

Application of the SEBAL method in water resources management in the Yellow River Delta of China

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ABSTRACT

Evapotranspiration (ET) from agricultural fields, a consumptive use of fresh water for irrigation, is an important factor in water resources management in the Yellow River Delta (YRD) of China. Because the surface energy balance algorithm for land (SEBAL) methodology requires a less ground measurements and includes the complete energy balance calculation, the algorithm was used to estimate ET as a component of the energy balance on a pixel-by-pixel basis in the YRD. Advanced very high resolution radiometer and eight Landsat images covering the YRD were used to estimate both daily and monthly actual ET (ET_a) with the SEBAL method. The net crop water requirements (WRn) for the irrigated land were also estimated by subtracting the effective precipitation from the potential evapotranspiration (ET_p). The volume of net crop water requirements was obtained for the YRD area jointly with the digital crop maps and WRn values. Assessment of the performance of irrigated crops revealed that water delivery did not exceed the crop requirements, and the WRn for cotton and wheat were smaller than the irrigation demand. The result confirmed that the SEBAL model can estimate the ET_a and ET_p with higher accuracy, which will be an important tool in integrated water resources management and can provide spatial information to help decision-makers improve the current water use policies in the YRD.

Keywords: SEBAL; Water resources management; Evapotranspiration; Net crop water requirement; Yellow River Delta; Consumptive use

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