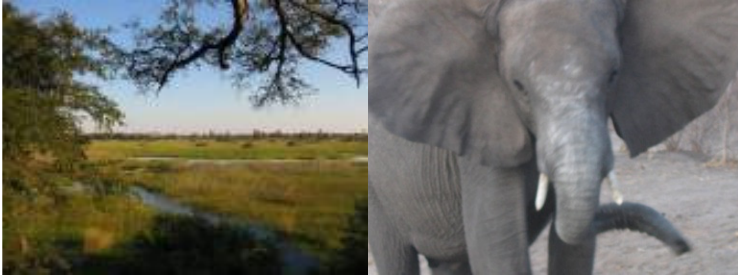




A spatial model of elephant, vegetation and fire dynamics for scenario-based adaptive management simulations

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Department of Agricultural & Biological Engineering



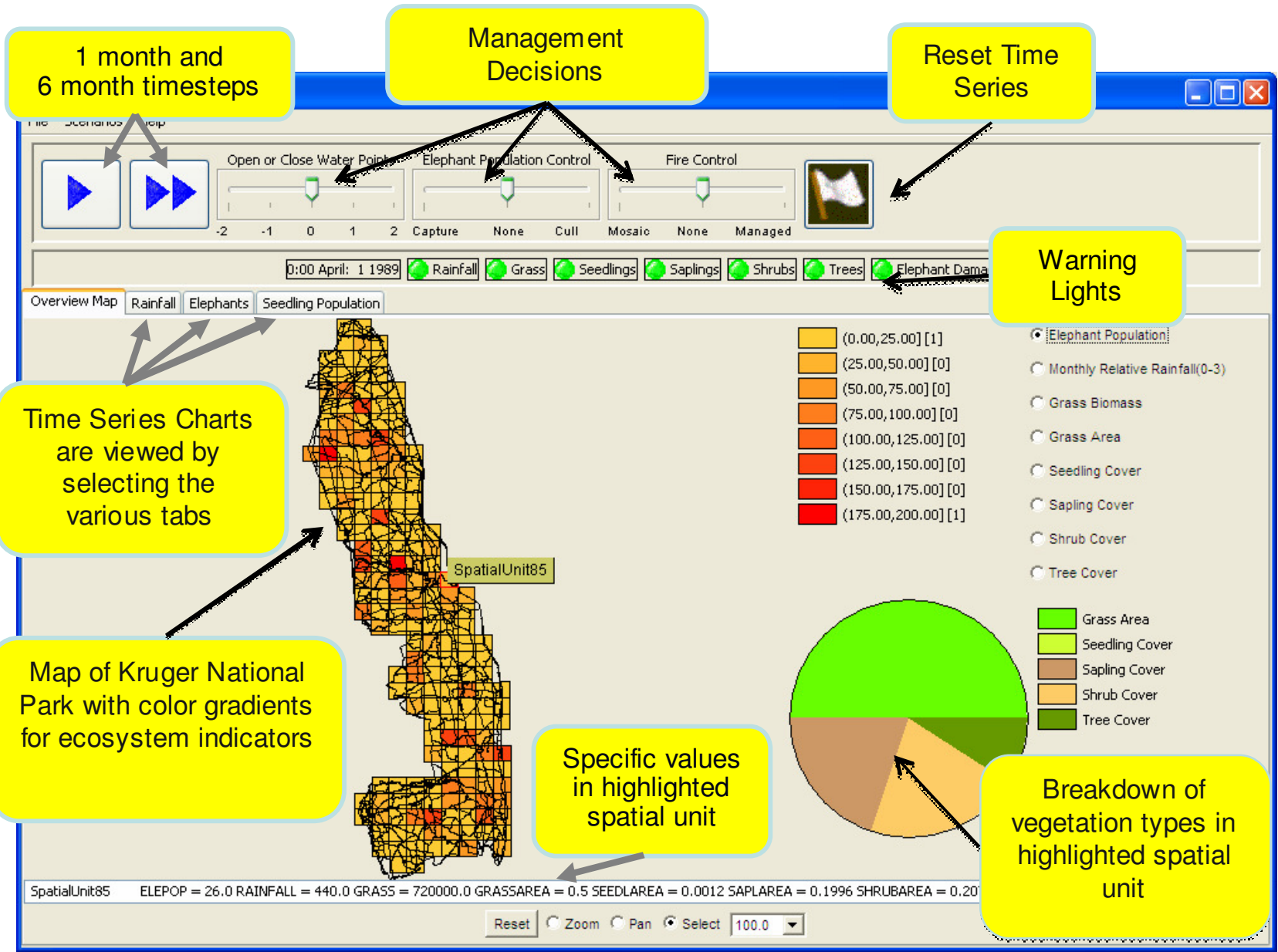
Overview



- Challenge: Modeling for Adaptive Management
 - Landscape Scale Elephant/Vegetation Modeling
 - Uncertainty and sensitivity analysis
 - Global sensitivity analysis techniques
 - Decision analysis techniques
- Integration for Scientific and Institutional Learning

