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Anomalies in vegetated urban areas analyzed by the red-edge method

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Hyperspectral remote sensing is a new approach to analyze vegetated urban areas. Our applied images were taken over a Hungarian city (Gyöngyös) in 2002. The spatial resolution was 5 m per pixel, and the flight latitude was 3000 m. The observed urban area had many vegetated surfaces under different ecological condition. Gyöngyös (inhabitants 30.000) does not belong to big Hungarian cities but it has been constantly growing. We think that ecological problems arise in cities with a moderate number of inhabitants as well.

For our purpose we had taken methods, which are suitable for monitoring "green" and "stressed' surfaces in urban environment. Our hyperspectral images had eight channels in the region of the spectrum 639 nm–762 nm. For this region is very characteristic to calculate the inflexion point. It was performed with numerical derivation (until 2^{nd} derivative) and with interpolation to find the precise wavelength value (λ_{inf}). We constructed a computer program written in IDL that was able to compute the above mentioned steps. Finally, we had got an inflexion value for every pixel in the scene. The algorithms performed in IDL were very effective in 3D visualization also. This capability of IDL was utilized very effectively.

From our visualized and calculated result can be easily read anomalies in vegetated areas. Preconditions for this method are that before classification it muss decide, which properties of the vegetation are ecologically acceptable in a city and which ones are strongly correlated with the inflexion points. In our work we developed a method, which was focused on practices and was simple to use. We suppose the every day use of hyperspectral technology in the future.