

FLUXMOD

A Process-based Framework for Improving Pesticide Volatilization Estimates from Soil

Seok Min Hong^{1,2}, Rafael Munoz-Carpena^{1*}, Naresh Pai³, Rob de Rooij¹, George Sabbagh³

¹ Department of Agricultural and Biological Engineering, University of Florida, Gainesville, Florida, USA

² Department of Convergent Environmental Science, Dongguk University, Goyang-si, Republic of Korea,

³ Bayer CropScience, LLC, St. Louis, Missouri, USA

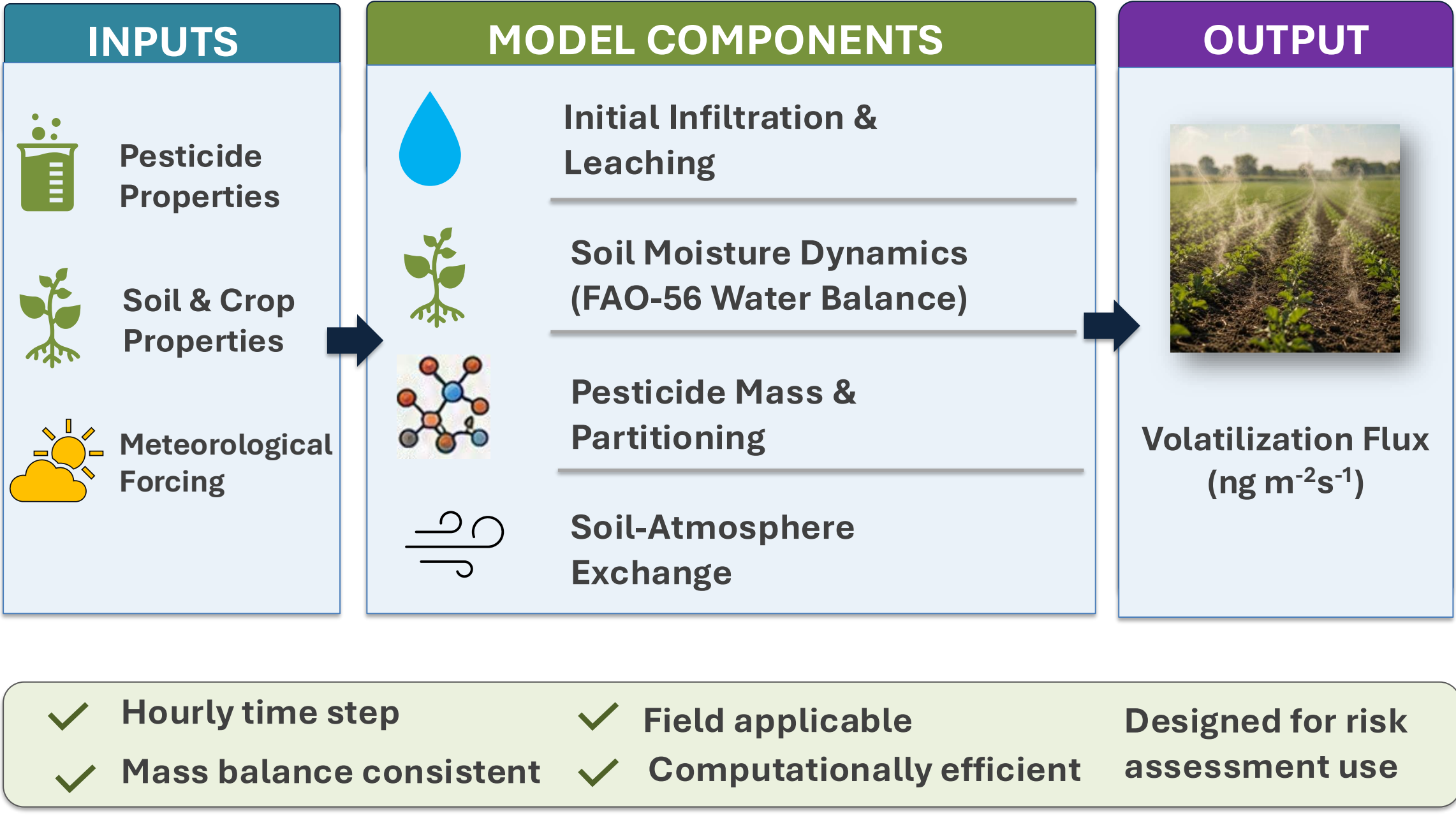
UNIVERSITY of FLORIDA



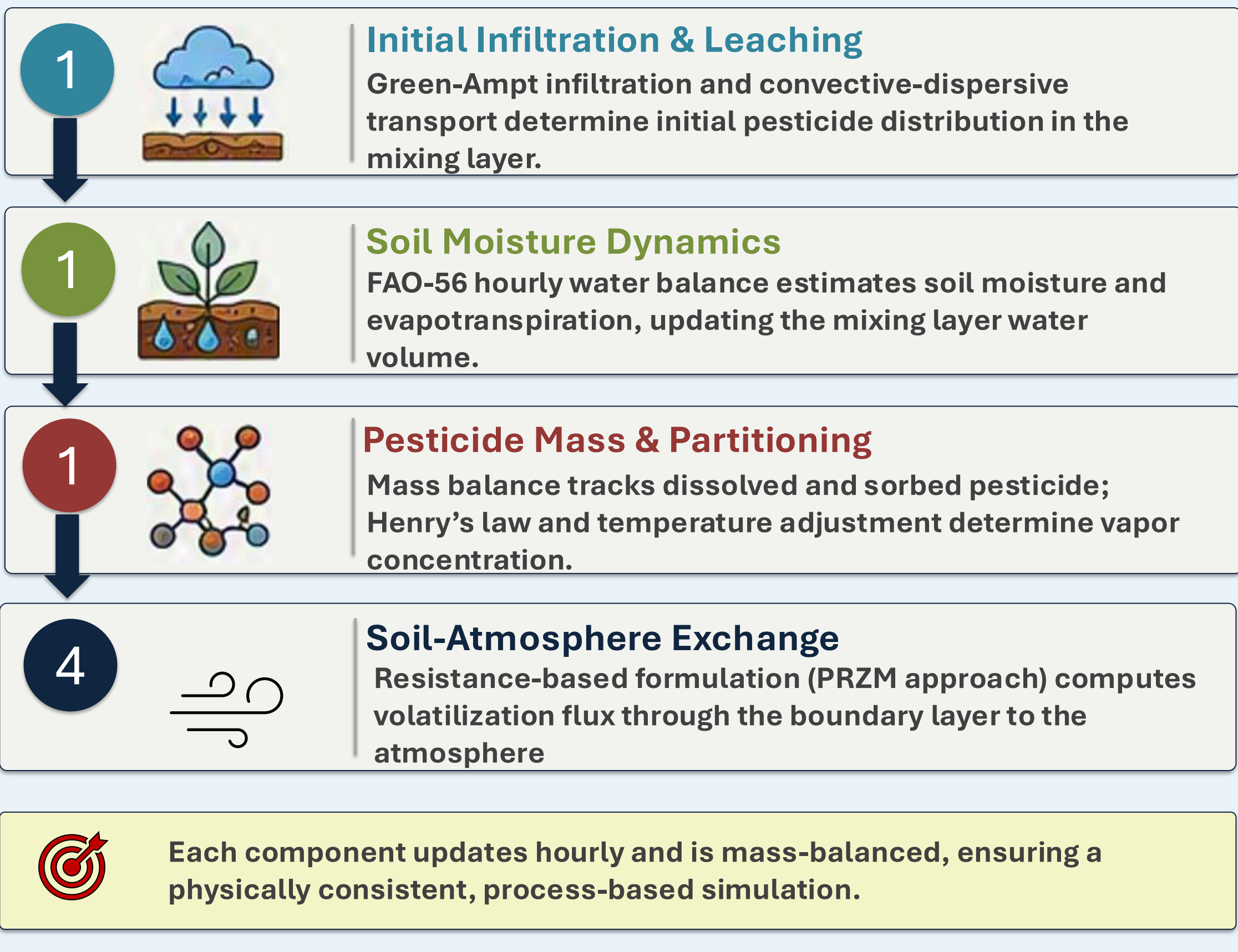
FLUXMOD SIMULATES TRANSPORT/INFILTRATION DURING APPLICATION, providing initial conditions for soil moisture dynamics and volatilization processes.

1. FLUXMOD FRAMEWORK

FLUXMOD couples soil water, pesticide mass balance, and soil-atmosphere exchange processes to predict time-resolved volatilization flux under field conditions.

