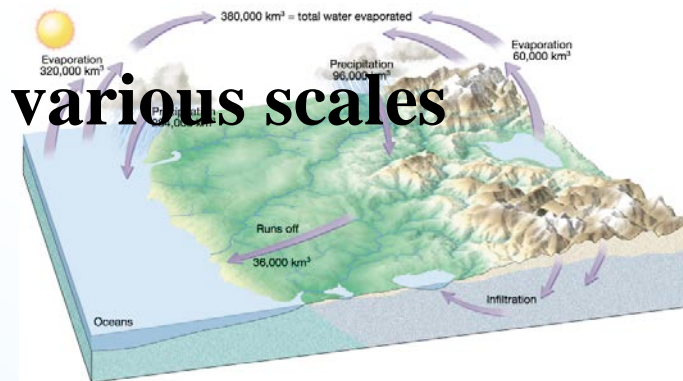


The Scaling Impact of Hydrologic Processes on the Integrated River Basin Response

Zhongbo Yu

Feb. 2, 2010

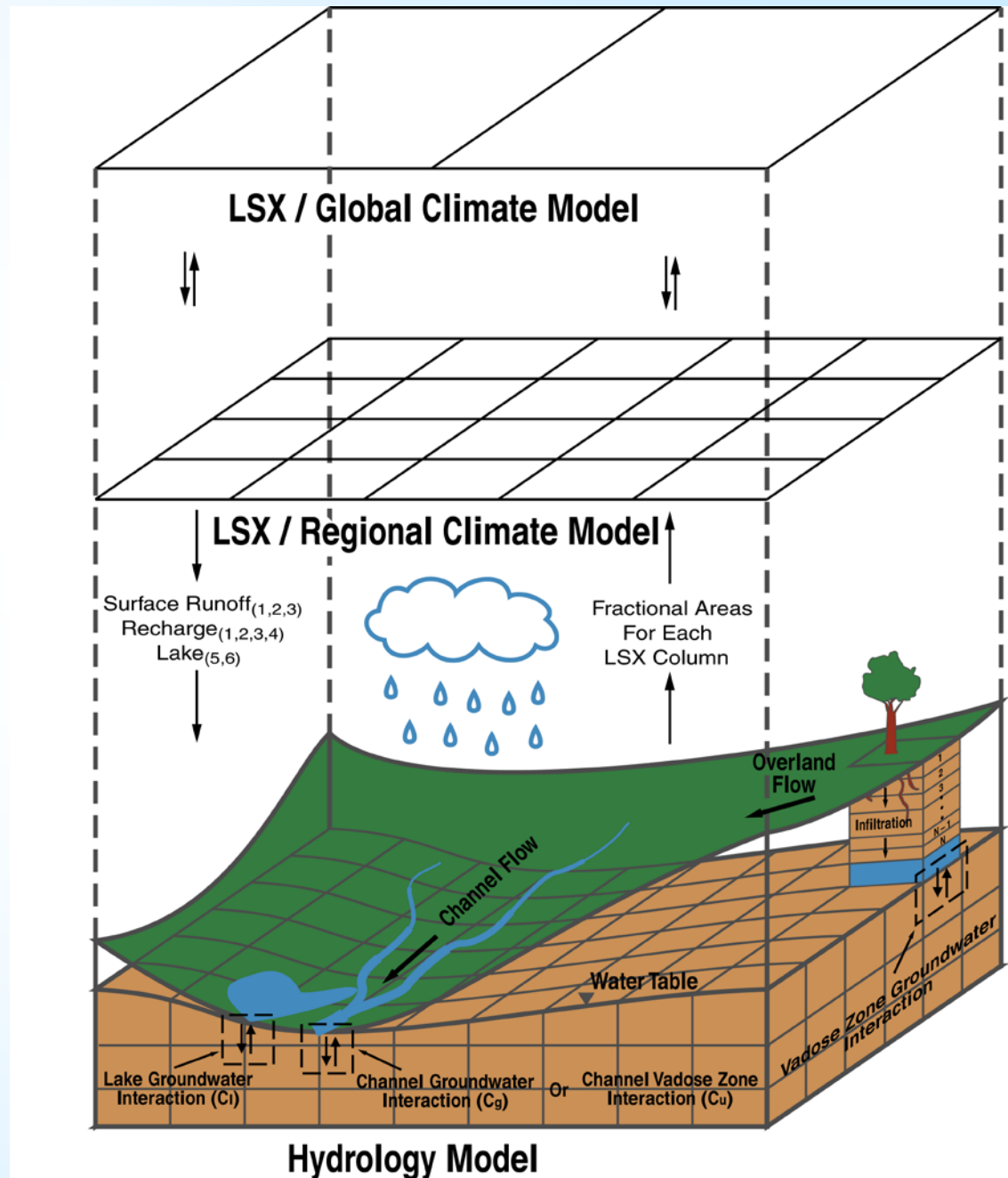
- **Hydrologic change in response to the climatic variability (i.e., global warming)**
- **Impacts at global, national or regional scales**
- **Coupled, efficient model systems**
- **Large-scale impacts vs. small-scale hydrology**
- **Needs to bridge the gaps among various scales**

