Large Scale Environmental Monitoring and Change Detection

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ABSTRACT

Improved resource management requires the monitoring of urban expansion, deforestation and the degradation of agricultural land. Environmental monitoring using change detection algorithms has been carried out at regional and local scales using LANDSAT's Multispectral Scanner and Thematic Mapper. The high temporal frequency and wide areal coverage of the imagery obtained from the Advanced Very High Resolution Radiometer make possible a detailed analysis of land-use changes over large regions of the earth's surface.

Twelve Global Vegetation Index (GVI) images of Europe, produced by compositing Normalized Difference Vegetation Index (NDVI) data over a three week period, were used to represent a complete year of images from January 1984 - December 1984. The GVI product reduces the effect of cloud cover by selecting the maximum NDVI value within the sampling period.

Prior to the change detection analysis, a median filter was passed over each image to reduce possible edge effects in the output image due to slight misregistration of the imagery. The filtered GVI image for the first data was subtracted from the GVI image for the second data to produce a Ratio Difference image. The Ratio Difference image is sensitive to rates of change of photosynthetic activity.

The problem of cloud cover in a temperate climate is not completely removed by using GVI data. The pixels affected by cloud will have low NDVI values. Consequently for these pixels the Ratio Difference values will be meaningless. It is possible to remove these spurious pixels by examining the temporal context of each pixel.