

Comparison of Evapotranspiration Estimation with Hydrological and Meteorological Model in a Semi-arid Region

Wang Wenzhong¹ and Zhang Youjing²

¹Department of Geographical Information Science, Hohai Univ

² State Key Laboratory of Hydrology-Water Resource and Hydraulic Engineering, Hohai Univ

Various methodologies have been used to estimate the actual evapotranspiration (ET_a) using remote sensing imagery. However, the estimating results are few used to hydrological simulation and application because of lacking effective validation and precision assessment. The aim of this paper is to compare ET_a estimation result using remote sensing technique with that of hydrological and meteorological model in a Semi-arid Region. The ET_a was calculated with SEBAL model in the main headstreams of Nile in SUDAN with the support of the long time series EOS-MODIS data. And the results were compared with two major hydrological methods (modified Thornthwaite water balance model (TWB) and complementary model (GG model)) based on pixels. The results showed that both daily and monthly ET_a calculated by SEBAL model were close to that of TWB and GG model in the rainy season. But the results were higher than that of TWB in the dry season. Further more, an average of annual ET_a calculated by three meteorological methods (Turc-Pike, Schreiber, Ol'dekop methods) was 662.8mm, as a standard to compare with 788.1mm based on SEBAL model. The relative error of 18.9 % was introduced in SEBAL model. The error was also caused by the high monthly ET_a estimation in dry season. Model comparison results indicate that SEBAL model must be modified by the soil moisture status in dry season. When the threshold value calculated from TWB model in dry season was used, the accuracy of compared results was greatly improved. The results also indicate that more suitable validation models or combined methodologies will be necessary when using the SEBAL method to estimating ET in the dry season.

Key words: Evapotranspiration estimation, SEBAL, Validation, Semi-arid Region.

Corresponding author: Zhang Youjing

Wang Wenzhong

Graduate

Department of Geographical Information Science, Hohai Univ., box668, No.1 Xikang road, Nanjing, China, 210098

Email: wangwenzhong_1983@163.com

Zhang Youjing

Professor

State Key Laboratory of Hydrology-Water Resource and Hydraulic Engineering, Hohai Univ., Department of Geographical Information Science, Hohai Univ., No.1 Xikang road, Nanjing, China, 210098

Email: zhangyj@hhu.edu.cn.