

## InSAR analysis in Mexico City in 2016

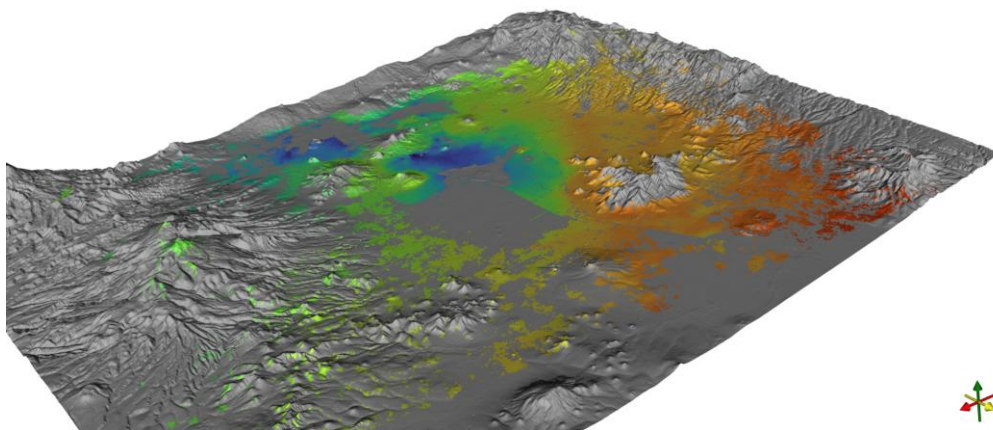
This notebook focuses on the analysis of land subsidence in Mexico City as a result of groundwater extraction in 2016 using Sentinel-1 radar imagery and interferometric processing (InSAR). The workflow is based on the **PyGMTSAR** library, a Python interface to GMTSAR, which streamlines radar data handling and interferogram generation.

Our contribution did not involve developing new algorithms but rather understanding the provided code in detail, documenting its functionality, and clarifying each processing step to be easily implemented in different areas of interest, for example before and after earthquakes, melting of glaciers etc.

The implemented workflow includes the installation of dependencies, acquisition and preprocessing of Sentinel-1 data, and the generation of interactive 3D interferograms to detect surface deformation. The results demonstrate significant ground subsidence in Mexico City, largely attributed to groundwater extraction. Through InSAR techniques, the analysis enables displacement mapping with centimeter-level precision, providing valuable insight for environmental and urban monitoring.

Overall, the project emphasized comprehension and annotation of existing code as a way to build practical expertise in radar remote sensing and geospatial analysis.

### Interactive LOS Displacement on DEM



### Bibliography:

Rosen, P. A., Hensley, S., Joughin, I. R., Li, F. K., Madsen, S. N., Rodriguez, E., & Goldstein, R. M. (2000). *Synthetic aperture radar interferometry*. Proceedings of the IEEE, 88(3), 333–382.  
<https://doi.org/10.1109/5.838084>

Ferretti, A., Prati, C., & Rocca, F. (2001). *Permanent scatterers in SAR interferometry*. IEEE Transactions on Geoscience and Remote Sensing, 39(1), 8–20.  
<https://doi.org/10.1109/36.898661>

Authors: Piotr Krajewski, Katarzyna Wcisło, Bartosz Ptaszek