

Multi-temporal Multi-sensor Analysis of Urban Agglomeration and Climate Impact in China for Sustainable Development

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The overall objective of this research is to investigate multi-temporal, multi-scale, multi-sensory satellite data for analysis of urbanization and climate impact in China for sustainable urban development. The specific objectives are:

- to understand how and where urban clusters/urban agglomerations develop in China using multi-temporal and/or multi-sensor satellite data;
- to develop new algorithms that can rapidly detect urban clusters and land cover changes from multi-temporal and/or multi-sensor satellite data
- to evaluate high spatial and spectral resolution space borne SAR and optical data for mapping the spatial configuration of selected Chinese urban landscapes;
- to evaluate what impact urban land use and land cover change has on the environment and climate in terms of local and regional temperature and precipitation;
- to investigate how climate change affect urban areas and to assess the vulnerability and risks of flooding, as well as extreme events in coastal urban areas.

The methodology to be employed in this research involves image processing and data fusion, image classification, change detection, accuracy assessment, quantitative analysis of the impact of urbanization on the environment and climate, as well as vulnerability analysis of human settlements and especially those in coastal areas due to climate change.

The major deliverables expected from this project will include the following:

- Refereed journal papers in International Journal of Remote Sensing, Remote Sensing of Environment, Planning & Environment, etc.
- Presentations at major international symposia, e.g., Urban Remote Sensing Symposia, Earth Observation for Global Change (EOGC), IGARSS, etc.
- Final project report to be submitted as required
- 4 Ph.D. thesis (one at KTH, one at Pavia, one at IRSA and one at Nanjing U.)
- 5 M.Sc. thesis (at least two at KTH, one in Pavia, one in IRSA and one at Nanjing U.)
- One workshop on Urbanization and Climate Impact to be hosted in China
- Special Sessions at major conferences (IGARSS and JURSE)

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为可持续发展服务的中国城市化研究及其对气候的影响

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项目的总体目标是利用多源、多时相、多尺度的卫星数据，分析中国的城市化及其对气候的影响，以支持可持续发展研究。具体研究目标如下：1利用多源多时相卫星数据，了解中国城市化发生的位置及规模；2发展新的算法，用于支持从多源多时相卫星数据中快速探测城市及土地利用变化的需求；3评估高空间分辨率、高光谱分辨率的合成孔径雷达数据和光学数据在中国特定城市的制图效力；4 评估城市土地利用/覆盖变化在局部和区域中对环境和气候的影响；5研究气候变化如何影响城市地区，以及评估沿海城市地区受洪水、极端事件的威胁程度。

研究方法包括图像处理和数据融合、图像分类、变化监测、精度评价、城市化在环境和气候方面的定量分析，以及气候变化引起的居民地特别是在沿海地区的受威胁程度分析。

项目产出包括：在主流国际遥感刊物发表学术论文；在国际会议上做报告、举办专题，宣读研究成果；在中国举行城市化及其气候影响的工作会议；项目进展报告；4篇博士学位论文，5篇硕士学位论文。