ASSESSMENT OF VERY HIGH RESOLUTION SATELLITE DATA FUSION TECHNIQUES FOR LANDSLIDE RECOGNITION

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ABSTRACT:

Data fusion is gaining increasing attention in the remote sensing community and the usefulness of pan-sharpened data have been demonstrated for environmental applications. The ideal fusion algorithm should enhance spatial details and, at the same time, avoid spectral distorsion. Several pan-sharpening techniques have been developed but the ranking of their efficiency represents a not easy task, since it depends on the application the pan-sharpened image is devoted to.

The IHS-based method was reported in literature as one of the most effective data fusion technique among those commonly adopted in the framework of landslide recognition by visual analysis of pan-sharpened SPOT-HRV (PAN) and Landsat-TM multispectral images. Other works assess the performances of data fusion methods on the basis of some suitable quality indexes, demonstrating that the Gram-Schmidt Adaptive (GSA) algorithm together with its improved version GSA-CA based on local statistics, produce very effective results.

In the framework of MORFEO project devoted to the assessment of the potentialities of EO satellite data in landslide investigation and monitoring, this work evaluates the performances of the aforementioned data fusion techniques. The methods have been tested on an IKONOS image acquired over the test area of Collazzone in Central Italy. The pan-sharpened images obtained by the three techniques are compared on the basis of photointerpretation performed by skilled geologists on a selected set of several types of landslides located in different environmental contexts. The results are discussed and their effectiveness is highlighted, in particular emphasizing advantages and limits of the different techniques.