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## Analysis between ancient human settlements and volcanic landscapes using earth observation and archaeological data

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Geological and environmental conditions that influence local topography also affect indirectly the location of human settlement dynamics. Understanding those relationships plays an important role in archaeological research related to the evolution of settlement dynamics. In the lower Tyrrhenian Islands, an important parameter is also the volcanic landscape evolution. This work aims to study the patterns of Neolithic, Copper and Bronze Age settlements, based on known archaeological sites at the Low Tyrrhenian Islands, and to generate hypotheses about the relations of settlement patterns with the volcanic landscape. To that end, a Web-GIS database was created, which was fed with topographic, geological, geomorphological data and Earth Observation data. Geomorphological analysis, derived from digital elevation models, and earth observation products such as the SENTINEL missions, can provide useful estimations into the processes shaping landscapes and insight into the location and evolution of settlements. The analysis includes a series of different data correlation, from geomorphologic to socioeconomic, integrated by an indicator analysis. A series of thematic maps were developed to interpret why areas were selected to host settlements. Through the use of the database that was developed during the project, a set of indexes have been applied. Those included exposure and vulnerability indices for the inland and coastal areas, but also location and defensibility indices for the archaeological sites. Moreover, baseline maps for future risk estimations through a Multi-Criteria Decision Analysis System (MCDA), have been produced. The Volcanic Islands of the lower Tyrrhenian coast have a volcanic origin and were influenced, and partly still are, by explosive and effusive eruptions of various energy and types, by more or less intense deformational events, often connected with the dynamics of the volcano, and quiescent periods of varying duration. The areas under investigation present different characteristics in their geomorphological but also their societal evolution. Geomorphological data further analyzed in a ternary diagram that indicated the relative influence of each of the parameters in each area. From the diagram, it can be seen that the locations of human activities are strongly affected by past and recent volcanic activity.

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