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341-8 Soil Heat Flux Determined From Diel Water Content and Temperature Variations.

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Soil heat flux for a measurement interval is commonly determined using heat flux plates buried at some depth below the surface. The heat flux values are adjusted to represent the soil surface heat flux by determining the heat stored in the layer between the plate and surface. Heat storage is calculated by measuring the soil temperature change over the interval and, ideally, the water content of the layer so that its heat capacity can be estimated. We present an alternative measurement scheme that employs an array of temperature sensors, one at the surface and others at suitable depth intervals, and an array of soil water content sensors installed horizontally in vertical positions midway between those of the temperature sensors. The diel surface soil temperature wave is fit to a sine series, which is a solution to the heat flux equation, and the solution is compared with the temperature measured at the next depth below while varying the thermal diffusivity until the best fit is obtained. The best fit thermal diffusivity is used to calculate the thermal conductivity given the heat capacity estimated from the sensed water content. In the Pullman soil, this resulted in The soil heat flux is determined for each vertically adjacent pair of temperature sensors. Theory, methods and comparisons with heat flux plate data are reported.

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