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The impact of irrigation on budyko framework hypothesis in Neyshaboor watershed, Iran

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In this paper, the Budyko hypothesis was extended to study the effect of irrigation on annual water balance in watershed of Neyshaboor. Since the study area is an irrigated agricultural watershed, we have to consider the amount of evapotranspiration from irrigation water which affects the ratio of actual ET to precipitation (ET/P). For this situation there are two ways to apply and calibrate the budyko curves. First to separate actual evapotranspiration from both rainfall and irrigation and then calibrate the budyko framework for the evapotranspiration from rainfall only. Second to include irrigation in the Budyko framework and incorporate irrigation water inflow in water availability. For this purpose, we divided the watershed to 248 HRU (Hydrologic Response Unit) and calculated annual water balance for each HRU using actual evapotranspiration derived from both SWAT model and SEBAL algorithm. For the first solution, we separated actual evapotranspiration into blue (from irrigation) and green (from rainfall) components based on water footprint definition. Results showed that the first way is more appropriate for Neyshaboor watershed than the second one. The method of estimation of effective precipitation was also important. Effective precipitation estimated by SWAT model leaded to more appropriate results than USDA SCS method.