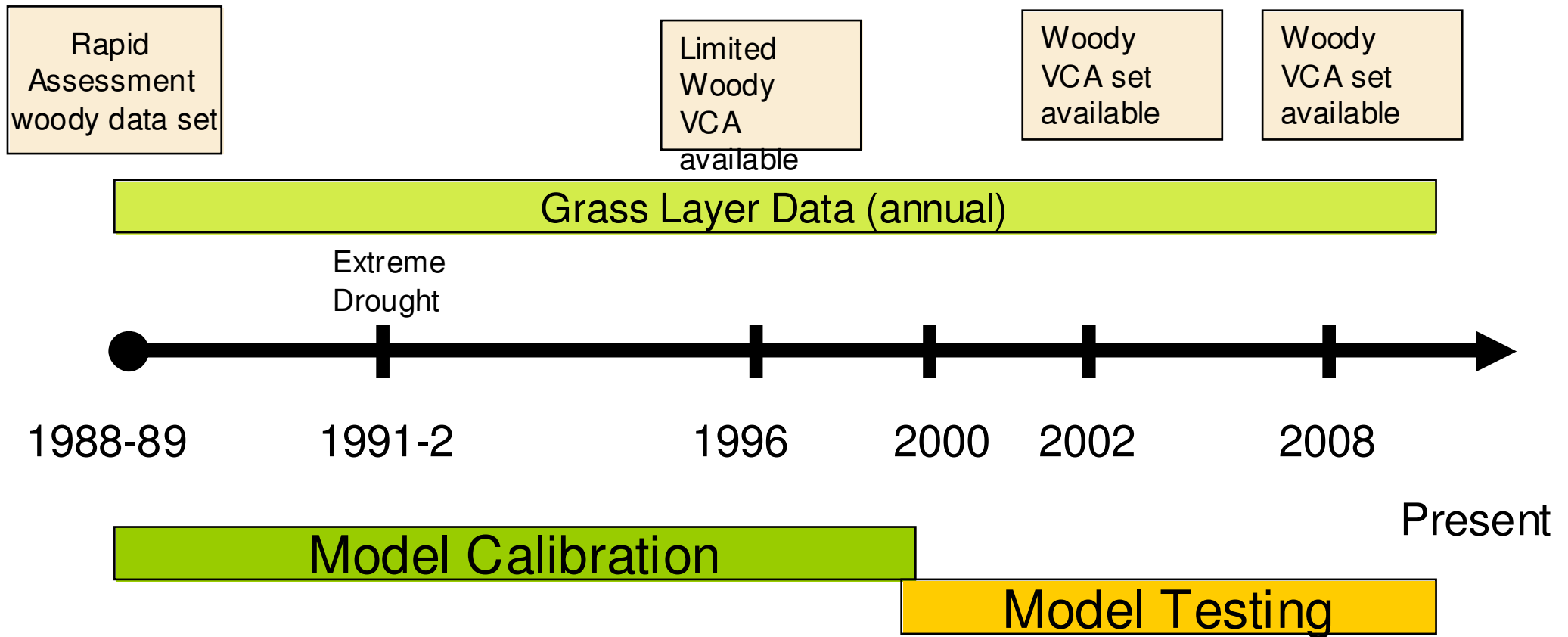


QnD: EleSim



- Adapted from Baxter & Getz (2005)
- 195 grids
 - 10 km x 10km
- Time Step
 - 1 month
- Grass (kg)
- Trees (#)
 - Seedlings (<1m)
 - Saplings (1-2m)
 - Shrubs (2-3m)
 - Trees (>3m)
- Elephants (#)
- Fire
- Water points

