

## **Abstract**

The main aim of the dissertation thesis was to develop method, based on the use of multispectral satellite data and the theory of dissipation, allowing the analysis of landscape functioning. The theoretical basis is Prigogine's theory of dissipation and self-organization of structures in which energy dissipation is seen as the transformation of solar energy to other forms of energy. In this process the essential role play water availability and vegetation, which is able to bind solar radiation into biomass (through photosynthesis) and by transpiration convert it effectively into latent heat. Maximum dissipation of the daily pulse of energy is considered as a major ecological function of the landscape; land cover temperature and its changes over time are indicators that determine the balance between the flow of water, energy and mass balance.

The model area of northwest Bohemia and Saxony present various types of landscape – from relatively natural landscapes to that one, with an extremely high anthropogenic load. Landsat satellite images from the years 1986, 1995 and 2004 come from different periods of the season, so it was possible to analyze not only time changes, but also the behavior of vegetation in different phenological phases.

Land cover, relative surface temperature, gained from Landsat thermal channel, the amount of green biomass (Normalized Difference Vegetation Index) and moisture (wetness component from the Tasseled Cap transformation) are selected parameters, relevant to the assessment of landscape functions in terms of solar energy dissipation. These parameters were assessed in relation to land cover, as well as their impact on thermal characteristics of landscape, including the aspect of different phenological phases. The basic principle of the method was the integration of thermal images and information about the qualitative characteristics of land cover, expressed by wetness- biomass index. This index was made as a sum of NDVI and wetness component to detect the reduced dissipation capacity of the landscape. Based on cross-classification analysis of both images, seven categories have been defined, which characterize the landscape in terms of how solar energy is dissipated. One side of the classification scheme is a type of landscape with a relatively high amount of green biomass without water deficit, which is able most of the incident solar radiation, by evapotranspiration, transform into latent heat. The other side of classification scheme is characterized by a landscape with a minimal amount of vegetation with high water deficit and prevalence of sensible heat fluxes.