ESTIMATING EVAPOTRANSPIRATION OF DIFFERENTLY MOISTURED PEATLANDS USING REMOTELY SENSED SURFACE TEMPERATURE

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Remote sensing of surface temperature using infrared thermometry have long been recognised as a way of estimating plant water status and evapotranspiration of plant cover. The crop surface temperature seems to respond well to meteorological conditions, plant status and soil water content. Crop surface temperature gives information on the evapotranspiration rate being the final effect of these paramenters. The use of crop surface temperature determined with the thermal images can provide this information over large peatland areas.

The aim of the paper is to show the possibility of usage of infrared thermometry coupled with basic meteorological observations to estimate evapotranspiration of plant cover and to examine the effect of moisture status on estimated evapotranspiration in different peatland sites. A method of calculating actual evapotranspiration of grassland using crop surface temperature measured with the infrared thermometer, with the aid of the energy budget equation, is presented in the paper.

The investigations were carried out in 1999-2001 in the Notec river valley in the three differently moistured grassland sites with peat-moorsh soils: periodically wet, drying, dry. The canopy infrared temperature, air temperature, relative humidity, vapour pressure deficit and solar radiation were measured manually with a hand-held Infrared AG Multimeter Model 510B. Wind speed was measured at the height of 2 m with a hand-held anemometr. Volumetric soil water content was measured with the TDR method using the Thetaprobe meter. Besides observations of plant colour, plant height and the degree of soil cover were performed.

The results show the effect of meteorological and soil moisture conditions as well as the state of plant cover on the crop surface temperature and the evapotranspiration rate. According to the actual values of these parameters the courses of evapotranspiration rate in the examined sites were different. In most cases the highest rate was observed in the drying site with optimal soil moisture conditions and good status of plant cover.

The obtained results have proved the possibility of using remotely sensed surface temperature for operational - in real time - evapotranspiration estimation. The infrared crop temperature can be useful in the identification of soil-water conditions in different peatland areas covered with permanent grasslands.