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During the last few decades, in many regions throughout the world abandonment of agricultural land has induced a high concentration of people in densely populated urban areas. The deep social, economic and environmental changes have caused strong and extensive land cover changes. This is regarded as a pressing issue that calls for a clear understanding of the ongoing trends and future urban expansion. The main issue of great importance in modelling urban growth includes spatial and temporal dynamics, scale dynamics, man-induced land use changes. Although urban growth is perceived as necessary for a sustainable economy, uncontrolled or sprawling urban growth can cause various problems, such as, the loss of open space, landscape alteration, environmental pollution, traffic congestion, infrastructure pressure, and other social and economical issues. To face these drawbacks, a continuous monitoring of the urban growth evolution in terms of type and extent of changes over time are essential for supporting planners and decision makers in future urban planning.
A critical point for the understanding and monitoring urban expansion processes is the availability of both (i) time-series data set and (ii) updated information relating to the current urban spatial structure a to define and locate the evolution trends. In such a context, an effective contribution can be offered by satellite remote sensing technologies, which are able to provide both historical data archive and up-to-date imagery. Satellite technologies represent a cost-effective mean for obtaining useful data that can be easily and systematically updated for the whole globe. Nowadays medium resolution satellite images, such as Landsat TM or ASTER can be downloaded free of charge from the NASA web site. The use of satellite imagery along with robust data analysis techniques can be used for the monitoring and planning purposes as these enable the reporting of ongoing trends of urban growth at a detailed level.
Nevertheless, the exploitation of satellite Earth Observation in the field of the urban growth monitoring is a relatively new tool, although during the last three decades great efforts have been addressed to the application of remote sensing in detecting land use and land cover changes using a number of data analyses, such as: (i) Spectral enhancement based on vegetation index differencing, principal component analysis, Image differencing and visual interpretation and/or classification, (ii) post-classification change differencing and a combination of image enhancement and post-classification comparison, (iii) mixture analysis, (iv) artificial neural networks, (v) landscape metrics (patchiness and map density) and (vi) the integration of geographical information system and remote sensing data. In this paper a comparison of the methods listed before is carried out using satellite time series made up of Landsat MSS, TM, ETM+ASTER for some test areas selected in South of Italy and Cairo in order to extract and quantify urban sprawl and its spatial and temporal feature patterns.