

Paleo is so *old*.
Is it obsolete?



Ben Harding

Paleo Workshop
Albuquerque N.M.
November 2, 2007



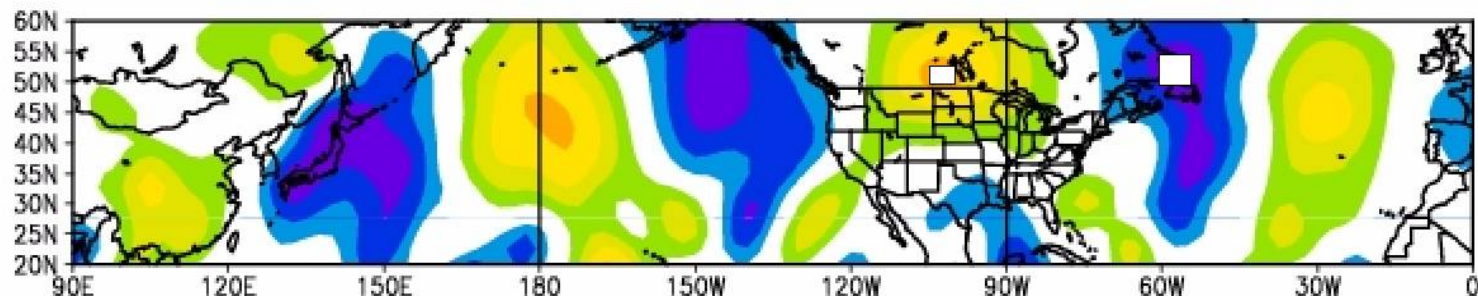
HYDROSPHERE
Resource Consultants

System Sensitivities

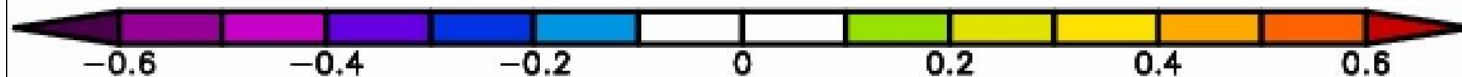
- **What matters to a water supply system?**
 - Everyone: Spells
 - Juniors: Mean flow
 - No storage: Distribution of annual flows
- **What drives these statistics?**
 - Large-scale climate features
- **How well do GCMs simulate these?**

Climate Diagnostics

500mb Meridional Wind (N/S)

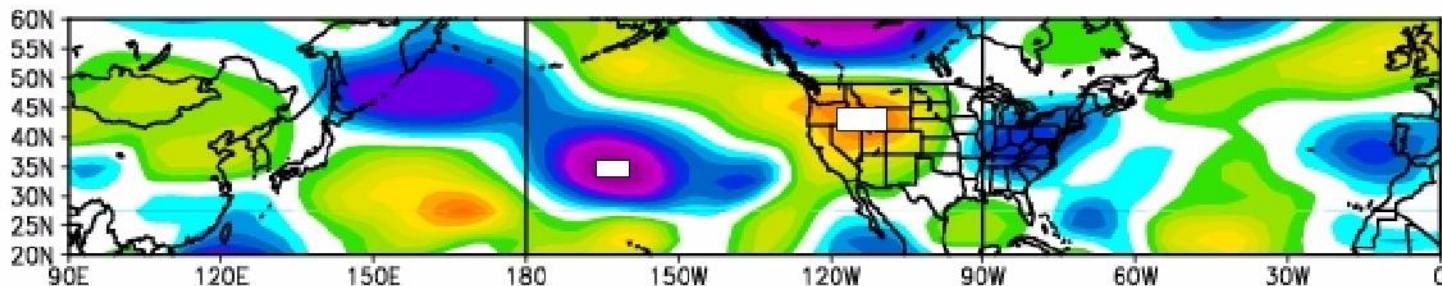


Sep 1957 to 1999: 500mb Meridional Wind
Seasonal Correlation w/ Sep = Apr-Jul runoff: SumCoSpringsOctJan.txt
NCEP/NCAR Reanalysis

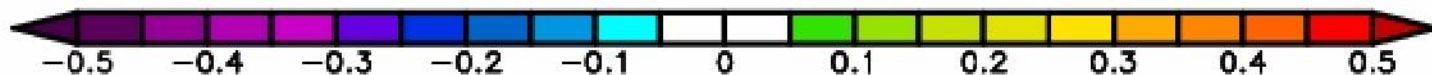


Climate Diagnostics

500 mb Zonal Wind (E/W)

