IMPACT OF EVAPOTRANSPIRATION PROCESS REPRESENTATION ON RUNOFF PROJECTIONS FROM CONCEPTUAL RAINFALL-RUNOFF MODELS

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Assessing impacts of potential climate change is important for water resource systems

- Increase in temperature
- Reduction in average rainfall
- Increase in the frequency and intensity of extreme rainfall

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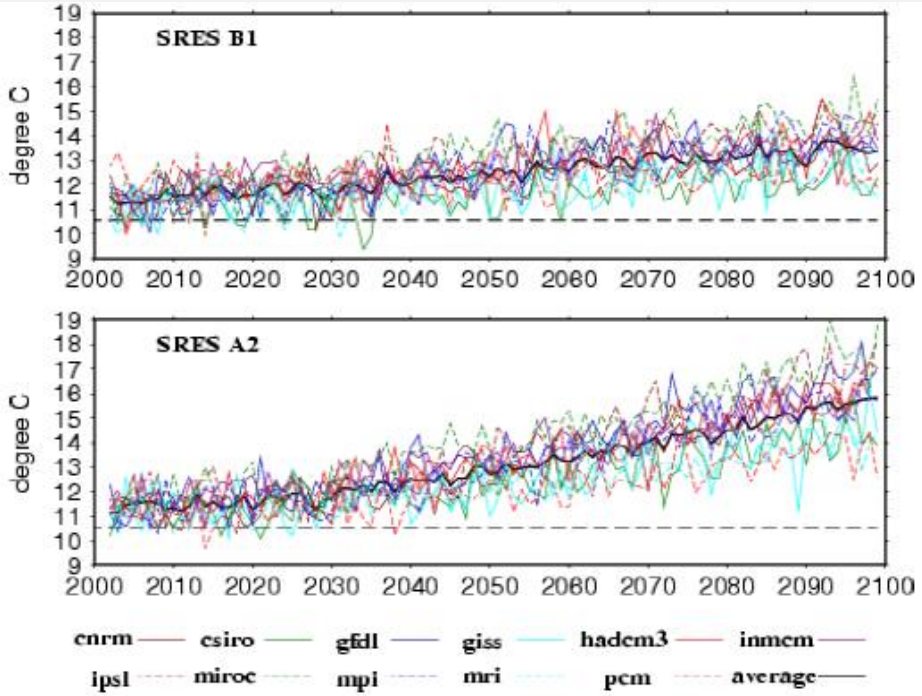
Conceptual rainfall-runoff (CRR) models are useful to assess climate impact on water resource systems

