A water tracer tool to understand the role of lateral flow in hydrologic simulations

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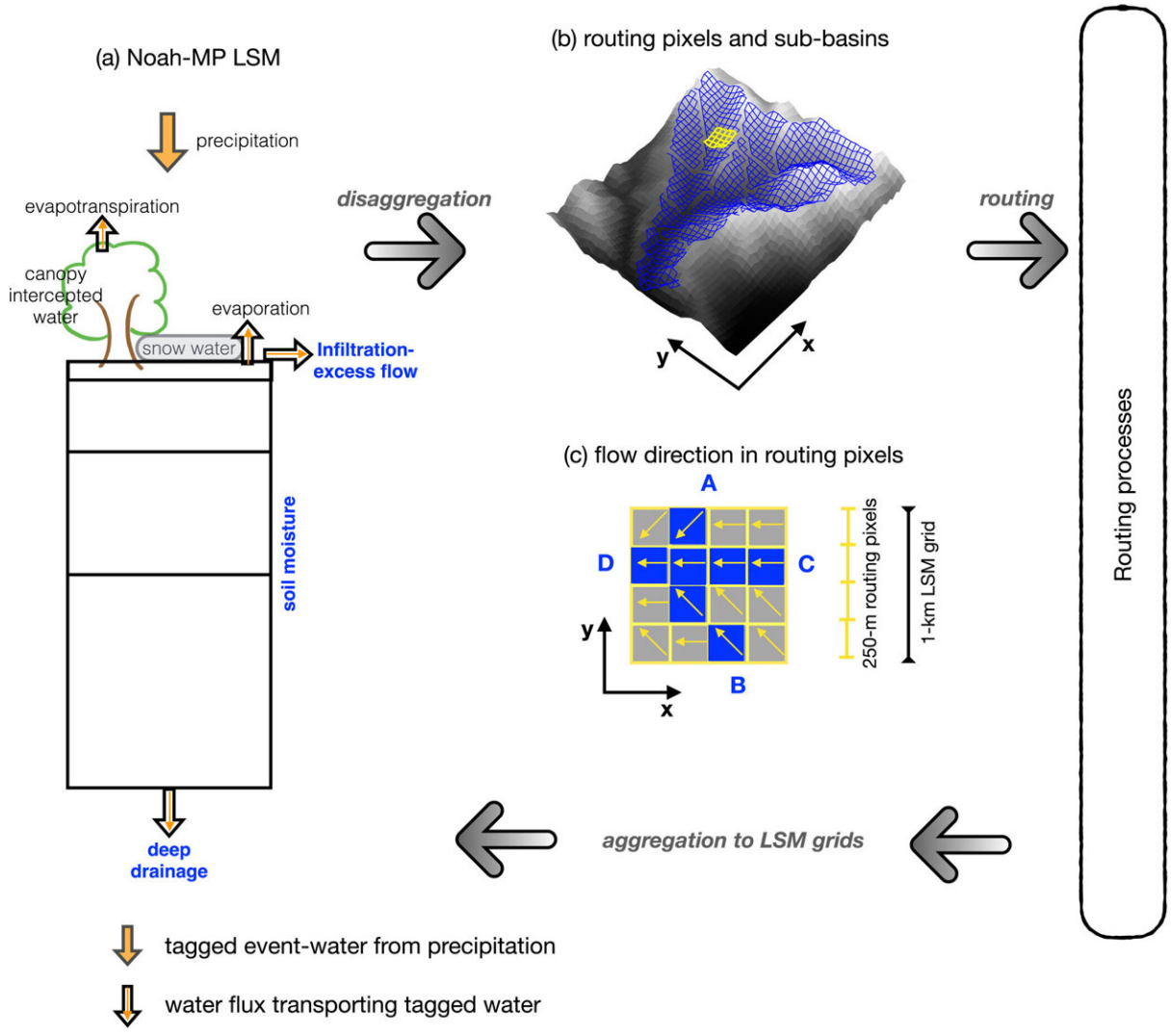

Schematics for the WT-WRF-Hydro structure. Credit: *Water Resources Research* (2024). DOI: 10.1029/2023WR034938

Lateral water movement from ridges to valleys plays a key role in organizing water and energy at the watershed scale. But it has long been neglected in traditional land models.

To better understand the importance of modeling lateral flow in hydrologic models, researchers have developed a water tracer tool within an advanced hydrologic model, WRF-Hydro, or the Weather Research and Forecasting Model Hydrological modeling system, an open-source community model that links atmosphere and terrestrial hydrology models.

The work is published in the journal *Water Resources Research*.

The water tracer tool is used to understand the effect of incorporating lateral flow on modeling streamflow, but it can also be used by the broader scientific community to examine the responses of water movement to different perturbations.

The tool allows scientists to tag rainwater or snowmelt and track how it travels through a watershed differently if lateral flow is enabled and disabled in the simulations. By testing over two watersheds, researchers found that accounting for lateral flow lengthens the time that water spends in a dry watershed but shortens the time in a wet watershed, indicating different responses to modeling lateral flow in different regions.

In locations where tracer measurements are available, the modeled results compared with the measured ones can indicate model deficiencies that require future improvements.

More information: Huancui Hu et al, Integrating a Water Tracer Model Into WRF-Hydro for Characterizing the Effect of Lateral Flow in Hydrologic Simulations, *Water Resources Research* (2024). DOI:

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