



## **Orthoprojection of MIVIS airborne hyperspectral images of mountain regions: results and preliminary geomorphological applications in the Aosta Valley (NW-Italy)**

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Geomorphological analysis is an essential element of many landslide monitoring and hazards assessment studies. Remote sensing techniques have long been an effective tool for such analysis. Here we present results from an investigation using high resolution hyperspectral airborne sensor MIVIS (*Multispectral Infrared and Visible Imaging Spectrometer*) images in the Aosta Valley (Italian Western-Alps)

MIVIS acquires images with high application potential for thematic studies in many fields by recording, with high geometric resolution, 102 spectral bands in the spectral regions of visible, near infrared, middle infrared and thermal infrared. However, large geometric deformations, due both to MIVIS sensor model and to moved surface of the study area, make difficult using raw data. Therefore correct geometric definition of whole recorded scene is a preliminary operation necessary to an optimal use of MIVIS images.

GeoSITLab research group (University of Torino) attended to geometric correction of MIVIS images of whole Aosta Valley Region (NW Italian Alps) taken by CGR Parma for the Aosta Valley Regional Service T.A.O.P. Dipartimento Territorio Ambiente e Risorse Idriche. Three different orthoprojection methods have been tested: two non-parametric (Rational Function Model and Neural Networks, last one developed by authors) and one parametric (PARGE-RESE) that can use attitude and position data recorded during images registration. Quantitative and qualitative analysis of obtained

results allow to affirm that the parametric method is best one in terms of planimetric accuracy.

In this preliminary phase of application, general thematic studies have been produced on geomorphological features of the Southern side of Mount Blanc Massif. In the case of the Miage Glacier (Val Veny), debris cover characteristics and possible sources from instable slopes have been investigated. In the case of Mont de la Saxe (Val Ferret), superficial evidences of deep seated gravitational deformations have been studied. Results demonstrate good potentialities of MIVIS hyperspectral images for geomorphological studies.