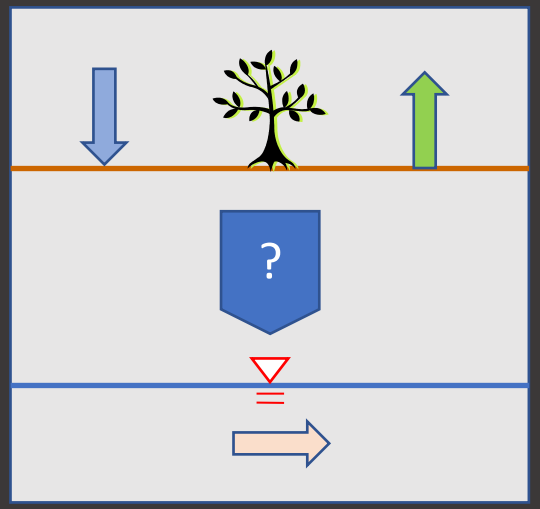
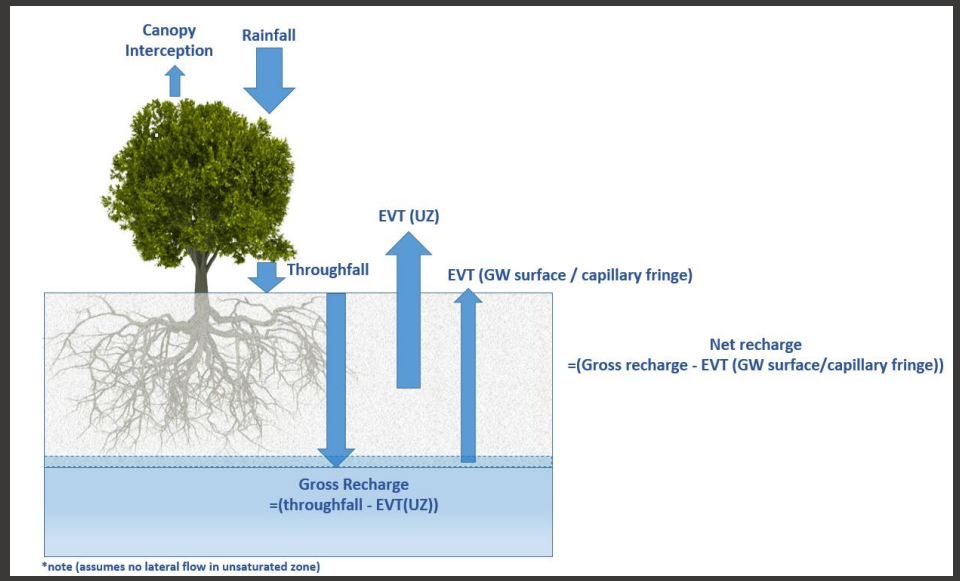
Recharge model complexity

