A continental rifting event in Tanzania revealed by Envisat and ALOS InSAR observations

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Abstract:

The area south of the Gelai volcano, near Lake Natron, located at the border of Tanzania and Kenya in the East African Rift (EAR), was struck by a seismic swarm in July-August 2007. This seismic swarm, with the largest shock recorded on July 17th 2007 (Mw=5.9), was centered on the southern flank of the Gelai volcano and is very likely caused by a dyke intrusion with normal slip on graben bounding faults, preceded by a normal faulting event. These conclusions are drawn after investigation of the seismicity and preliminary modelling of the observed deformation detected by the joint analysis of L-band and C-band InSAR observations (ESA CT-3224 and ESA-JAXA ALOS project 3690). However, the interpretation and modelling of the interferograms spanning the event is hampered due to the large amount of shocks spread over a period of two months, the complex deformation patterns from these earthquakes, and the high number of sources probably involved. Next to several ENVISAT ASAR interferograms also one ALOS PalSAR image pair (single HH polarization) is available covering this particular continental rifting event.
This study considers overlapping ASAR and PalSAR interferograms. The use of the ALOS data to improve the ENVISAT data is investigated. The latter show decorrelation effects at critical areas due to the dense vegetation at the volcano flanks, while the ALOS interferogram is fully coherent. The ALOS interferogram is used to estimate the hidden deformation behind the decorrelated patches of the ENVISAT interferogram. A combination of the ALOS and ENVISAT interferograms is used to create new interferograms with shorter temporal baseline in order to improve the analysis, and hence simplify the modelling of the observed deformation (i.e. reduced number of sources).