Paper ID: 89226
interactive

IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Interactive Presentations - IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (IP)

Author: Mr. Wondwossen Mindahun
Ethiopian Space Science and Technology Institute (ESSTI), Ethiopia

Mr. Natnael Agegnehu
Ethiopian Space Science and Technology Institute (ESSTI), Ethiopia
Mr. Eyasu Leta
Ethiopian Space Science and Technology Institute (ESSTI), Ethiopia
Dr. Solomon Gerra
Ethiopian Space Science and Technology Institute (ESSTI), Ethiopia

APPLICATION OF INSAR TECHNOLOGY FOR EARTHQUAKE HAZARDS ASSESSMENT AND DAMAGE ANALYSIS OF SEMERA TOWN AND NEARBY AREAS, AFAR, ETHIOPIA

Abstract

Earthquake studies were made in the East African Rift system in the past decades through different scholars. This study also discusses Earthquake Hazards Assessment and its Surface manifestations through multi-Temporal data Using Interferometric Synthetic Aperture Radar (InSAR) Techniques in Semera and proximate Towns of Afar. InSAR is space geodetic and remote Sensing technology to monitor and measure ground movement using RADAR products of earth observation system. The study area is approximately 250km from the triple intersection of East African Rift, Red Sea, and Gulf of Eden. This intersection is also a place through which the world plate tectonic line passes. The objective is to make an analysis on deformations using InSAR and estimation of the surface displacement due to earthquake effects in the areas. European Space Agency (ESA's) Sentinel-1A radar data in IW-SLC data format from year 2015 – 2021 were employed. Multiples of interferograms then generated for all available imageries selected at approximately three months intervals within each year. These interferograms led to identify where there have been signal dispersions on the surface within the study area due to earthquake activities. Coherence maps of different interpretations (i.e., spatial coherence and temporal coherence which show the distribution of the surface phase scatterer point coordinates helping us to see the quality of each interferogram and the distribution in the entire dataset) were also developed. Graphical representations of these spatial ordinates were drawn as well. Temporally profiled interferograms reveal differences in signal dispersions among them. Additional statistical analysis on some model building types and evidences from settlers in other study by the same Authors validate the existence of ground instability within the selected time range. Displacement and velocity time series results are produced using the final Persistent Scatterer InSAR (PS-InSAR) technique through SARPROZ software. The ground surface deformations are found to have a velocity measurement of -80 - 80 mm/year while there is -600 - 600 mm in displacement amount within these five to six years temporal data observation and PSI results. Therefore, InSAR processing demonstrates there have been previous seismic actions in the study area that were not causing extreme deformations from the cumulative results of interferograms. Validations for these findings have been made by physical site inspections, measurements and Hazard and damage Assessments using other open-source tools. Cumulative results show that even though the amounts of velocity and displacements obtained in the InSAR technique also include human factors.