Spatial Pattern of Land Subsidence in Anambra Basin, Nigeria

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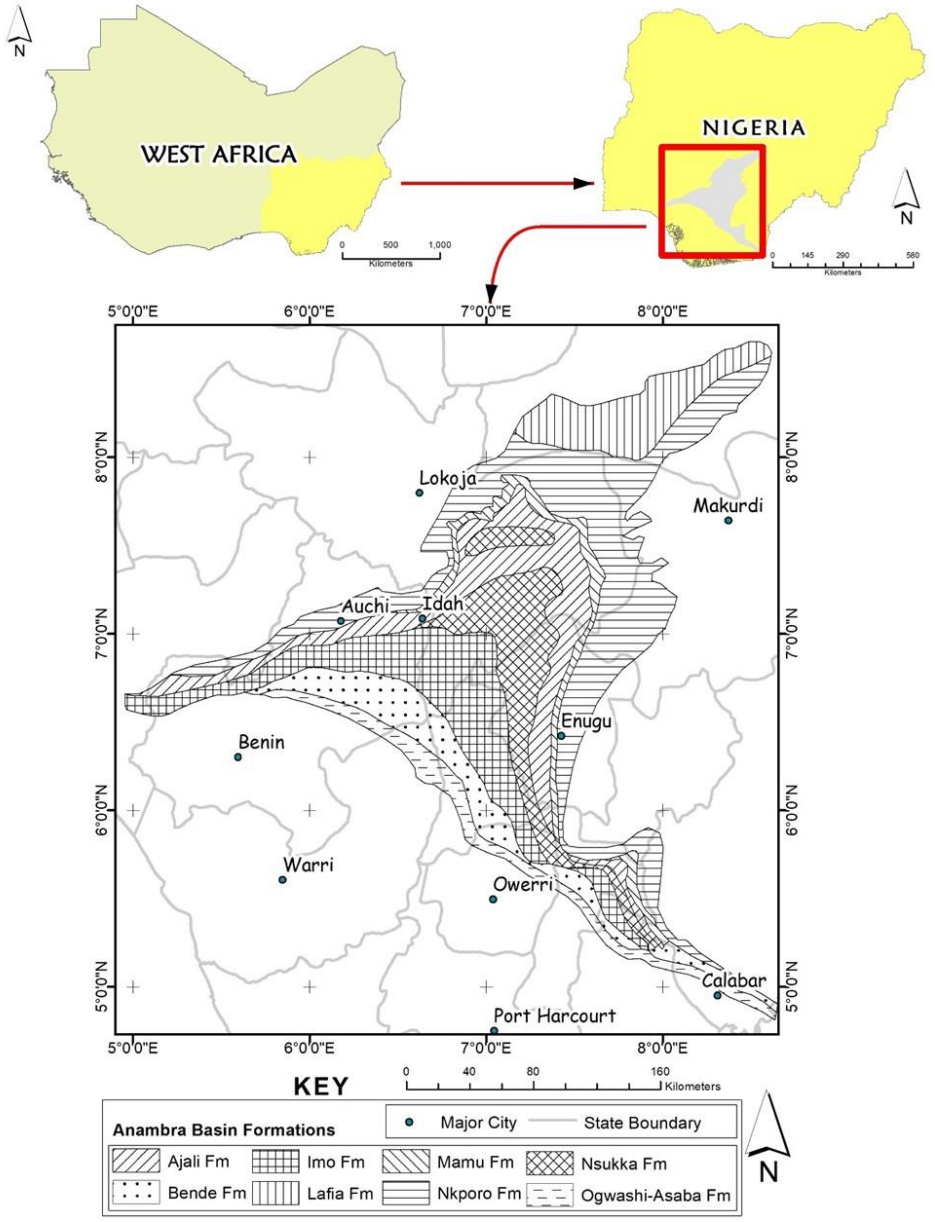
Study Objectives

- The objective of the study is to characterize the land deformation in Anambra basin between 2015 and 2020
- The figure to the right shows the Anambra basin coverage and the geologic formations.
- The Anambra basin, bounded to the south by the Niger Delta basin, extends north-westward into the Niger Valley, northward to the Jos massif, and northeastward as far as Lafia. The basin is geographically situated between latitudes 5.00°N - 8.30°N and longitudes 5.00°E - 8.30°E, covering an area of about 40,000 km^2

