Representation of soil moisture and root water uptake in a climate model:

“Soil water balance”

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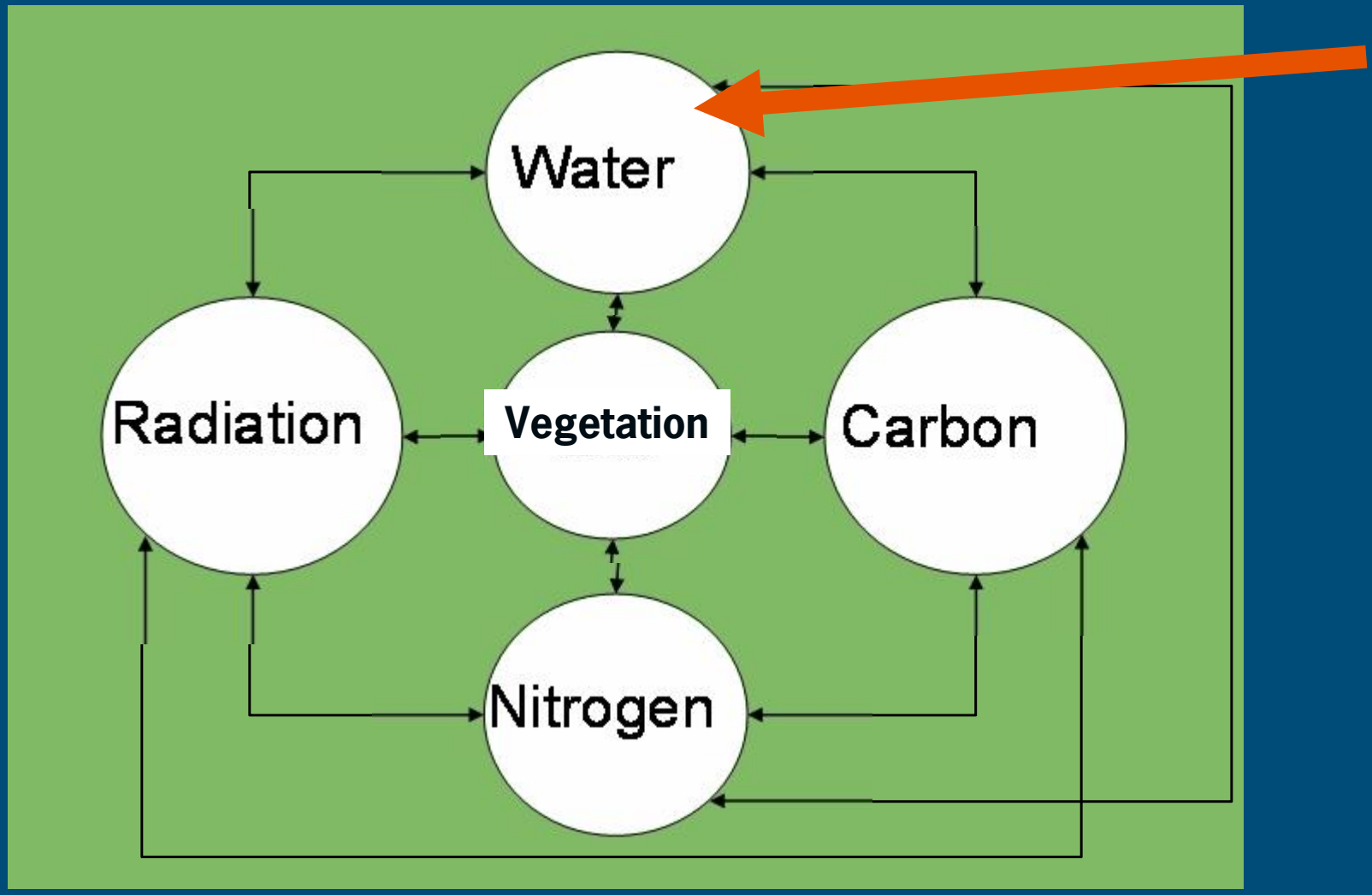
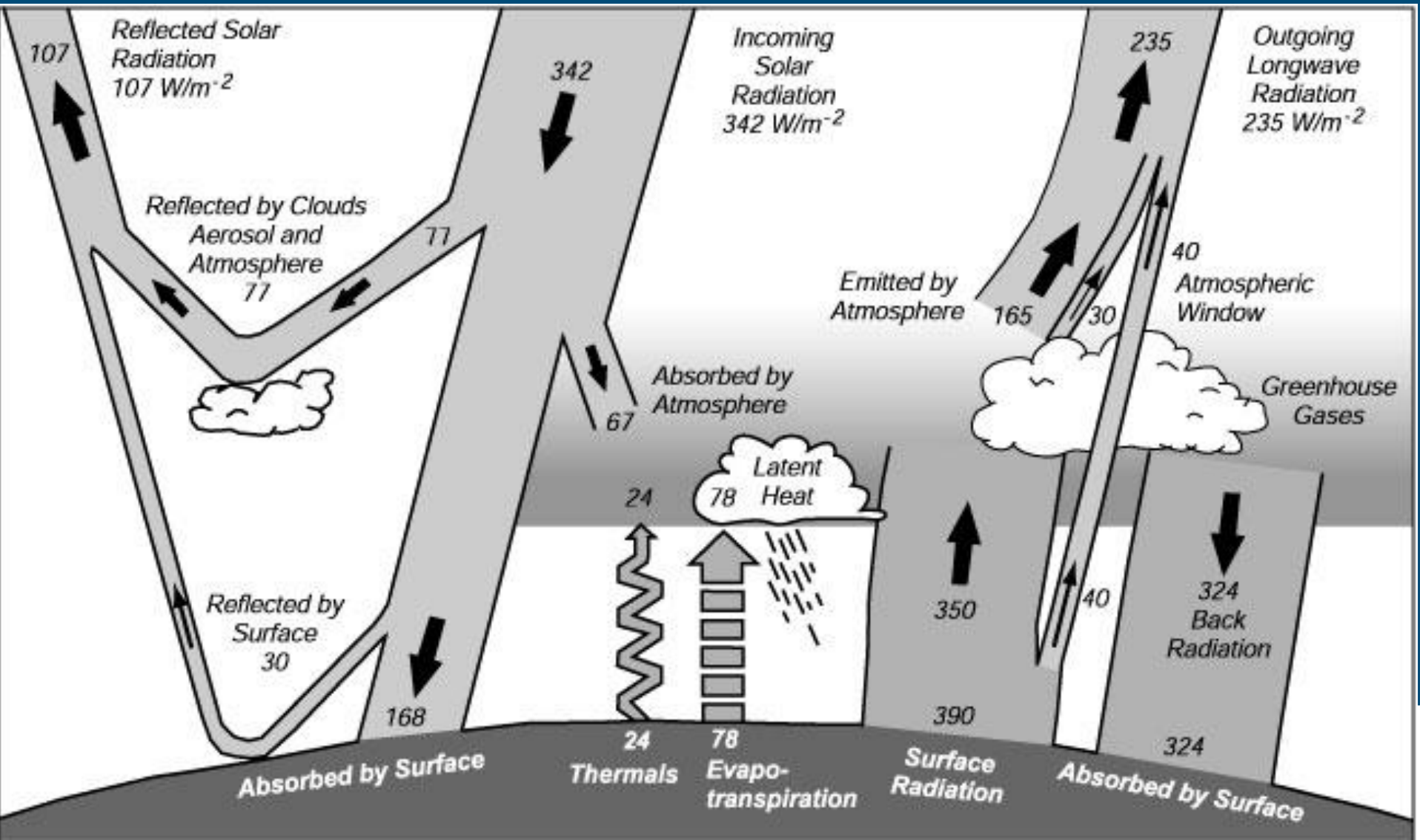
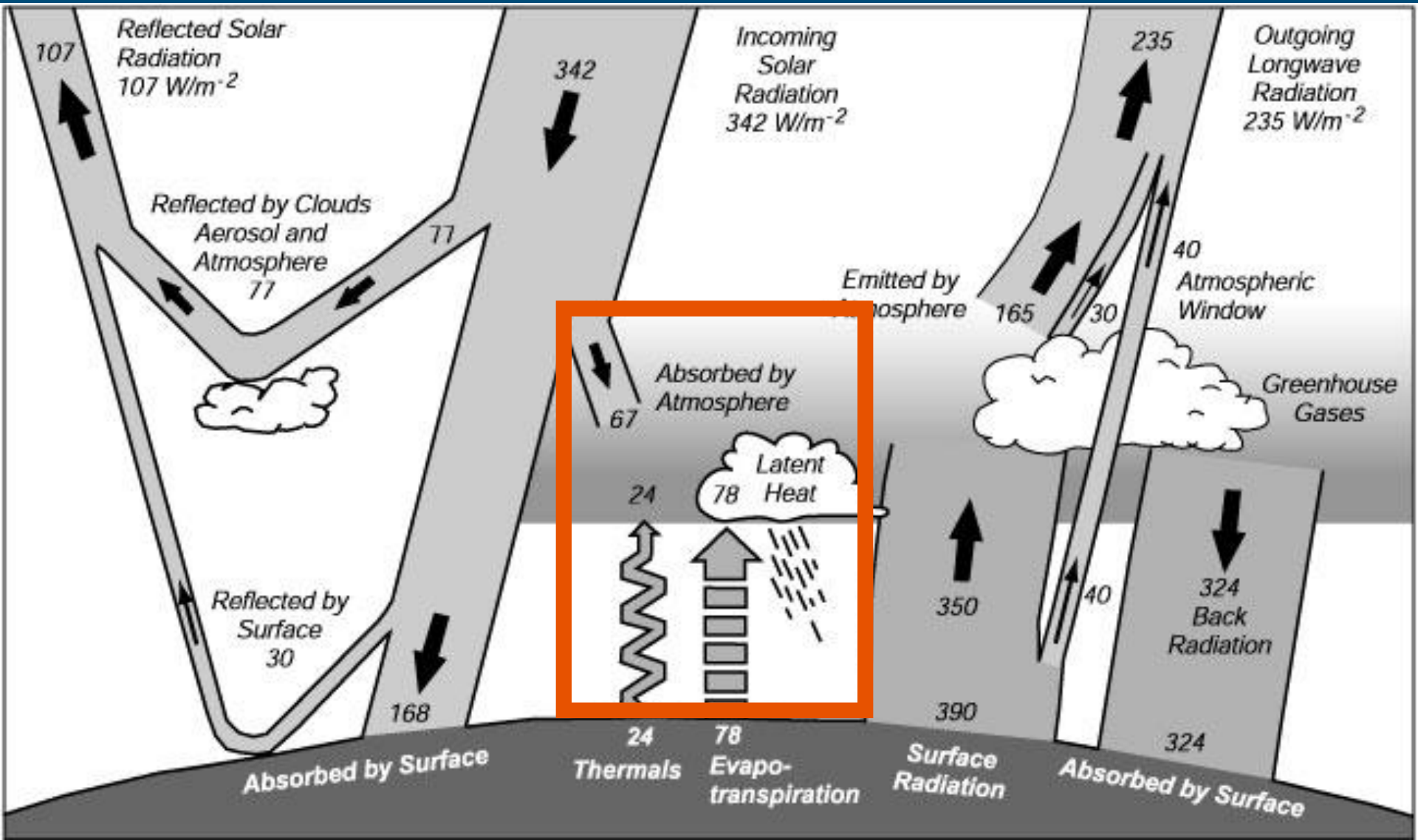
For a climate change model with feedbacks