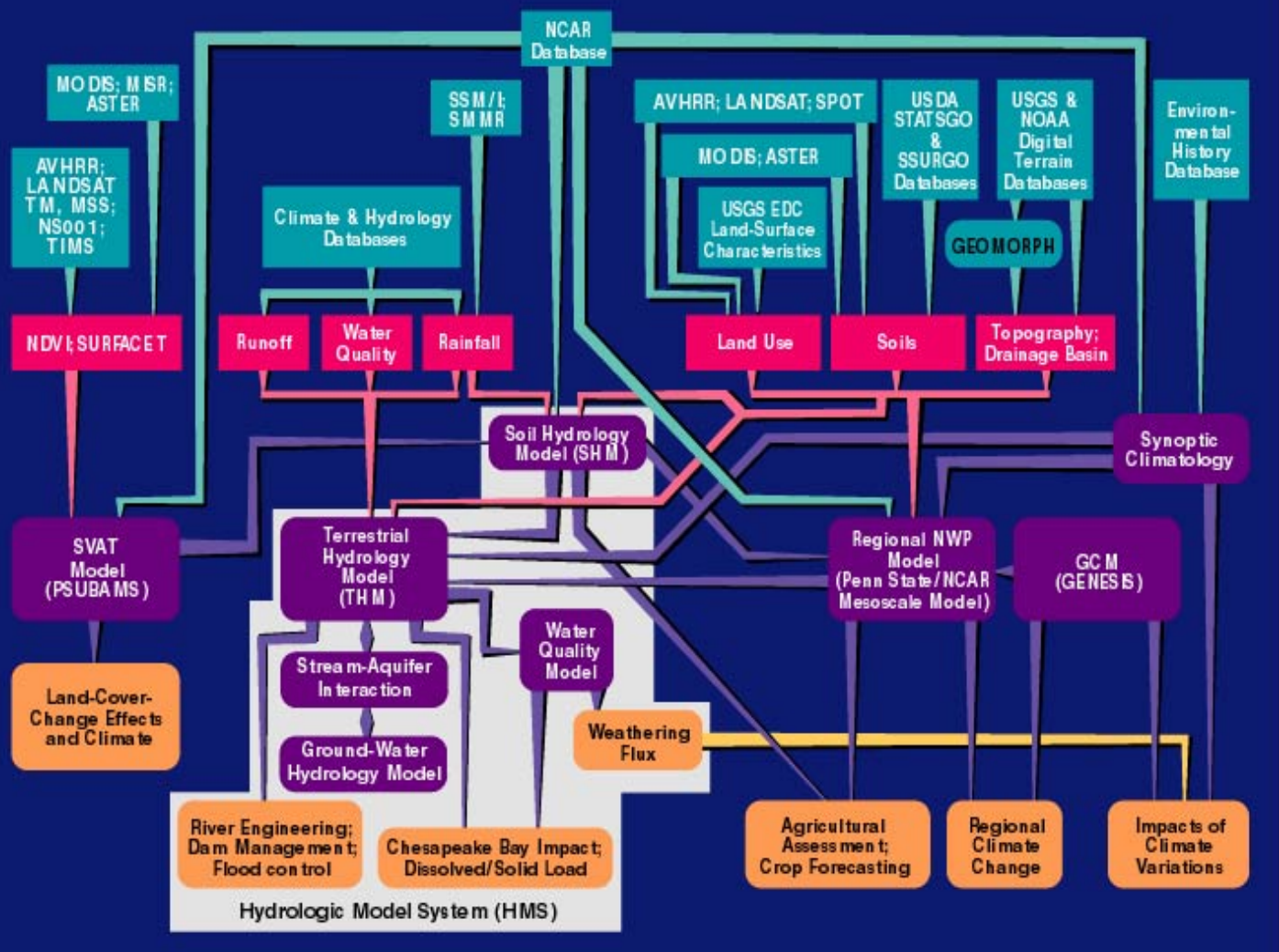


Outline

- Model description
- Ongoing research
- Future directions

- **Models**
- **Data sets**
- **Model development**
- **Scale effect**
- **Environmental changes on the hydrologic responses**





Data Analysis



Key Variables

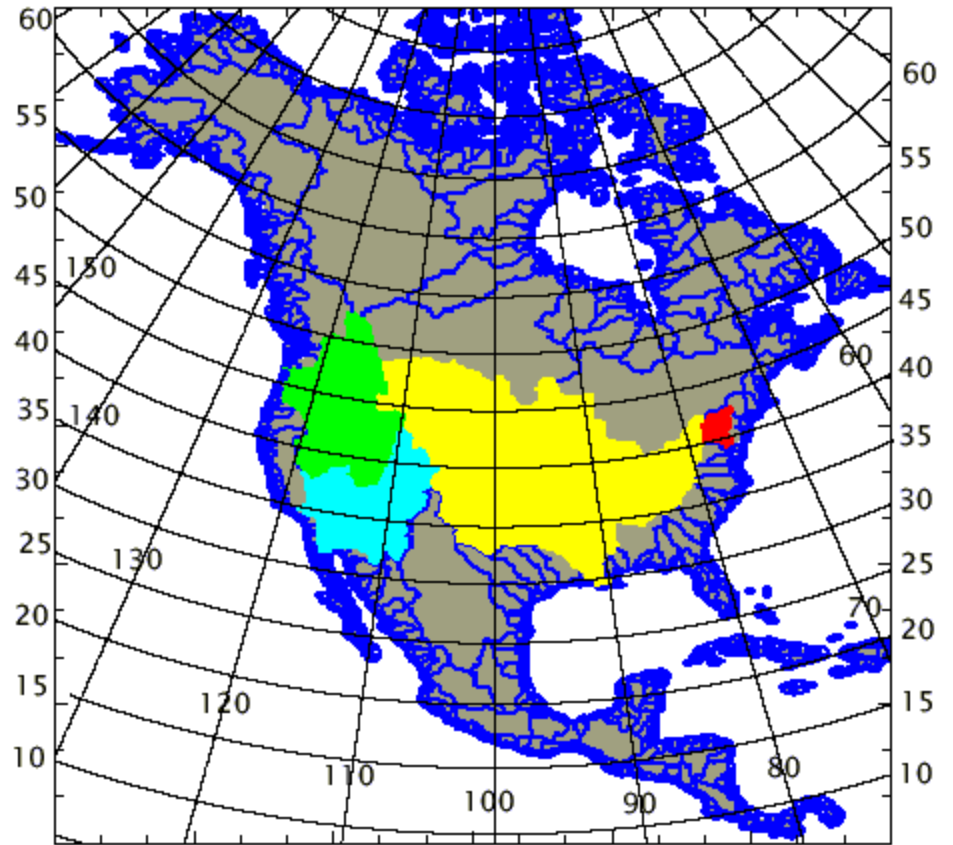


Coupled Models

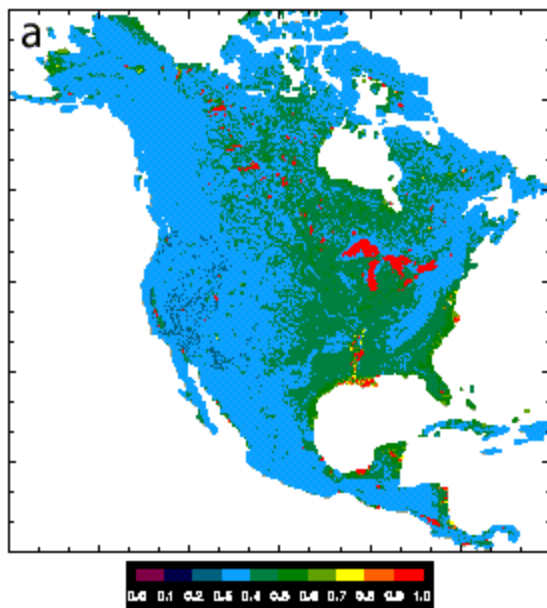


Application Studies

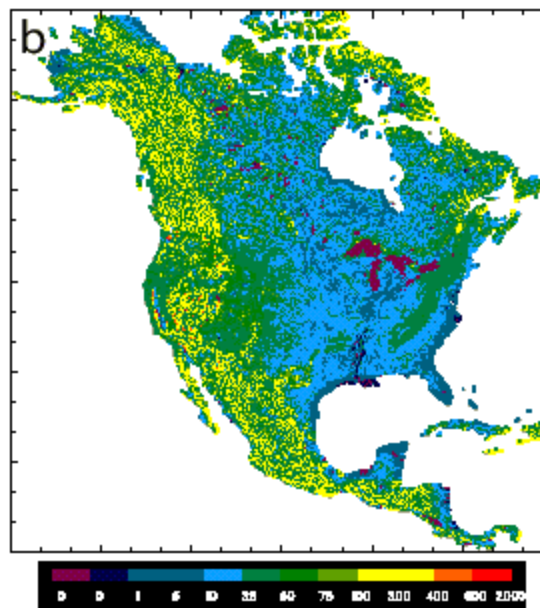
- Mississippi River Basin
- Columbia River Basin
- Colorado River Basin
- Susquehanna River Basin



