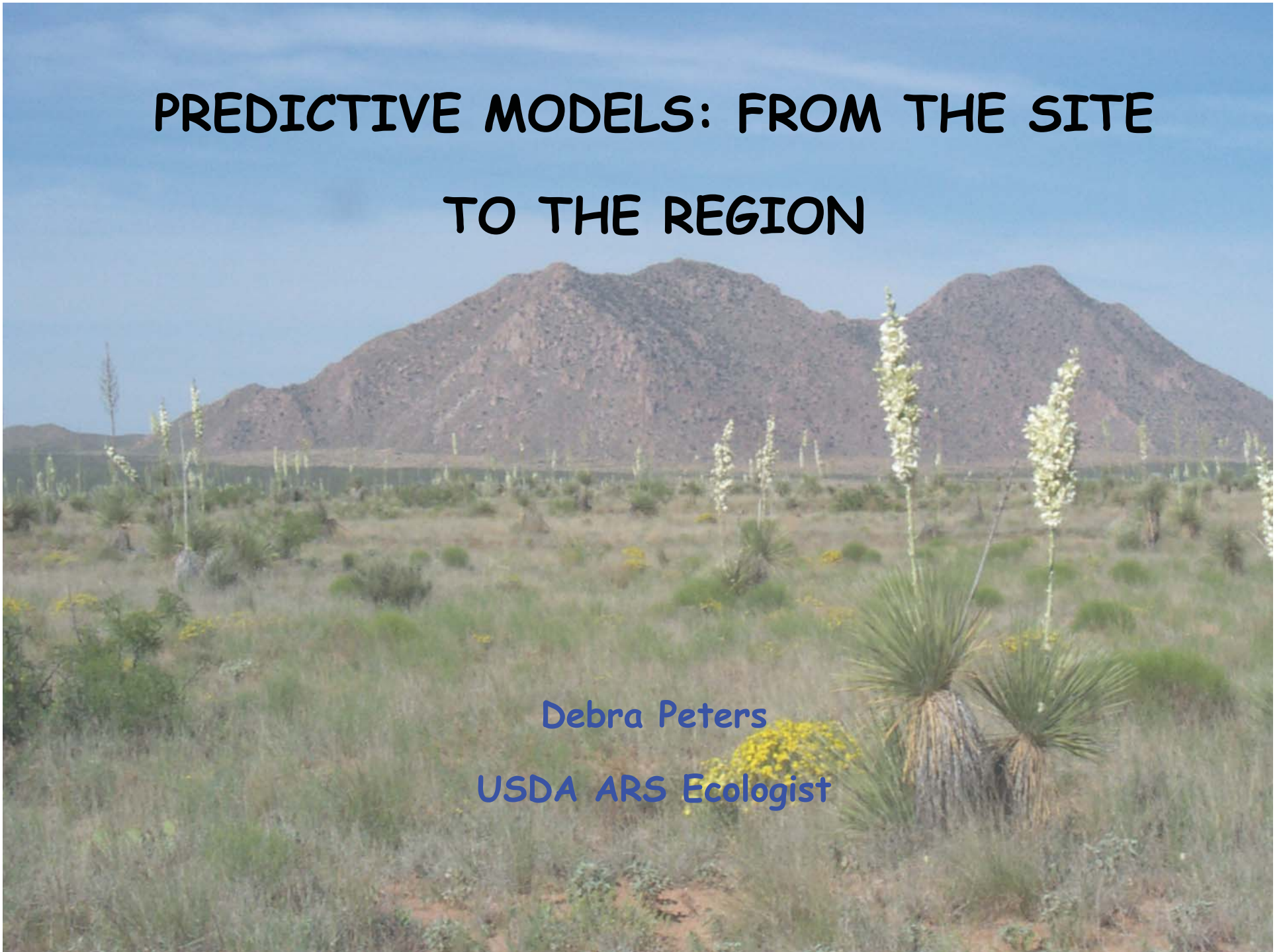


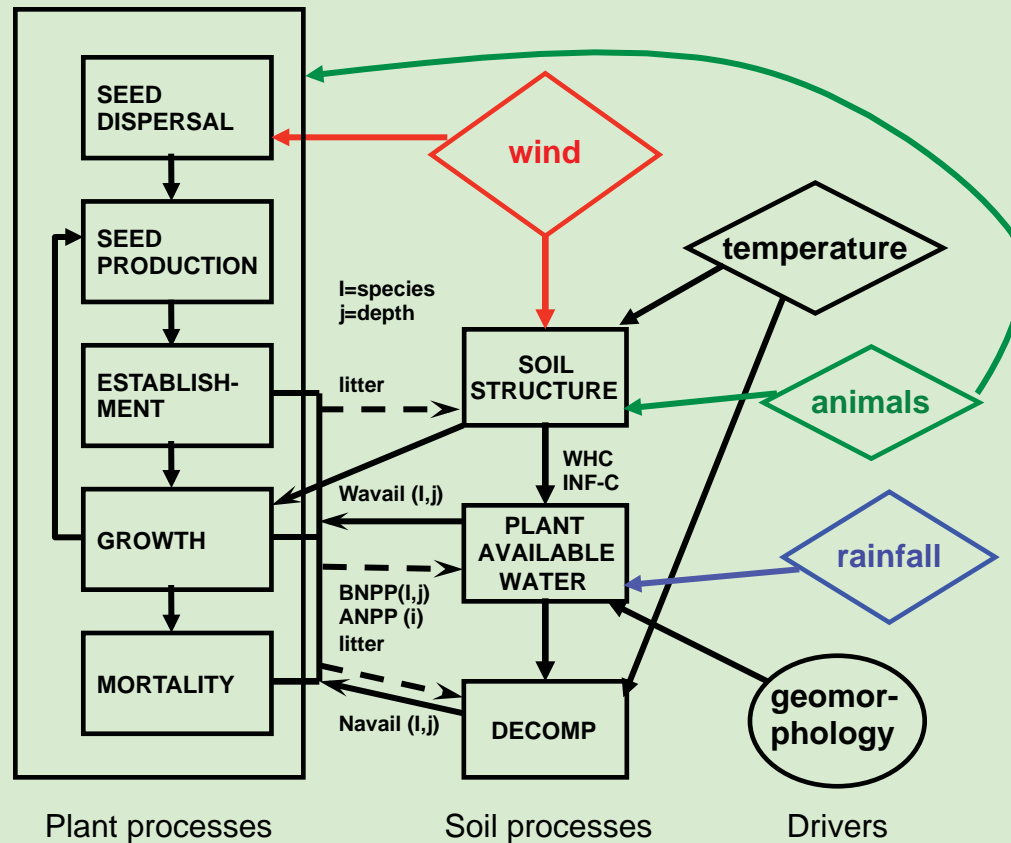
PREDICTIVE MODELS: FROM THE SITE TO THE REGION

Debra Peters

USDA ARS Ecologist



