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InSAR time series to characterize landslide ground deformations in a tropical urban environment: focus on Bukavu, East African Rift System (DR Congo)

Adriano Nobile (1), Antoine Dille (1,2), Elise Monsieurs (1,3,4), Olivier Dewitte (1), Nicolas d'Oreye (5,6), and Francois Kervyn (1)

(1) Royal Museum for Central Africa, Earth, Tervuren, Belgium (adriano.nobile@africamuseum.be), (2) Vrije Universiteit Brussel, Earth System Science, Department of Geography, Brussels, Belgium, (3) University of Liège, Department of Geography, (4) NASA Goddard Space Flight Center, Hydrological Sciences Laboratory, Greenbelt, MD, USA, (5) European Center for Geodynamics and Seismology, Luxembourg, (6) National Museum of Natural History, Luxembourg

The western branch of the East African Rift System, in Central Africa, is a region naturally prone to landslides due to the geomorphology of the area and to the occurrence of earthquakes and heavy rainfall events.
The city of Bukavu (DR Congo) is located within the Rift, on the southern shore of Lake Kivu, in a tropical environment. Little is yet known about the current kinematics and the processes that drive large slow-moving landslides that continuously affect highly populated slopes of the city. Here we use InSAR time series to monitor ground deformations associated to the largest landslide in Bukavu (1.5 km^2) that mostly moves in the E-W and vertical directions with displacement rate up to 25 cm/yr as highlighted by DGPS measurements taken at benchmarks in the area.
Using 80 Cosmo SkyMed SAR images acquired between March 2015 and April 2016 with a mean revisiting time of 8 days in both ascending and descending orbits, we produced displacement rate maps and ground deformation time series with the Small Baseline Subset (SBAS) technique implemented in StamPS software. Results show that the landslide is divided into blocks that move with different velocities which is consistent with field observations and DGPS measurements. Despite a short revisiting time offered by CSK constellation, we lose the coherence within the fastest moving regions of the landslide.
To constrain these results we are now processing ∼40 Sentinel-1A images acquired in the same period in ascending and descending orbit. Probably the longer Sentinel-1 wavelength (5.6 cm) compared to the Cosmo SkyMed one (3.1 cm) will allow us to measure fastest displacements observed with DGPS data.