

Estimation of Evapotranspiration based on METRIC and SEBAL model using Remote sensing, near Al Jouf, Saudi Arabia

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Abstract

The current study focuses on estimating evapotranspiration in arid and semi-arid environments in the Northern part of Saudi Arabia near Al Jouf. The objective of the research is to study, analyze and estimate Evapotranspiration (ET_r) using SEBAL (Surface Energy Balance Algorithm for Land) and METRIC (Mapping of Evapotranspiration at high Resolution using Internalised Calibration) model and comparing the two models with Vegetation index and LST (Land Surface Temperature). The image was processed in ArcGIS and Matlab software with toolbox LandMOD ET mapper. The area average Evapotranspiration is about 2.21mm/day for METRIC model, 2.6mm/day for SEBAL and the average Land surface Temperature is 324.3 Kelvin. There is a highly inversely correlation between ET and Land surface temperature which is about $R^2 = 0.8$. The value of ET ranges from 0.05 to 8 mm for both SEBAL and METRIC models during 2019/07/07. Both highly elevated and agricultural area shows the high value of ET ranges from 5 to 8 mm/day. In addition, The Normalized Differential Vegetation Index (NDVI), LAI (Leaf Area Index), and Emissivity were also calculated from the Surface energy balance equation. The estimation of ET_r from SEBAL model is better than METRIC model based on R^2 of different vegetation indices. The importance of the work is to estimate ET and explain the impact in Environmental effects for better planning in water resource development.

Keywords: ET, SEBAL, METRIC, Landsat, LandmodMapper