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**SOLAR AND NET RADIATION AND AERODYNAMIC ALGORITHMS FOR APPLYING LANDSAT-SCALE  
ENERGY BALANCE IN MOUNTAINS AND COMPLEX TERRAIN**

Richard Allen\*, Ricardo Trezza, Ayse Irmak, M. Tasumi

**ABSTRACT:** METRIC is a thermal satellite-based energy balance model for producing images of ET over large areas. Applications are typically made using Landsat imagery to produce 30 m resolution data. In mountains and complex terrain, solar radiation is a strong function of slope and aspect. We present a newly refined technique to estimate beam, diffuse and terrain components of solar radiation independently and the positive impact this has on reflectance retrievals at 30 m resolution. We describe an adjustment in terrain temperature for cross-valley thermal emission of long-wave. In addition to radiation effects, we increase wind speed with relative elevation within a 3 km locality of each pixel, as well as increase aerodynamic roughness as a function of relative terrain roughness, represented as a standard deviation of elevation within a 3 km locality. These aerodynamic modifications increase convective heat transfer in complex terrain and reduce estimated ET. In some applications we reduce estimated wind speed on leeward slopes of mountains when wind direction is judged to be consistent within the image. Illustrations of estimated ET with and without these algorithms is demonstrated. It is possible that these algorithms may be useful in estimating reference ET in complex terrain as well. More research and development in this area is needed.

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\* Professor, University of Idaho, 3793 N 3600 E, Kimberly, ID 83341 USA, Phone: 208-423-6601, Fax: 208-423-6699, Email: rallen@kimberly.uidaho.edu