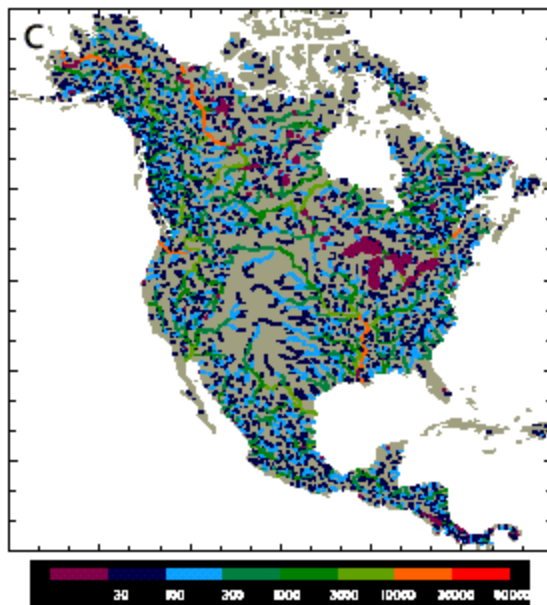
Soil Moisture



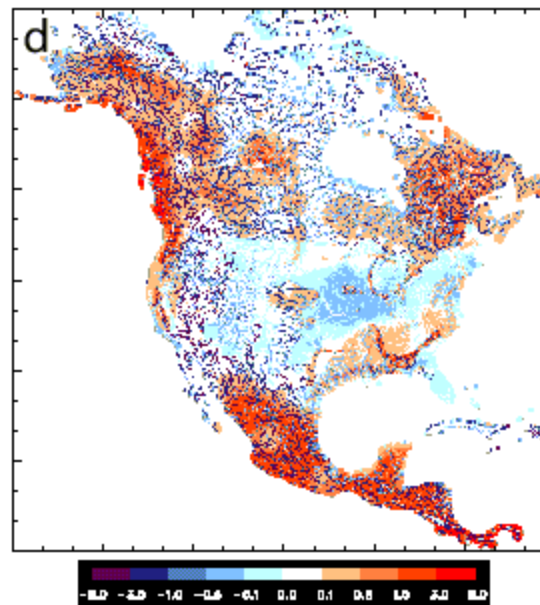
Water Table

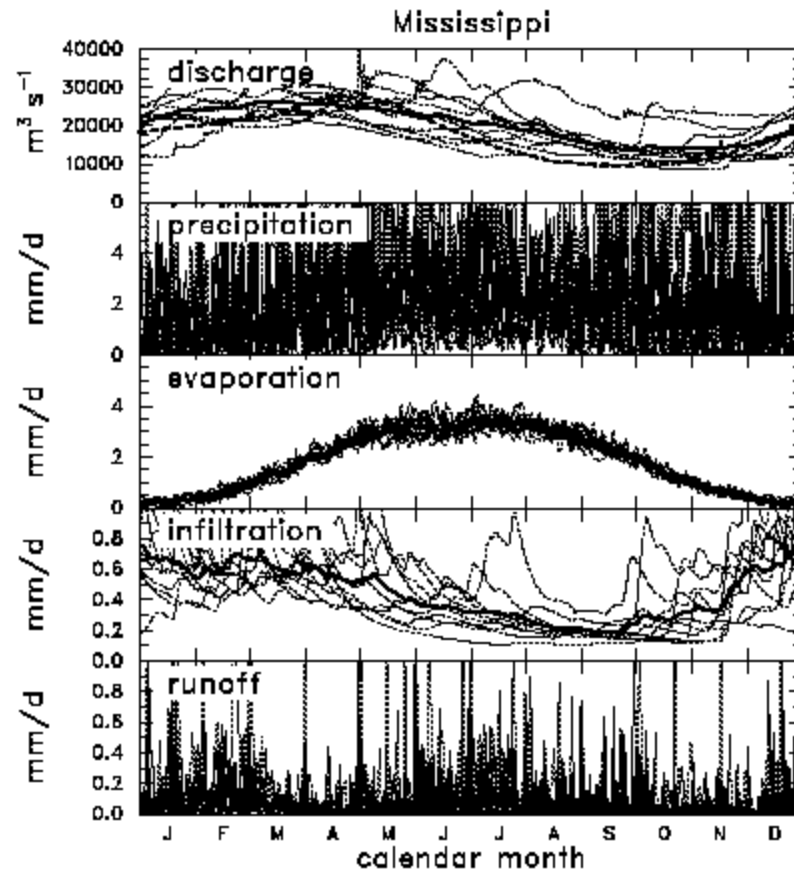


