



Spatial distribution of water surface evaporation, potential evapotranspiration and climatic indicators of humidification in Slovakia

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Continuous exchange of humidity takes place between the active surface (the surface of soil, water, vegetation, where the solar radiation is transformed into other kinds of energy, mostly heat) and the atmosphere. Humidity is getting into the atmosphere through evaporation from the active surface. Therefore, evaporation is a physical process where water changes its phase from the liquid (or solid) to gas. In the natural conditions two kinds of evaporation processes are distinguished – evaporation from abiotic substrate (water, soil) and transpiration which represents the evaporation from surface of the vegetation. The whole evaporation which is a sum of evaporation and transpiration is called evapotranspiration. Evaporation in meteorology is expressed as the height of a column of evaporated water (mm).

The water surface evaporation is measured in the network of meteorological stations of Slovak Hydrometeorological Institute by GGI-3000. The measurements are restricted to the frost-free period of year. This paper deals with the evaluation of evapotranspiration parameters at 8 meteorological stations from which the data for the period 1971 – 2010 were available.

Potential evapotranspiration is a very important climatological element which belongs to the elements of both energetic and hydrological balance. Potential evapotranspiration is the highest possible evaporation under the specific meteorological conditions if the water is not a limited factor. Information about spatial and time distribution of potential evapotranspiration is of a great importance regarding theoretical and practical problems of agriculture, forest and water management and in forming and protection of the environment.

The measurement of potential evapotranspiration is very difficult and it is possible to realize it only in laboratory conditions. Therefore, it is not included in standard measurements of Slovak Hydrometeorological Institute. The values of evapotranspiration are usually estimated from other meteorological elements (the air temperature, the relative humidity, the sunshine duration and the wind speed), characteristics of soil moisture and physiological attributes of vegetation. Potential evapotranspiration is calculated according to the empirical or semi-empirical forms based on the measurements of other meteorological elements. In this paper potential evapotranspiration was calculated by Budyko method for 31 meteorological stations in period 1961 - 2010.

Climatic indicator of humidification represents the relationship between the amount of water supplies in the form of precipitation and the amount of water, which is possible to evaporate from the surface of sufficiently watered soil and vegetation. It expresses the moisture conditions of a specific region. Climatic indicator of humidification was calculated by the relationship: $KU = E0 - R$, where $E0$ is the sum of potential evapotranspiration and R is the total precipitation. Negative values of the climatic indicator of the humidification occur in the regions with sufficiently enough moisture, so the amount of total precipitation exceeds evaporation.

In the paper, there are presented maps (monthly, seasonal, annual) of water surface evaporation, potential evapotranspiration and climatic indicator of humidification, they annual variability and spatial distribution.