) and SBAS (Time series analyzing technique). Combining these two approaches allow us to generate the mean deformation velocity maps and displacement time series maps. For this study, Sentinel 1A satellite data was observed over a period of 2015 -2019 for Hamburg area and the results from SBAS was validated with GPS /level data from three stations. A modified SBAS algorithm has been applied in this study which densifies the deformed pixel over in the decorrelated area when compared to standard method. This study concludes that by monitoring such deformation over a time period through SBAS-InSAR technology helps as a tool for sustainable urban planning and development.