Emissivity of the atmospheric boundary layer in the high-mountain conditions

F. Smolen, M. Ostrožlík
Geophysical Institute of the Slovak Academy of Sciences[1]

A b s t r a c t: Measurements of the downward atmospheric radiation, air temperature, and air humidity at the levels of Skalnaté Pleso and Stará Lesná have become input parameters to the study of the total atmospheric emissivity. Based on the experimental data the total atmospheric emissivity at the reference levels, as well as the mean emissivity of the layer between these levels were calculated. An analytic relation was derived to express the dependence of the total atmospheric emissivity on the optical depth of water vapor, and on the air temperature. It was shown that the percentage portion of the investigated layer emissivity on the emissivity of the whole atmospheric column has an expressive daily course and depends on the absorption ability of the mentioned layer in the infrared spectrum range.

Key words: atmospheric emissivity, downward atmospheric radiation, atmospheric boundary layer, clear sky, optical depth of water vapor, vertical thermal gradient

[1] Dúbravská cesta 9, 842 28 Bratislava, Slovak Republic, e-mail: geofostr@savba.sk