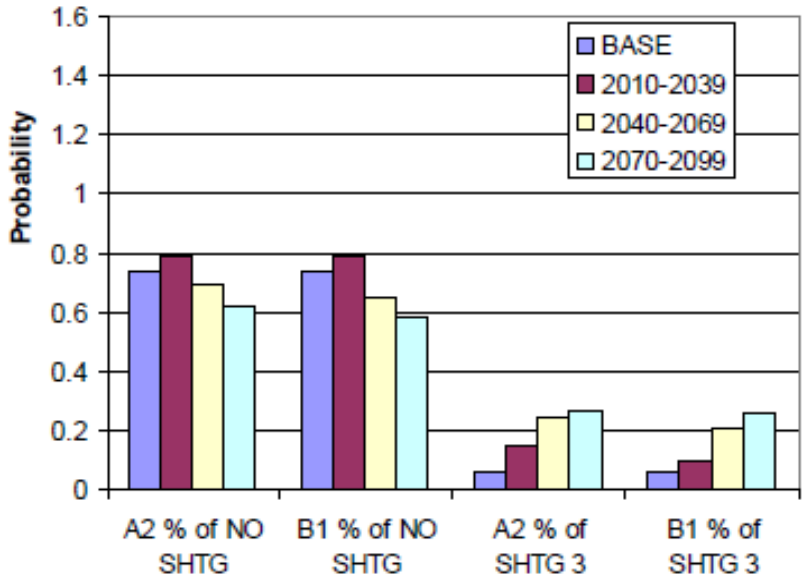
Projected climate change



Projected temperature changes, with 11 GCMs, 2 emission scenarios

CRR models

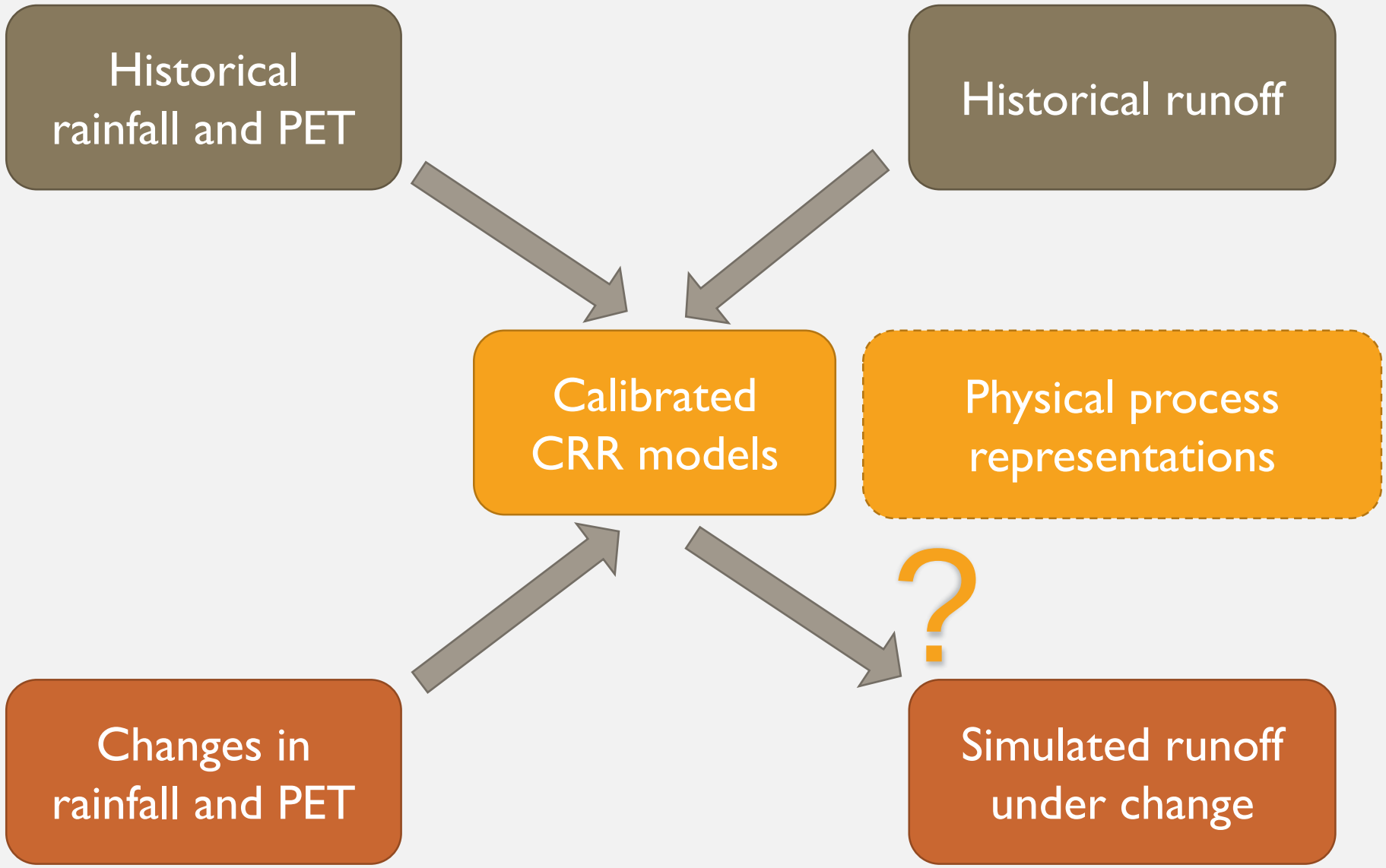
Impact on water resource systems



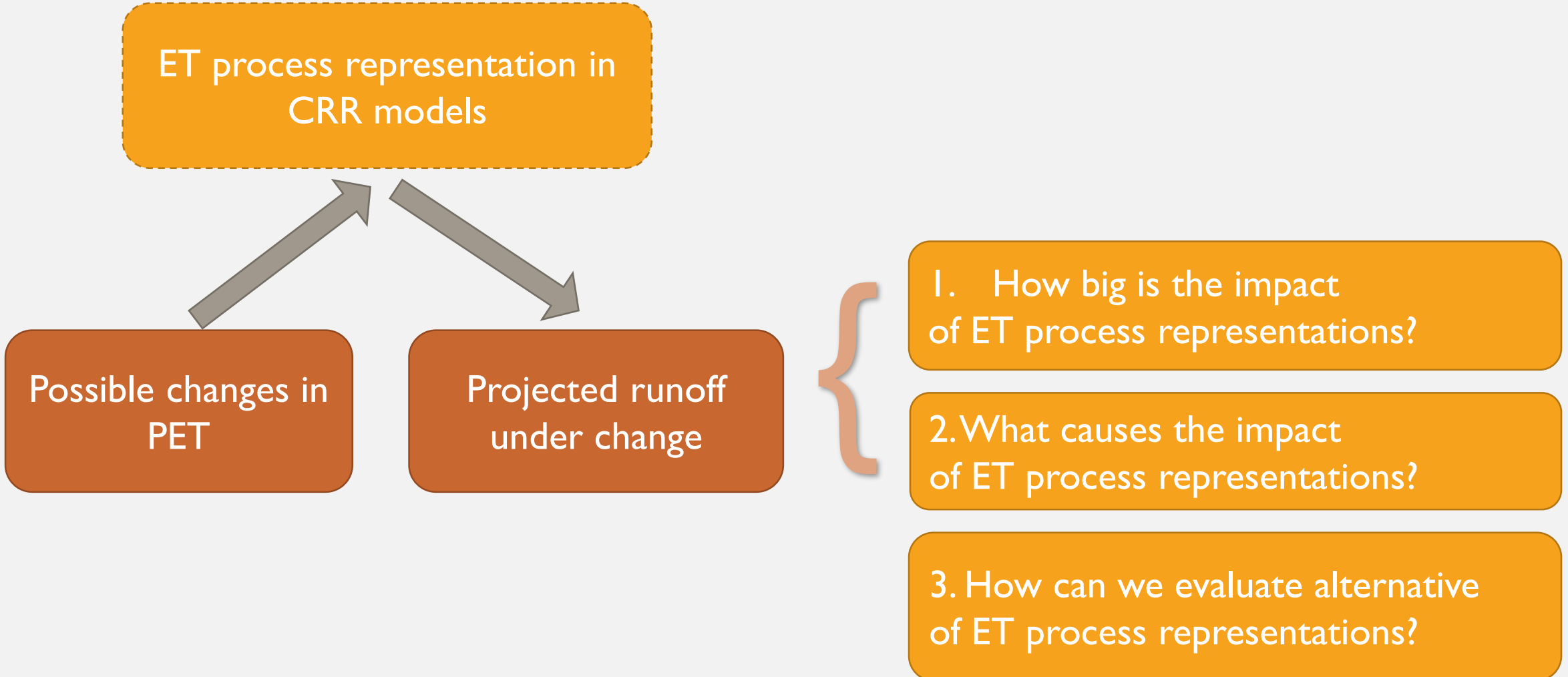
Projected average probability of no supply shortage and level-3 shortage under 2 emission scenarios

