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J. Eckardt

J. A. Jakob

J. Lamp

V. Wittje

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MULTITEMPORAL AND MULTISPECTRAL REMOTE SENSING OF SOILS IN CULTURED LANDSCAPES OF NORTH GERMANY

J. ECKARDT, J. A. JAKOB, J. LAMP AND
V. WITTJE
Christian-Albrechts University
West Germany

Different techniques have been tested since 1974 to meet the difficult task of soil remote sensing in intensively cultured and small-parcelled landscapes of North Germany.

Conventional stereo - interpretation of physiographic elements and patterns of landscapes by pan, color and infrared air photographs lowers the necessary number of soil borings and the cost of survey appreciably as well as increasing the information content and accuracy of soil maps. Especially, man-induced soil erosion and accumulation of hilly young moraines, position of sand dunes and old river beds on outwash terraces and appearance of periglacial polygon soils on flattened old moraines, only partly or not detectable in the field, were made visible with remote sensing.

To increase the information content of remote sensing data and make interpretation more reproducible the multispectral remission was measured by an 11-channel-scanner. These data were calibrated by spectral photometry of soil samples within the wavelength range of 250 - 1400 nm to estimate by multiple regression analysis soil components, especially organic matter, free iron and clay.

Additional information was achieved by measuring three times a day the multitemporal thermal emission with the scanner in autumn and spring of test areas. The data were interpreted by experiments in the field and laboratory, which measured the heat balance of soils in relation to external factors and the soil moisture regime.