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COPING WITH MISBEHAVING LAND-USE TYPES (MOUNTAINS, TREES, DESERT, PLAYAS, OPEN WATER) WITH METRIC AND OTHER SATELLITE-BASED ENERGY BALANCE MODELS

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ABSTRACT: METRIC is a thermal-satellite-based energy balance model for producing images of ET over large areas. Calibration of the energy balance is done using inverse modeling at extreme conditions (CIMEC) to create a near surface temperature gradient (dT) equation that is expressed as a function of surface radiometric temperature. That function is typically applied universally throughout a 150 km sized area. In some land use types such as dry desert, modification is needed to both the dT function and to aerodynamics, such as employing an excess resistance. We often modify the soil heat flux density estimate in desert to compensate for hot surface temperature caused by delaminated and low-cohesion soils. Similar modifications can be required for salt-laden playa soils. In some forest and orchard systems applications, we decompose bulk radiative surface temperature into three subpixel temperatures representing canopy, shaded surface and sunlit surface to improve estimation of heat transfer. We also increase albedo to account for effects of shadows under nadir-looking satellites. Treatment of radiation on slopes and aerodynamics in mountains is treated in a separate presentation. Finally, a fully aerodynamic procedure is applied to open water bodies in satellite images that leverages surface temperature information. We feel that the aerodynamic approach has less uncertainty than energy balance for water where water energy storage can be as high as 80% of net radiation.

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