Hydrol. Earth Syst. Sci., 14, 2479-2494, 2010
www.hydrol-earth-syst-sci.net/14/2479/2010/
doi:10.5194/hess-14-2479-2010

Topographic effects on solar radiation distributi mountainous watersheds and their influence on reference evapotranspiration estimates at wate scale

C. Aguilar[1], J. Herrero[2], and M. J. Polo[1]
[1]Fluvial Dynamics and Hydrology Research Group, University of Córdoba
[2]Fluvial Dynamics and Hydrology Research Group, University of Granada

Abstract. Distributed energy and water balance models require tin surfaces of the climatological variables involved in hydrological pro Among them, solar radiation constitutes a key variable to the circu water in the atmosphere. Most of the hydrological GIS-based mode simple interpolation techniques to data measured at few weather disregarding topographic effects. Here, a topographic solar radiati algorithm has been included for the generation of detailed time-se solar radiation surfaces using limited data and simple methods in a mountainous watershed in southern Spain. The results show the n role of topography in local values and differences between the top approximation and the direct interpolation to measured data (IDW to +42% and −1800% in the estimated daily values. Also, the com of the predicted values with experimental data proves the usefuln the algorithm for the estimation of spatially-distributed radiation va a complex terrain, with a good fit for daily values (R^2 = 0.93) and t fits under cloudless skies at hourly time steps. Finally, evapotransp fields estimated through the ASCE-Penman-Monteith equation usir corrected and non-corrected radiation values address the hydrolog importance of using topographically-corrected solar radiation fields inputs to the equation over uniform values with mean differences i watershed of 61 mm/year and 142 mm/year of standard deviation. speed computations in a 1300 km^2 watershed in the south of Spai up to a one-hour time scale in 30 × 30 m^2 cells can be easily carrie a desktop PC.

Final Revised Paper (PDF, 2290 KB) Discussion Paper (HESSD)

Citation: Aguilar, C., Herrero, J., and Polo, M. J.: Topographic effect solar radiation distribution in mountainous watersheds and their in on reference evapotranspiration estimates at watershed scale, Hy Earth Syst. Sci., 14, 2479-2494, doi:10.5194/hess-14-2479-2010, 2010. Bibtex EndNote Reference Manager XML