Benefits and trade-offs when assessing groundwater allocation limits





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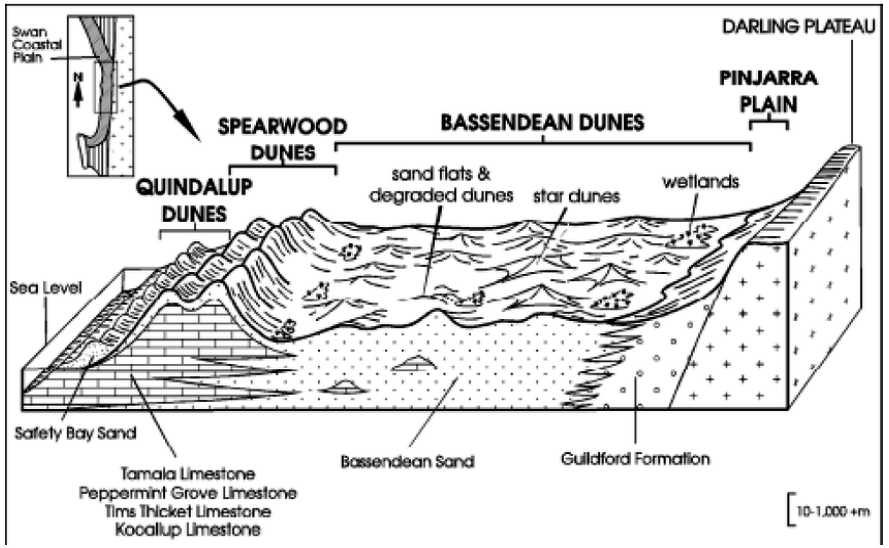
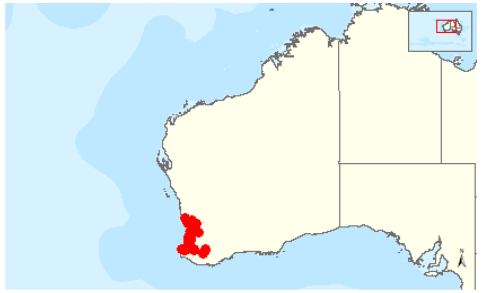
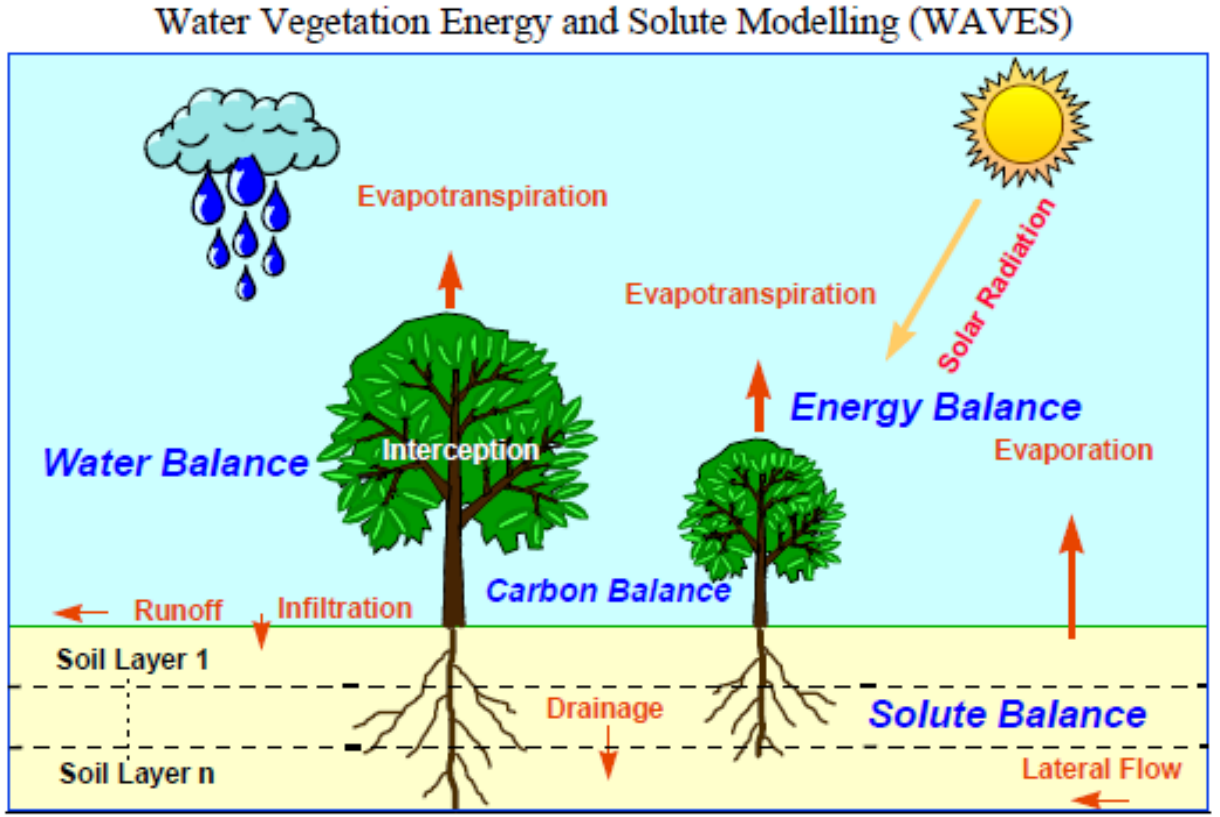
[2]Cath Moore, [1]Wolfgang Schmid, [4] Joel Hall, [1]Warrick Dawes, [5]Richard Silberstein, [2]Susana Guzman, [4]Rob Nelson

