

Improving Evapotranspiration Estimation Using Remote Sensing Technology

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The Question and What We Did The state of New Mexico has started a program of assessing the water budget of various watershed in state. A major step in calculating the water budget is the assessment of evapotranspiration (ET). While the surface water budget can be determined through inflow and outflow monitoring, and the precipitation can be measured, the water budget for the interconnected groundwater and evapotranspiration (ET) is more complex. The critical step in understanding the water budget in a basin is the accurate estimation of ET. Evapotranspiration is the combined loss of water to the atmosphere mainly from plant transpiration and direct evaporation from moist soil and liquid water. In a watershed or basin, ET is considered the net loss from the hydrologic system and precipitation as a gain to the system. This project developed a model using satellite technology to calculate ET.

How We Did It The model that we developed uses the images from the LandSat-8 to determine evapotranspiration (ET). LandSat-8 images provides parameters which can be combined with climate data to determine ET (which is crop water use) in a given location. The model analyzes the images from the satellite and calculates the ET at pixel level using the concept of surface energy balance. A pixel is a unit of image which varies in size from 30 m to 100 m. The ET for individual pixels are summed up to determine the total ET for a crop field. The innovative aspect of the model is that it can calculate ET without the need for ground level measurements.

What We Found Out Comparing ET measurements at the ground level with the values calculated with satellite based model, preliminary results indicate that accurate estimates of ET is possible. However, due to diversity of topography, land use and climate in the state, more measurements and ground level validation will be needed.

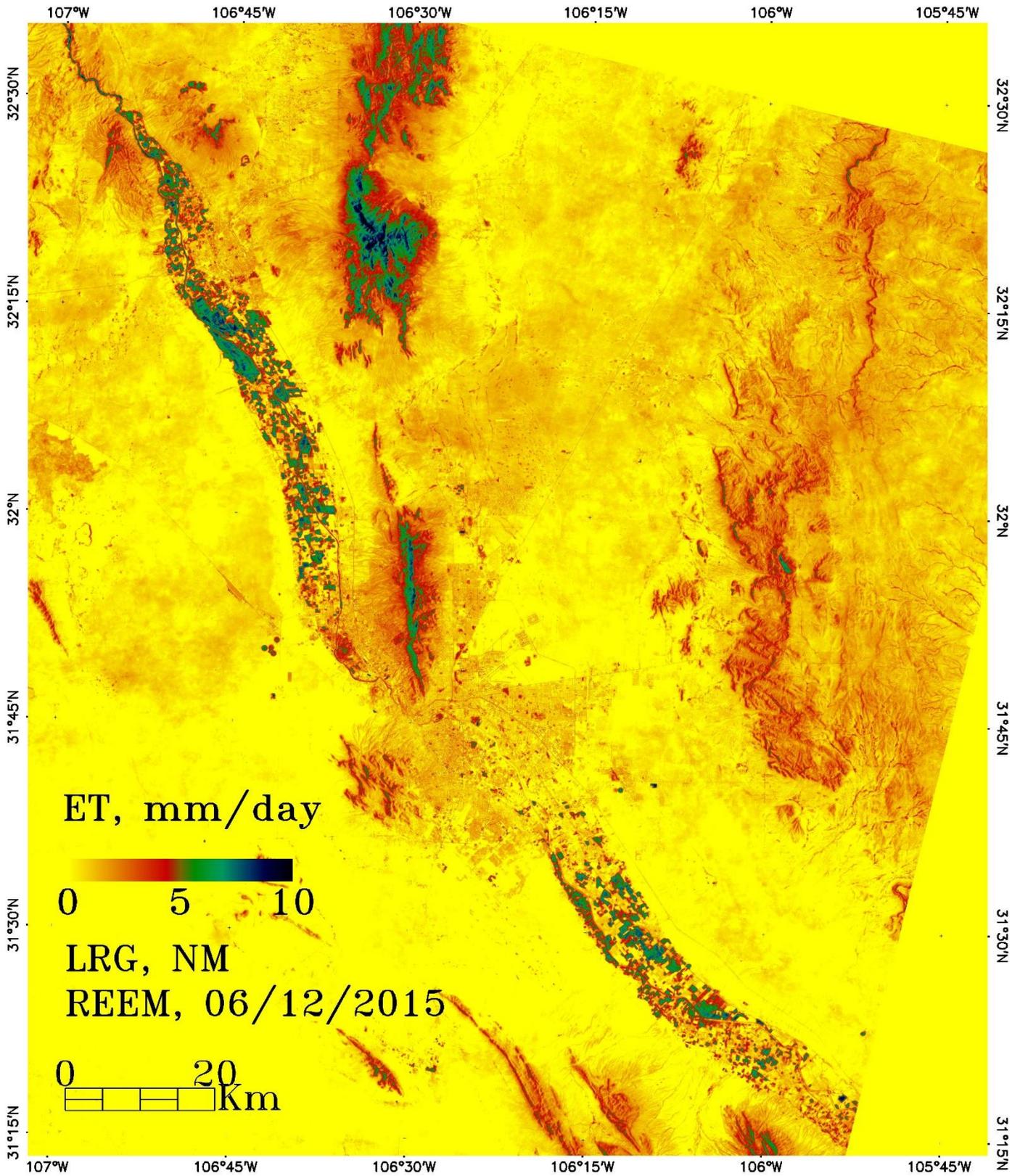


Figure: Example of evapotranspiration (ET) map for Lower Rio Grande calculated from satellite based model