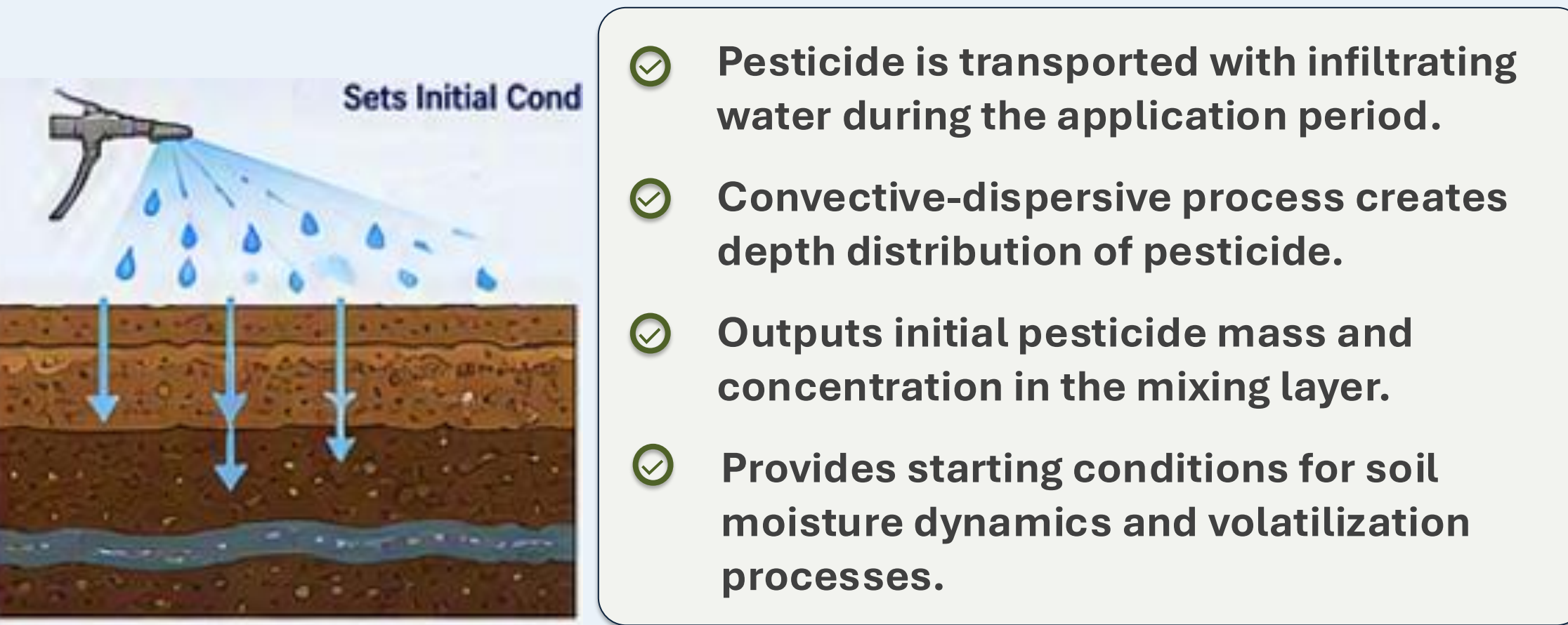


2. FLUXMOD COMPONENTS AT A GLANCE

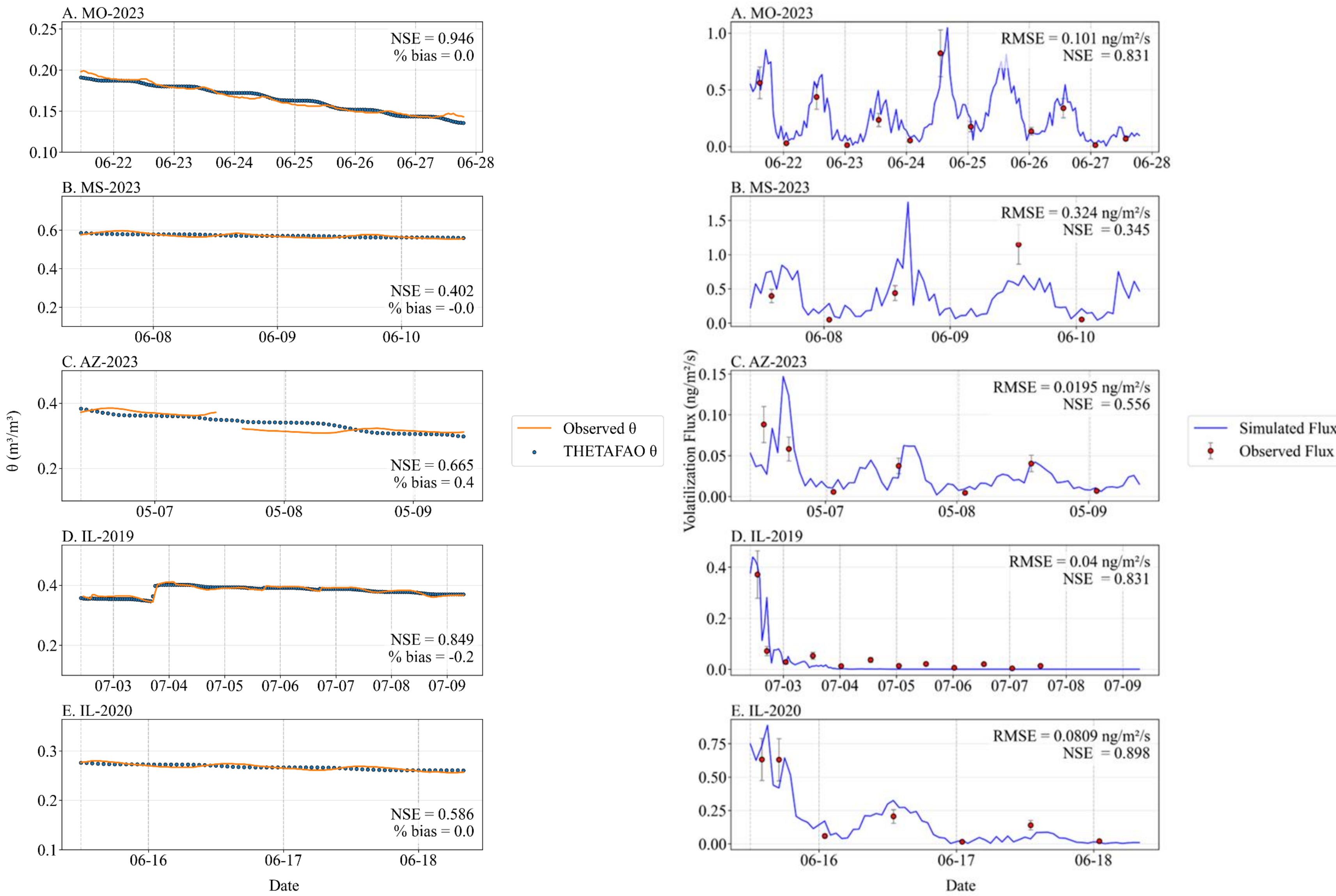


3. TRANSPORT/INFILTRATION DURING APPLICATION

Sets Initial Conditions for Subsequent Components



4. SOIL MOISTURE & FLUX VOLATILIZATION PREDICTION



FLUXMOD captures soil moisture and dynamic emission patterns with multiple peaks and decays during the first days after application across diverse field sites

5. MODEL PERFORMANCE SUMMARY (Against Observed Flux)

