Geophysical Research Abstracts, Vol. 8, 07000, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07000

Geoelectrical methods for landslide investigation: a critical review

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In the last years, many geophysical techniques such as seismics, geoelectrics, magnetometry and gravimetry, have been applied for investigating landslide areas. These techniques allow to delineate the geometry of the landslide zone, to identify the sliding surface and to study the dynamics of the groundwater flows.

Recently, great attention has been drawn to geoelectrical techniques, such as Electrical Resistivity Tomography (ERT) and Self-Potential (SP) methods showing high spatial resolution capability and relatively fast field data acquisition. Indeed, the development of innovative and robust inversion methods for geoelectrical data allows a more accurate interpretation of them in order to solve complex geological problems. The geometrical description of the subsurface structures (i.e. faults, sliding surfaces, etc.) and the study of the space-time dynamics of groundwater flow associated to landslide activity can be regarded as examples of these problems.

In this work a critical review related to the use of geoelectrical methods for investigating and monitoring landslides is presented and discussed. A wide range of different typologies of landslides (translational slide, earthflow) has been analysed and in particular we focus our attention to results obtained by geophysical surveys carried out in Southern Apennine chain (Regione Basilicata, Italy).