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GRID technologies to remotely control distributed sensors for 4d geoelectrical tomography: first results in landslide monitoring.

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A novel approach based on GRID technologies has been proposed to remotely control active and passive geoelectrical sensors for obtaining high-resolution 4D tomographic electrical images of landslide bodies. The prototype system has been implemented assembling hardware components (multimeter, multichannel cables, electrical impolarizable probes, TDR sensors and probes for soil and meteo-climatic parameter measurements) and developing new software routines for geoelectrical data control and processing.

The system allows to measure the self-potential voltage differences between electrodes putted into the ground at different depth (0,2m 1,0m and 2,0m) distributed along a profile with 45,0m length with 5.0m of spacing. Combining the SP data for the different depth we produces a high resolution tomography image along a vertical section crossing the profile representing the probability to find electrical point sources. Furthermore, the system can be used for active geoelectrical measurements: electrical currents can be automatically injected into the ground obtaining subsurface resistivity images of landslide body. Then, the integration of passive and active geoelectrical measurements allows us to detect the time-dependent-changes of water content in vadose zone and to evaluate the geometrical features of landslide body.

The remote control of geoelectrical and meteo-climatic sensors with GRID technolo-

gies was the key for obtaining in near-real-time electrical tomographic images before, during and after strong rainfall precipitation periods and, consequently, to analyse the complex dynamics of subsurface water infiltration processes. An advanced, java-based, system of tools for remote management and control of the sensors is, in fact, able to automatically change acquisition parameters (e.g. sampling frequency) of the "in situ" instrumentation on the base of some 'triggering' threshold of crucial measured meteorological parameter (e.g. rain rate). Finally, the first results obtained during an experimental field test carried in Lucanian Apennine Chain (Southern Italy) is presented. The study area is located close the Tito and Picerno villages and it was interested by diffuse and large surface deformation phenomena after a strong rainfall and snow events occurred on March 2006.