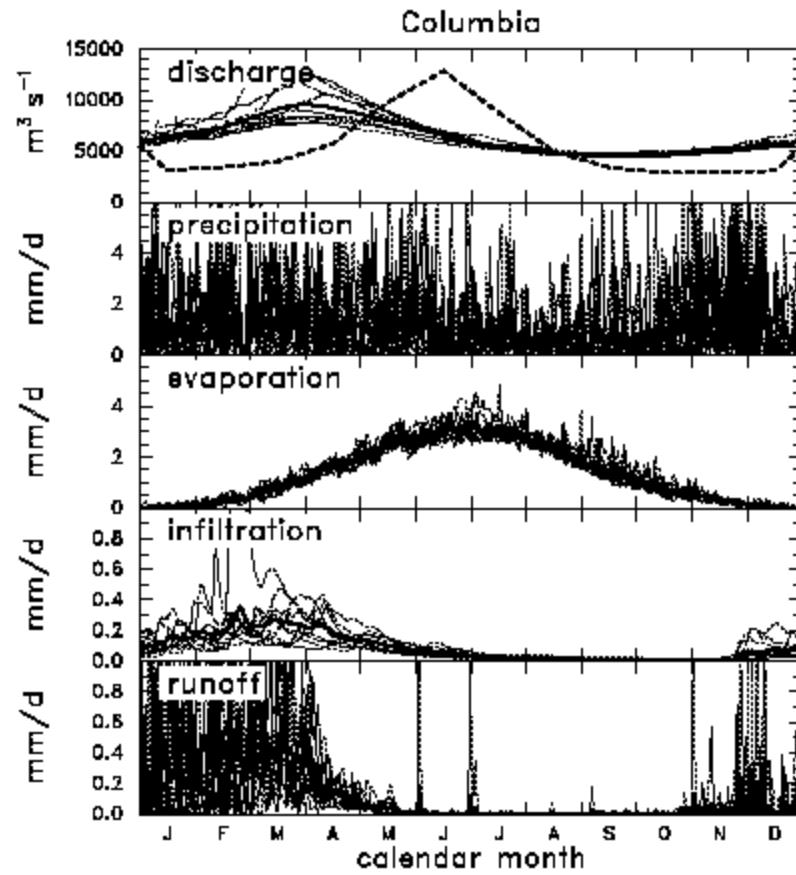
Discharge

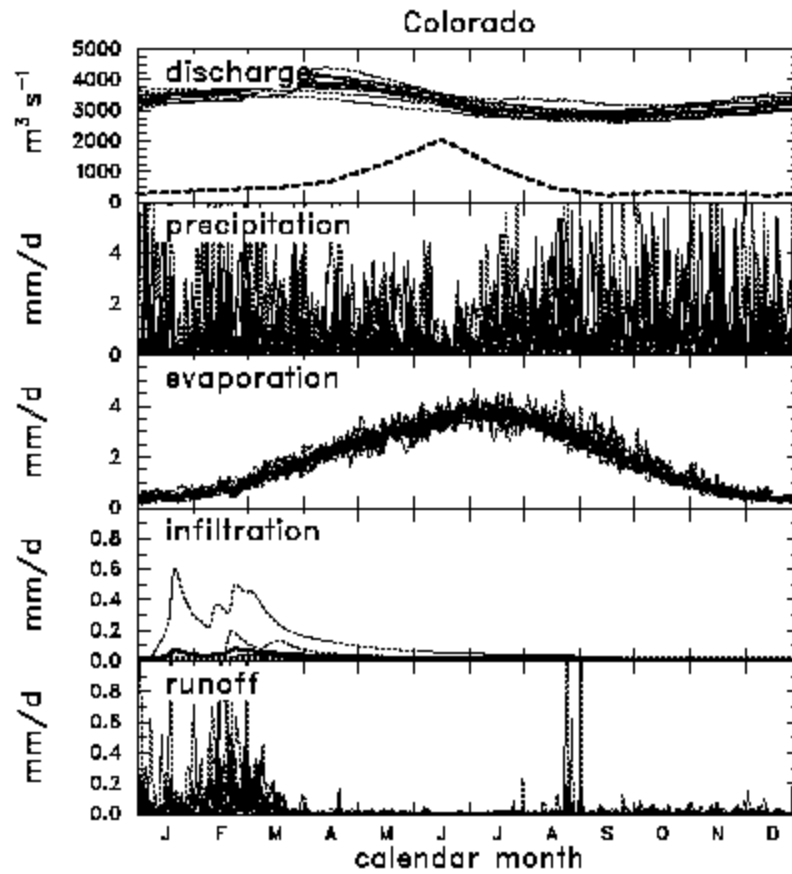


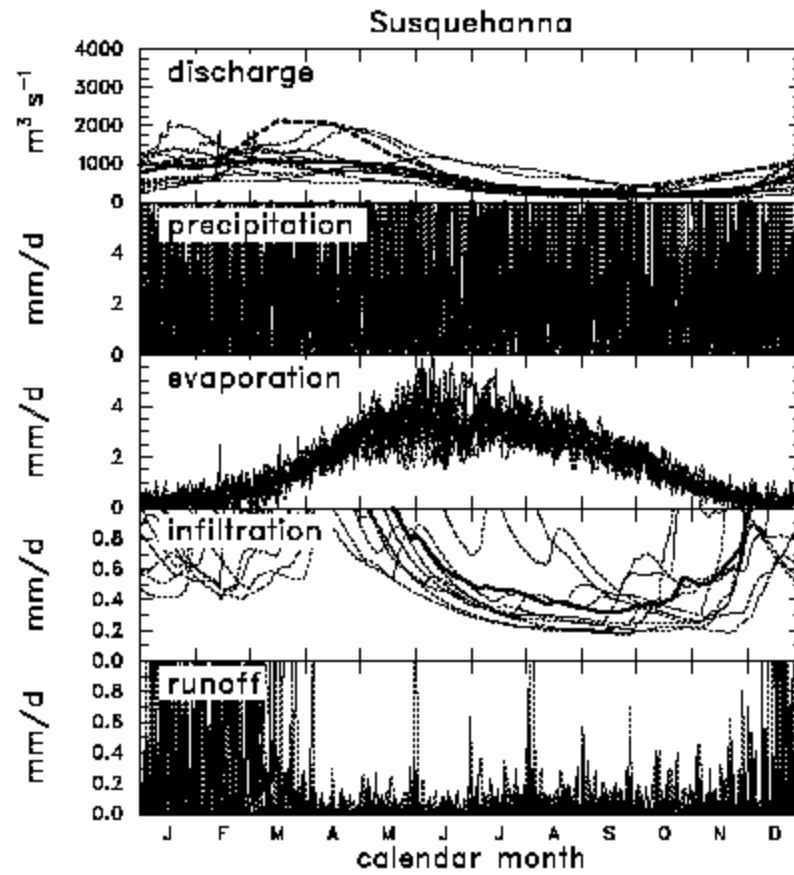
Recharge

