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## **Integrated remote sensing technologies for multi-depth seabed and coastal cultural resources: the case of the submerged Roman site of Baia (Naples, Italy).**

**Crescenzo Violante**<sup>1</sup>, Nicola Masini<sup>2</sup>, and Nicodemo Abate<sup>2</sup>

<sup>1</sup>National Research Council - CNR, Institute of Heritage Science, Napoli, Italy (crescenzo.violante@cnr.it)

<sup>2</sup>National Research Council - CNR, Institute of Heritage Science, Potenza, Italy

Among new technologies that enable representation of the submarine cultural landscapes, marine geophysical surveys provide fast and cost-effective tools now widely applied to the reconnaissance and management of underwater cultural and natural resources. In addition, passive and active sensors such as LiDAR and optical one mounted on Unmanned Aircraft Systems (UAS) represent very effective tools for coastal remote sensing applications that require high spatial resolutions. In this work we use ultra-high resolution acoustic and LiDAR-derived data to characterize and map the marine and coastal area in the Baia archeological site (Naples, Italy). This area belongs to the Campi Flegrei volcanic field, which is affected by vertical ground movement called “Bradyseism” that strongly influenced the morphology of the coast over the last 2 Ka. As a consequence, Roman artifacts and structures dating from 1<sup>st</sup> Century BC to 4<sup>th</sup> Century AC, including Villas, luxury buildings and landing ports are now below the sea water surface, and partly buried within the marine sediments. Marine geophysical investigations included ultra-high resolution swath-bathymetry and parametric sub-bottom profiler surveys that allowed to characterize and map cultural and natural resources at seabed and in the shallow subseafloor. At same time optical (both visible and multispectral) images and LiDAR-derived elevation provided detailed information of the archaeological features and their natural setting along the adjacent coast. The main aim of this approach was to implement non-destructive geophysical methods for investigating and reconstruct the interrelationships between cultural and natural heritage at sea-land interface in the Baia archeological site. Such approach is now crucial for the evaluation of future trends induced by climate change and for a number of policy and management issues.

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