

Estimating evapotranspiration in Puerto Rico and Hispaniola using satellite remote sensing

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Evapotranspiration (ET) is an important component of the hydrologic cycle. Quantification of ET is essential for proper irrigation scheduling and water conservation efforts. A technique is presented in which satellite solar insolation estimates are used to predict daily reference evapotranspiration (ET_0) using the Penman-Monteith (PM), Priestly-Taylor (PT) and Hargreaves-Samani (HS) methods over Puerto Rico and Hispaniola. The remote sensing resolution over Puerto Rico and Hispaniola are 1 km and 2 km, respectively. In addition to solar insolation, other meteorological variables (e.g., net radiation, air temperature dew point temperature and wind speed) are estimated. As an example of the methodology, ET_0 was estimated over Hispaniola for March 5, 2010 using the three methods. The results indicated relatively close agreement between the methods. A comparison between estimated and observed solar radiation in Puerto Rico is also presented. As a practical example of the use of the methodology, the Hargreaves-Samani ET was estimated for various crop seasons at seven locations in Haiti. The crop ET was estimated by multiplying the ET_0 by a crop coefficient (K_c). The goal of the analysis, which considered five different vegetable crops and seven locations, was to determine the cumulative seasonal water consumptive use. Determination of the seasonal water consumptive use is valuable for determining water supply infrastructure for farms and irrigation districts. This research represents a preliminary step in the development of a remote sensing ET product for PR and Hispaniola.

Palabras Claves/Key Words: Satellite, remote sensing, evapotranspiration, solar radiation, Puerto Rico, Dominican Republic, Haiti, Caribbean