
The use of earth observation to support the sustainable development of settlements

Thomas Esch, Hannes Taubenböck, Christian Geiß, Wieke Heldens, Michael Wurm, Stefan Dech

(Dr. Thomas Esch, German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Oberpfaffenhofen, 82234 Weßling, Thomas.Esch@dlr.de)

(Dr. Hannes Taubenböck, German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Oberpfaffenhofen, 82234 Weßling, Hannes.Taubenböck@dlr.de)

(Christian Geiß, German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Oberpfaffenhofen, 82234 Weßling, Christian.Geiß@dlr.de)

(Wieke Heldens, German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Oberpfaffenhofen, 82234 Weßling, Wieke.Heldens@dlr.de)

(Michael Wurm, University of Würzburg, Institute of Geography, Department of Remote Sensing, Am Hubland, 97074 Würzburg, Michael.Wurm@dlr.de)

(Prof. Stefan Dech, German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Oberpfaffenhofen, 82234 Weßling, Stefan.Dech@dlr.de)

1 ABSTRACT

In the last decades the world has faced a constantly accelerating growth of urban areas. The resulting rapid changes in urban environments involve considerable challenges with respect to the observation, analysis and understanding of the complex processes affecting and forming the environmental, economic and social dimension of urban agglomerations. Hence, effective and sustainable urban management increasingly requires innovative concepts and techniques to obtain up-to-date, independent and area-wide information on the characteristics and development of the urban system. Traditionally, urban and regional planning instruments rely on data provided by statistical or topographical surveys. However, such data often shows a comparably coarse spatial and temporal resolution. Moreover, the production is very time consuming and cost-intensive - properties which significantly restrict periodic updates, especially in developing countries. Space- and airborne earth observation (EO) has become a promising and cost-effective tool to provide updated geoinformation and indicators on various aspects of built-up areas in manifold spatio-temporal dimensions. Thus, the German Remote Sensing Data Center (DFD) of the German Aerospace Center (DLR) has increasingly researched into the support of urban and spatial planning by means of remote sensing techniques and EO-based geoinformation products. In our presentation we introduce selected applications and techniques such as change detection - e.g. to detect informal settlements or activities in critical zones such as nature protection areas or regions at risk of floodings -, the monitoring of urban sprawl, the modelling of imperviousness and urban-micro climate or deriving socio-economic characteristics and assessing the vulnerability of cities towards natural disasters. The approaches were applied and assessed in various regions of the world, ranging from industrial nations to developing countries.

Outline

This paper introduces earth observation (EO) applications including change detection, monitoring urban sprawl, modeling imperviousness and microclimate, deriving socio-economic characteristics and assessing vulnerability towards natural disasters.

Key words

earth observation, geoinformation, indicators, sustainability, vulnerability