



## **Using IKONOS imagery for mapping instability factors and slope failures along a county road (Daunia, Italy)**

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We report on the exploitation of high resolution optical imagery for the detection of slope conditions leading to instability and for mapping of active landslides along a road located in the Daunia Apennines (Southern Italy). The study area belongs to the municipal territory of Rocchetta Sant'Antonio and is known for recurrent landslide problems. We focus on 11 km long portion of SP99bis road, which has been damaged by many landslides and is currently closed to the traffic. This study is a part of an ongoing engineering geology investigation whose outcomes will be used to design future slope stabilization works.

In order to obtain good quality data the IKONOS imagery was first orthorectified and pan-sharped. To overcome the lack of stereoscopic capability and to aid landslide identification, the imagery was draped over a detailed DEM (5 m grid). The image interpretation resulted in the recognition of 48 active landslides (some of small dimensions), which affect about 15% of the road length. Furthermore, thanks to the high resolution of the imagery it was possible to obtain very detailed information on water runoff in the areas upslope, downslope, as well as along the road track. Particular attention was paid to features indicative of the drainage conditions negative for the slope (and the road) stability, such as disordered surface drainage, water ponding, undrained depressions, anomalous wet areas. Poor drainage conditions (detected from satellite imagery) were found to coincide with 30 landslides. Further, in situ inspections conducted shortly after periods of intense rainfall confirmed that the hillslope areas in the vicinity the road landslides, as well as the road itself, are characterized by inadequate drainage. A comparison of field observations and remotely sensed data revealed that over 80% of the anomalous wet sites identified in situ was also detected from the satellite imagery. In conclusion, this case study demonstrates the practical applicability of high resolution satellite imagery for mapping slope failures and associated factors of instability.