

SPECTRAL PROPERTIES OF PERVIOUS AND IMPERVIOUS SURFACES

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ABSTRACT

Considerable effort has been devoted to large area mapping of impervious surfaces with optical sensors. The most successful examples are those where the majority of the land surface is vegetated and presumably pervious. Discriminating impervious built up areas from other land cover classes is considerably more difficult in areas where exposed soil is not densely vegetated. The lack of a direct physical relationship between optical reflectance and surface permeability can pose a serious problem for spectral identification of impervious surfaces. The problem is compounded with moderate resolution broadband sensors because 1) the spectral resolution may not be adequate to discriminate different materials with similar spectra and 2) the spatial resolution may result in spectral mixing of pervious and impervious surfaces within the Field Of View. An alternative approach is to map pervious surfaces rather than impervious surfaces. The spectral characteristics of soil and vegetation are both more diagnostic than those of the enormous variety of composite impervious surfaces. Another potentially diagnostic characteristic of pervious surfaces is temporal variability of reflectance related to moisture content. This provides a means of discriminating between unvegetated pervious soils and built up impervious surfaces in complex heterogeneous landscapes. This study uses a combination of Ikonos, AVIRIS and Landsat imagery to demonstrate the spatial, spectral and temporal consistency of pervious and impervious surfaces in urban settings. A more detailed description of this analysis is available with figures online at www.LDEO.columbia.edu/~small/Urban.html .

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