remote sensing

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Editorial

New Trends in High-Resolution Imagery Processing

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Photogrammetry is a technique that was limited to a few specific sensors and application fields until a few years ago. In the last twenty years, the landscape related to remote sensing applications has drastically changed because of technological advances such as the exponential development of new sensors and new hardware capabilities, including increasingly high-performance digital cameras; an increase in the number of platforms dedicated to high/very-high-resolution (HR/VHR) image acquisitions, from aerial and terrestrial to satellite and UAV—Unmanned Aerial Vehicle platforms; and the evolution of algorithms required for digital image processing including Structure For Motion—SFM algorithms.

These recent advances in sensor technology and algorithm development enable the use of HR remote sensing imagery in different application fields, ranging from landslide and landfill monitoring to archaeological applications, monitoring an active volcanic area, morphological studies, and so on.

By combining the potential of remote sensing with disciplines in different fields, interesting and evolving research areas can be developed; particular attention can be paid to remote sensing applications dedicated to cultural and archaeological heritage. High-precision geomatic surveys, which include GNSS—Global Navigation Satellite System, TLS—Terrestrial Laser Scanning, and photogrammetric surveys, can be used to support the archaeological and historical interpretation of observable structures and help to establish the exact site location, improving the accurate planning of the archeological excavation [1]. Remote sensing data can support mapping the archaeological potential of a given area and offer predictive hypotheses related to the presence of buried sites; therefore, it is important to evaluate the potential and the reliability of classification techniques such as object-based image analysis (OBIA) for archaeological predictive modeling [2].

Some remote sensing techniques and procedures that can be considered consolidated are still being studied and investigated more deeply; operations of fundamental interest for the proper use of satellite imagery are constantly evolving to improve procedural efficiency and the accuracy of results; among these, we can mention the fusion of images acquired from different sensors [3] and pansharpening—a technique that allows combining spectral information with the higher geometric accuracy of panchromatic images—an operation of fundamental importance for many feature extraction processes [4,5]. Similarly, the extraction of elevation information from stereo pairs and triple acquisitions (tri-image acquisition) requires specific in-depth analysis to optimize workflows [6–8]. The reverse problem of observing the satellite orbit from the ground can also be implemented with a complete and portable system for image acquisition [9].

Regardless of the application, each product must be validated to define the metric level of precision and accuracy. High- and very-high-resolution images are affected by deformation mainly because of camera distortions and acquisition geometry, and then they must undergo a geometric rectification process to be used for metrical purposes. New satellite platforms dedicated to remote sensing with increasingly technologically advanced sensors onboard may present new acquisition geometries that need to be analyzed to

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perform proper orientation of new products, a fundamental procedure that is the basis of modern photogrammetry [10].

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