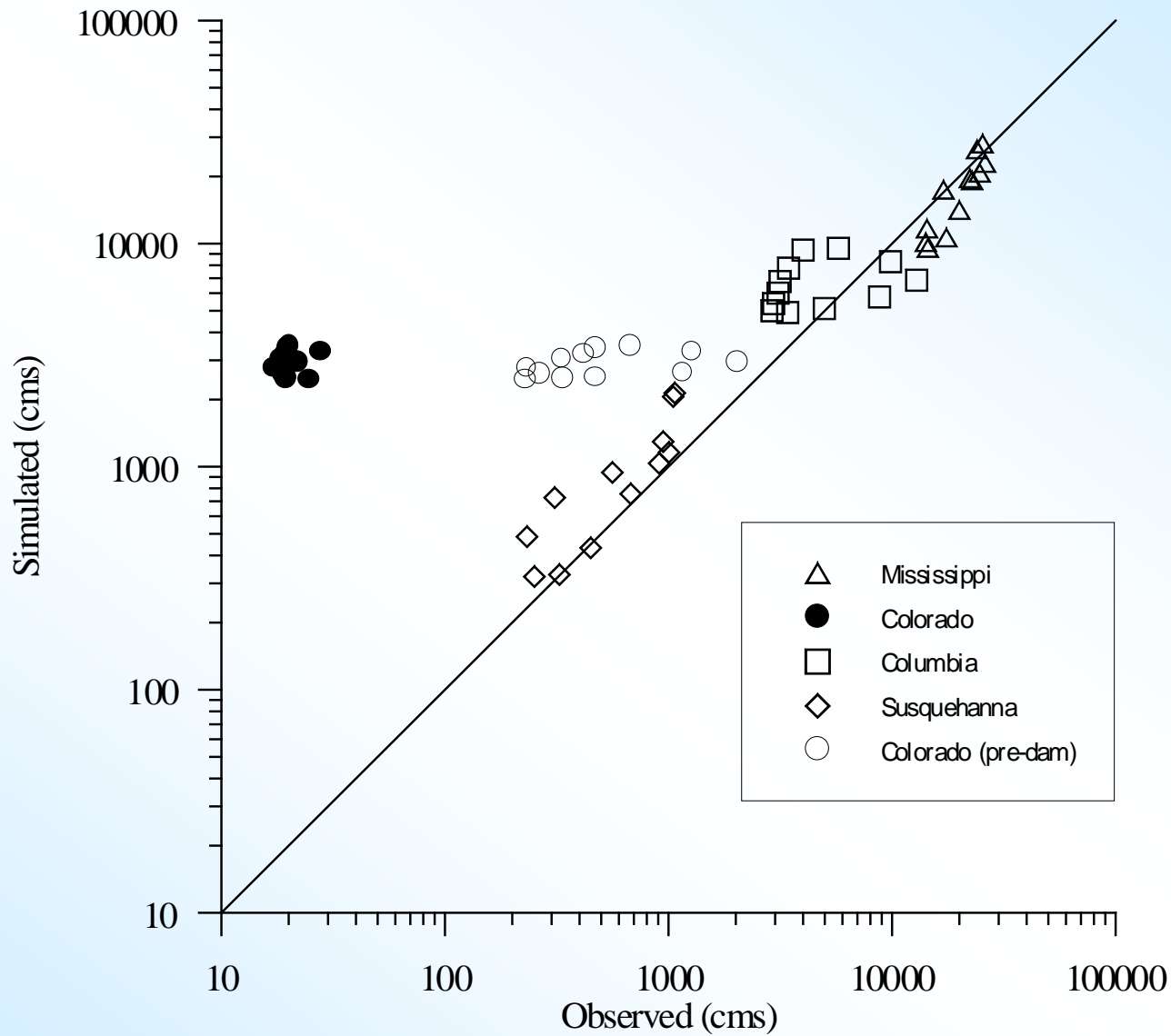


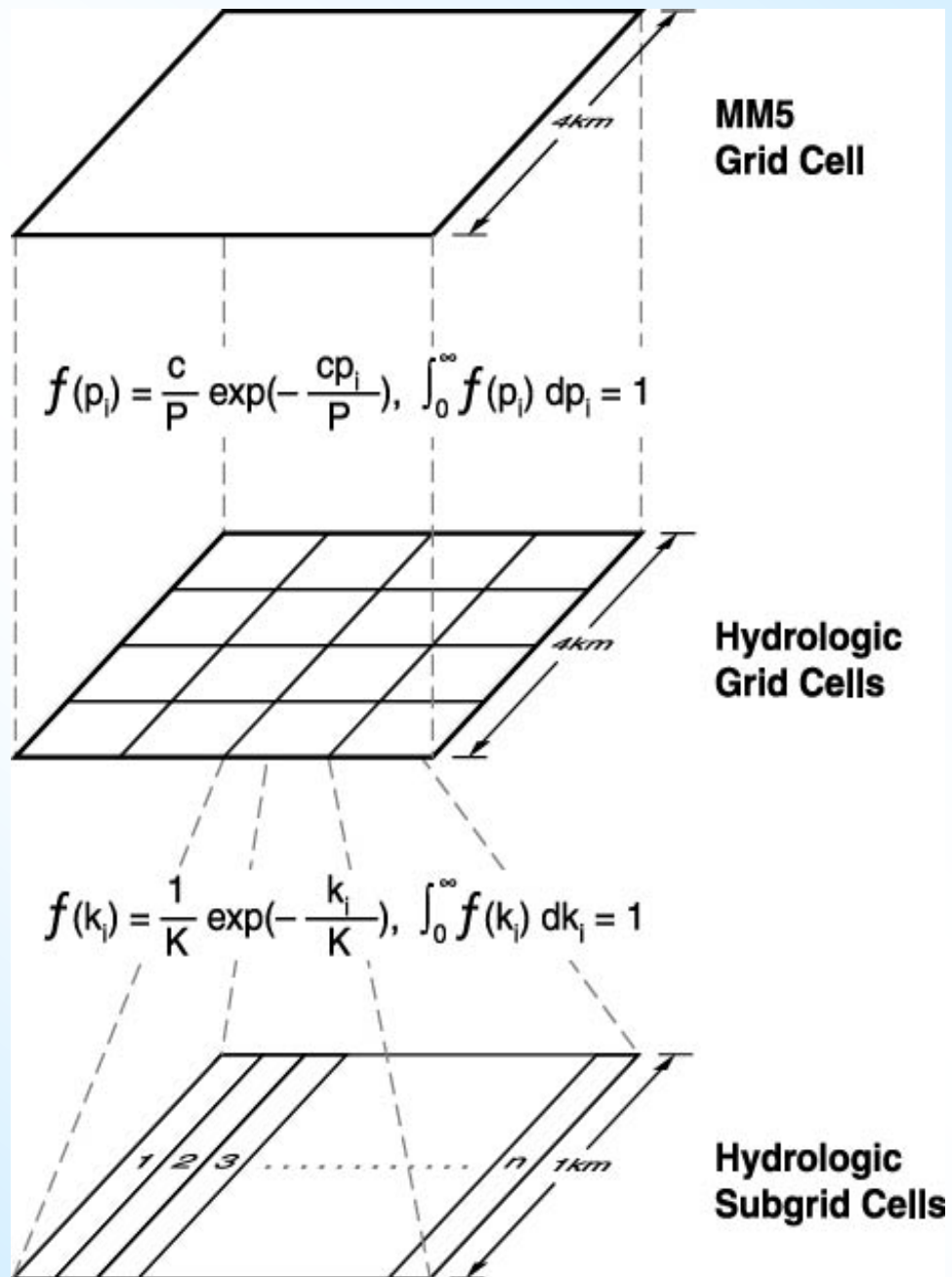


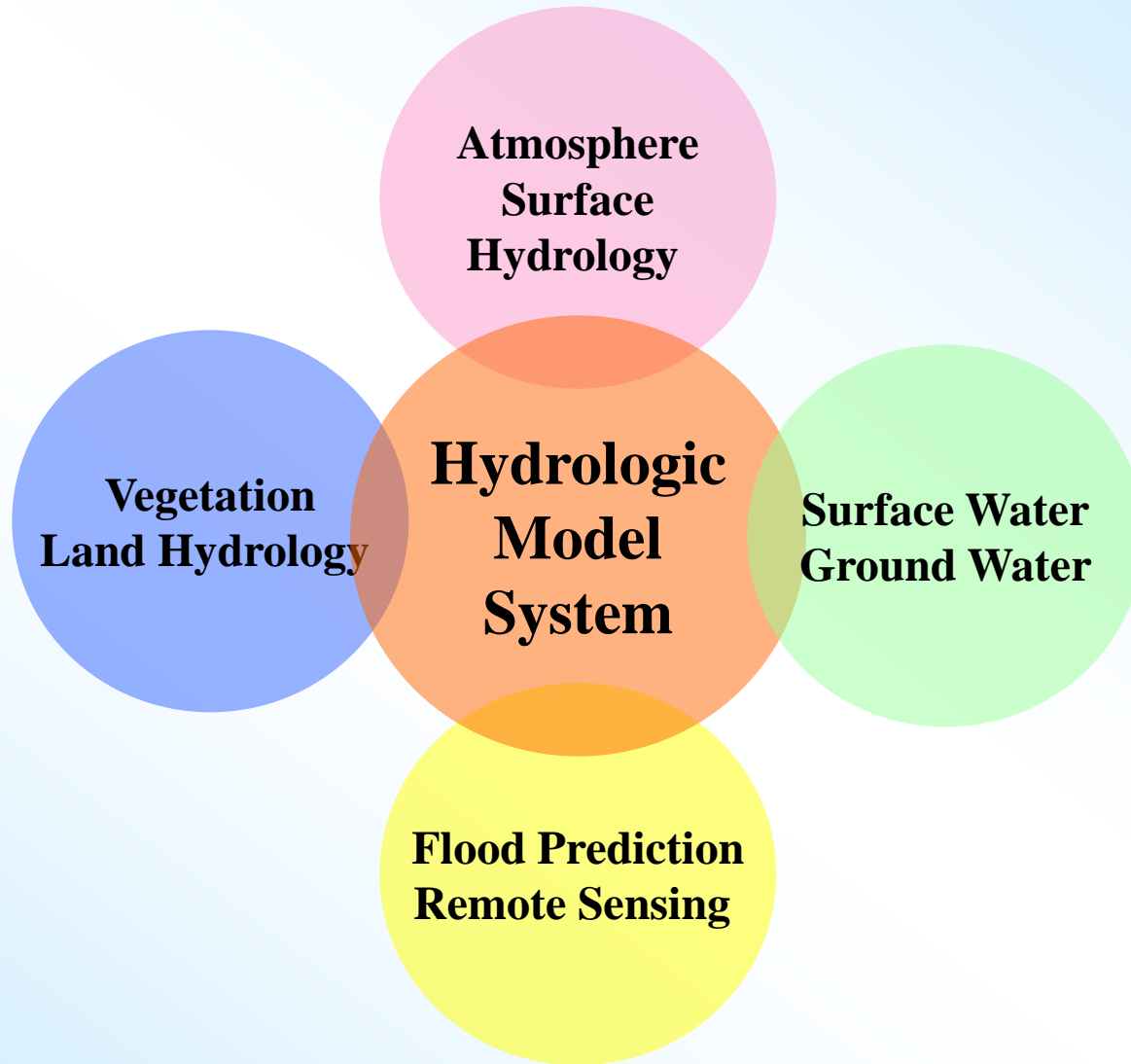






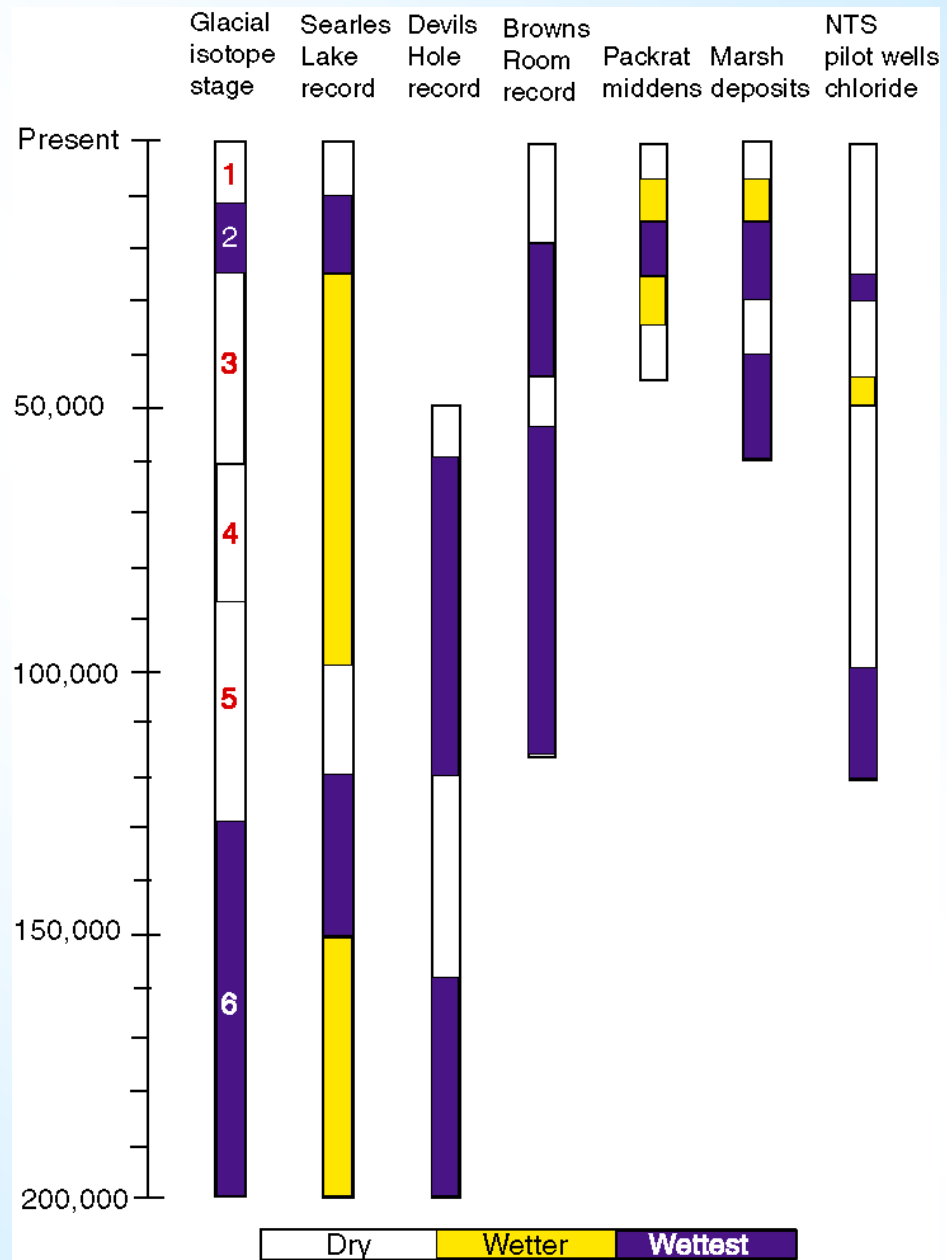