Radiation balance



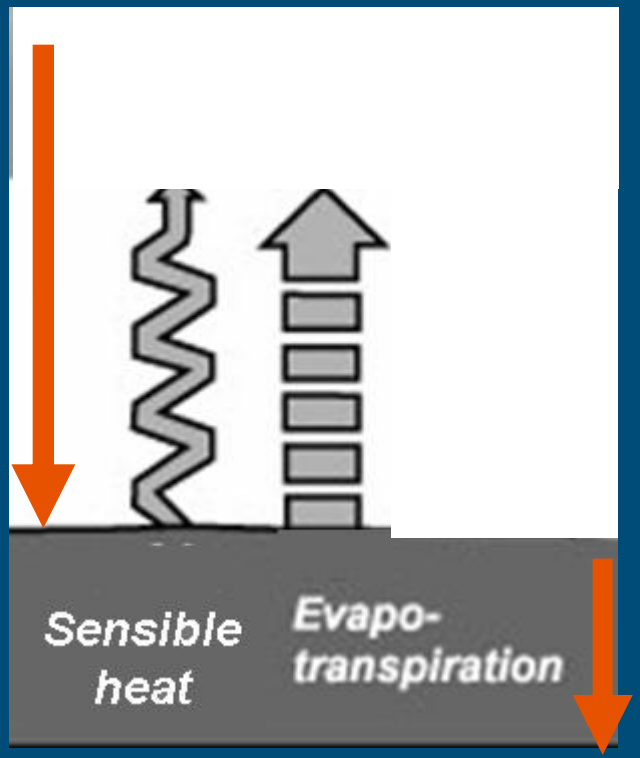
Radiation balance at surface



Net radiation partitioning

Energy balance

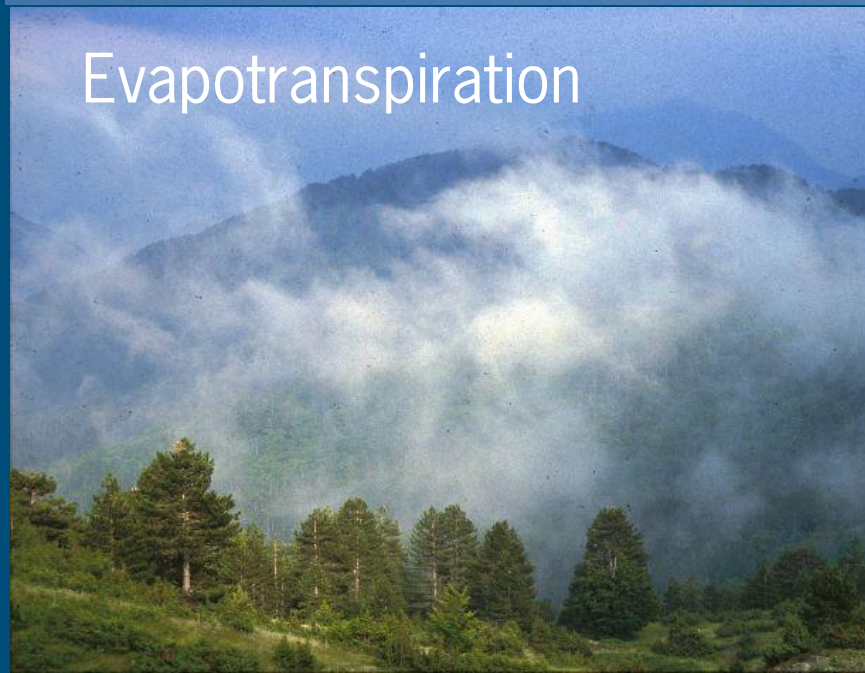
Net radiation



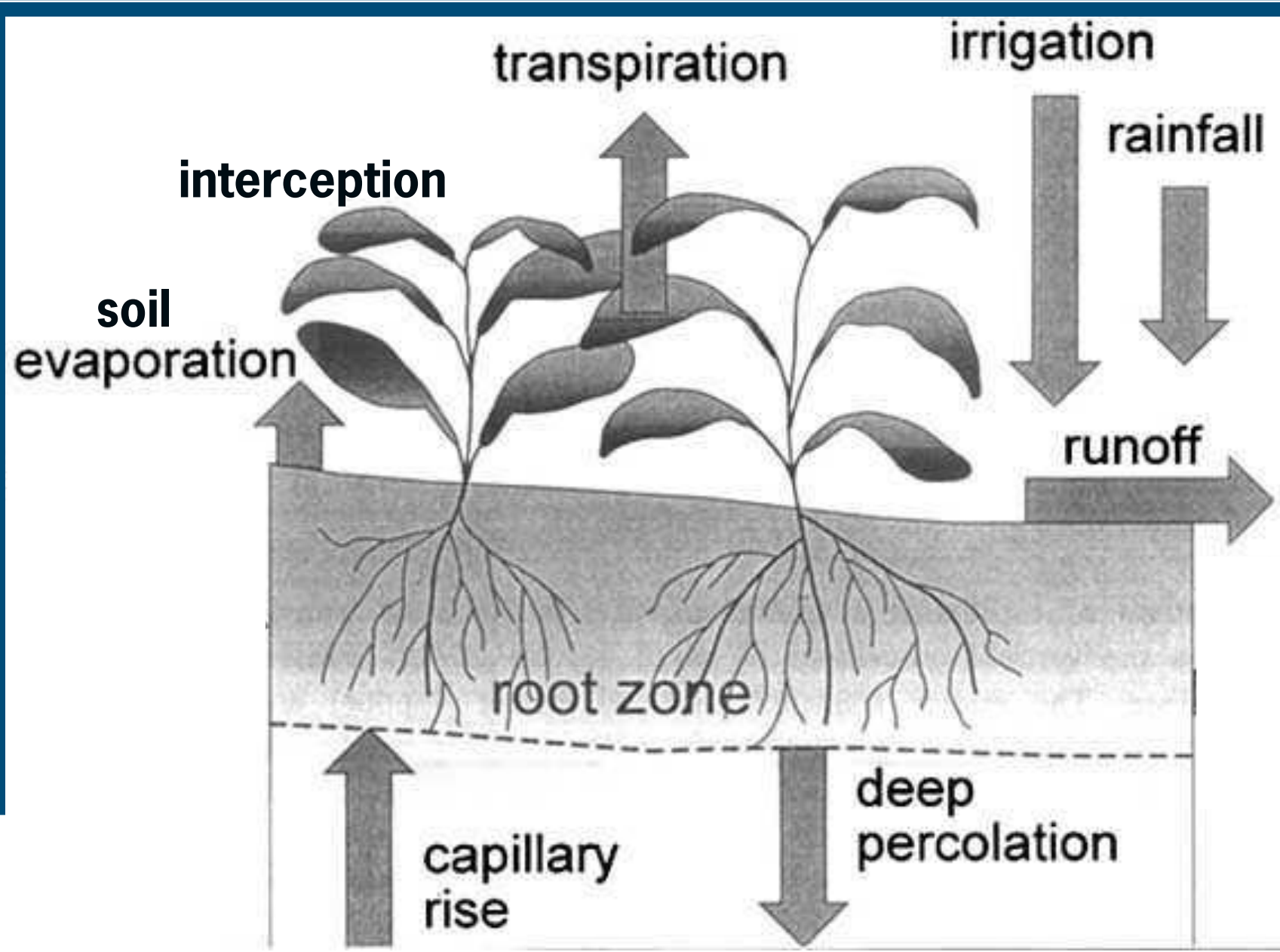
