MEDIUM AND LARGE SCALE MAPPING OF LANDSCAPE SEALING

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“Four great forces have forged the explosive growth of cities in the 20th century: deagrarization and rural overpopulation combined with industrialization; it’s concomitant deindustrialization combined with the growth of the service sector; the mobility revolution, and the parallel telecommunications revolutions.” (i)

Consequently; mapping and monitoring status and change of location, extend and degree of sealed surface as an indicator of the density of urban structures as well as urban dynamics is of high importance due to the fact that the EO based result can cover a large area as snapshot of the certain region of eminent interest. The greatest effect of surface sealing (impervious areas) are found in urban agglomerations and the urban fringe where large portions of the surface are sealed and changes are everyday occurrences. Changed political conditions often cause local economic effects which can easily be interpreted on the base of information referring to sealing. Supplementary knowledge concerning sealing is highly important for a wide range of environmental tasks and risk analysis such as flood protection, city climate modelling, recharge of aquifers and land subsidence. At the same time the European Soil Thematic Strategy requires the reduction of land consumption and degradation of land surface. One of the major indicators for the aims of the Soil Thematic Strategy is surface sealing.

Referring to the wide range of applications possible, various scale and degree of class depth for sealed areas is required by the end user . The developed sealing products cover a range in scale and class depth. Where on one hand EO data provide the chance to map large areas (states/counties) in medium scale resulting in artificial masks (binary or detailed using e.g. IRS multi-spectral), it also offers the chance to generate comparable results in larger scale (SPOT). The decisive is the link between NDVI and the corresponding degree of sealing meaning the distribution of the NDVI values on the 11 sealing classes. For a profound estimation literature was studied (ii,iii,iv,v). The overall technology is based on various object-oriented interpretation techniques which allow representation of spectral behaviour (lower resolution) in combination with additional object structure knowledge derived from high resolution panchromatic imagery. Furthermore, for the estimation of sealed areas (transport system) also rules from the German soil protection law were taken into account as long as auxiliary data could be used in the classification process. Sealing values are defined for certain land use types, such as tar roads, compact cobble stone, areas with destructed buildings (90%), concrete plates (80%), pavement with sand (70%), loose pavement (60%)

The approach was successfully applied on a larger region (Free State of Saxony, Germany) as well as on different European Cities, such as Dresden, Leipzig, Prague. For Dresden an independent team of soil scientists were sent out for field work, testing 41 different areas. Every corresponding pixel was assigned a degree of sealing in the field according to vegetation intensity, building intensity and amount of other sealed areas (concrete, tar). In areas with mixed signatures the amount of sealing was estimated by calculating an average value from all occurring sealing values in the relevant area. The results from this field campaign can be transferred to any other comparable city.

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