[1]CSIRO, [2]GNS Science, [4]Department of Water and Environmental Regulation, WA, [5]Hydrological and Environmental Scientific Solutions P/L, WA





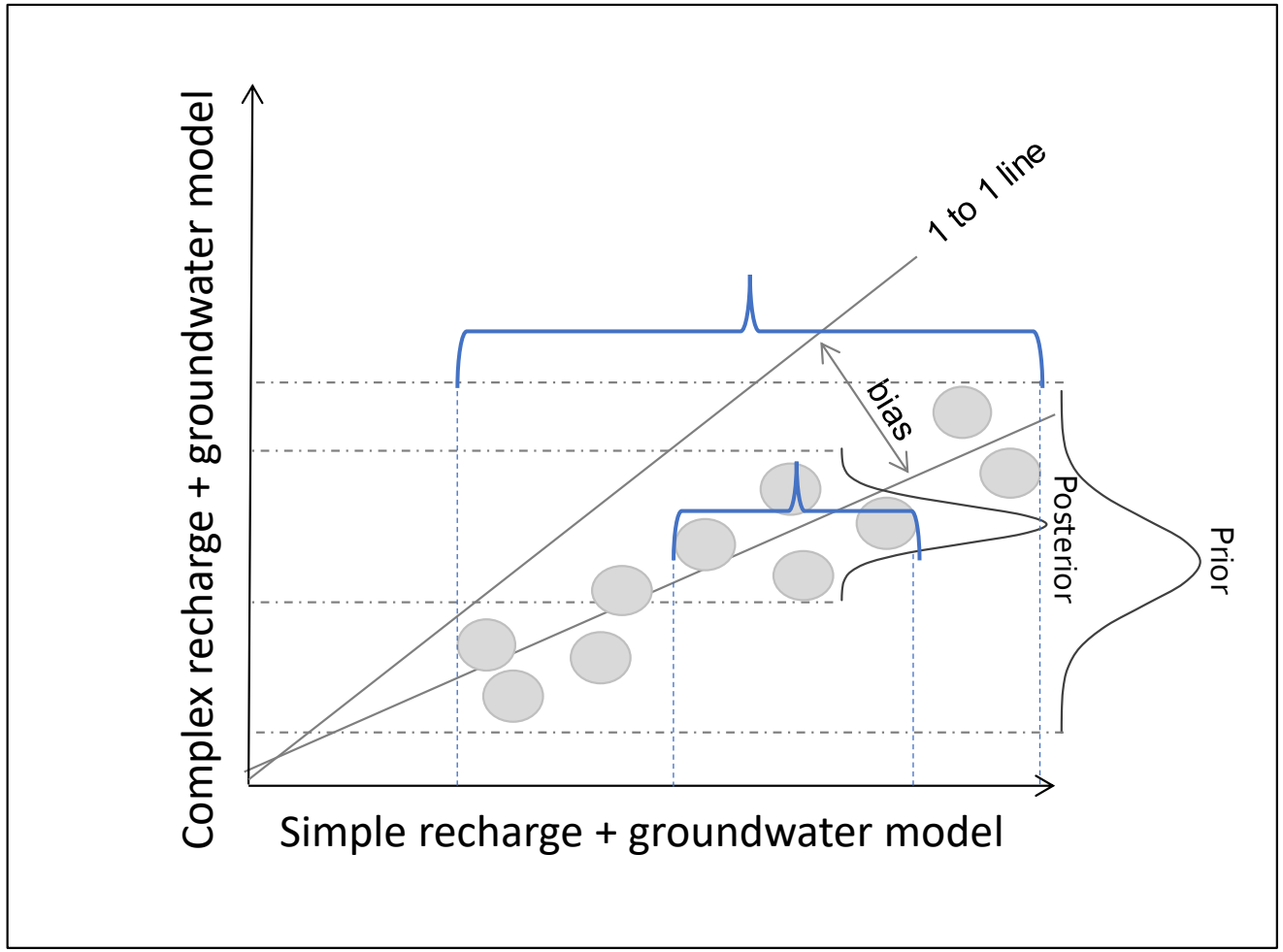


Objectives and Case study

Complex-Simple model analyses

Complex reference model

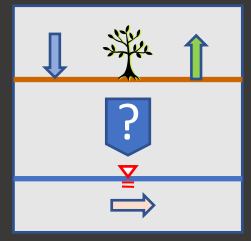
(VFM cell-by-cell)
Fines scaled + 1D simplification of numerical solution of unsaturated flow