Soil heat

Thermals

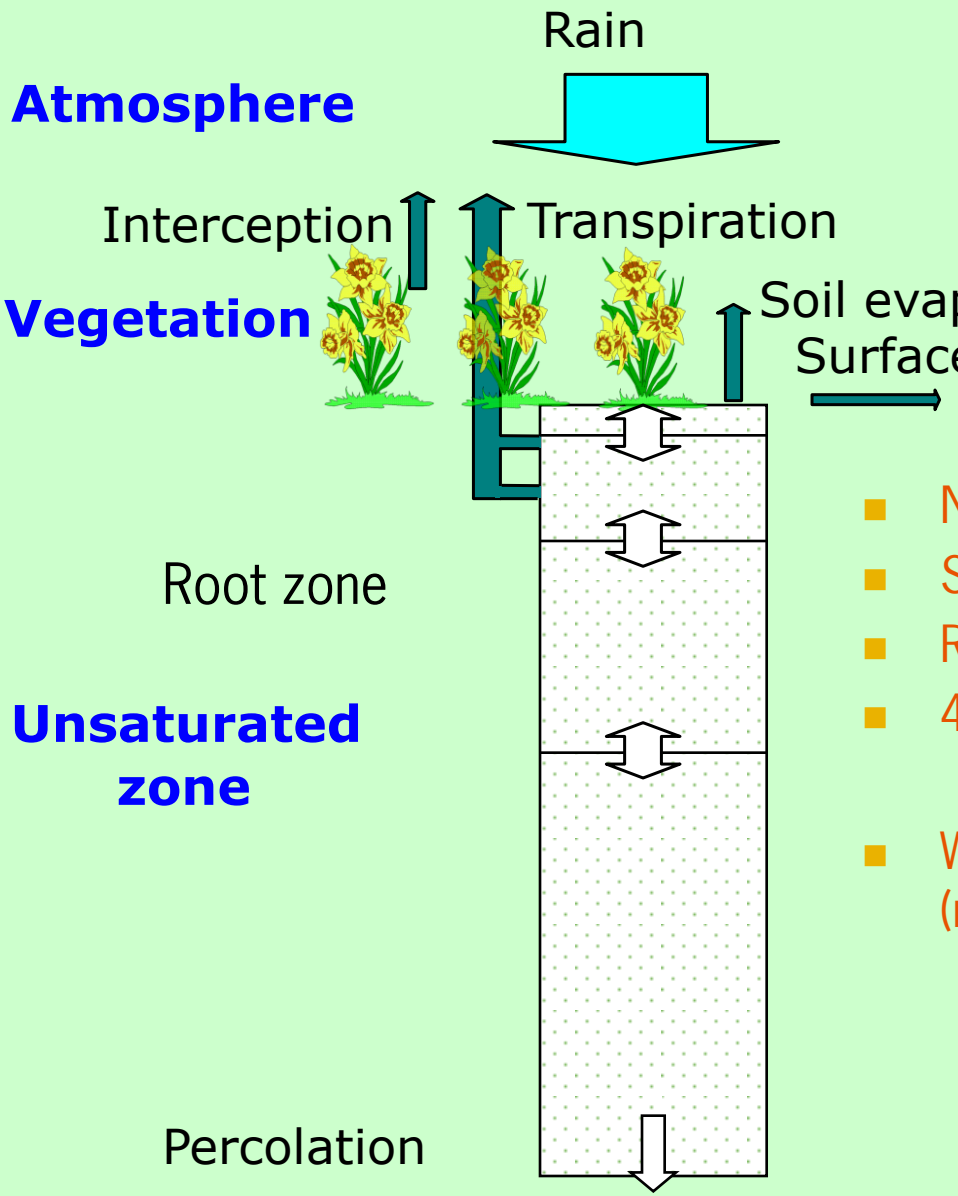
Evapotranspiration



Soil water balance



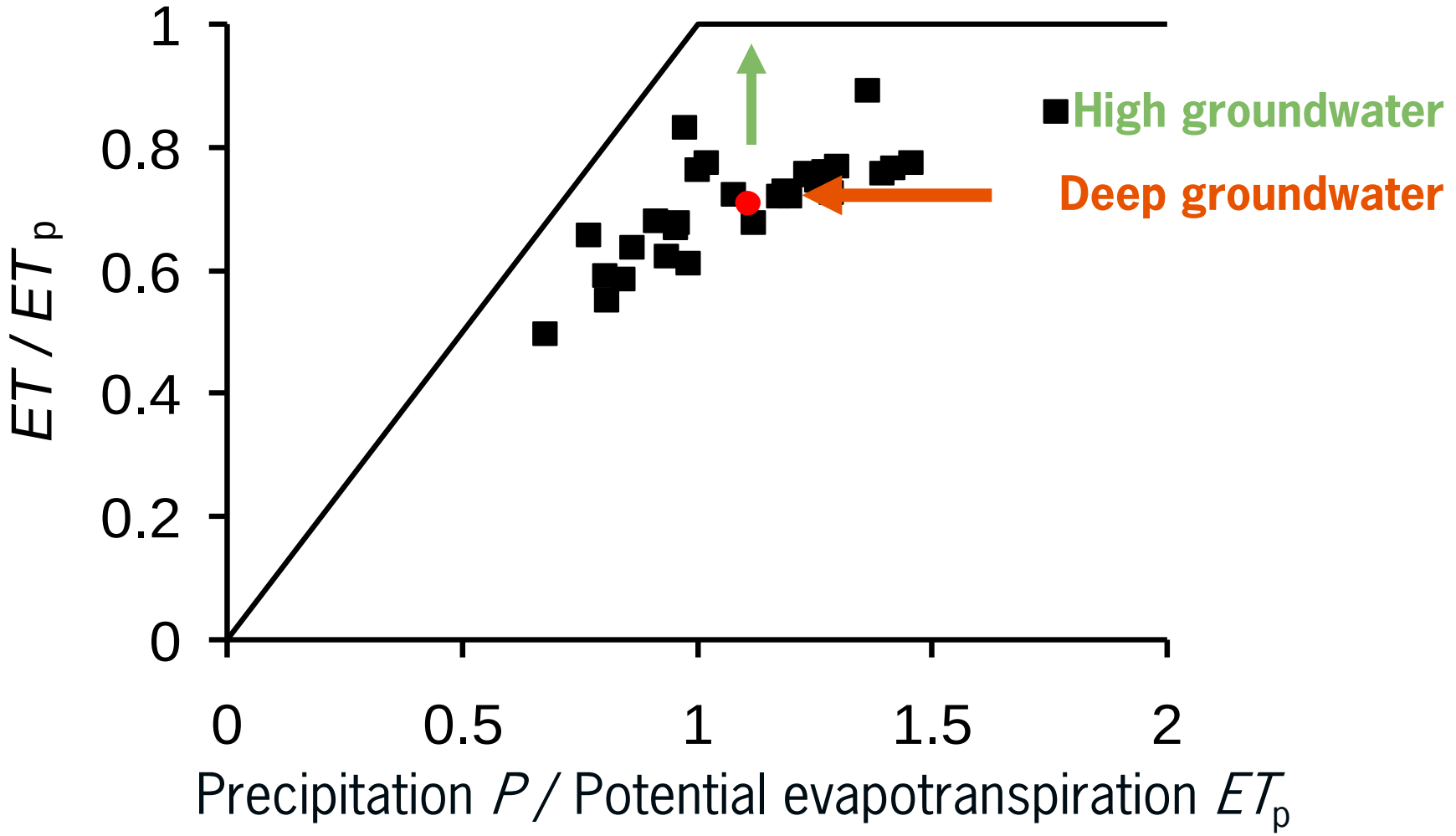
TESSEL-model for flow of water and heat



