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Modular thermal gradiometer

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Direct ground temperature gradient measurement is a nice instrument for heat-flow real-time monitoring. A precise temperature gradient measurement requires a large number of sensors connected to a data logger. In this case sensors installation and wiring is the most difficult task. This paper describes an easy way to implement such an instrument. The instrument allows a simple installation of large amount of gradiometers using a daisy chain architecture. Each gradiometer (a stainless steel tube 1 meter long) contains 11 thermometers, the daisy chain interface and a non-volatile memory filled with thermometer's calibration parameters. The smartphone-based sun-powered data logger offers a nice user interface, local data storage, data transmission and GPS position.