(Example: Christensen and Lettenmaier, 2006)

The performance of CRR models can be limited under a changing climate



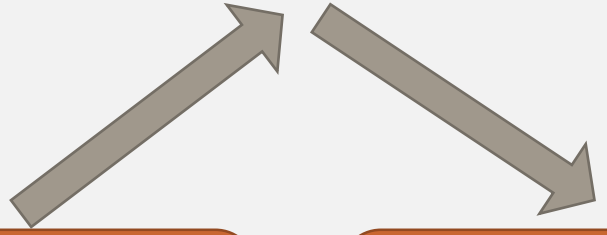
Study objective:
To assess the impact of alternative ET process representations within CRR models on runoff projections under a changing climate



Understanding the impact of ET process representations in CRR models on runoff projection

ET process representation in CRR models

Three structurally different CRR models



Possible changes in PET

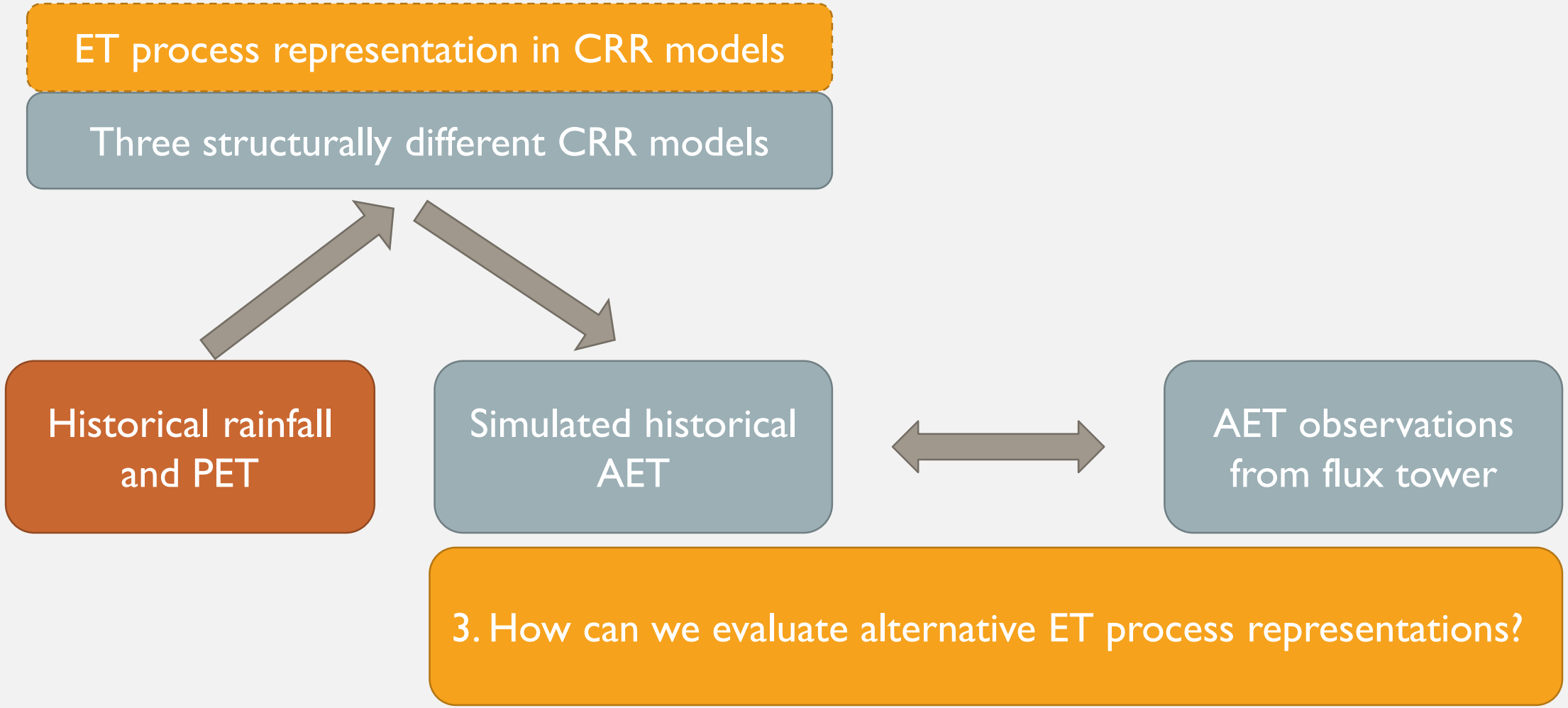
Projected runoff under change

1. How big is the impact of ET process representations?

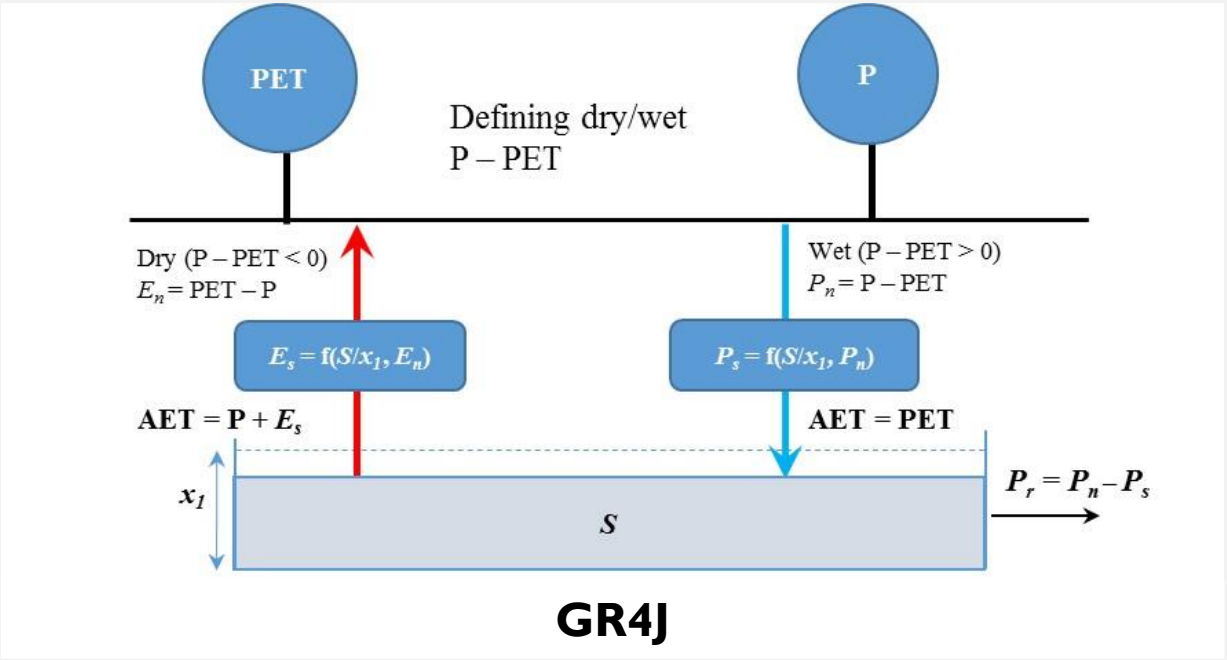
2. What causes the impact of ET process representations?

Climate variable to perturb	Perturbation range
T	0 to +8°C
RH	-10% to +10%
R_s	-10% to +10%
u_z	-20% to +20%

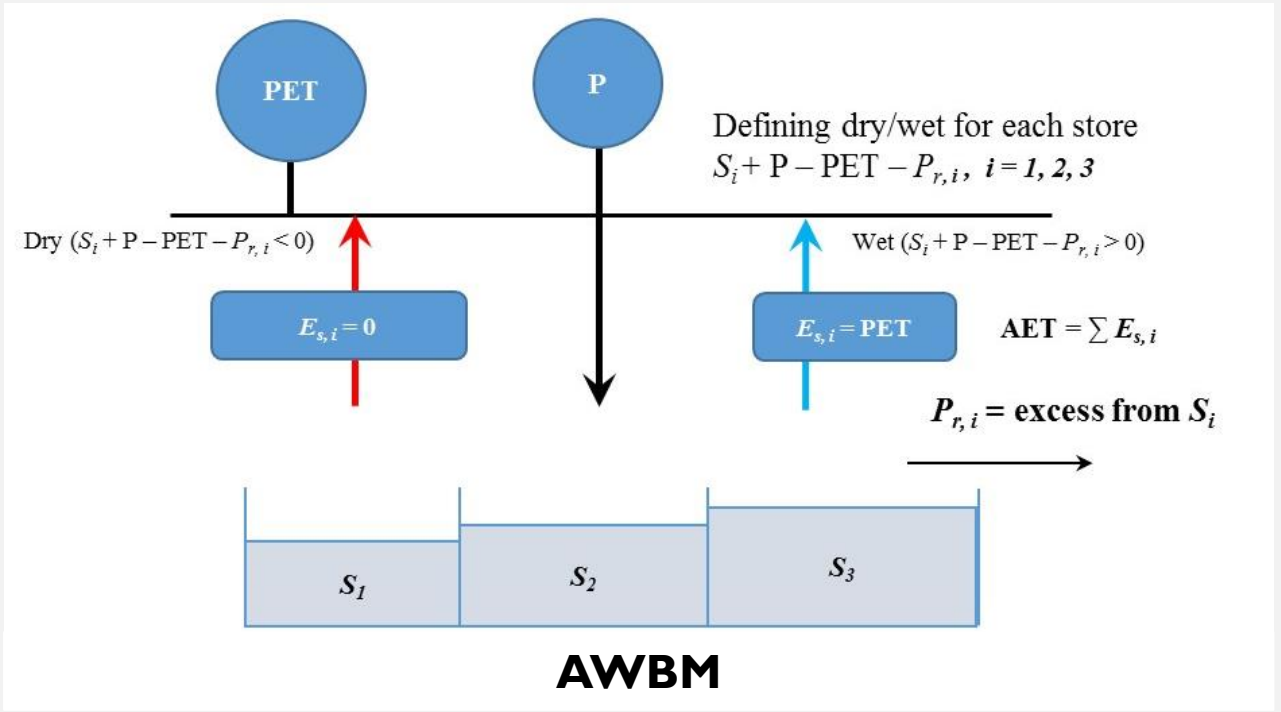
Evaluation of alternative ET process representations in CRR models