- No groundwater table is present
- Soil is homogeneous over entire depth
- Root zone: entire profile (2.89 m)
- 4 numerical layers

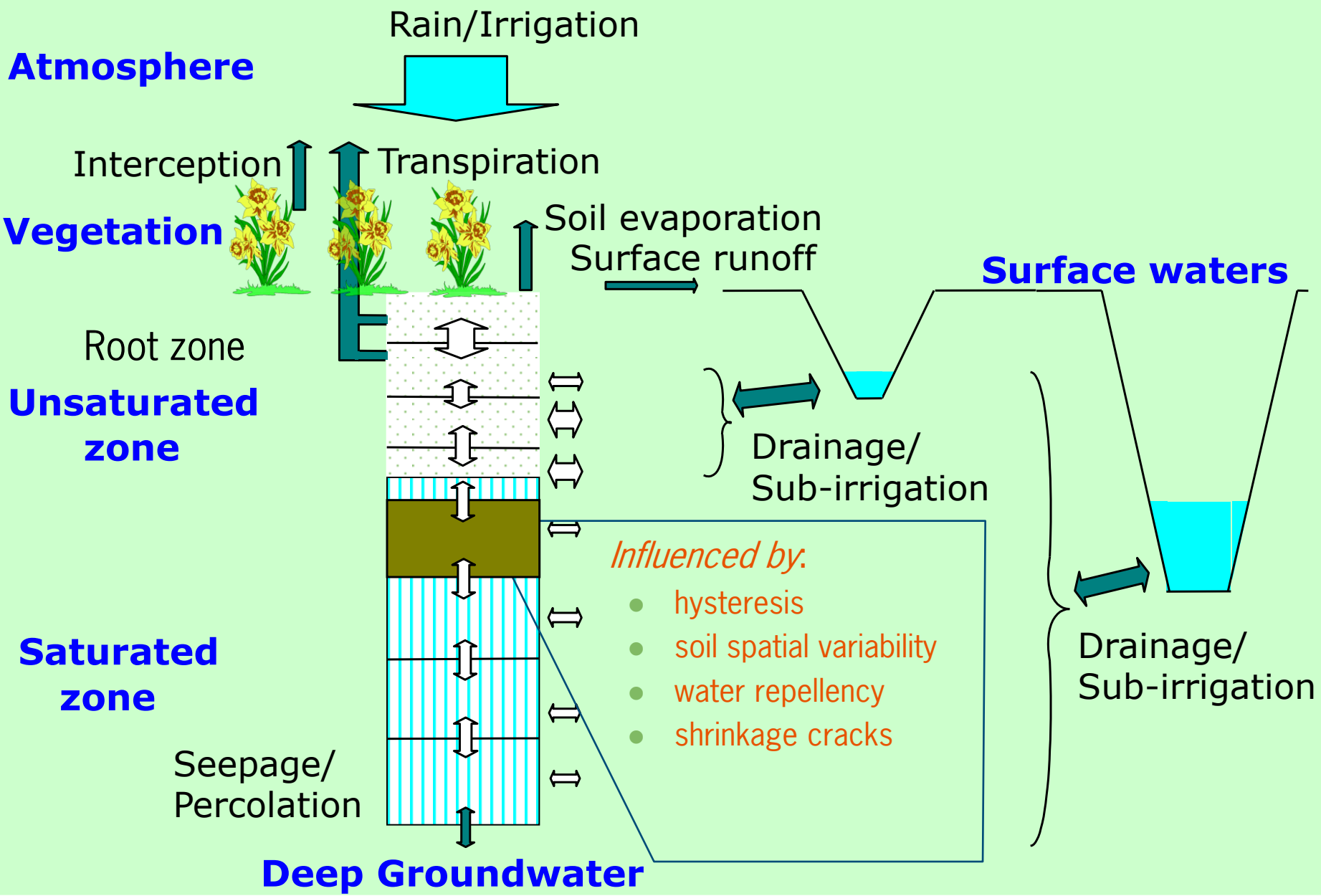
- Water management absent (no irrigation or drainage)