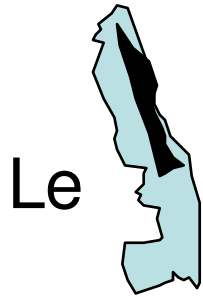
Model Testing Strategy



Historical Data as inputs: Rainfall, Fire, Elephant Populations

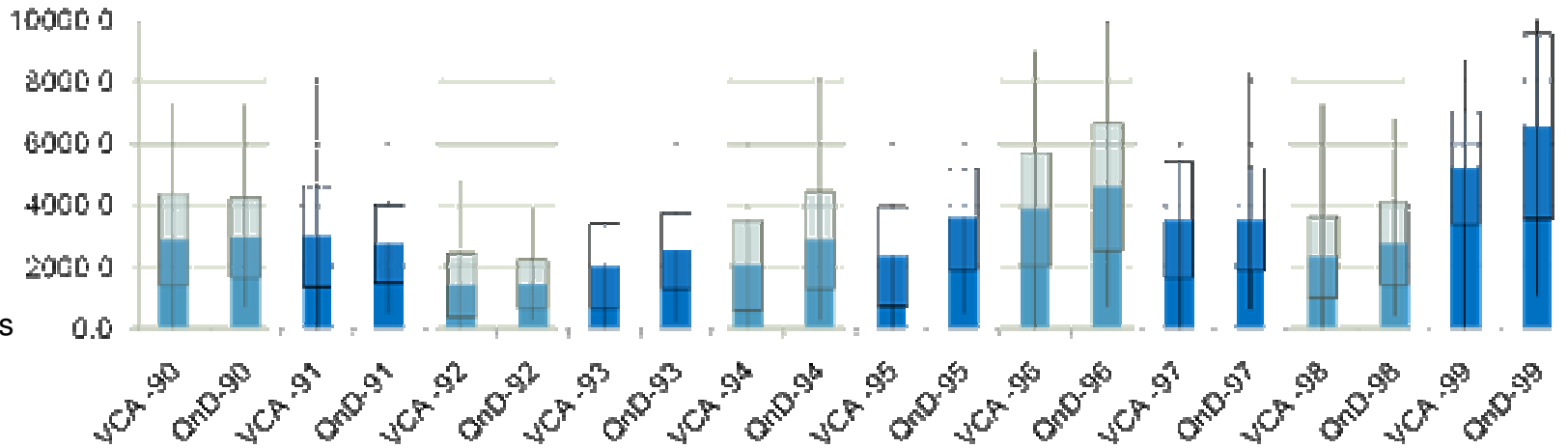
Peak Herbaceous Biomass (kg/ha) Comparisons

Observed (VCA) vs Simulated (QnD)



