

# Geomatics Support View in Flood Control and Watershed Management Within the Niger Delta Region of Nigeria

Jacob Ehiorobo and Juliet Akpejiori (Nigeria)

**Key words:** GNSS/GPS; Remote sensing; Risk management; Spatial planning; Flood management; Digital Elevation Model; Watersheds; IFSAR; GNSS RTK

## SUMMARY

The Niger Delta region is a low-lying area consisting of several tributaries of the Niger River and ending at the edge of the Atlantic Ocean. It consists of several creeks and estuaries as well as stagnant mangrove swamps. The region has an area of approximately 20,000 km<sup>2</sup> and a 450m coastline. Nigeria's economy depends predominantly on oil and gas from the region as the main source of foreign revenue. Rise in sea level is a major problem for the Niger Delta as sea level rise creates inundation due to coastal flooding by incoming rivers.

The Niger Delta region has been experiencing recurrent flooding especially in the low lying areas along the Niger River and its tributaries as well as far east to the Calabar river. The Federal Government attempted some mitigation measures after the 2012 flooding but these were only palliatives. Knowing these problems, it is necessary to embark on flood forecasting and develop watershed management programs.

The aim of the study is to improve on the mechanism for the protection of people and properties from flood events and create a sustainable environment for the utilization of land and water resources. The study focuses on DEM generation using IFSAR Sentinel 1A/B TOPS satellite mission for watershed delineation and flood zoning of the study area. The Digital Elevation model (DEM) generation was derived through radar interferometry, utilizing the phase difference between the representations of the interferometric pairs of Sentinel 1 single look complex (SLC) scenes. The Interferometric Wide (IW) swath mode acquires data with a 250km swath at 5m X 20m spatial resolution (single look). It captures three sub-swaths using the Terrain Observation with progressive scans SAR (TOPSAR) acquisition principle. Thirty-seven (37) interferometric pairs of the Sentinel 1A/B acquired from January 2016 to September 2019 (4years) obtained from the European Space Agency (ESA) were used in this study. The Digital Elevation Models generate were validated from

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GNSS RTK results.

Based on the generated DEM, watershed and sub-watersheds were delineated. Slopes and aspects were determined for flood mitigation planning and management.

Keywords: Flood management, Digital Elevation Model, Watersheds, IFSAR, GNSS RTK

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