Soil water balance in the Netherlands (example)

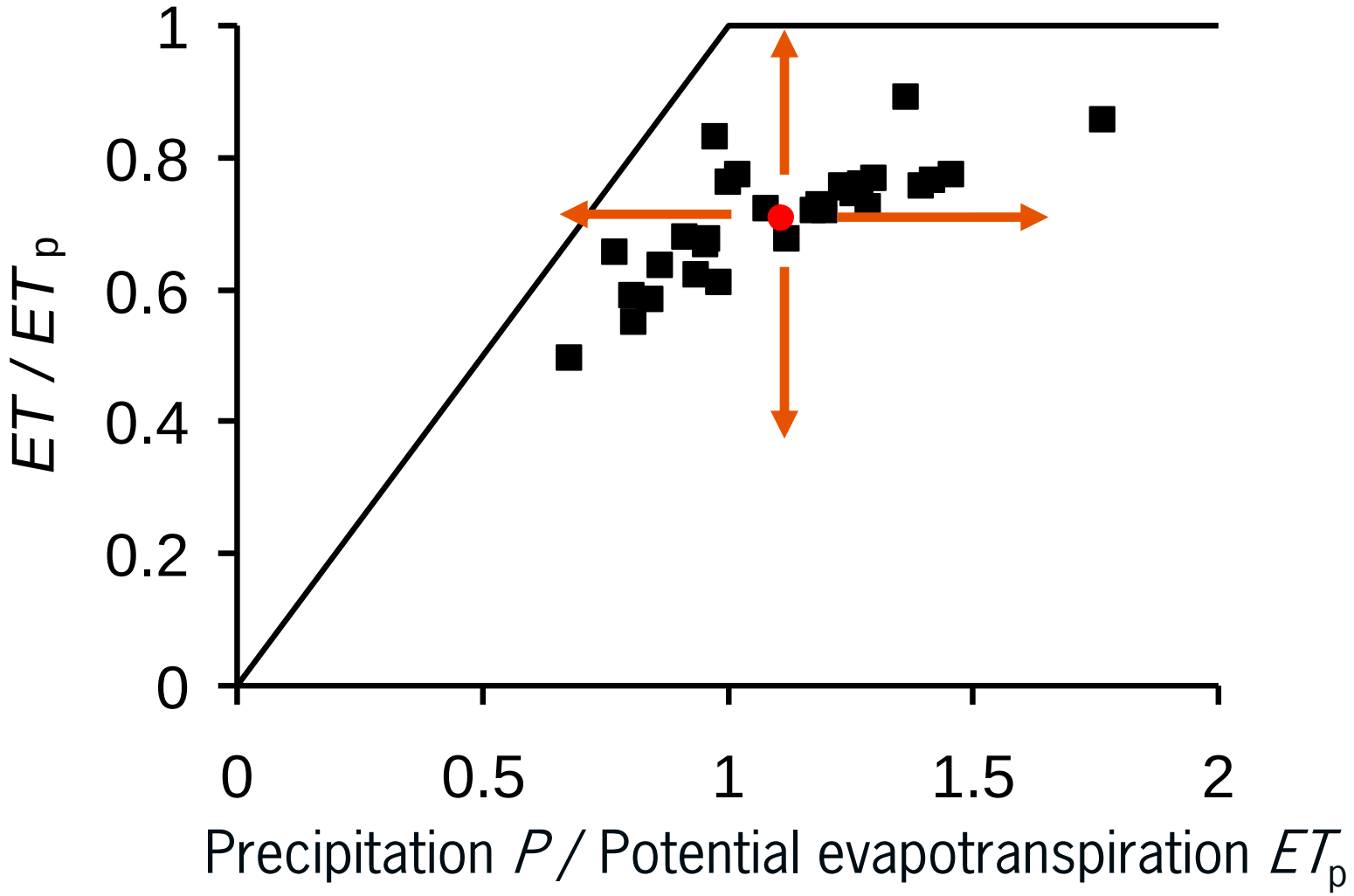


Groundwater dependent systems

SWAP-model for flow of water, heat and solutes



Possible effects of modifications on soil water balance

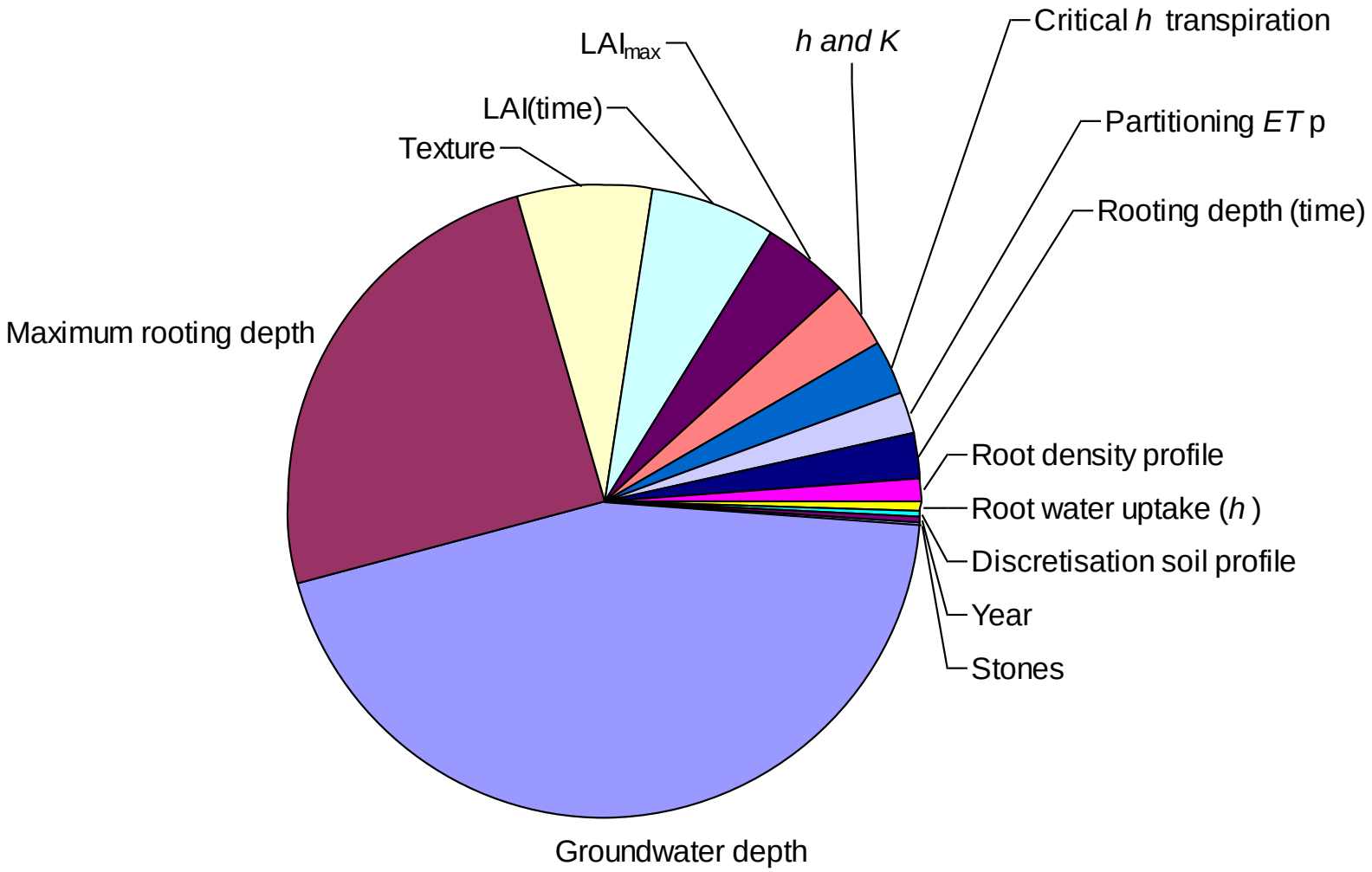


Tests with the detailed SWAP model