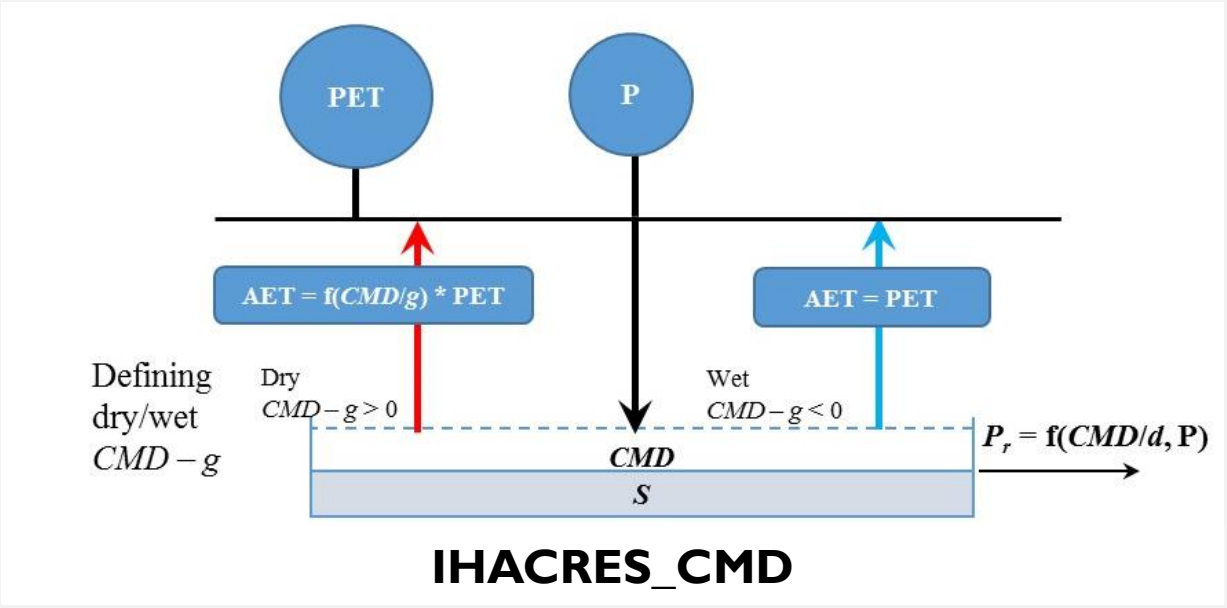
Three structurally different CRR models – **GR4J**, **AWBM** and **IHACRES_CMD**



