InSAR time series: the SBAS/PSI time series approach to study landslide movements

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Landslides Processes

- Mass movement along a slope
- Several triggering sources

Cause damage to people, buildings and infrastructure
Satellite images
LS Catalogues

- Localize LS
- Spatial parameters
- Trigger Point
- Slope angle

InSAR Displacement rate
Western branch of the EARS – Bukavu
Bukavu – Kadutu
InSAR - Bukavu

- CSK ifg 20150714-20150807
- Ascending Track
- Radar geometry

Bukavu LS:
- Inhabited area
- Movement toward East
- Displacement rate <10 cm/yr
ENVISAT Data

Envisat ASAR images

- Ascending (T228)
- Descending (T307)
- Period: end 2002 – half 2008
- Acquisition frequency unstable
ENVISAT SBAS

Ascending Track
Movement away from the satellite

Descending Track
Movement toward the satellite

Duble difference displacement
Cosmo-SkyMed Data

- Ascending (25 imgs – 20 used)
- Descending (25 imgs)
- Period: Mar - Oct 2015
- Acquisition frequency stable (8 days)
CSKS - PS

Ascending Track
Movement away from the Satellite

Descending Track
Movement toward the Satellite
Validation Field observations

- Large population density
- Few masonry buildings
- The road was asphalted in 2013
Validation
GPS campaign

- 5 measurements between Aug. 2014 – Aug. 2015
- 21 benchmarks
- Next campain in Feb.2016
Trigger mechanisms

Rainfall monitoring

11 Rain gauge installed
Discussion

Satellite images are very useful to study landslide processes:

• Localize
• Evaluate parameters (shape, size, slope angle etc)
• Evaluate displacement rate (InSAR)
• Create catalogue and hazard maps

InSAR on Bukavu Landslide suggest:

• Movement in East direction
• up to 5 cm/yr

Future works:

• 50 new CSK acquisitions (more than 1 year)
• Validation of InSAR result with field an GPS data
• Comparison between InSAR and rainfall TS
Thank you!