Simple models

- VFM_LUMPED: Upscaled + 1D simplification of numerical solution of unsaturated flow
- OWHM: Upscaled + analytical solution of pressure head in root zone (FMP) and 1D approximation of numerical solution in deeper vadose zone (UZF)
- LUMPREM: Upscaled + bucket model
- BASE: Upscaled + empirical equation

Cross section model



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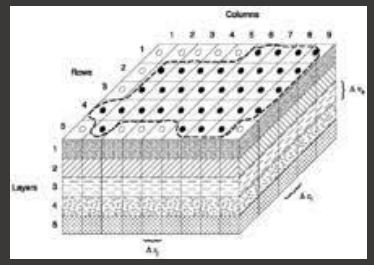
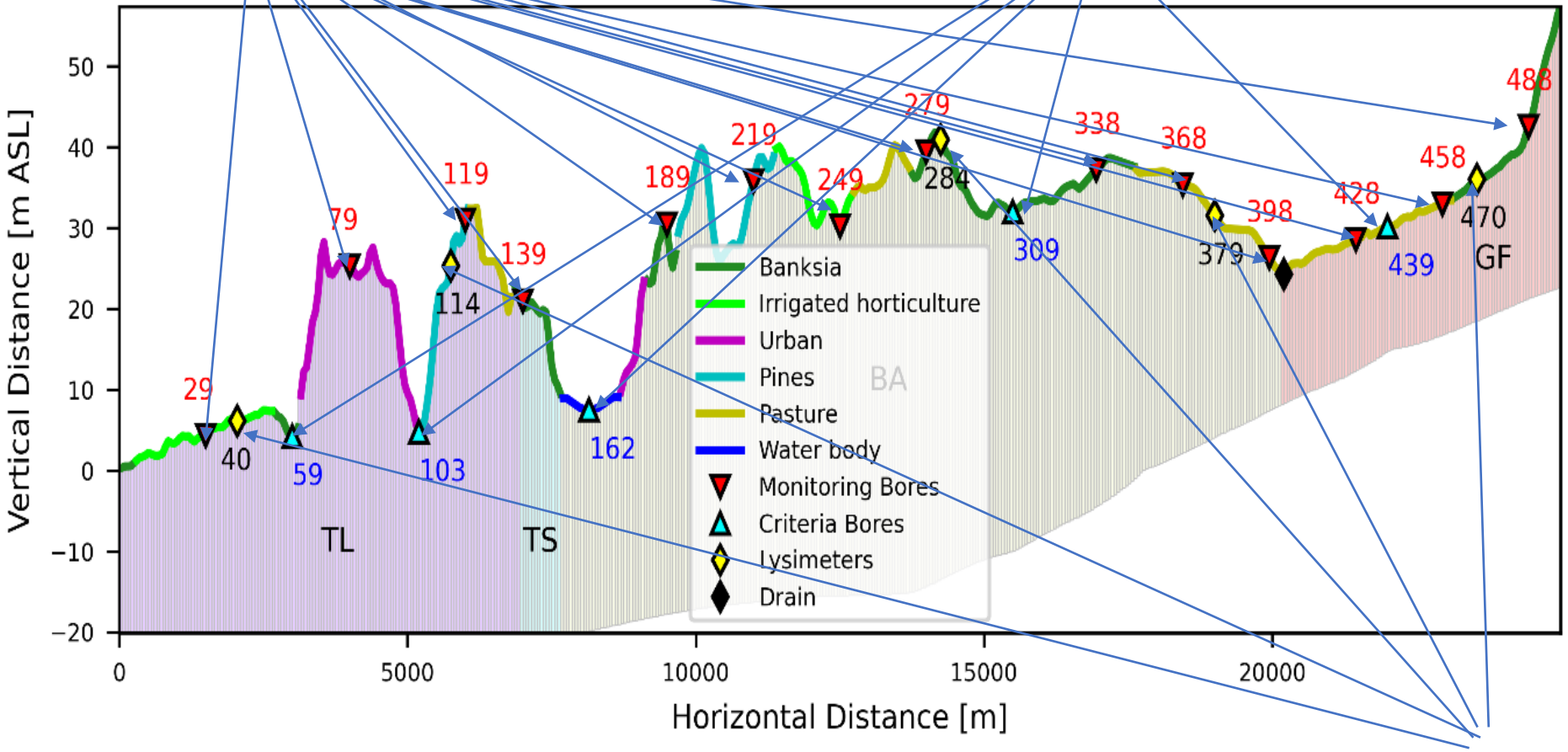