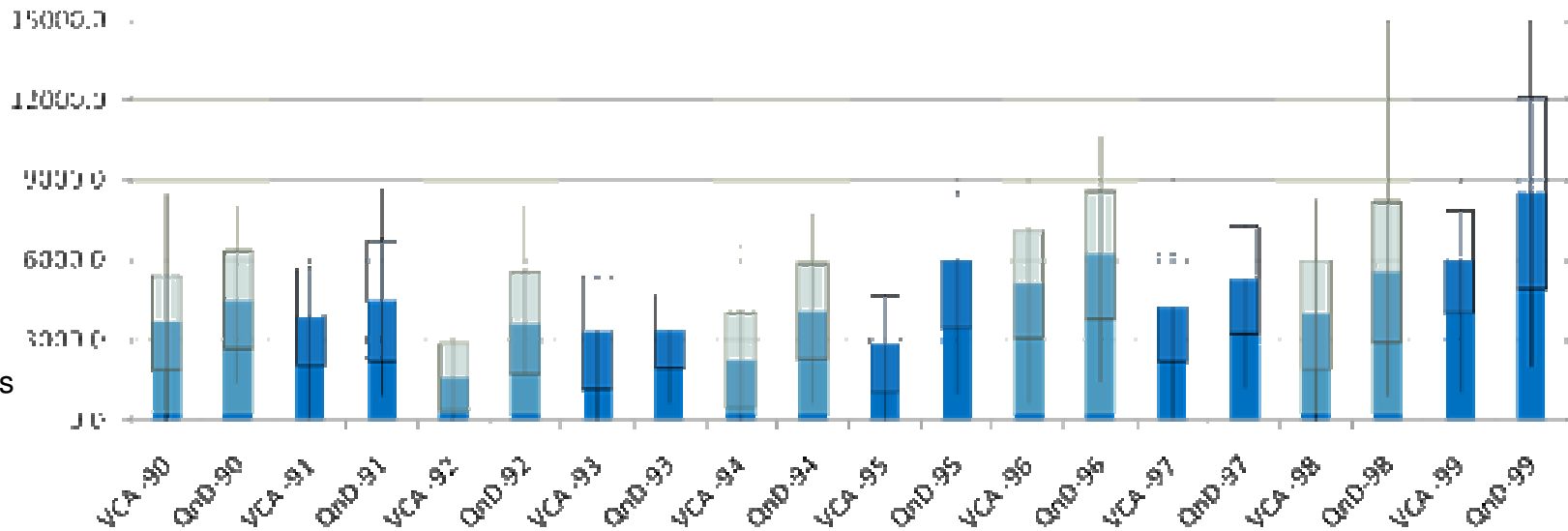
Le

VCA n = 90 -110 sites
QnD n = 35 grids



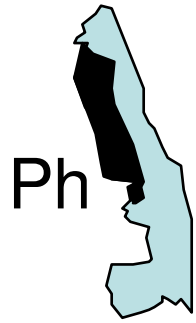
Sa

VCA n = 71 -77 sites
QnD n = 27 grids

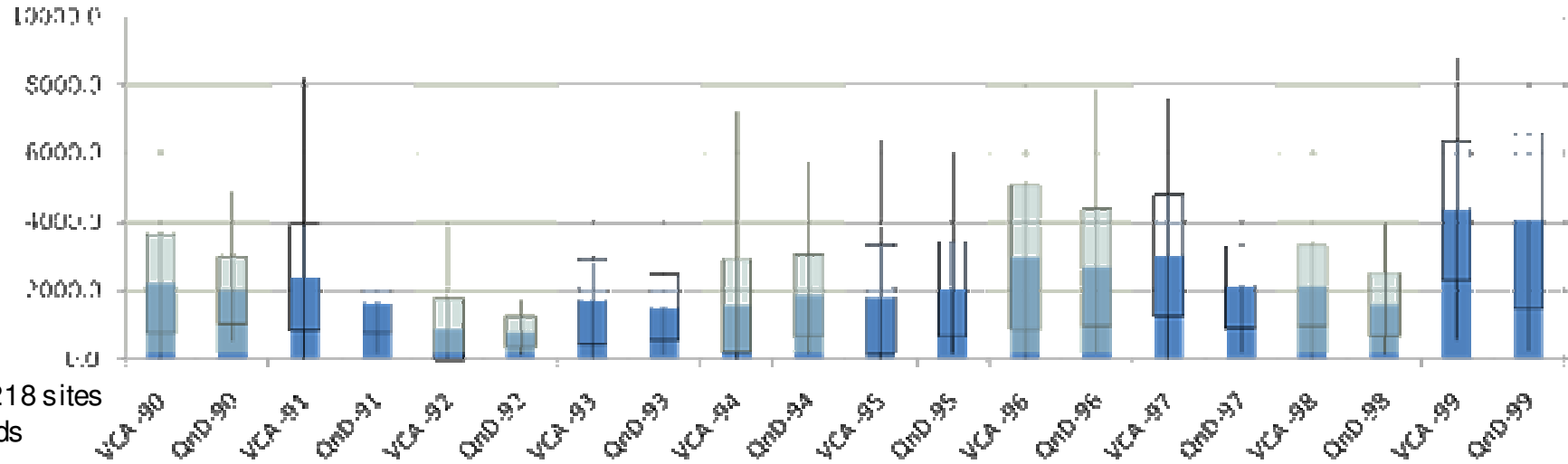


Peak Herbaceous Biomass (kg/ha) Comparisons

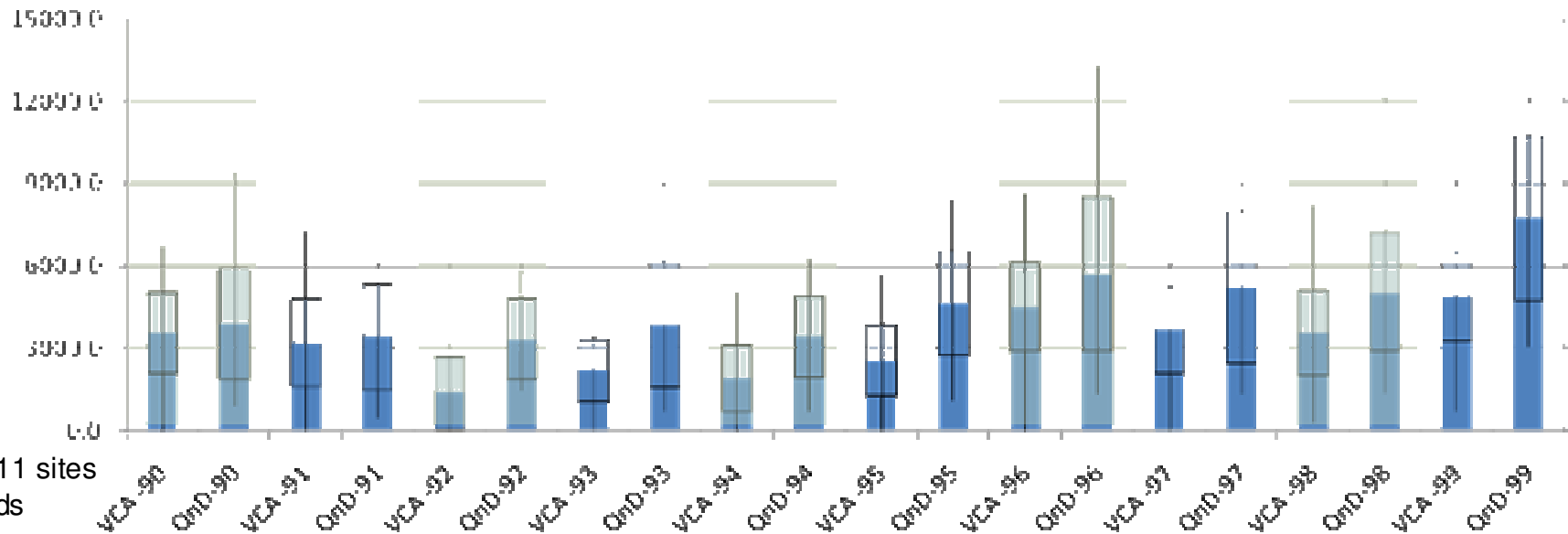
Observed (VCA) vs Simulated (QnD)