ENSEMBLE modular model



ECOTONE (plants)

SOILWAT (vertical water)

tRIBS (horizontal water) [Vivoni; ASU]

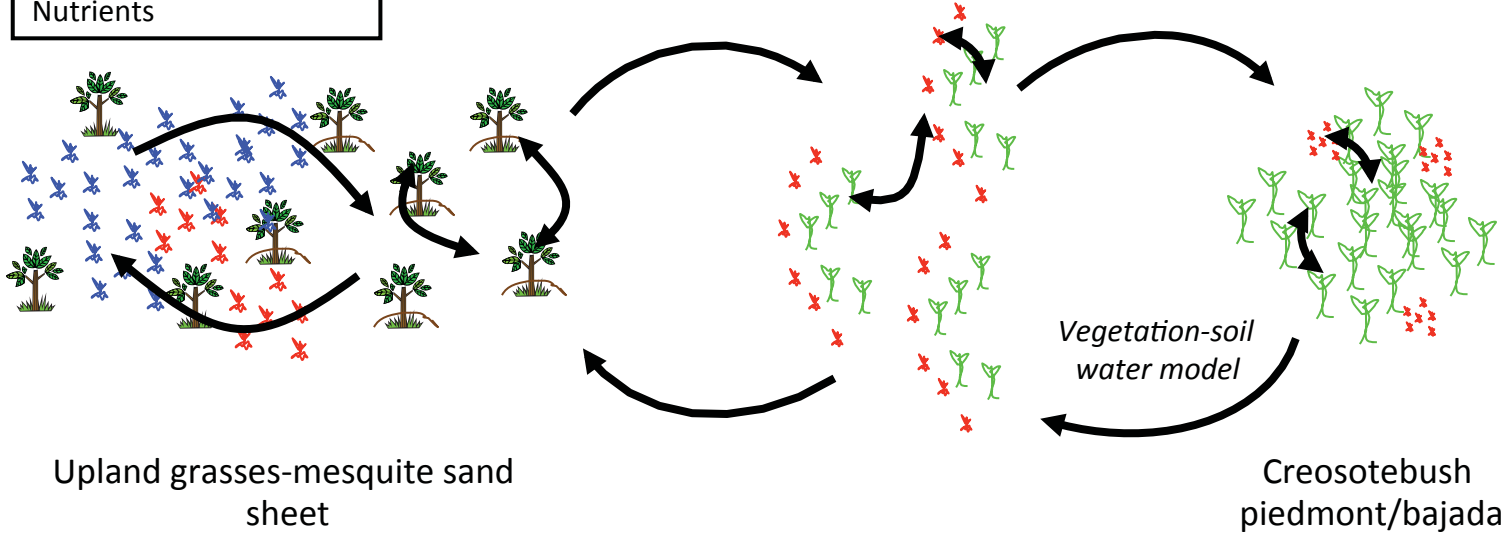
WEMO (wind) [Okin; UCLA]

