Urban Mapping using Satellite Time Series

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Abstract

When we analyze the development of urban areas, it becomes clear that satellite image time series are highly valuable data sources that can be exploited to describe - besides vegetation cycles and land use changes - the dynamics of urban settlements and their infrastructure.

Modern high resolution optical and SAR sensors with good signal-to-noise characteristics open new perspectives for local image classification and quantitative change analysis, while low resolution sensor data are often available over many years and provide more insight into long-term processes. Advanced analysis algorithms allow the identification of typical pixel changes and their confidence levels. Finally, data fusion represents a new perspective for urban mapping.
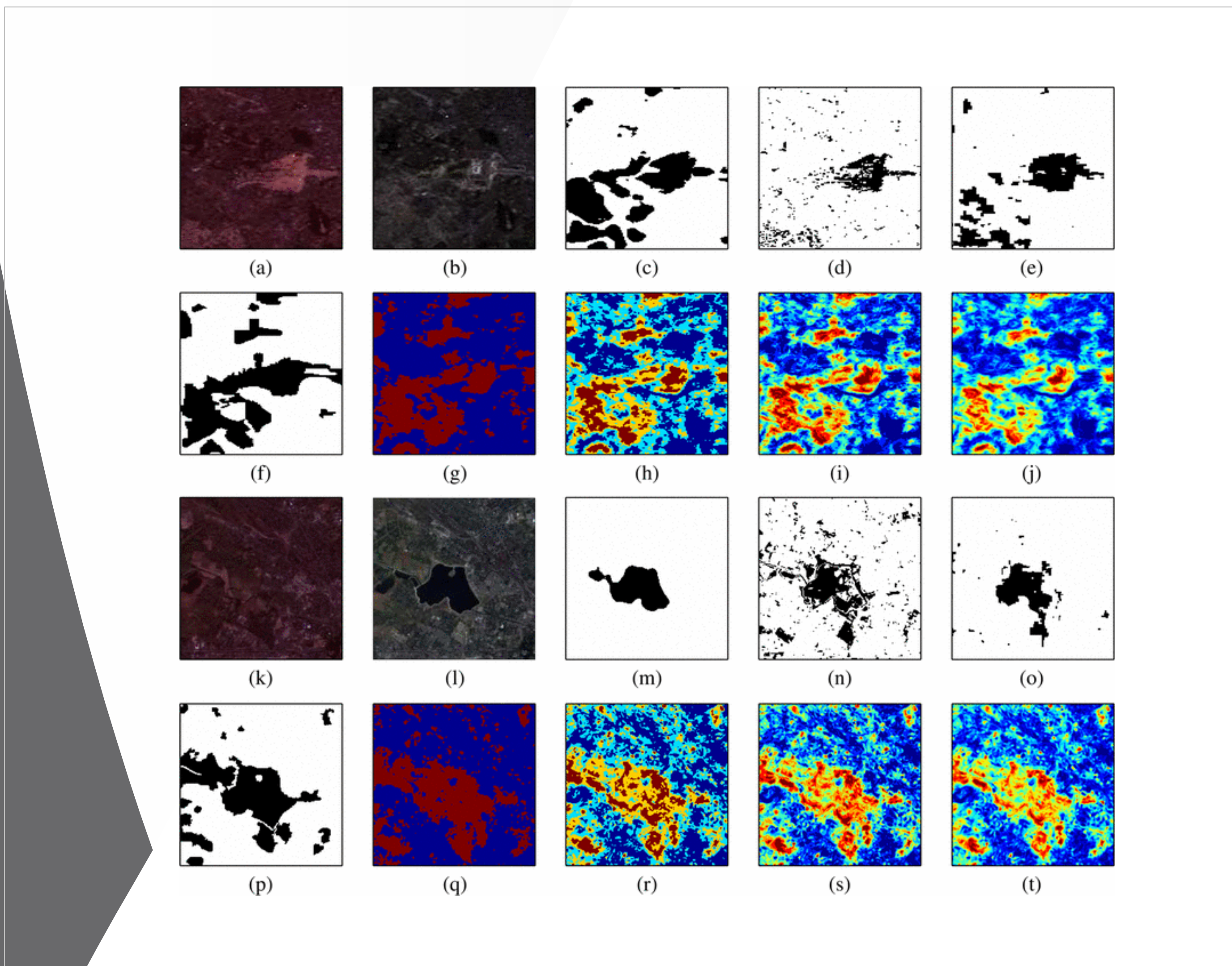
❖ Multitemporal satellite image time series: Analysis of urban development in and around Bucharest, Romania using Landsat data
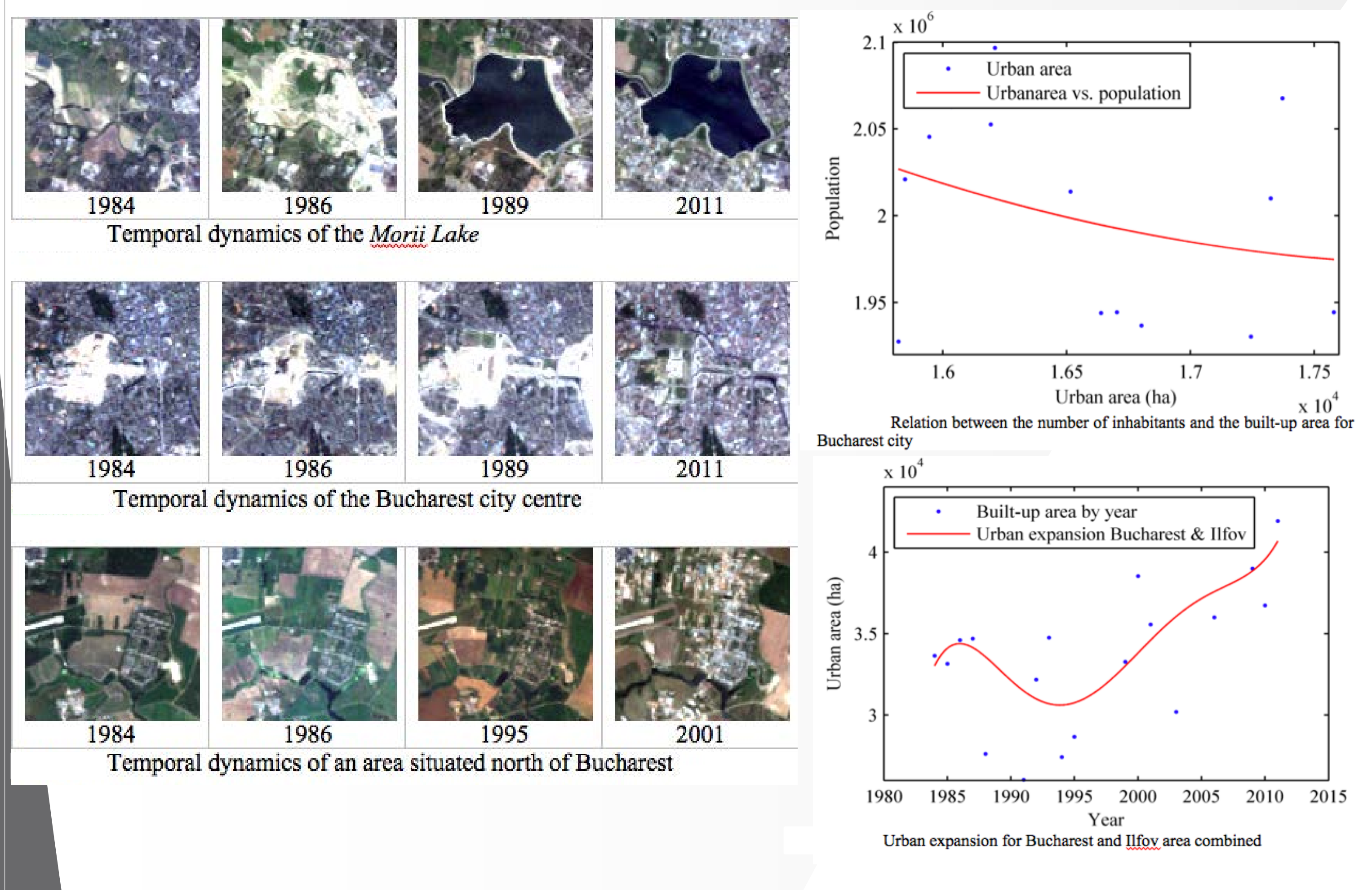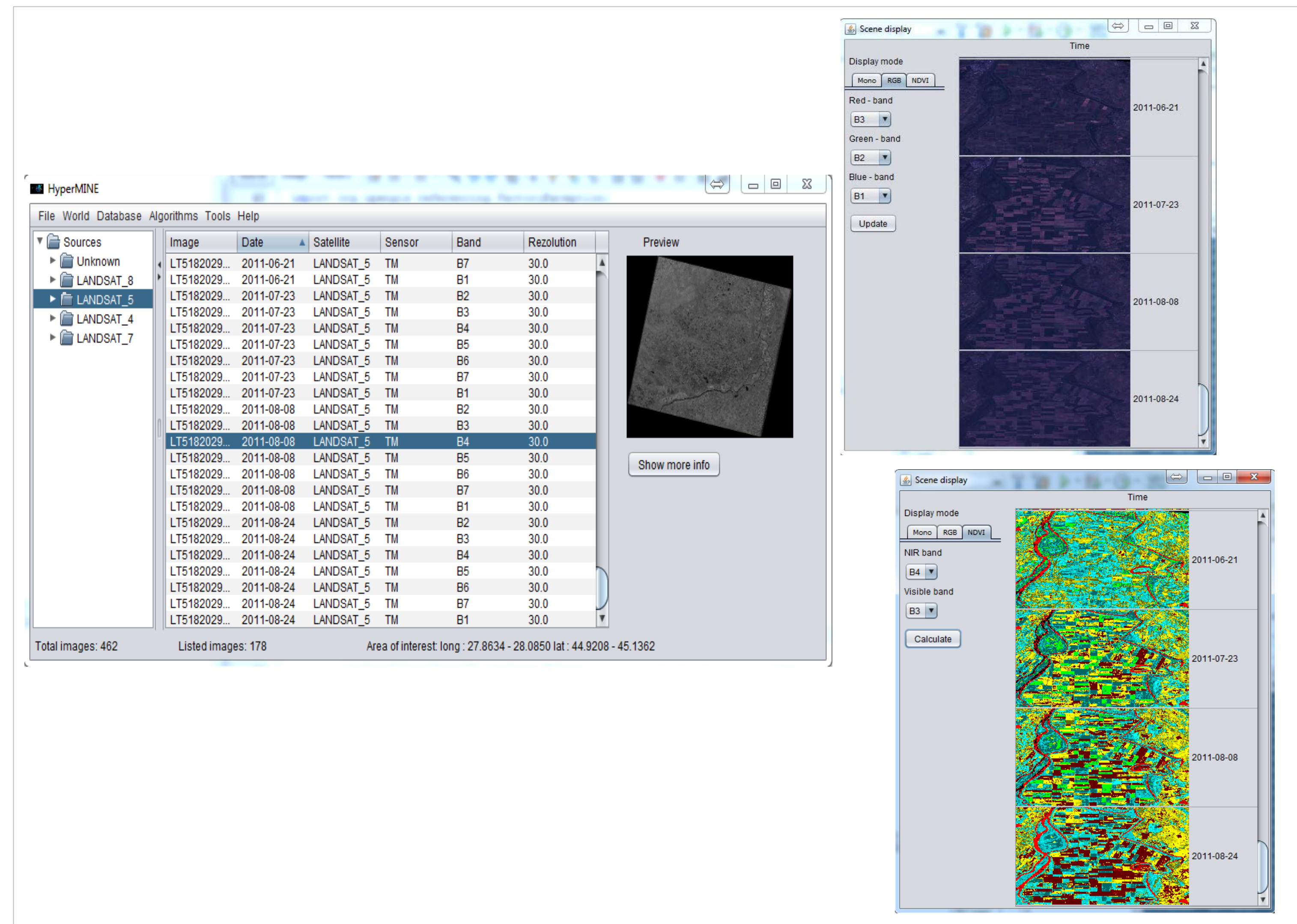

