

GEOHAZARD ASSESSMENT BY PHOTOMONITORING: IRIS A NEW POWERFUL TOOL FOR ANALYSIS

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INTRODUCTION

PHOTOMONITORING is a new monitoring solution that exploits the widespread use of optical/multispectral sensors worldwide to obtain information on changes or displacements in the terrain. Analyses can be carried out on datasets of images acquired from the same type of platform, on the same area of interest, at different times, and can be conducted using specific algorithms that allow the evaluation of any changes in radiometric characteristics (Change Detection) and/or displacements that have occurred in the time interval covered by the acquisition (Digital Image Correlation). Through these image applications it is possible to study the evolution and significant changes of the observed scenario, therefore, when applied to Earth Observation, they allow for a better mapping of geological and hydrogeological risks, vunderstanding the evolution and causes of the processes underway.



MATERIALS AND METHODS

DIC (**Digital Image Correlation**) is an optical-numerical measurement technique capable of providing full-field 2D surface displacements or deformations of any type of object. Deformations are calculated by comparing and processing co-registered digital images of the surface of the same 'object' collected before and after the deformation event. DIC makes it possible to quantitatively assess the displacements and deformations that have occurred between two images acquired at different times, analyzing the different pixel blocks and allowing for a resolution of up to 1/10th of a pixel.

strain field





IRIS SOFTWARE

IRIS Software is Developed by **NHAZCA S.r.I.**, implements advanced imageprocessing algorithms for the monitoring application. IRIS is conceived to work with terrestrial, aerial and satellite imagery of any datatype (Optical, Thermal, Near-Infrared) allowing to reach subpixel accuracy in displacement monitoring. The Main Functions of IRIS Software including a Pre-processing and Post-processing; an image **Co-registration function**, and advanced image-processing algorithms for carried out a Change Detection Analysis and Displacement Analysis. IRIS has been integrated and will be accessible to users as a Cloud on-demand processing service in multiple Exploitation GEP platforms like ESA Charter Mapper.





CONCLUSIONS

The **PhotoMonitoring** analyses presented in this paper allowed the mapping and quantification of changes occurring after Natural Hazard events with the quantification of the displacement rate. These analyses were carried out on Sentinel-2 Open-Source images and with a new generation software, IRIS, developed by NHAZCA S.r.I., a Startup of the Sapienza University of Rome, which allowed us to identify and map some geological hazards. The results obtained allow us to fully understand the potential of **Earth Observation** techniques, and more specifically of IRIS and of Satellite Photomonitoring, today a reliable and versatile tool that allows the monitoring and study of the impact of geological hazards such as earthquakes, landslides and floods and through data from different sensors (optical, radar, laser).

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