Materials of transport

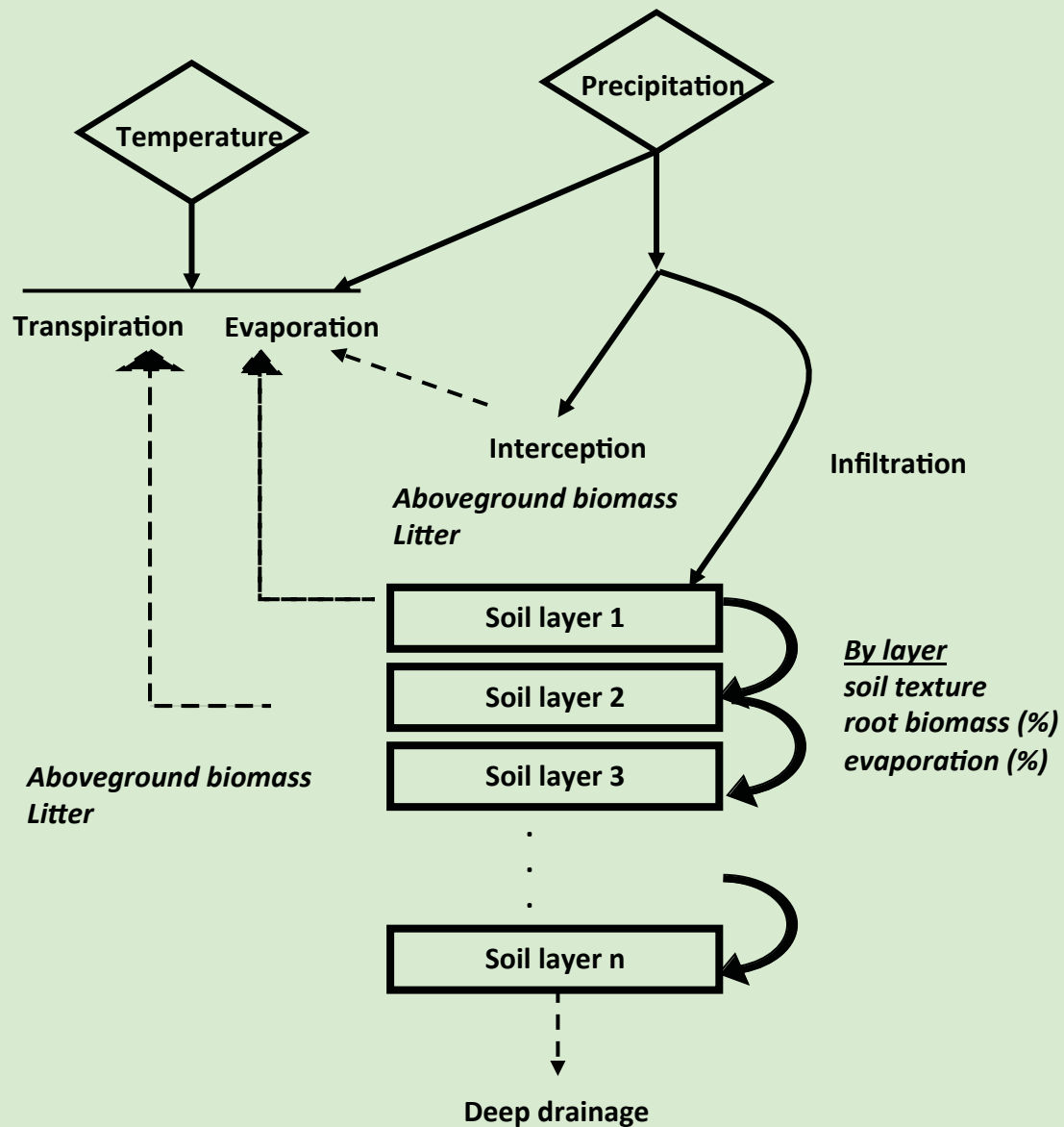
Water
Seeds
Soil particles
Litter
Nutrients

