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## Heat wave vulnerability maps of Naples (Italy) from Landsat images and machine learning

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Maps of land surface temperature of the area of Naples (Southern Italy) show large spatial variation of temperature anomalies. In particular, the metropolitan area of Naples is generally characterized by higher temperatures than the rest of the area considered.

Since heat waves have become more frequent in the last decade, the creation of heat maps helps to understand the location where a town's population may be more affected by them. Ideally, this kind of maps would provide residents with accurate information about the health problems they may face.

Large temperature anomalies variations are caused by multiple or competing factors, leaving uncertainty in identifying vulnerable areas at this time.

To overcome this limitation and identify areas more vulnerable to the effects of heat waves, not only in the city of Naples but also in its suburbs, we combine the use of Landsat data with unsupervised machine learning algorithms to provide detailed heat wave vulnerability maps. In particular, we develop a procedure based on a combined use of hierarchical and partitional cluster analyses that allows us to better identify areas characterized by temperature anomalies that are more similar to each other than to any other all over the year. This has important implications allowing discrimination between locations that potentially would be impacted higher or lower energy consumption.