Ph



Sk



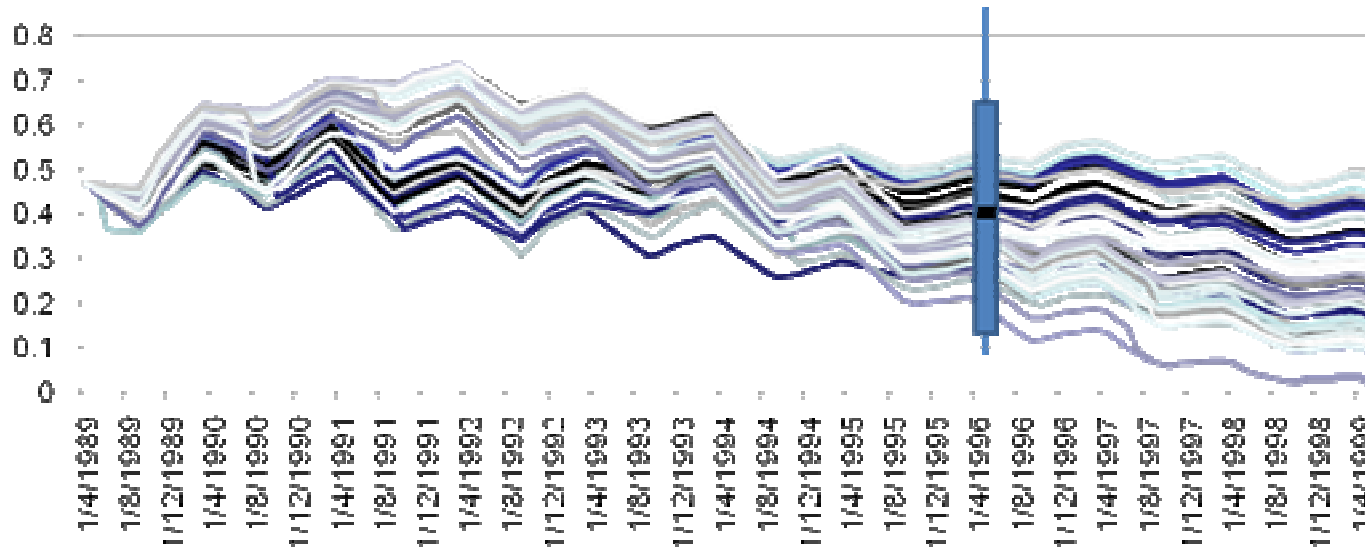
Total Woody Cover (%) Comparisons

Observed (wVCA1996) vs Simulated (QnD) grids

Ph



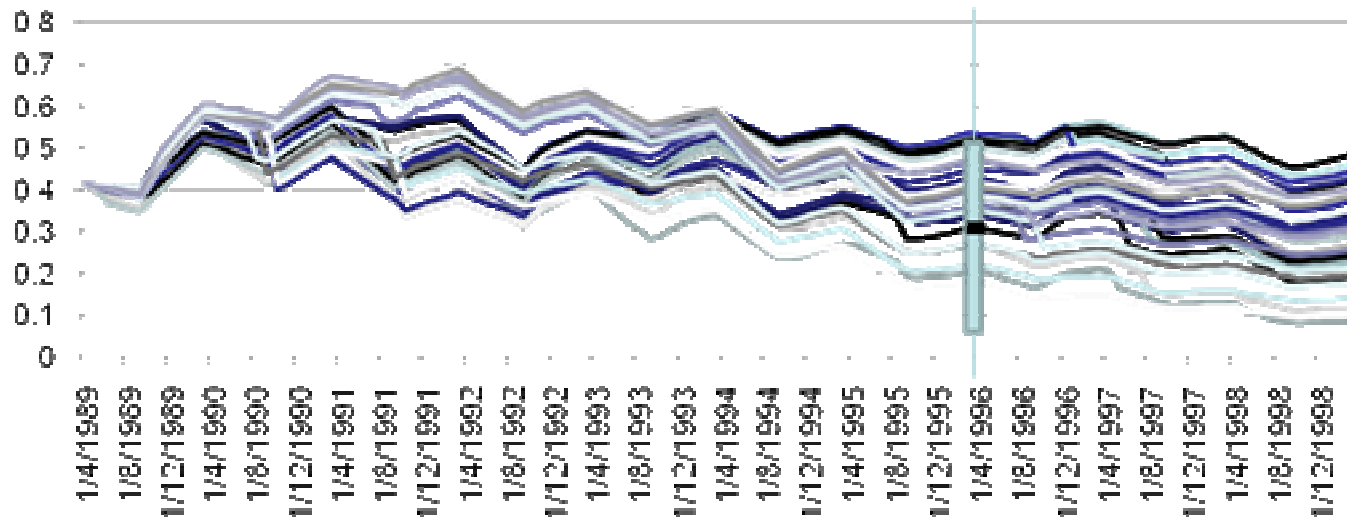
VCA n = 14 sites
QnD n = 52 grids