Transport models

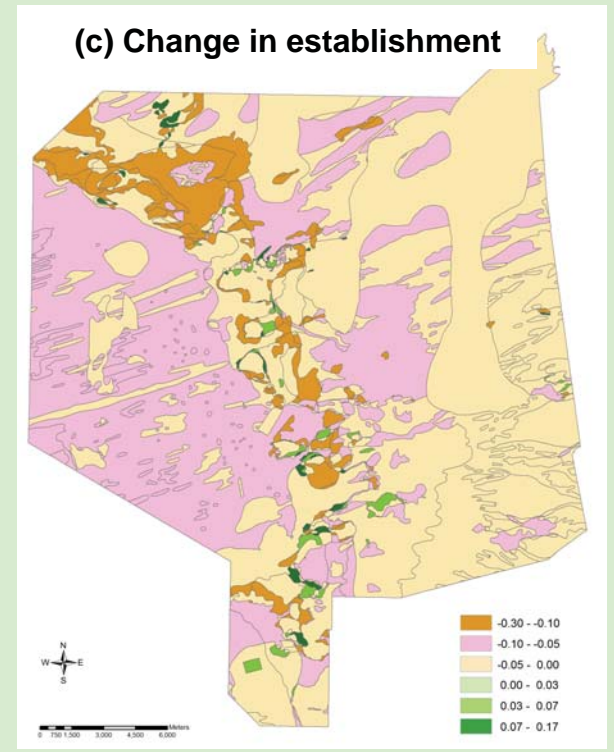
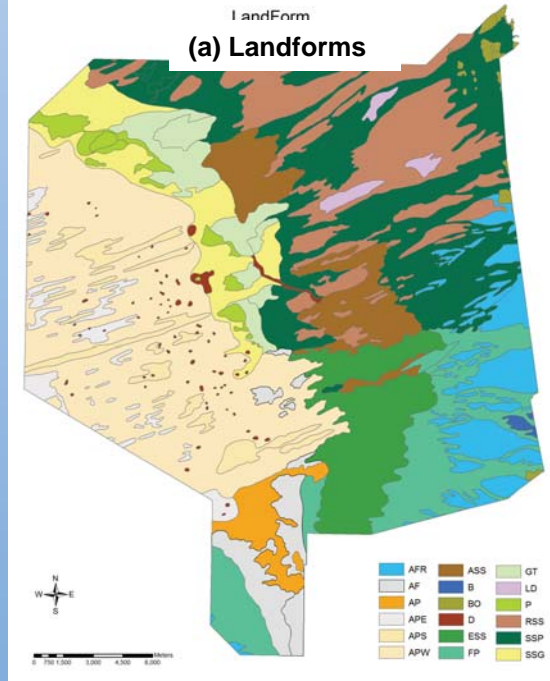
Hydrology
Wind
Animal



SOILWAT model to simulate daily soil water content by depth



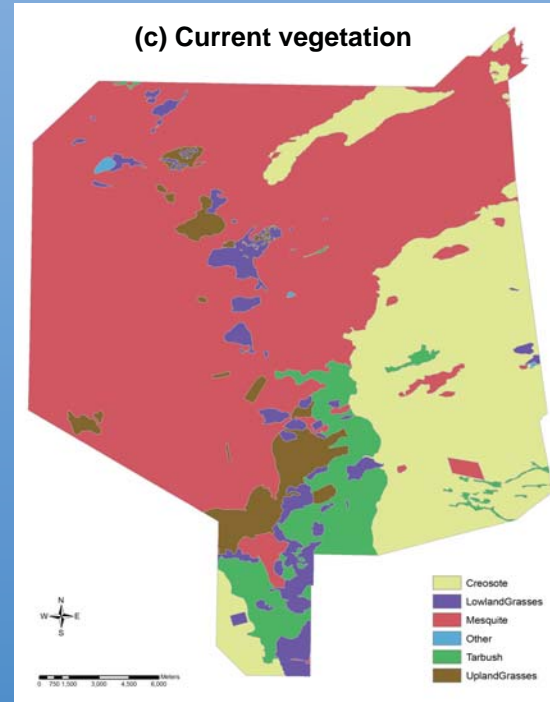
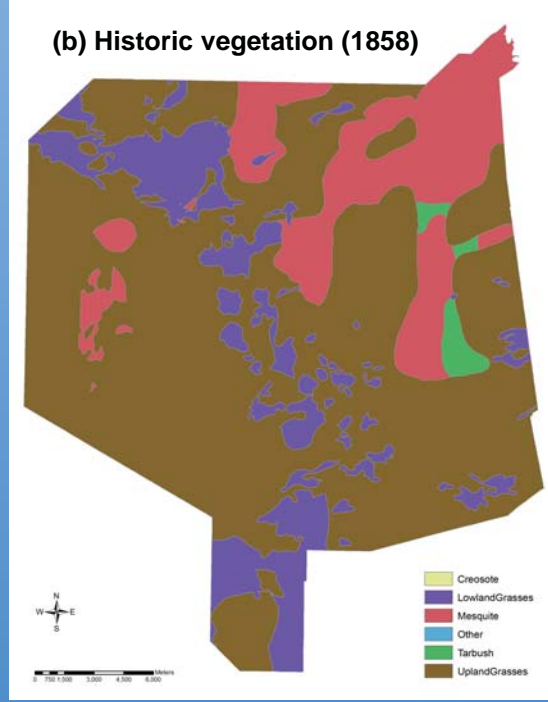
SOILWAT model inputs