❖ Data analytics for rapid mapping: Effects of the 2011 tsunami in Japan using very high resolution TerraSAR-X data
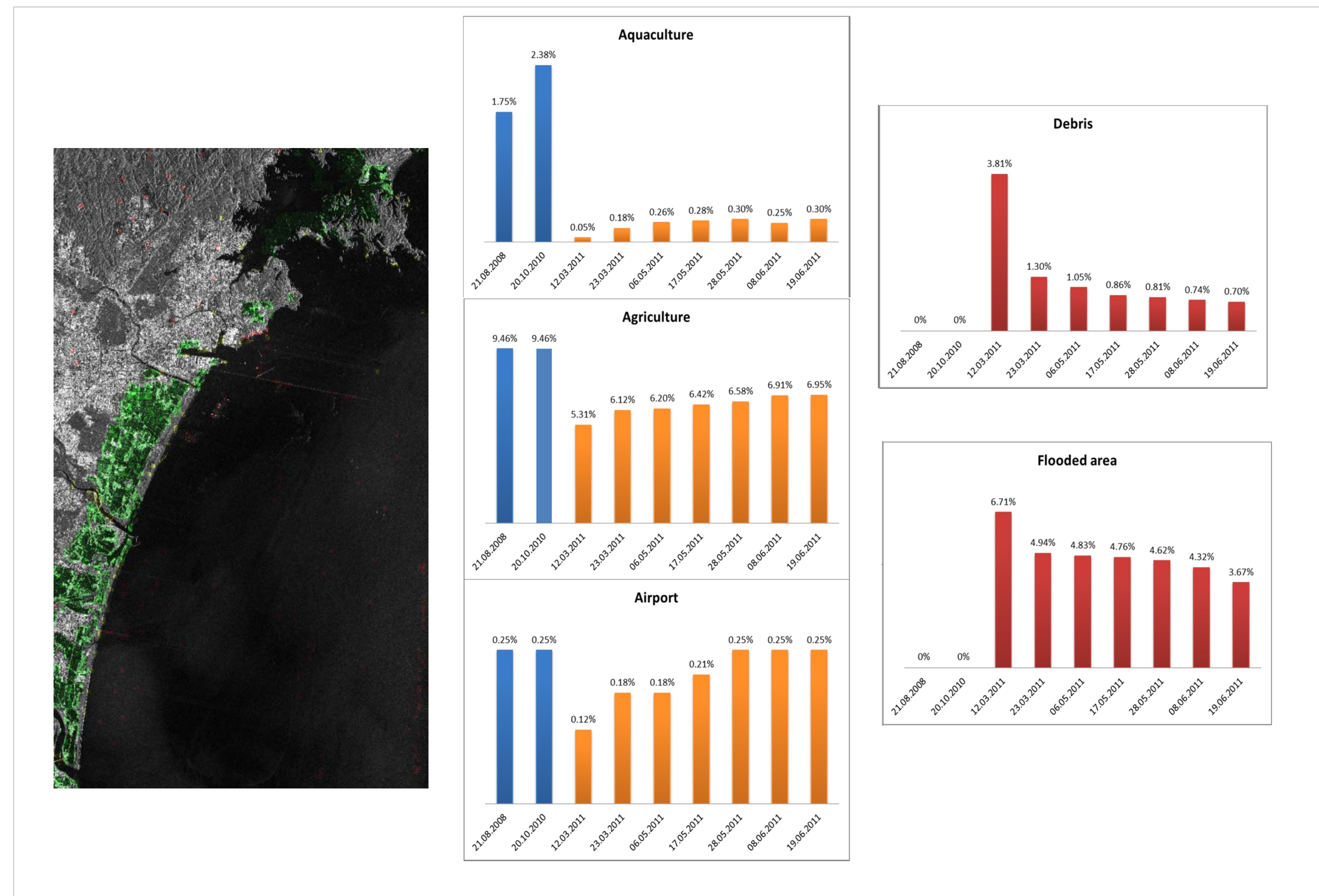
❖ Automatic change analysis in satellite images: Binary descriptors and Lloyd-Max quantization

❖ An Earth Observation spatio-temporal data mining system

Test Data Set

❖ Our test data set consists of:

  ❖ 109 cloud-free images of Landsat TM and ETM+ with a spatial resolution of 30 m covering the areas of Bucharest and Ilfov in Romania.
  ❖ 9 TerraSAR-X images with a resolution of 5.75 m. Two images were acquired as pre-disaster data (on September 21, 2008 and October 20, 2010) and 7 images were acquired after the 2011 Tohoku earthquake and tsunami, over Sendai, Japan as post-disaster data (for a period of three months from March 12, 2011 until June 19, 2011).
  ❖ Landsat 7 images with a spatial resolution of 30 m for the period between 1984 to 1992, covering an area of approximately 59×51 km² over the surroundings of Bucharest, Romania. The main interest was the construction monitoring of the Palace of Parliament and the Morii lake.
  ❖ 120 images acquired during the Landsat 4, 5, 7, and 8 satellite missions. These images cover the southern part of Romania and are centered around Bucharest.

References

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