- Discretization
- Maximum rooting depth
- Leaf area index as a function of time
- Soil depth (shallow - deep)
- Root extraction
- Soil texture
- Bottom boundary condition (Groundwater)

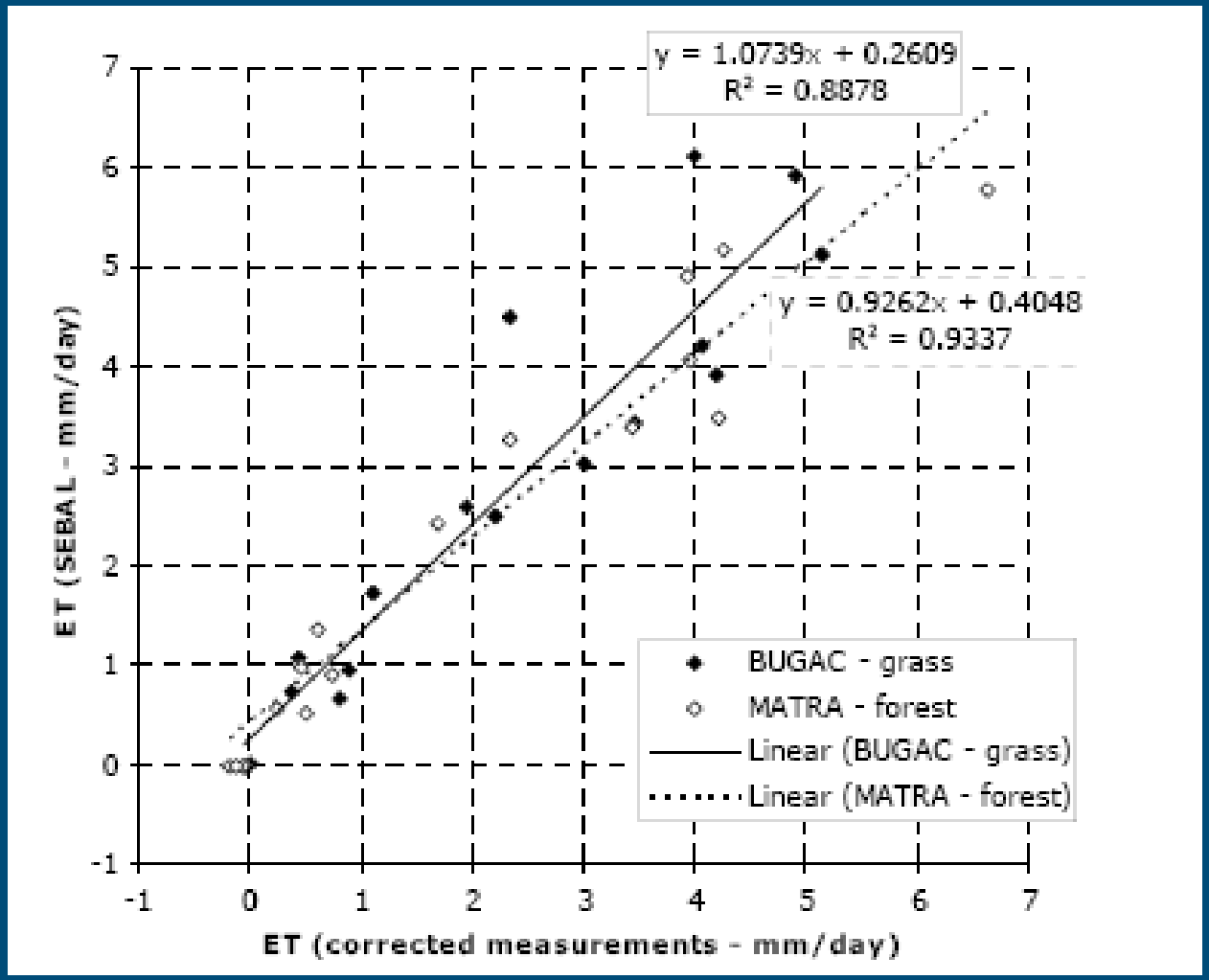
Effects SWAP tests on evapotranspiration *ET*