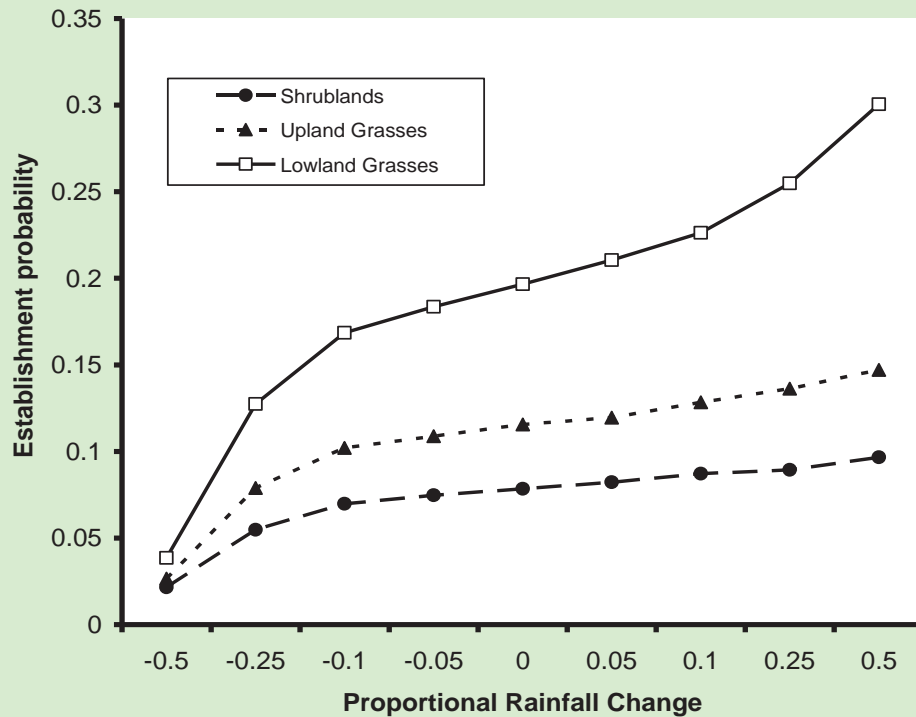


SOILWAT model output of black grama establishment

-largest decreases on soils with high clay content that converted to shrublands (evapo-transpiration increased)

-largest increases where production increased (evaporation decreased)