Future research

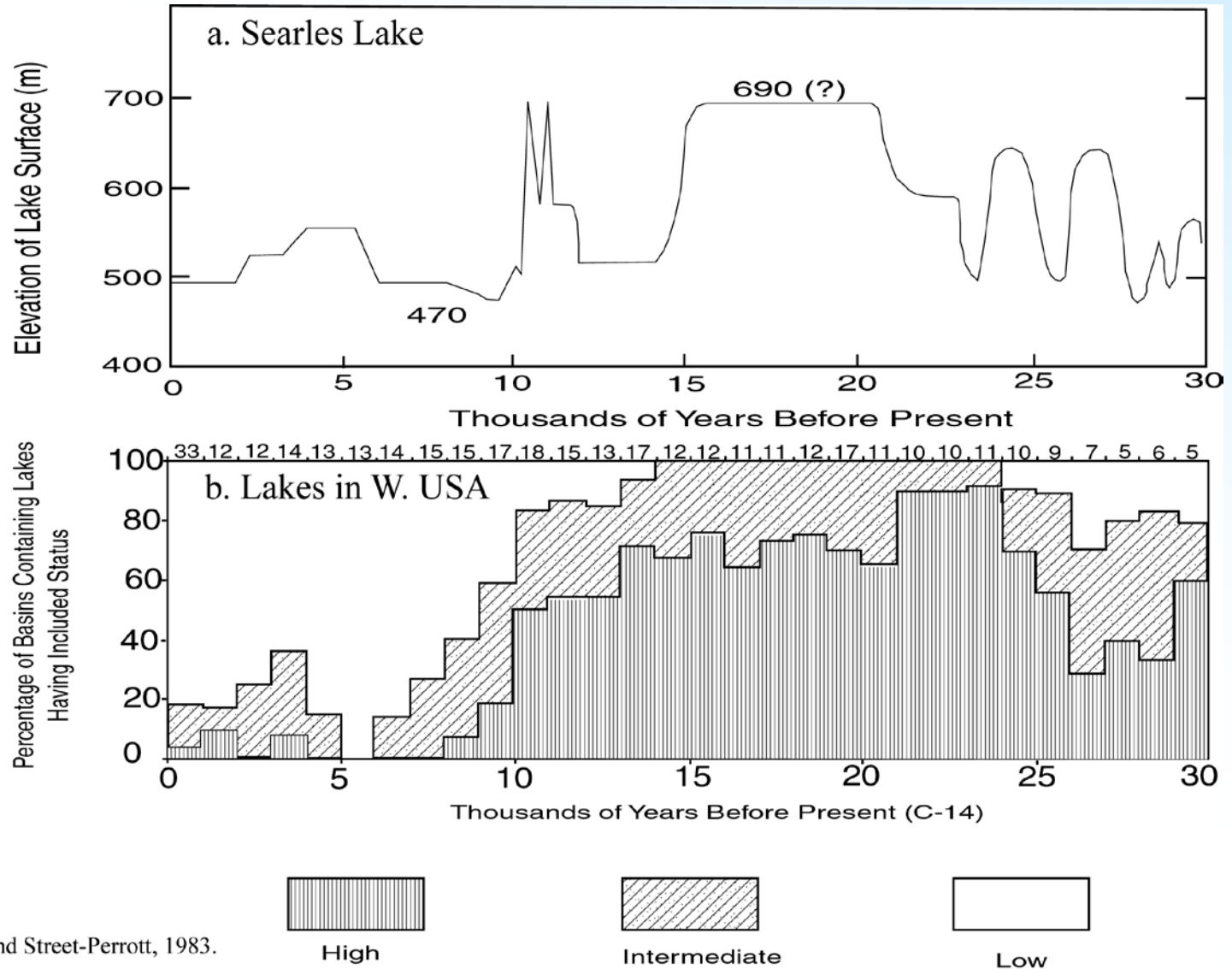
- The coupled climate-hydrology model
- Scaling effect on the simulation
- Paleoclimate and hydrology in last 20 k in Great Basin
- Impacts of climate change on hydrologic processes in Colorado river basin



Source: Tyler et al., 1996.