GR4J

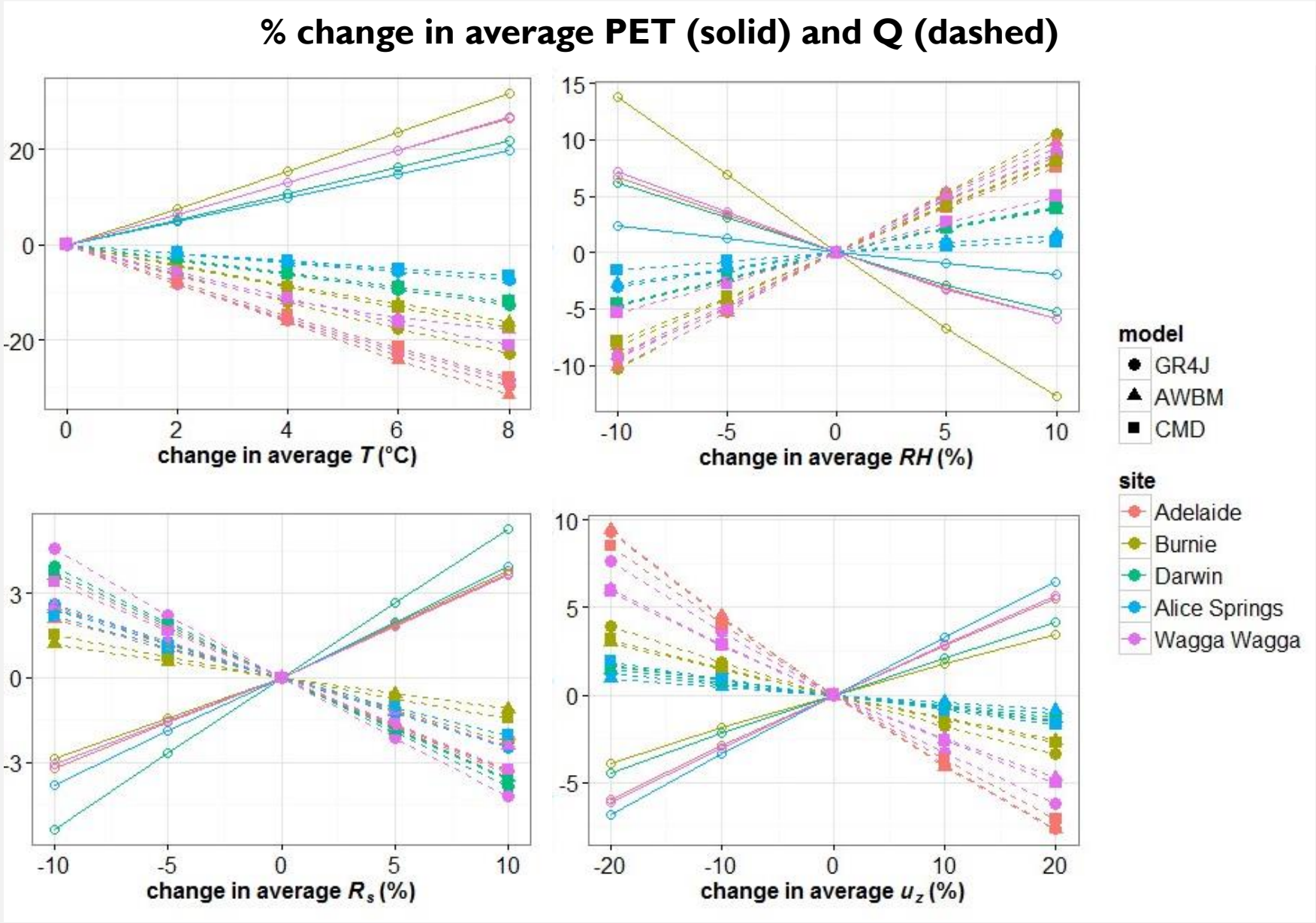


AWBM



IHACRES_CMD

Q1: How big is the impact of ET process representations on runoff projection?