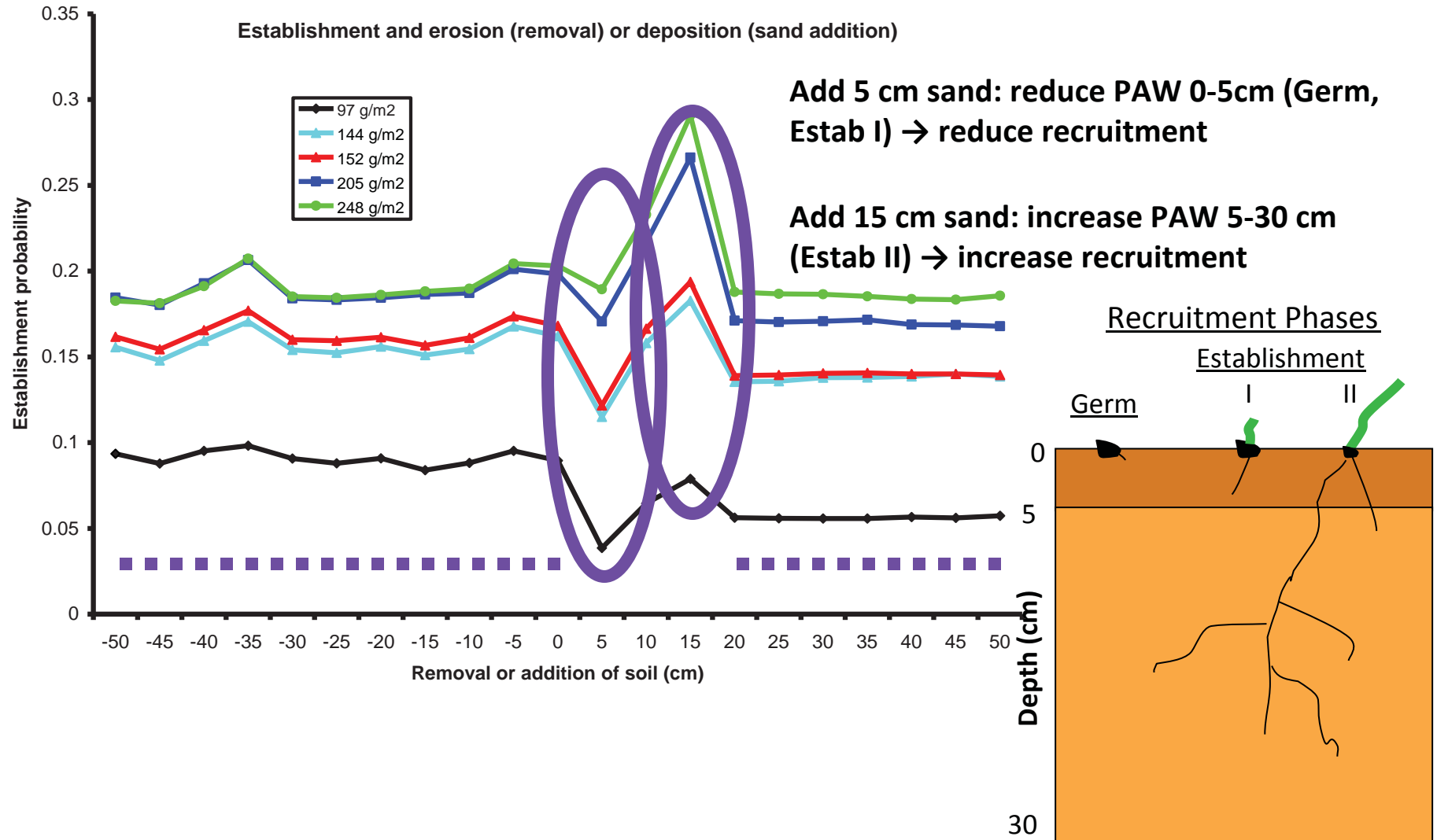




Lowland locations also most sensitive to changes in rainfall amount.

Results can be used to target locations for grass restoration with increases in rain (low-lying areas with high clay, high ANPP), but these locations are also most sensitive to decreases in rain.

Sand deposition and surface soil erosion with shrub invasion: effects on recruitment using SOILWAT.

