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DInSAR fringes simulation of sandbox models

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Interpreting satellite DInSAR patterns of slope movements can be difficult because of unwrapping problems, loss of coherence or radar imaging geometry limitations (layover, shadowing ...). We investigate the potential of simulating interferometric fringes as a tool to help understanding real DInSAR images.
Various types of gravitational slope deformations (sliding, toppling ...) have been produced in a sandbox in the lab. These experiments were monitored with a micro-lidar Minolta-Konika Vivid 9i to get successive Digital Elevation Models of the surface. A pair of DEM is then used to simulate DInSAR fringes patterns, with the possibility to vary the wavelength, the angle between the line of sight and the ground displacement, the look angle, the baseline, etc.
DInSAR fringes simulated here are idealized. They are not affected by any noise, decoherence, layover or shadow effects; radar image deformations are computed in ancillary files. However it appears that even these ideal wrapped fringes patterns get rapidly very complex when deformation is strong. Then this kind of tool is of interest to better constrain ground surface deformations from resulting InSAR fringes (from lab models or real landslides data). It makes also possible to test how the acquisition geometry impacts the InSAR result depending on the type of slope movement considered.