An Alternative Instrument for Measuring Soil Heat Flux. (S01-cobos092208-Oral)

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Abstract:

Soil heat flux is generally measured as the combination of heat flux measured at a certain depth by a soil heat flux plate and the heat storage in the soil above the plate determined by calorimetry. The use of heat flux plates in this arrangement introduces two kinds of measuring errors. First, because the thermal conductivity of the plates differs from that of the soil, soil heat flux by conduction is disturbed. Second, the presence of the plate impedes the flow of water and gas in the soil. Soil heat flux is governed by Fourier's Law, where the heat flux is the product of soil thermal conductivity and the vertical temperature gradient. We present here soil heat flux data collected over a field season by conventional heat flux plates and by three-needle sensors. The middle needle of the three-needle sensor measures the soil thermal conductivity directly, while the outer two needles measure the vertical temperature gradient in the soil, yielding a direct measurement of soil heat flux. These sensors disturb neither heat flux by conduction nor impede fluid flow in the soil, and should thus yield more accurate measurements of soil heat flux.

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