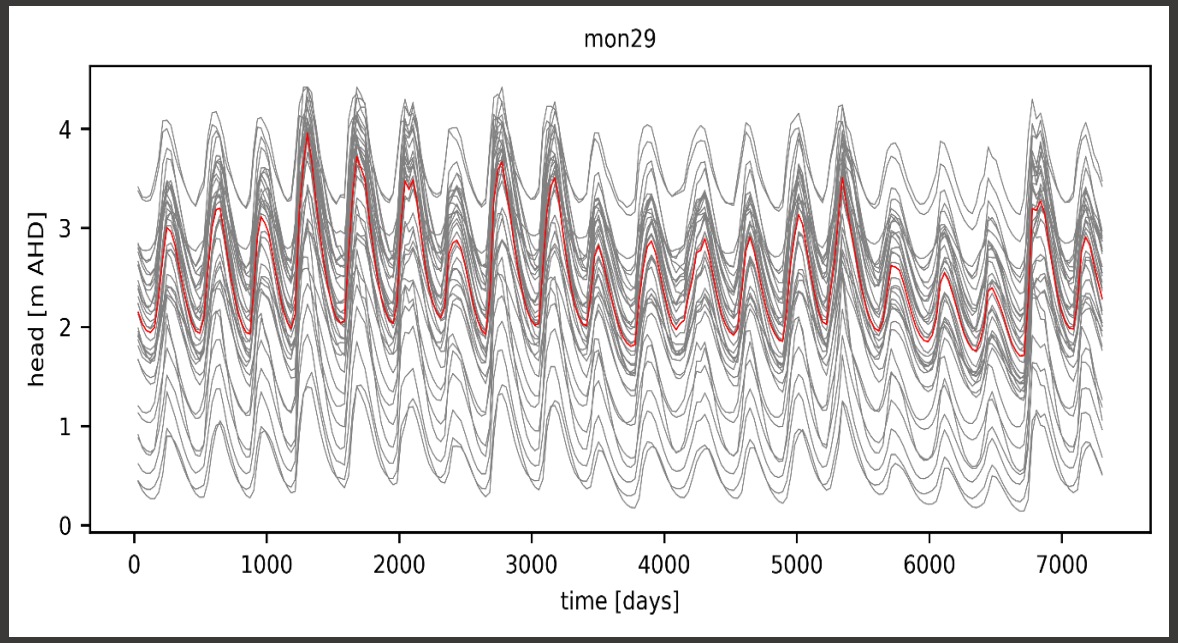
History matching bore locations

Prediction bore locations

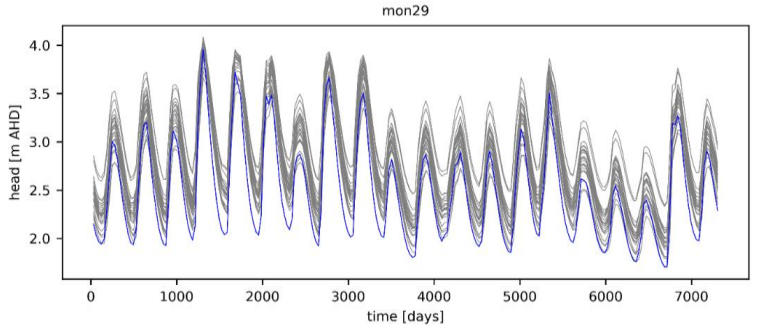


History matching lysimeter locations

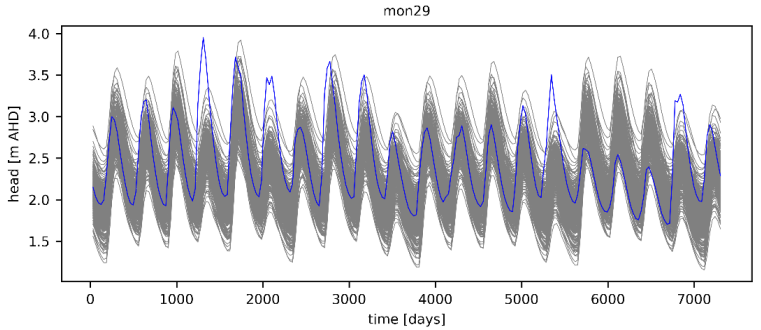
History matching groundwater levels



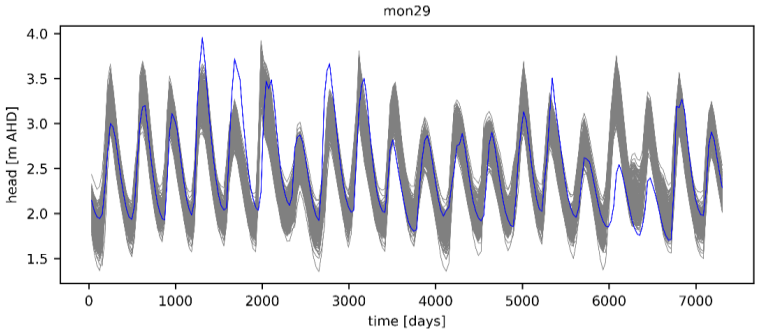
Groundwater levels from complex model realisations