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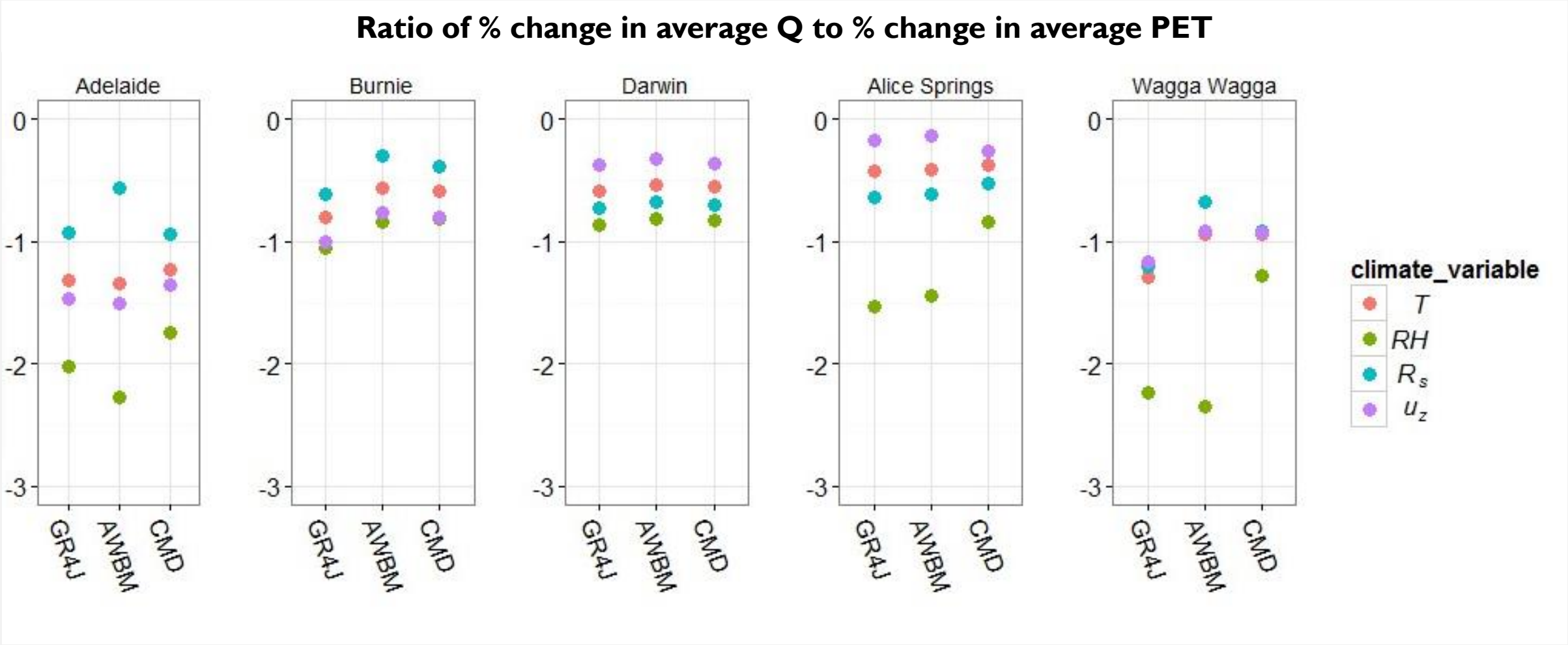
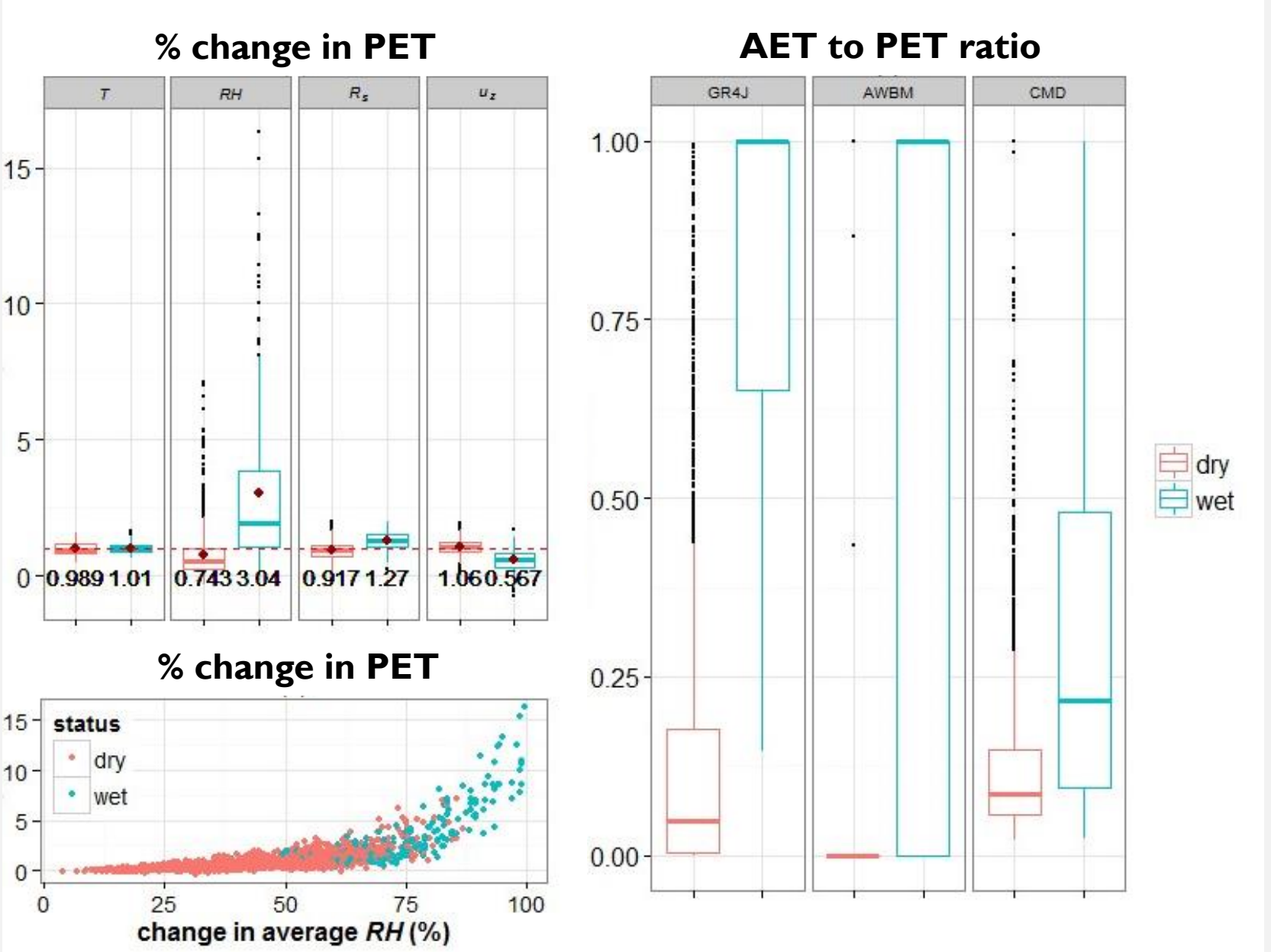