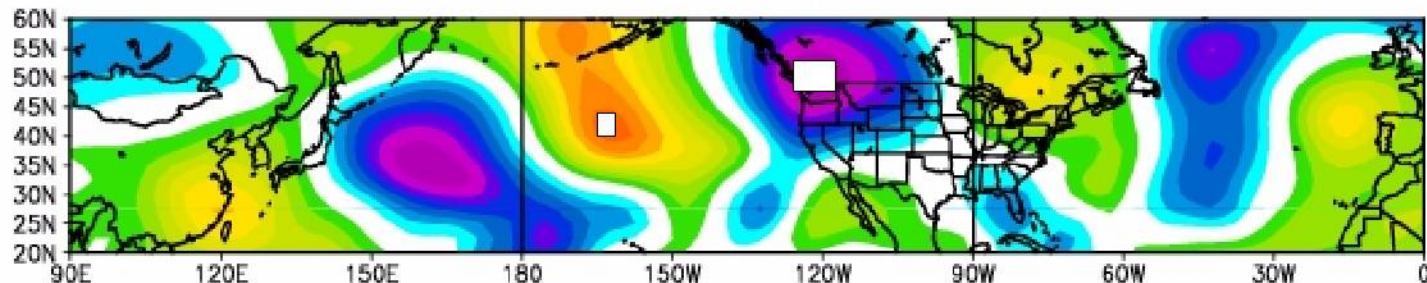


Sep 1957 to 1999: 500mb Zonal Wind
Seasonal Correlation w/ Sep = Apr-Jul runoff: SumCoSpringsOctJan.txt
NCEP/NCAR Reanalysis

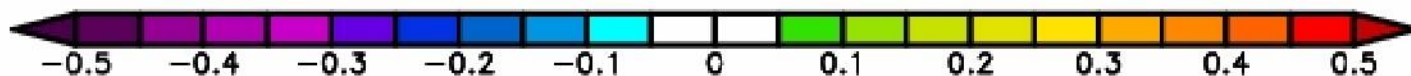


Climate Diagnostics

500 mb Geopotential Height

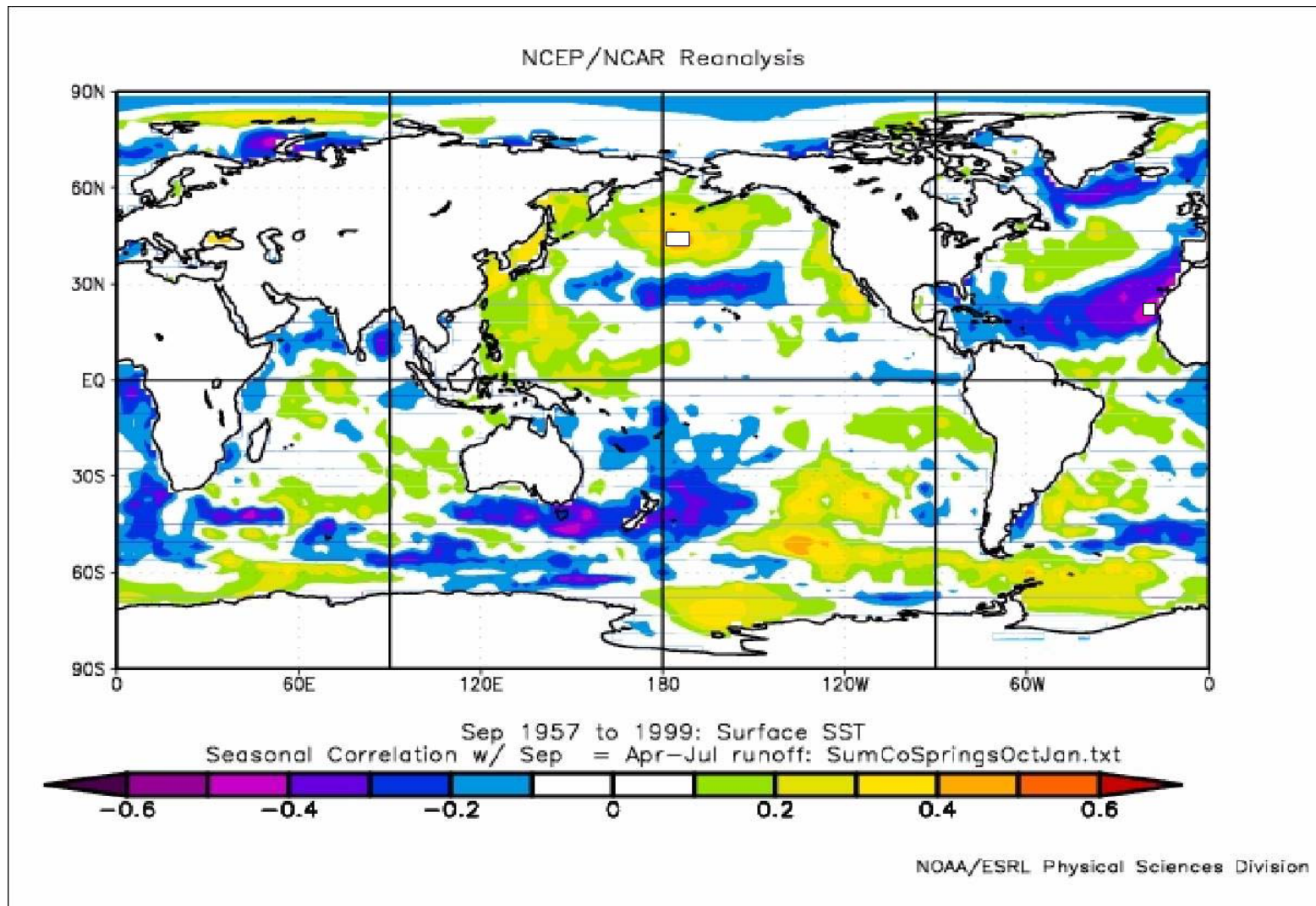


Sep 1957 to 1999: 500mb Geopotential Height
Seasonal Correlation w/ Sep = Apr-Jul runoff: SumCoSpringsOctJan.txt
NCEP/NCAR Reanalysis



