World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Satellite Derived Evapotranspiration and Turbulent Heat Fluxes Using Surface Energy Balance System (SEBS)

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Abstract : One of the key components of the water cycle is evapotranspiration (ET), which represents water consumption by vegetated and non-vegetated surfaces. Conventional techniques for measurements of ET are point based and representative of the local scale only. Satellite remote sensing data with large area coverage and high temporal frequency provide representative measurements of several relevant biophysical parameters required for estimation of ET at regional scales. The objective is of this research is to exploit satellite data in order to estimate evapotranspiration. This study uses Surface Energy Balance System (SEBS) model to calculate daily actual evapotranspiration (ETa) in Larkana District, Sindh Pakistan using Landsat TM data for clouds-free days. As there is no flux tower in the study area for direct measurement of latent heat flux or evapotranspiration and sensible heat flux, therefore, the model estimated values of ET were compared with reference evapotranspiration (ETo) computed by FAO-56 Penman Monteith Method using meteorological data. For a country like Pakistan, agriculture by irrigation in the river basins is the largest user of fresh water. For the better assessment and management of irrigation water requirement, the estimation of consumptive use of water for agriculture is very important because it is the main consumer of water. ET is yet an essential issue of water imbalance due to major loss of irrigation water and precipitation on cropland. As large amount of irrigated water is lost through ET, therefore its accurate estimation can be helpful for efficient management of irrigation water. Results of this study can be used to analyse surface conditions, i.e. temperature, energy budgets and relevant characteristics. Through this information we can monitor vegetation health and suitable agricultural conditions and can take controlling steps to increase agriculture production.

Keywords : SEBS, remote sensing, evapotranspiration, ETa
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020