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The Study of the Impacts of The agriculture practices on ET by In-situ Measurement and Numeric Modeling in Southern China

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ABSTRACT

Evapotranspiration (ET) has long been regarded as a very important component in energy and mass exchange between hydrosphere, atmosphere and biosphere. It is estimated that about 70% annual precipitation goes back to atmosphere through the process of ET, ET thus plays a significant role in modeling regional and global climate and assessing stresses on natural and agricultural ecosystems. The variation of ET is affected by many processes including hydrological, metrological as well as biological processes. Water used in Agriculture Sector is normally accounted for about 70% of total water consumption. ET may also be enhanced by agriculture practices as it is the key component of water consumption in agriculture practices.

A two-year continuous in-situ ET measurement (in half minute time scale) by eddy covariance method (using EC-QCL analyzer and three-dimensional ultrasonic anemometer) was conducted in a large vegetable farmland in the suburb of Yueyang City, Hunan Province. EddyPro software was employed to calculate the actual evapotranspiration, water vapor flux, latent heat flux (LE) and analysis the trend of actual evapotranspiration in different time scales. A RZWQM2 (Root Zone Water Quality Model) model was also developed based on the local metrological data and agriculture practices including planting, harvesting, irrigation practices and fertilization etc., The field observations including in-situ ET measurement are used to calibrate the RZWQM2 model. The calibrated model was further used to study the effects of various agriculture activates on ET. The study shows that the crop density has the greatest effects on the variation of plant transpiration following by irrigation and fertilization. This study provides some scientific basis for the optimization and improvement of agricultural activities in the future.

Key words: ET; Agricultural Practices; Eddy Covariance Method; RZWQM2 model