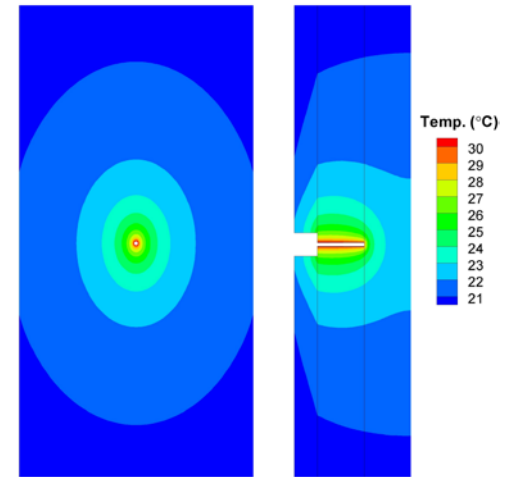


Numerical model simulates heat transfer in sapwood: Evaluation of thermal dissipation probes and water use estimates in trees.

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- Thermal techniques are widely used to estimate water flow and transpiration for trees grown in many environments.
- Models that allow ecologists to evaluate the performance of those techniques are lacking, thus limiting advancements in process-level understanding and technology development.
- A model of conductive and convective heat transfer in sapwood was developed and used to identify short-comings in a popular approach to measuring water use in trees.
- Uncertainty analysis suggested that significant over- and under-estimation of sap flow was possible using the 25-year-old calibration equation.
- Our new theoretical characterization of the sap flow measurement method will improve estimates of water use and latent energy exchange. When applied to AmeriFlux study sites such improved data will further our understanding of land-atmosphere interactions.



Citation: Wullschleger SD, Childs KW, King AW, Hanson PJ (2011) A physical model of conductive and convective heat transfer in sapwood: Implications for sap flow measurements using thermal dissipation probes. *Tree Physiology* 31:669-679; doi:10.1093/treephys/tpr051.