Le



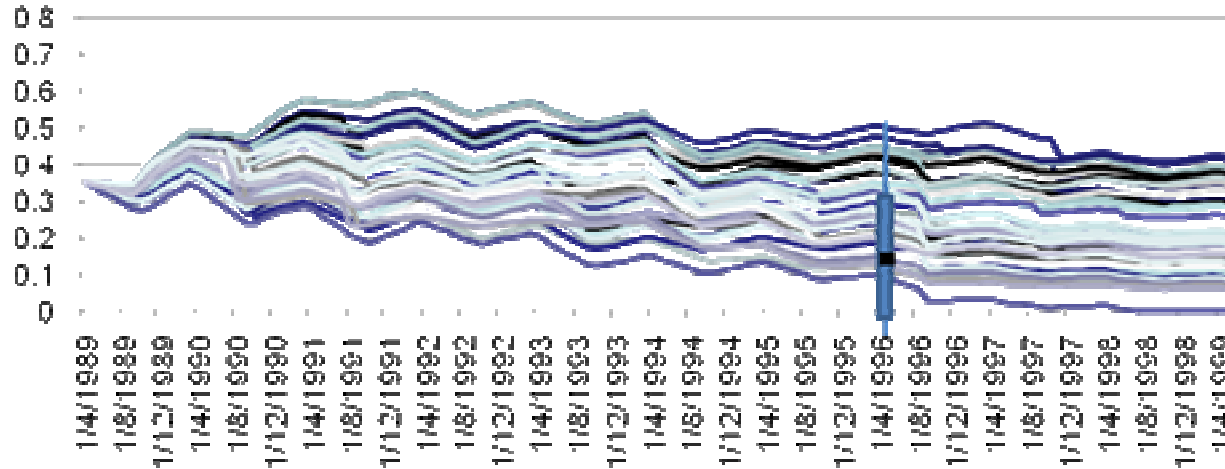
wVCA n = 24 sites
QnD n = 35 grids



Total Woody Cover (%) Comparisons

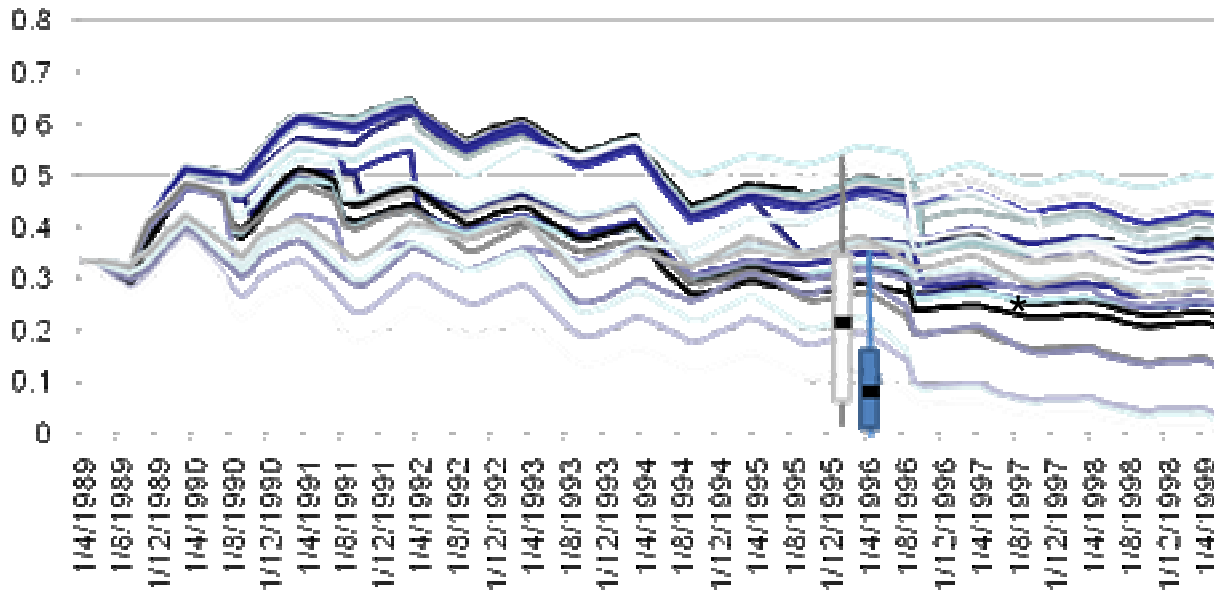
Observed (wVCA1996) vs Simulated (QnD) grids