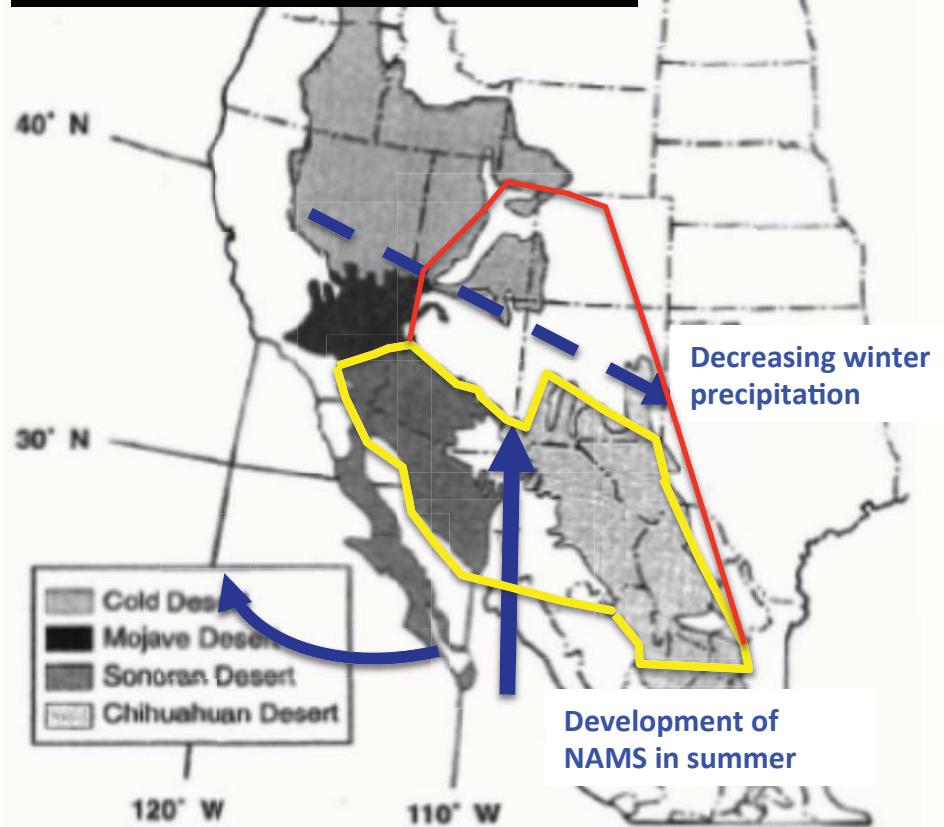


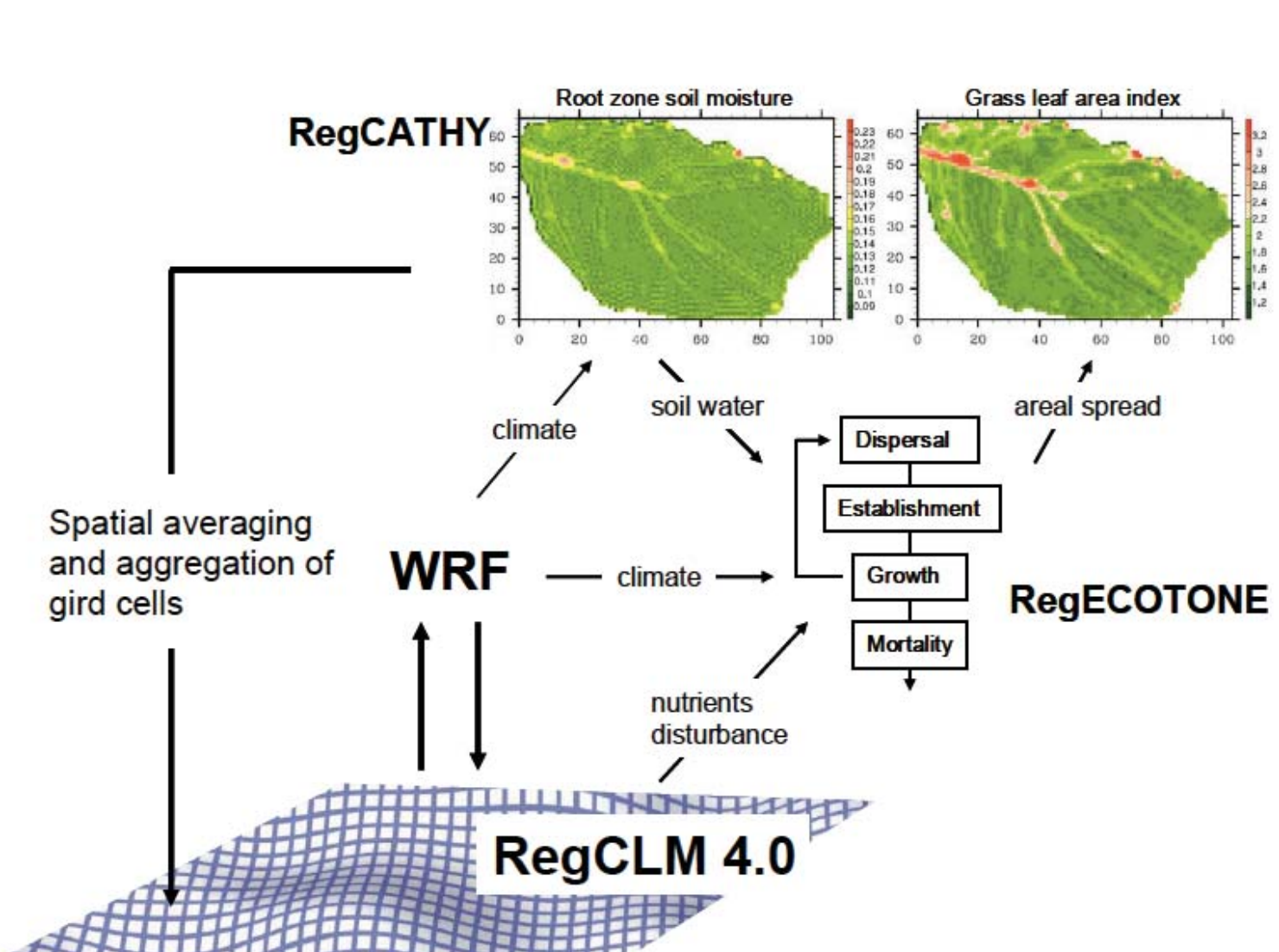
REGIONAL SCALE MODELING

How might shifts in the North American Monsoon System (NAMS) influence American deserts through changes in rainfall, invasive species, and wildlife?

- Funded by National Science Foundation
- \$3.6M for 5 years
- Led by Russ Monson (UA)
- 13 co-PIS from 7 state and federal agencies

Yellow: current NAMS region
Red: historic northern extent of NAMS





