A new approach to estimating evaporation from lakes and reservoirs based on energy balance and remote sensing data

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Estimating evaporation from water bodies such as lakes and reservoirs is commonly a difficult task, especially due to the lack of reliable and available ground data. Remote sensing (RS) data has shown a great potential for filling the gap. Nonetheless, interpretation of the RS data (e.g. optical reflectance, thermal emission, etc.) for estimating water evaporation has remained as a challenge. In this paper, we present a novel approach for estimating water evaporation based on satellite RS data and some readily measurable ground data. In the proposed approach, named as "Reference and Water surface Energy Balance (RWEB)", we define a reference surface and then solve the energy balance equation simultaneously for the reference surfaces and water surface. This approach was tested over the Doosti dam reservoir (north east of Iran) using whether station and RS data as well as water temperature measured biweekly along the study. Accuracy of the RWEB algorithm was examined by comparison to the standard "Bowen Ratio Energy Balance (BREB)" RS algorithm. The RMSD value of 0.047 mm/year indicated a good agreement between RWEB and BREB algorithms, while RWEB provides an easier-to-use approach regarding its required input variables.