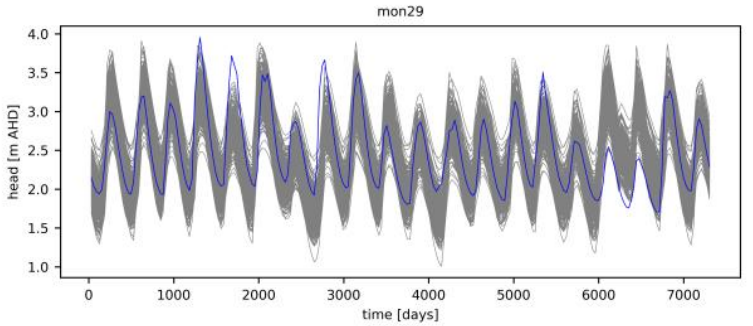
VFM-Lumped



Base

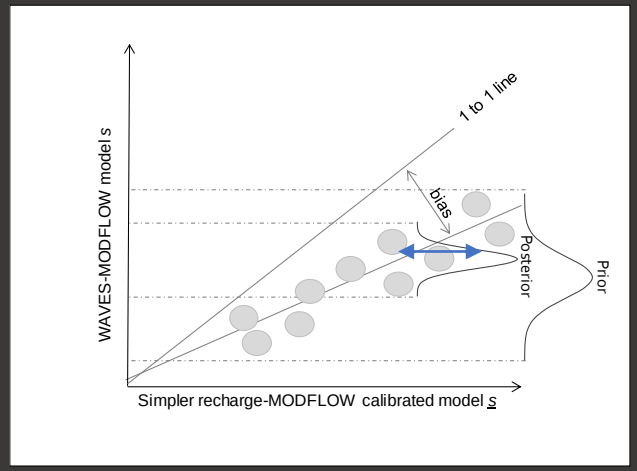


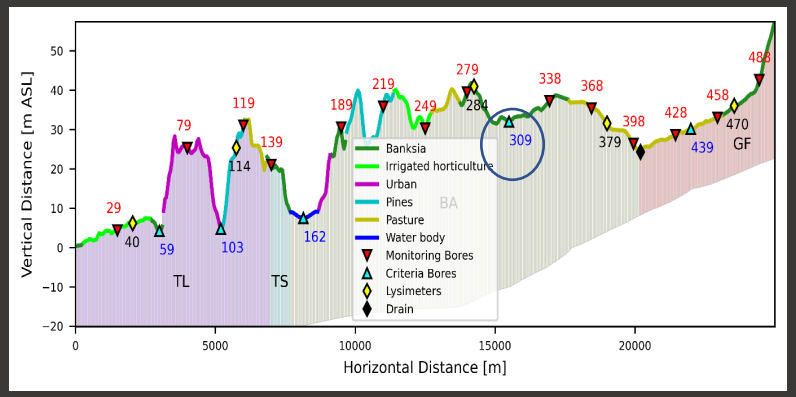
OHWM

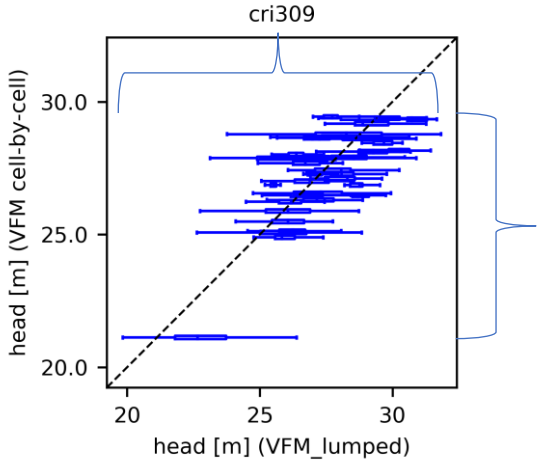


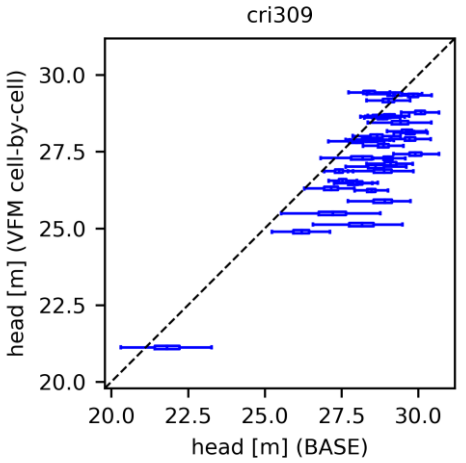
Lumprem

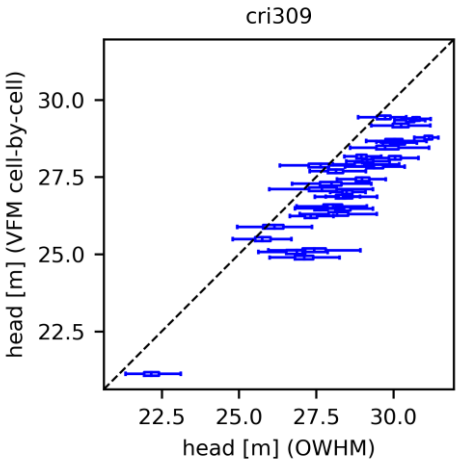
Predicting groundwater levels

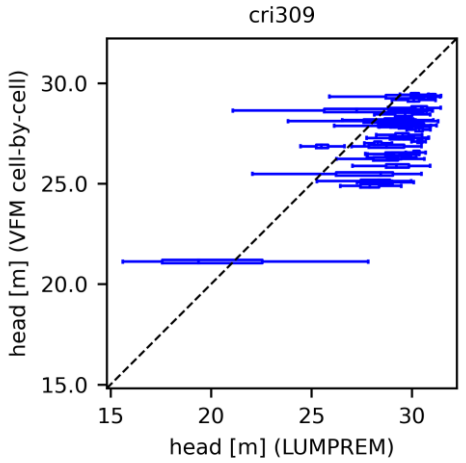




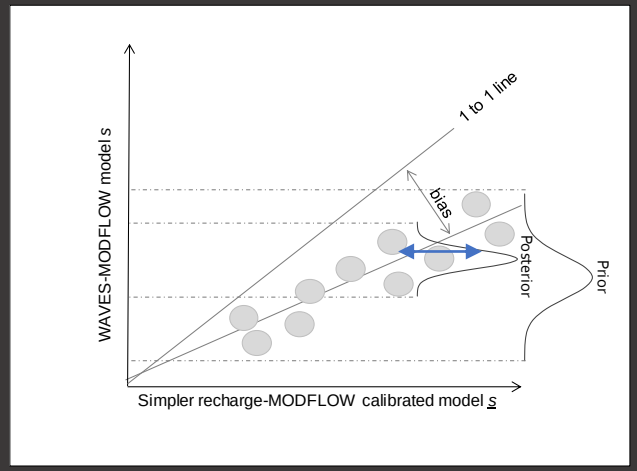


