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Drainage water temperature as an identificator of tile drainage runoff components

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This paper deals with water regime of a small agricultural tile drained catchment Dehtáře, which is situated in the Bohemo-Moravian Highland. The main objective was to estimate the possibility of identification of runoff components and runoff separation by using drainage water temperature. These values have been monitored continually since 2003. The tile drainage is located in the slope, which is typical for this region. As substrate, there are metamorphosed rocks – paragneiss, partly migmatised paragneiss and migmatite. Quaternary sediments are colluvial sands and loam. The runoff in tile drainage is not hydrologically homogeneous in this area, but it is composed of several components called traditionally base flow, direct runoff and interflow.

We found out that during discharge events (quick increase of discharges caused by snowmelt or stormy rainfalls) there exists a strong dependence of drainage water temperature on drainage discharge. This dependence is different (positive or negative) according to the season. The water temperature is changing practically immediately (the response is faster then 1 hour) with increasing discharge, so we can say that drainage water temperature is suitable tracer for identification and separation the fast component of runoff – direct flow.

From further analysis of discharge events we got another findings about the origin of drainage water. Related to longtime trend of season drainage water temperature, the drainage runoff consists mostly of shallow circulation. At the beginning of discharge event, the sharp change of water temperature occurs, and this water is specified as very fast component, which infiltrates in the recharge area and flows by preferential

flowpaths into the tile drainage. Nevertheless the base flow is also fast increasing because of immediately rising the groundwater table level. Regarding to fast response of discharge and temperature in the beginning of the rainfall and very slow infiltration of precipitations in the discharge zone (based on our field measurment), the drainage runoff consists only of small portion of water infiltrated directly in the tile drained area. According to our calculations, the recharge area is only a small area (probably near the watershed divide), which takes up only a small portion of the catchment.

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