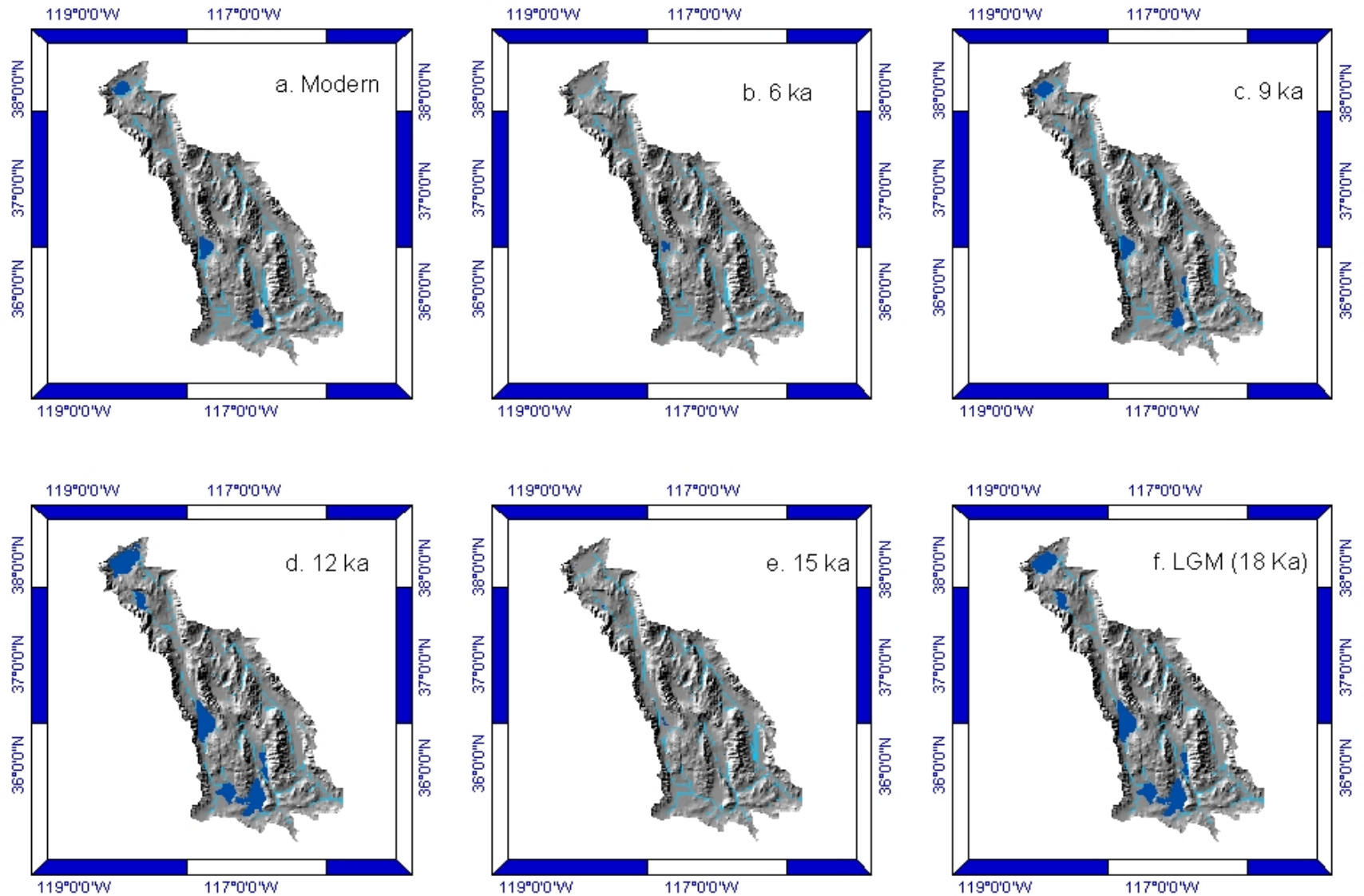
Lakes or Playas in Owens River System

Lake Level Changes in Searles Lake and Lakes in West USA During Last 30,000 Years



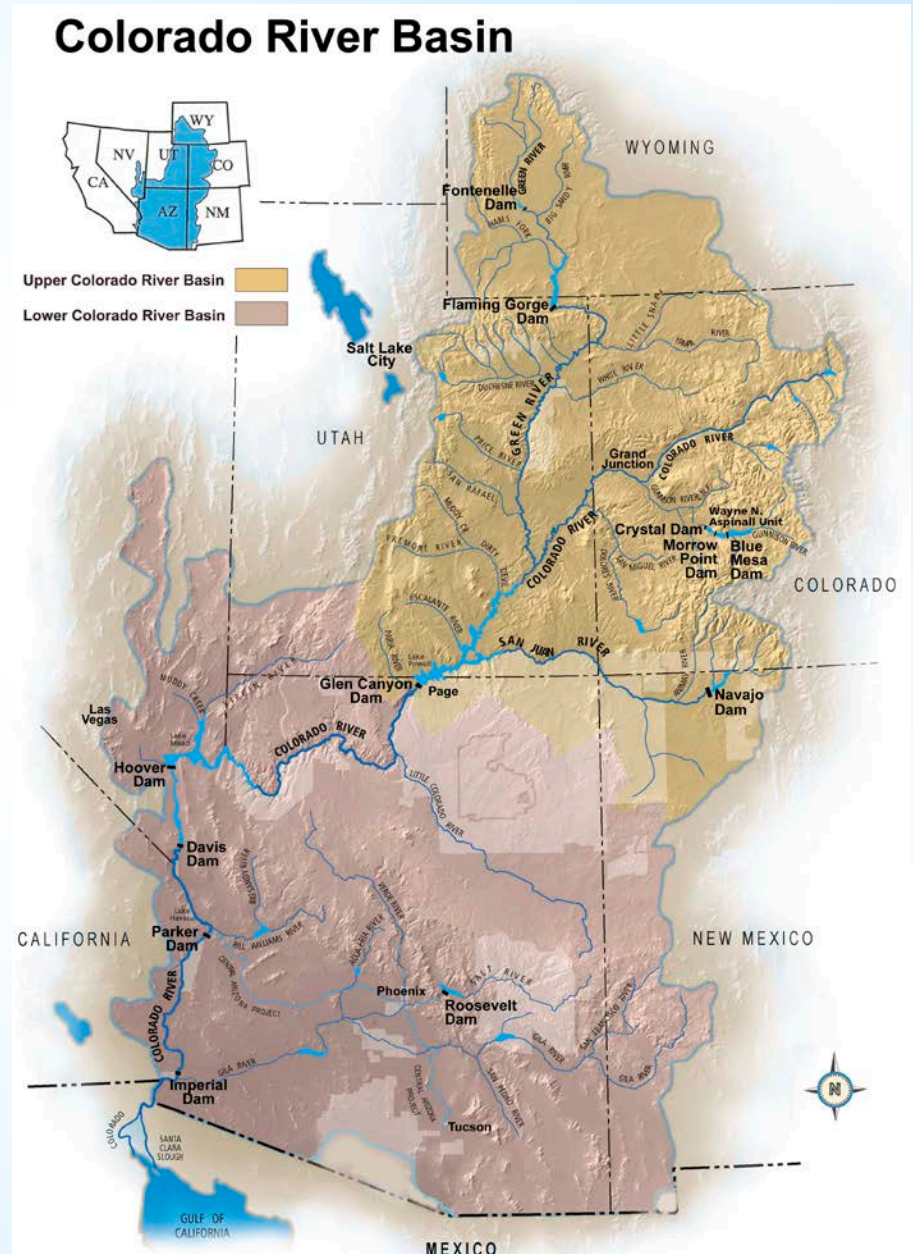
Source: Smith and Street-Perrott, 1983.

Simulated Lake Extent in Owens Valley in the Last 18 Ka



Colorado River Basin

- Climate changes
- Induced hydrologic responses
 - Temporal change
 - Spatial change
 - Extreme events
 - Water resource
- Agricultural activities
- Hydraulic projects (i.e. Dams)





Thanks !