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## Relationship between groundwater microtemperature and electrical potential of the vegetation

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The hydrological cycle is highly affected by changes in vegetation cover. One of the most important forces in this cycle is transpiration. This process returns approximately 50% of precipitated water back to the atmosphere, and accounts for more than 60% of the evapotranspiration rate. Vegetation is thus exposed to and governed by different meteorological variables, as well as by the availability of water in the soil and subsoil [1-9]. It's known that the variation in temperature of the groundwater at depths of up to 30 meters is subjected to daily and seasonal interference with the changing surface temperature. Beyond this depth thermal conductivity is not applied to detect signals of the surface temperature variation [10, 11]. However, groundwater microtemperature is clearly affected by vegetation activity [12-16].

The periodic variation in plant electrical potential has been evidenced in other studies [1, 17-19]. Some studies have shown that despite the periodic daily variation in electric potential in plants [1, 17, 20, 21], there is no direct link to xylem flow [17, 19, 22].

Atmospheric electricity has long been studied [23-25] and exhibits diurnal and seasonal variation [26]. While land and ocean tides are gravitationally controlled, atmospheric tides are mainly thermally controlled by solar radiation [27, 28].

The variation in groundwater microtemperature in summer was compared with meteorological parameters and with the electrical potential at plants. With increasing surface temperature, there is a decrease in relative humidity and an increase in the electrical potential of a tree, measured as the difference between the northern and the southern face of the stem (N-S), in order to eliminate the impact of the atmospheric electricity. This increase also coincides with an amplitude of approximately 2 mK in the groundwater temperature change and agrees with a vertical flow component of less than 10 cm. Possibly changes in the macro weather situation events were observed in the southern electric potential and groundwater temperature records. Atmospheric tides were detectable in the measurements of both, the north and south electric potentials.

### Participation

In-Person

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