Location: Hungary – continental climate

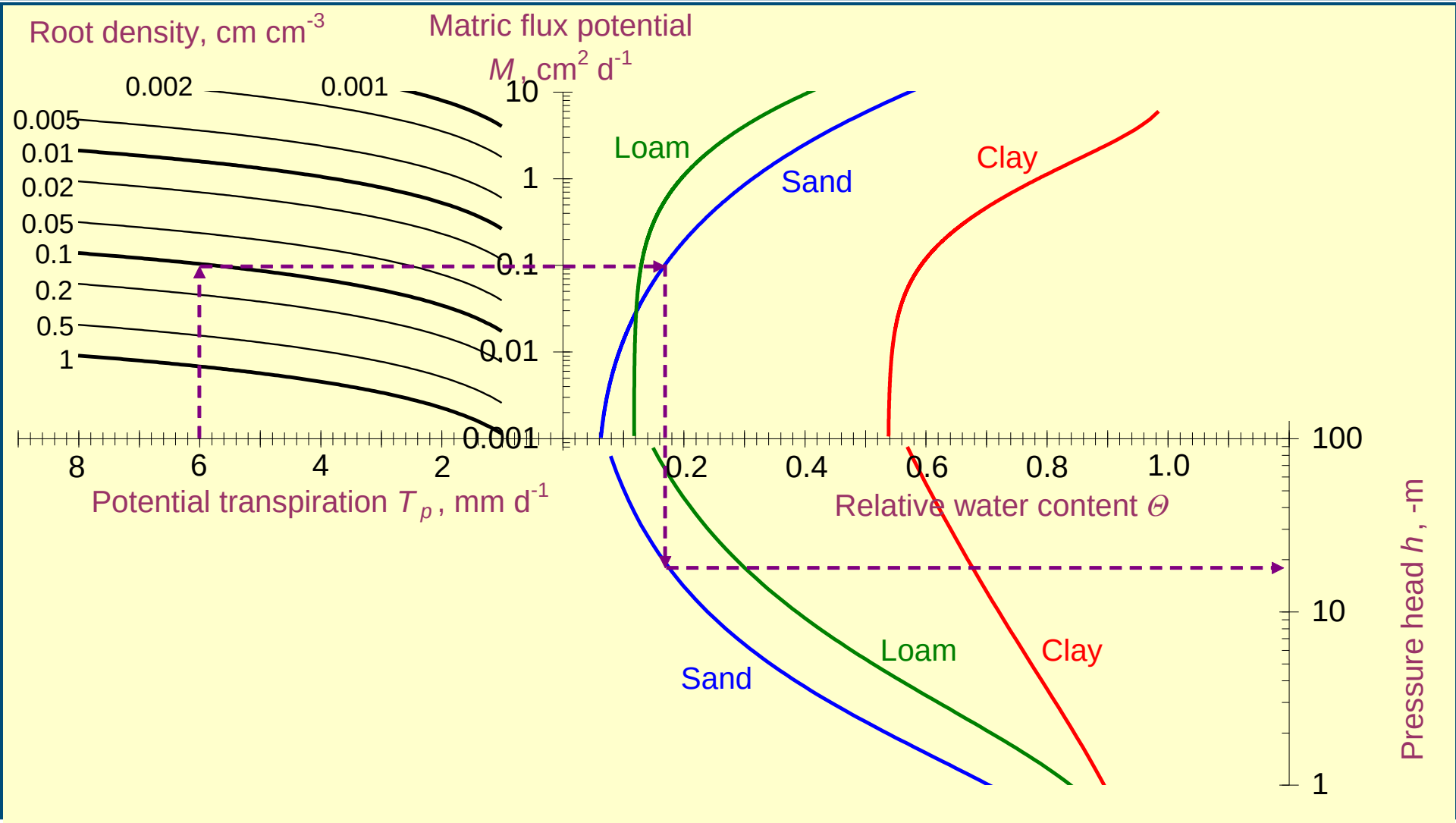


Implementation and testing *modified TESSEL* against RS data Hungary

Test area



Spinoff: Irrigation nomogram



Spinoff: Alternative concept for root water uptake