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A fully remotely sensed parameterization of land surface evapotranspiration and evaporative fraction

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Abstract: A fully remotely sensed parameterization of land surface EvapoTranspiration (ET) and evaporative fraction without any ancillary surface observation data is proposed to describe the spatial pattern of a semi-arid and sub-humid region in China. This parameterization of ET is based on the widely applied VI-Ts triangular space which is characterized by land covers from bare soil to densely-vegetated surface and volumetric soil water content ranging from extreme dry to saturated water conditions. VI-Ts triangular space considers the effects of VI, Ts and all the overall influence, including wind speed, surface resistance and so on, on the soil moisture and spatially distributed ET. In order to reduce the uncertainty of manually determining the upper and lower bounds of the triangular space, two polynomial equations as functions of VI and Ts are shown to respectively depict the universal dry(ET$\approx$0) and wet(ET=ET$_{pot}$) edge in this large region of North China with the help of a physically based soil-vegetation-atmosphere transfer(SVAT) continuum which emphasizes on the physics of water, heat and momentum transfer between soil and plant and atmosphere. Good results are obtained with this parameterization of ET compared to simulation of the physical SVAT and observation data from one of the observation station of Chinaflux network. The parameterization of ET from the triangular space can reasonably reveal the regional distribution of the ET of different land covers and soil water contents with good accuracy and has a very good prospect in fields of hydrological sciences and water resources management with its simplification and the

development of multi-spectral, multi-temporal and multi-angular satellite platform.

Key words: ET; VI-Ts triangular space; SVAT.