Sk

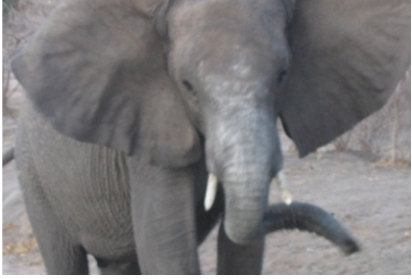


VCA n = 24 sites
QnD n = 43 grids

Sa



wVCA n = 21 sites
QnD n = 27 grids

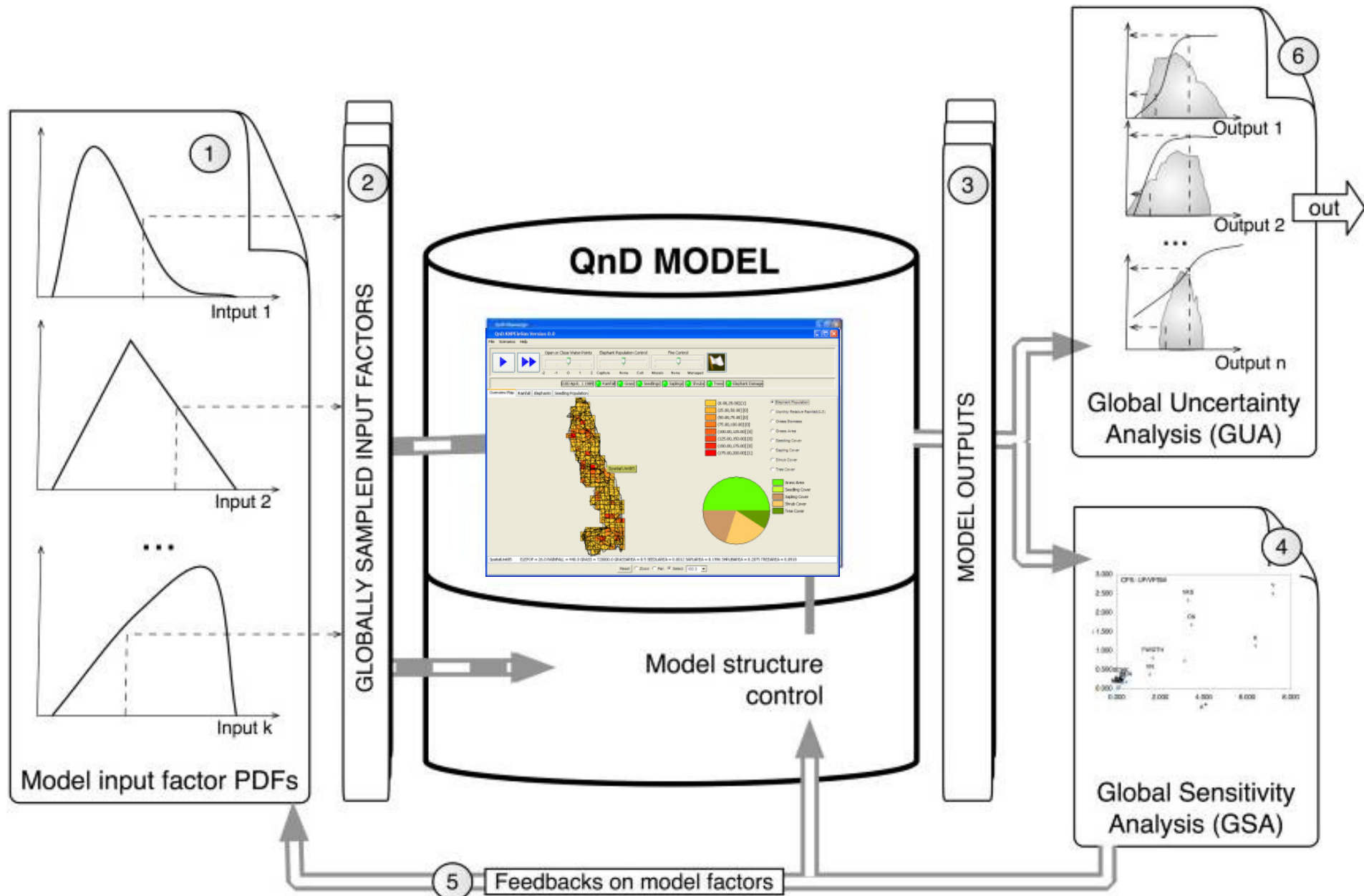


Discussion

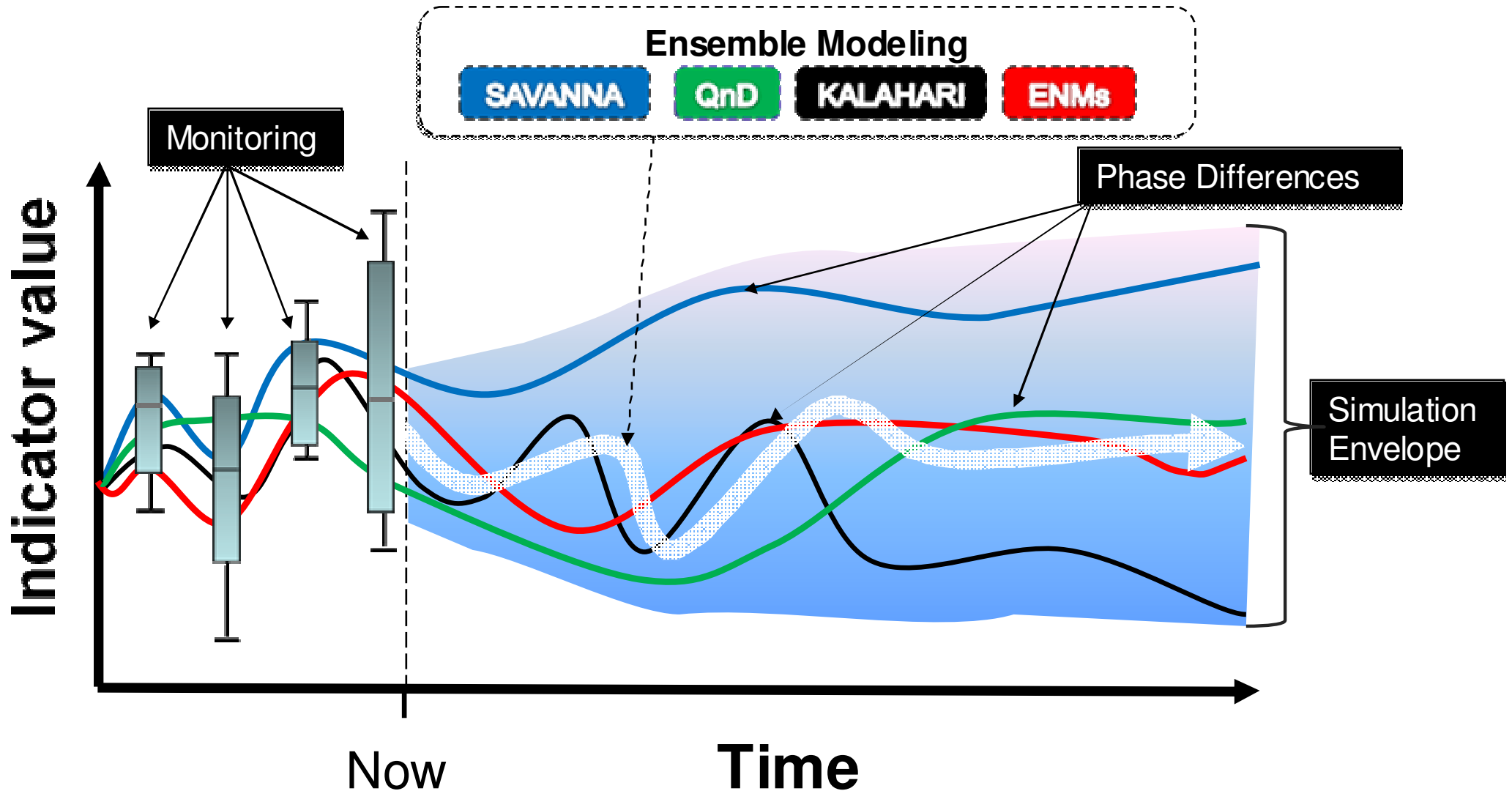


- **Calibration/Validation**
 - Wide variance of monitored data within Land Systems
 - Some WC over-prediction of basalt-based LS
 - Some WC under-prediction of granite-based LS
 - Grass biomass generally acceptable
- **Expansion of model testing/validation through 2009**

QnD:EleSim simulations for Global Sensitivity Analysis and Global Uncertainty Analysis



The Future? Ensemble modeling allows simulation and combination of models in uncertain futures



Thank you!

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