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# Lithological control on the kinematic pattern in a large clayey landslide (Avignonet, French Alps)

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Slow-moving landslides frequently affect gentle slopes made of clayey formations, with volumes which can range from a few m3 to several tens of millions of m3. These landslides frequently exhibit sudden acceleration phases and flows, which can be triggered by changes in the stress field (pore pressure increase, loading, erosion) or modifications in the soil characteristics (weathering, leaching or pollutant infiltration). Understanding landslide behaviour first requires the characterization of the ground surface kinematics, which can be achieved through punctual measurements, like GPS or optical devices, or more recently through dense displacement maps provided by digital photogrammetry, laser scanning or Synthetic Aperture Radar interferometry (InSAR). Continuous punctual measurements provide excellent temporal resolution with low spatial resolution. On the contrary, InSAR and Laser scanning, whose sensors can be attached to aerial or ground platforms, are limited in terms of temporal resolution. Displacement measurements on clayey landslides usually display a spatially heterogeneous field, with zones of higher activity which can evolve with time. While temporal variations are usually interpreted as resulting from pore pressure fluctuations, the spatial variability in the surface displacement has been related to various factors, including geological heterogeneity, the presence of discontinuities, the existence of several imbricate slip surfaces or the landslide mechanism itself.
The aim of this study is to highlight the control of lithology on the surface deformation and displacement rate field at the large clayey landslide of Avignonet (France). Although this landslide has been extensively studied, this influence has not been reported before, owing to a bias in the investigation that concentrated in inhabited areas. The detection of coarser layers at the surface was made possible by the application of geophysical methods (electrical resistivity tomography over the whole landslide) and was validated by hydrogeological observations and permeability measurements. Electrical imaging of the superficial coarser layer allowed a new interpretation of the displacement field to be proposed.
As already pointed out before in numerous studies, this case history illustrates the necessity of combining investigation and monitoring techniques for understanding the complexity of large landslide mechanism behaviour.