Evaluating the performance of various OSEB (One Source Balance) Models for estimating Evapotranspiration over a semi-arid region of Pakistan

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It is crucial to accurately estimate evapotranspiration ET as it plays a major role in water and energy balance. Changes in the climate and land cover can significantly impact the ET rate. Spatio-temporal variation in ET influences the patterns of water availability and impacts the ecosystem due to which it is very important to quantify ET in water-scarce regions. In Pakistan, there are very low footprints of meteorological station data. For this purpose, the Remote sensing techniques (Energy balance models) are proven cost and time-effective. In this research work, one source Energy Balance Models (S-SEBI) Simplified Surface Energy Balance Index and (METRIC) Mapping Evapotranspiration at high Resolution with Internalized Calibration were employed using Landsat 8 OLI/TIRS satellite imagery (from 2013 to 2020) to map the ET over the semi-arid district (Peshawar) of Khyber Pakhtunkhwa Peshawar, Pakistan. The obtained results were then validated with pan evaporation measurements of ET at the ground station provided by the National Agromet Center Islamabad, Pakistan. The modeled results show a very good correlation with ground-based station data in terms of the Pearson correlation coefficient r = 0.43 and 0.78 with a very slight deviation in terms of RMSD (Root Mean Squared Difference) exhibiting a value of 0.10 and 0.07 for S-SBI and METRIC, respectively. This study shows that the METRIC model is more effective compared to S-SEBI in calculating spatiotemporal ET over diverse regions with limited ground-based weather data.