	MO - 2023	MS - 2023	AZ - 2018	IL - 2019	AZ - 2018
NSE (No Uncertainty)	0.831	0.345	0.556	0.831	0.898
KGE	0.688	0.311	0.674	0.898	0.916
RMSE ($\text{ng}/\text{m}^2/\text{s}$)	0.101	0.324	0.0195	0.040	0.0809

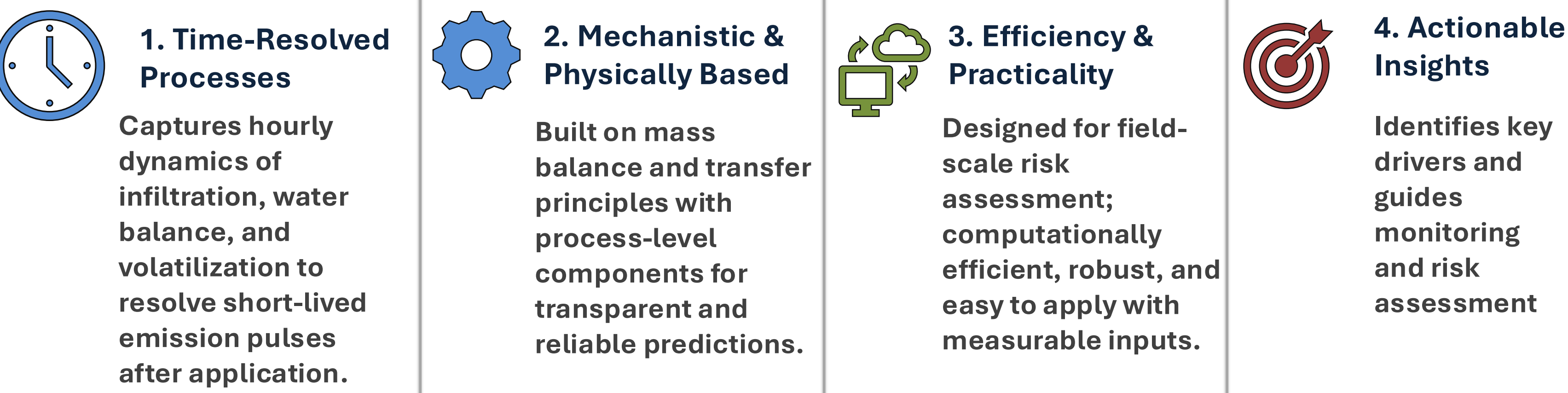


Including observational uncertainty (50%) improved NSE for most cases, indicating robust model performance under realistic measurement conditions.

6. GLOBAL SENSITIVITY ANALYSIS (SOBOL)



7. WHY FLUXMOD MATTERS?



9. TAKE-HOME MESSAGES

