On the Effect of Water Vapor Deficit on Evapotranspiration[1]

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Observations show that Evapotranspiration (ET) increases with Water Vapor Deficit (VPD) assuming similar conditions. Therefore, accounting for the ET parameterization effect using satellite observations is important. However, to date, satellite data cannot accurately quantify VPD at the near surface layer. Venturini et al. (2008) present a new formulation to derive evaporative fraction and ET from remotely sensed data by simplifying the relative ET of Granger's complementary relationship. Venturini et al. (2008) claimed that the method accounts for the VPD effect on ET. We found that their method does not accurately account for the atmospheric effect; although Granger's relative evaporation factor does accurately account for the atmospheric forcing on ET by stating that ET increases with VPD. Venturini et al.'s formulation drives the atmospheric effect in the wrong direction; their formulation has ET decreasing with increasing VPD, contrary to observations. The Venturini et al. (2008) formulation fails because their assumptions are invalid for most near surface atmospheric conditions. We validate this using the extensive measurements collected by Atmospheric Radiation Measurement project over the Southern Great Plain from 2000 to 2008. A simple method to accurately quantify VPD effect on ET is proposed.

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