Q2: What causes the impact of ET process representations on runoff projection?



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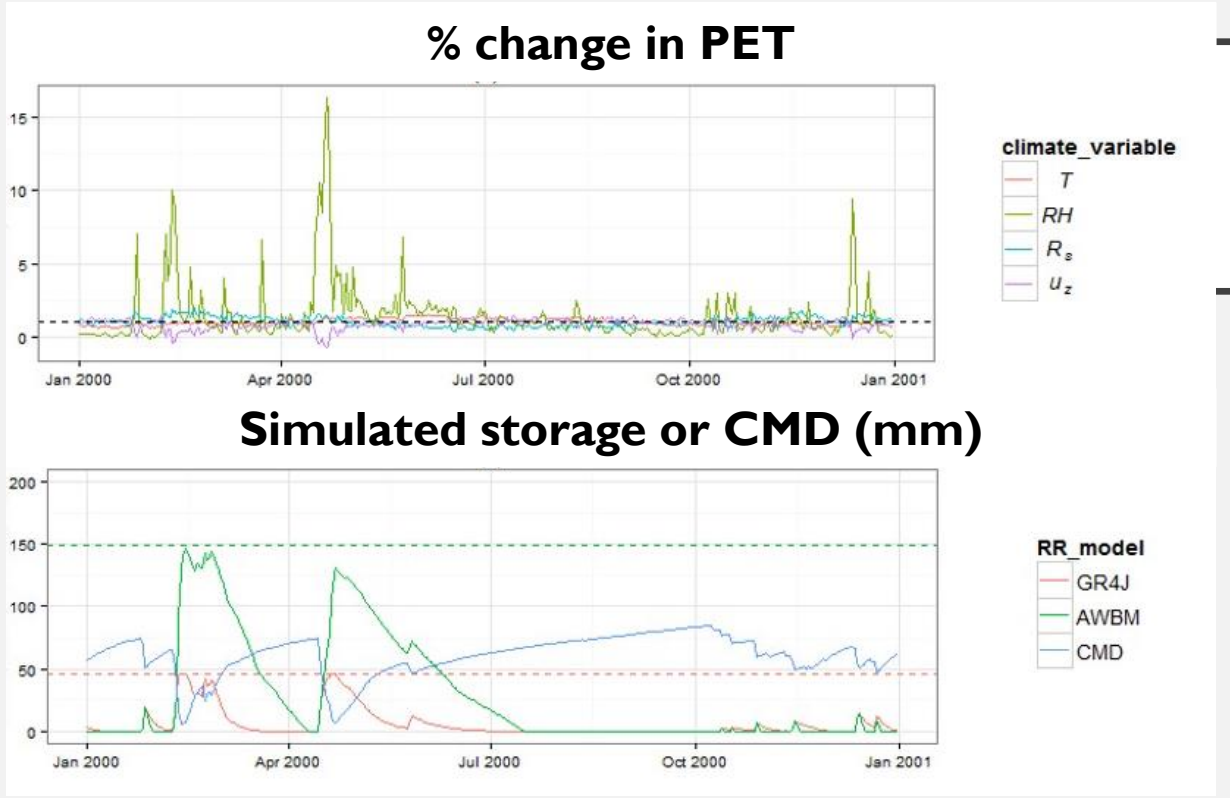