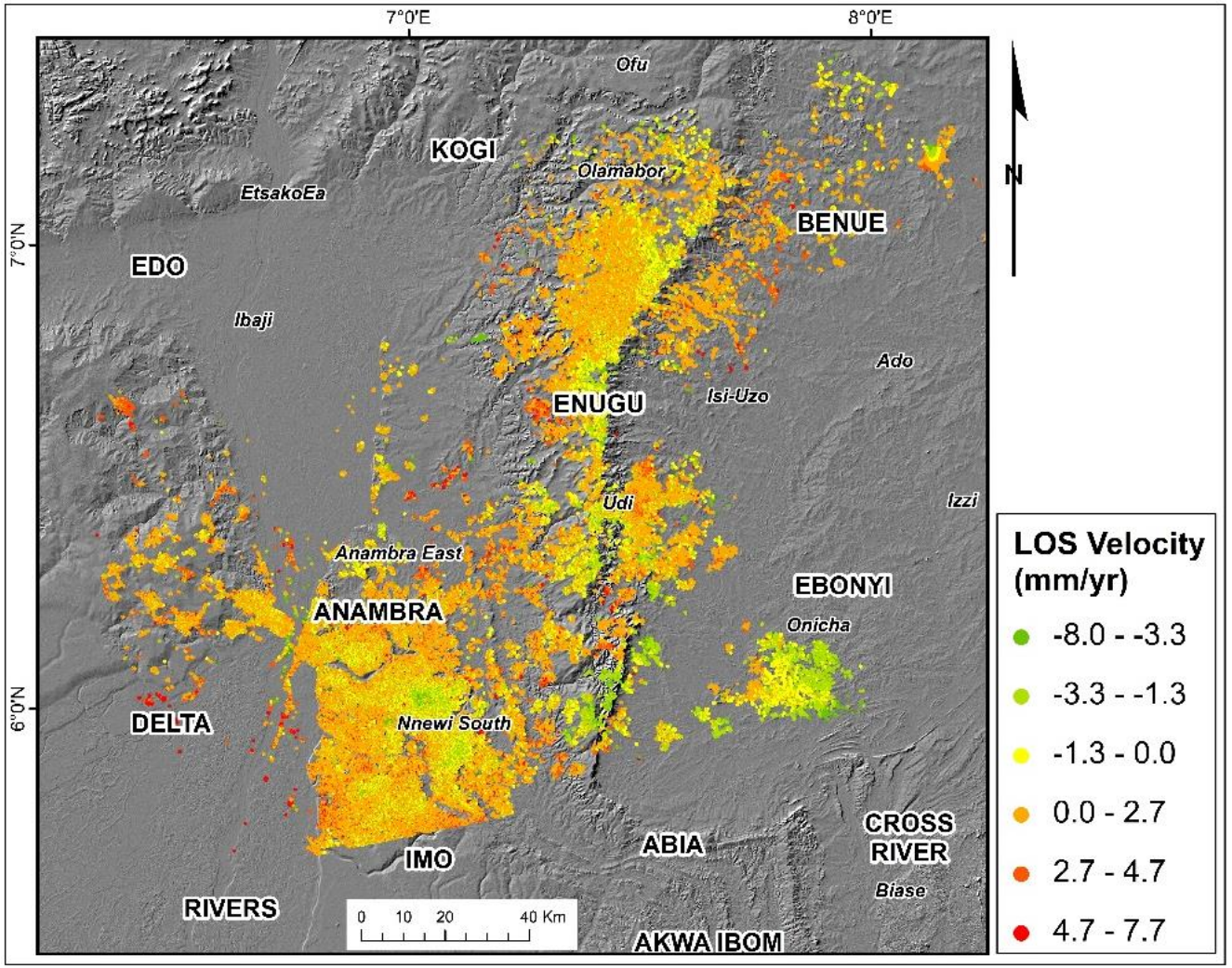


Methods

- The Parallel Small BAseline Subset (P-SBAS), a Differential SAR interferometry processing chain, was used for generating the Earth's deformation time series and mean velocity maps.
- Due to the computational intensiveness of the process, the SBAS Ground Motion Services of the Geohazard Thematic Exploitation Platform (GEP) cloud computing service (https://geohazards-tep.eu/#) was employed to process the InSAR datasets.
- The GEP was used in the Multi-Temporal Analysis (MTA) mode, ingesting SLC Level 1 Sentinel-1 data and delivering outputs such as the Line-Of-Sight (LOS) displacement time series, mean LOS velocity and unit vectors, temporal coherence, and average scatter elevation. 27 SLC images corresponding to 27 dates in the ascending orbit pass with track number 30 between orbits 06052 and 31077 were obtained between 23 May 2015 and 2 February 2020.

Results

- Some parts of the Basin with land subsidence include the central part of Kogi State, Anambra State, a major part of Abia State, a part of Rivers State, and the northern half of Imo State.
- The displacements are in the form of subsidence and uplifts. The negative values are interpreted as subsidence, while the positive values uplift.
- The largest subsidence rate in the LOS direction from 2015 to 2020 is 8.0 mm/yr in some parts of Ebonyi State, while the largest uplift is 7.7 mm/yr. Communities such as Onicha, Nnewi South, Oju, and Olamaboro, are subsiding, while communities such as Udi, Obi, and Isi-Uzo are experiencing uplift



Conclusion

- The study will benefit the society by providing necessary information about the subsidence rates in specific localities within the Anambra basin.
- Since subsidence could be as a result of anthropogenic activities in connection with fault structures, anthropogenic impacts can be controlled through necessary policies controlling the exploitation of crude oil in the region.