

How can we estimate evapotranspiration from local to regional scales?

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The determination of regional water budgets is a long-lasting vision of hydrologists and meteorologists. Successful simulations and forecasts of corresponding variables such as precipitation and stream flow are fundamental for many applications such as quantifying the hydrologic impacts of climate change, integrated water resources management, and flash flood forecasting.

However, evapotranspiration (ET), a key component of this budget, is still difficult to determine. ET results from complex feedback processes in the land system between the soil, vegetation, and the atmospheric boundary layer (ABL). Due to non-linear relationships and their strong interactions, it is neither possible to separate the processes acting on the components of the water cycle into a linear sequence nor is it possible to handle the variables of respective compartments such as the atmosphere as an independent forcing of soil-vegetation processes.

The subject of this workshop is to discuss recent advances in the understanding and quantification of ET on local to regional scales, and to present new tools for improving the characterization of ET under various soil-vegetation-atmospheric conditions.

The science topics include:

- development and application of new thermodynamic constraints for deriving ET;
- refined representations of the transpiration of vegetation considering that this process is dominating the latent heat flux over land;
- advanced considerations of the role of surface layer stability and boundary layer entrainment.

The tools for scaling ET from local to regional scale contain:

- advanced thermodynamic principles;
- hydro-meteorological modeling down to the large eddy simulation scale;
- hyperspectral remote sensing.

The goal of this workshop is to develop an interdisciplinary strategy for more accurate determination of regional ET from local-scale measurements, e.g., by sophisticated combination of observations, modeling, and theory. This strategy may emerge in the development and proposal for new research programs.

The workshop consists of a few teaser presentations followed by an extensive discussion leading to clear action items for future research activities.