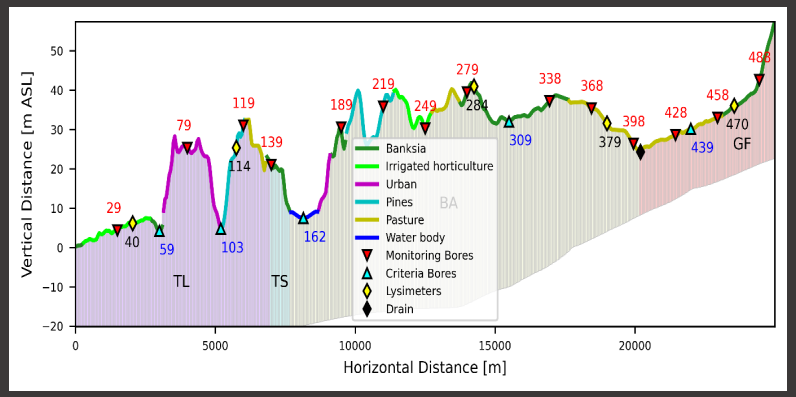


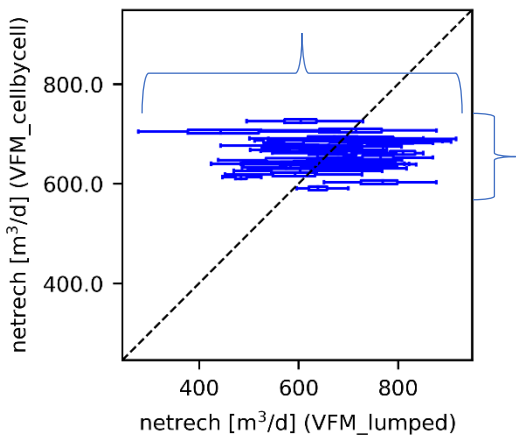


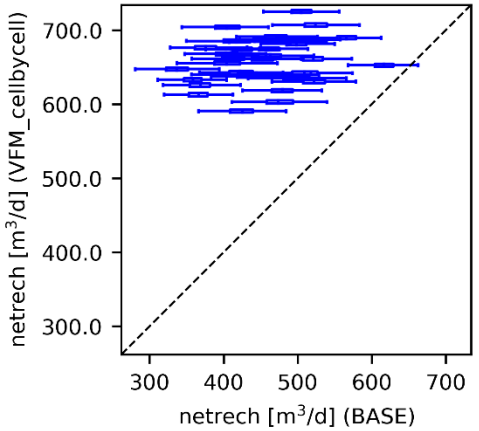


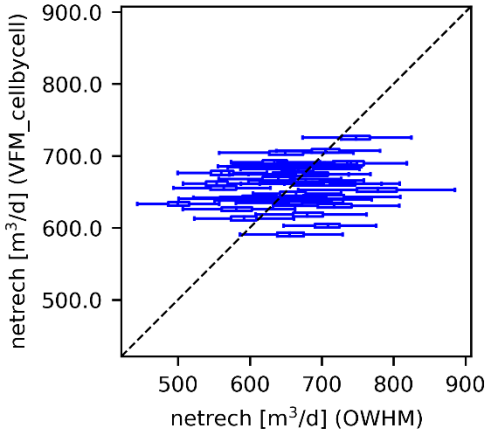
Predicting net recharge

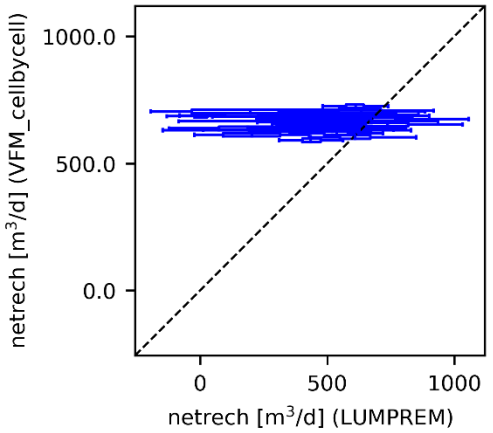












Conclusions to date

1. Complex-simple model analyses relies heavily on scripted workflows.
2. Simplification impacts leading to increased uncertainty are significant for net recharge predictions, whereas head predictions are reasonably robust.
3. All model simplifications increased the uncertainty in recharge predictions and introduced some bias when simplifying the recharge process representation.
4. Even the standard practice of upscaling parameters (as seen with the VFM-Lumped model) recharge uncertainty increased significantly, suggesting that better process representation may not always be worth the trouble.