APPROACH: integrated suite of simulation models

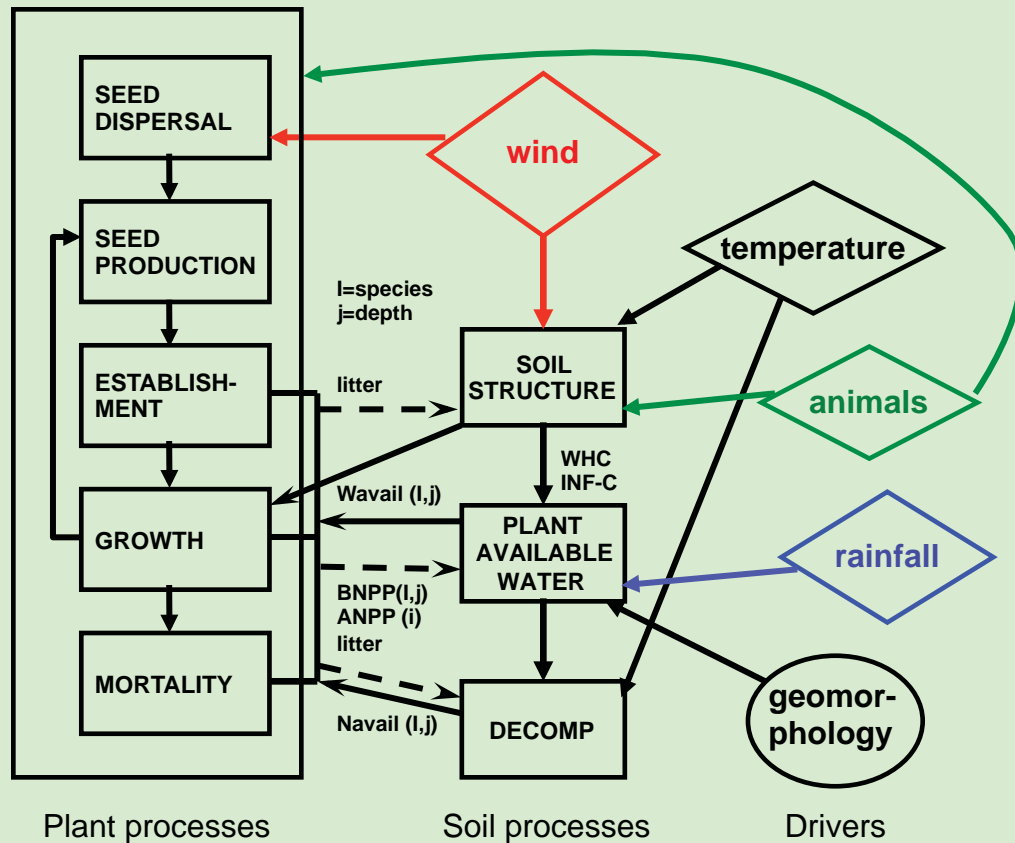
Weather Research and Forecasting model (WRF): regional scale weather

Community Land Model (CLM): regional scale vegetation

CATHY surface/subsurface hydrology model: landscape scale water

ECOTONE: vegetation at patch to landscape scales

Regional efforts with other models



ECOTONE (plants)

SOILWAT (vertical water)

tRIBS (horizontal water) [Vivoni; ASU]

WEMO (wind) [Okin; UCLA]