

## Estimating soil heat flux using Distributed Temperature Sensing

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**Abstract** Often the smallest component of the surface energy balance, surface heat flux, is assumed to have low spatial variability. The standard measurement technique, which makes use of a heat flux plate, is thus considered to be appropriate. In this paper a method is presented to measure the spatial variability of surface heat flux. A custom-designed plough system deployed three fibre-optic cables at three different depths close to the soil surface. Distributed Temperature Sensing was then used to gather temperatures with a spatial and temporal resolution of 1 m and 30 seconds, respectively. These measurements clearly indicated large spatial variability in surface heat flux along a 70 m stretch. Variations of up to 100% between points 15 m apart could be observed. These results demonstrate the need for distributed soil heat flux measurements.

**Key words** soil heat flux; surface energy balance; spatial variability; Distributed Temperature Sensing, DTS