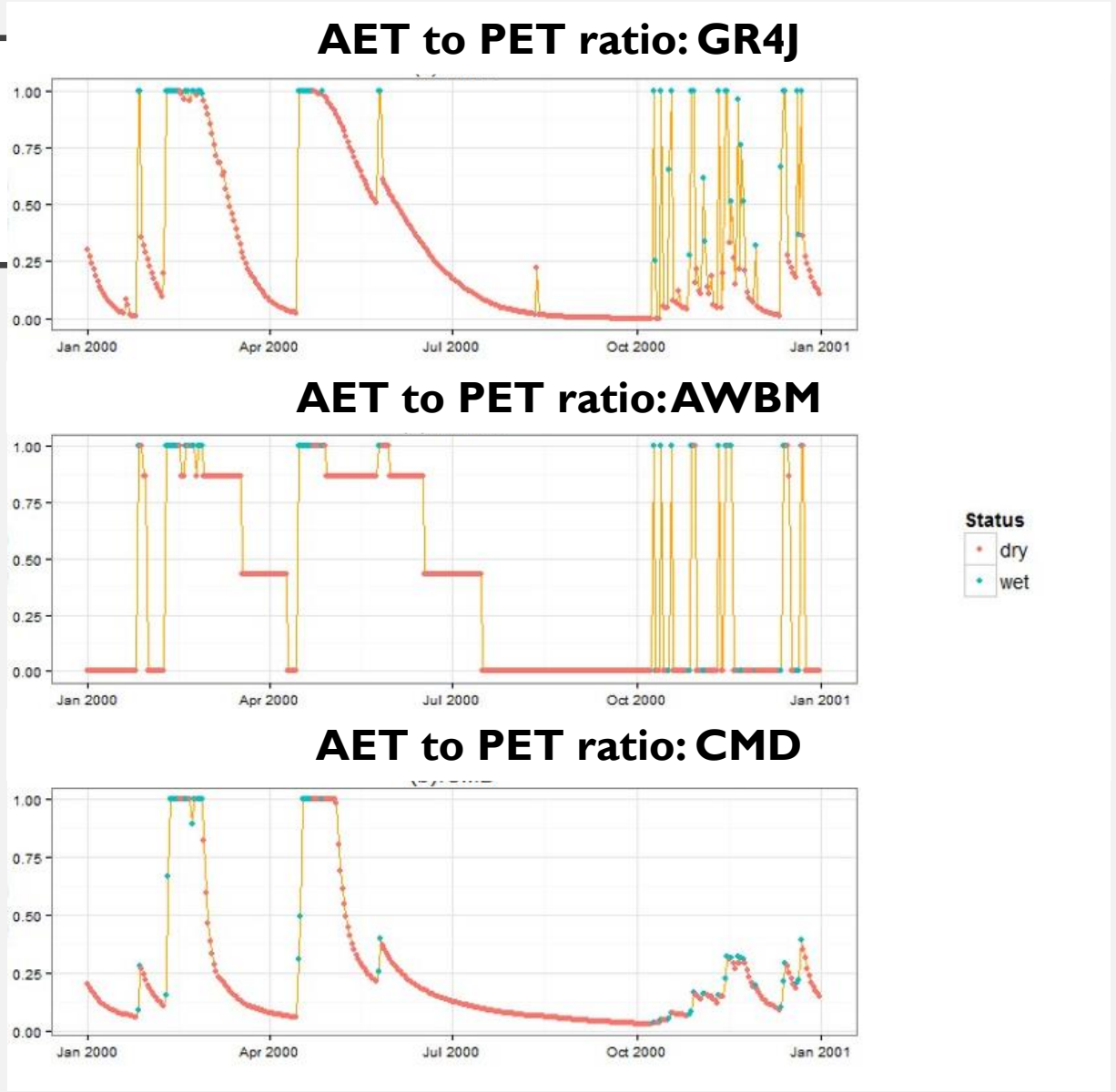

Q3: How can we evaluate alternative ET process representations?

KEY MESSAGES

- Different ET process representations in CRR models can have substantial impacts on the sensitivity of runoff projection under a changing climate.
- AET observations are useful tools to verify the realism of ET process representations in CRR models.
- Need for an improved understanding of physical processes to better infer the potential changes in rainfall-runoff relationships under climate change, and thus to facilitate better modelling of future water resources