Climate Diagnostics

Sea Surface Temperature



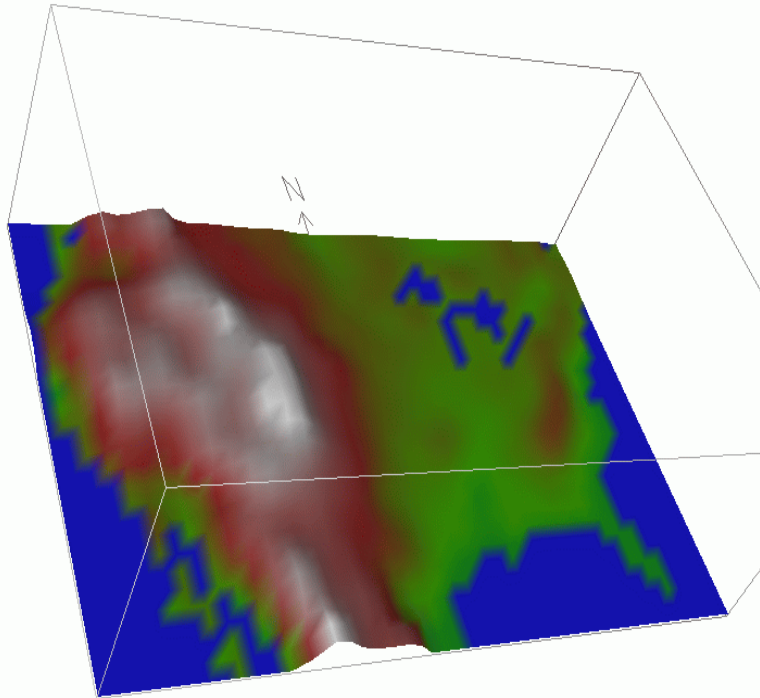
Limitations of GCMs

- **Scale/Resolution**
 - Grid cell size ~ 3°/300 km/200 sm
- **Processes**
 - Many are lumped
- **Temperature driven by radiation**
 - Relatively more straightforward
- **Precipitation driven by circulation**
 - Much more complex

(Don't even ask about the emissions scenarios)

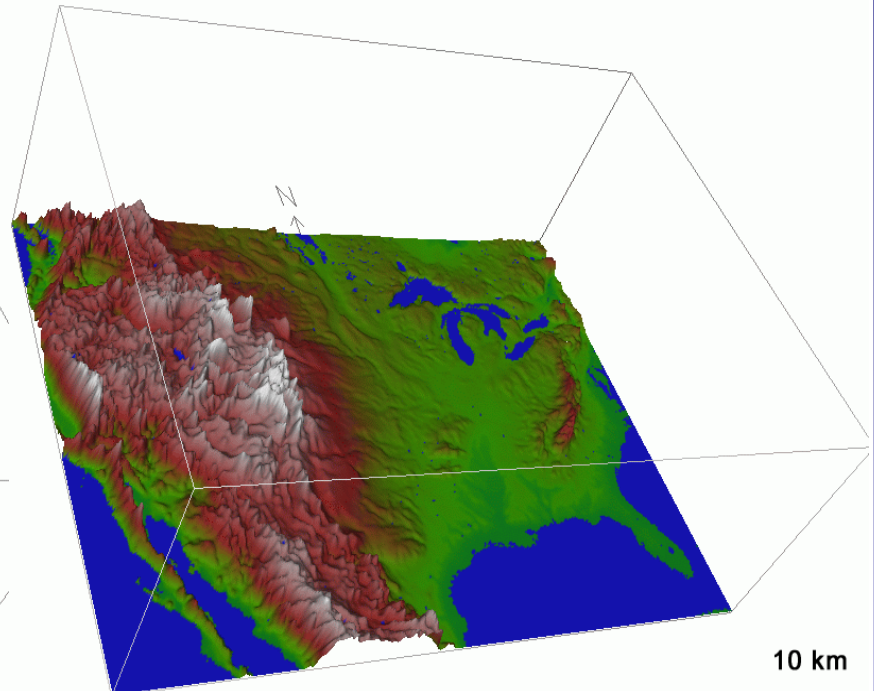
Resolution Effects--Topography

GCMs Now



100 km

GCMs in 5 – 10 years

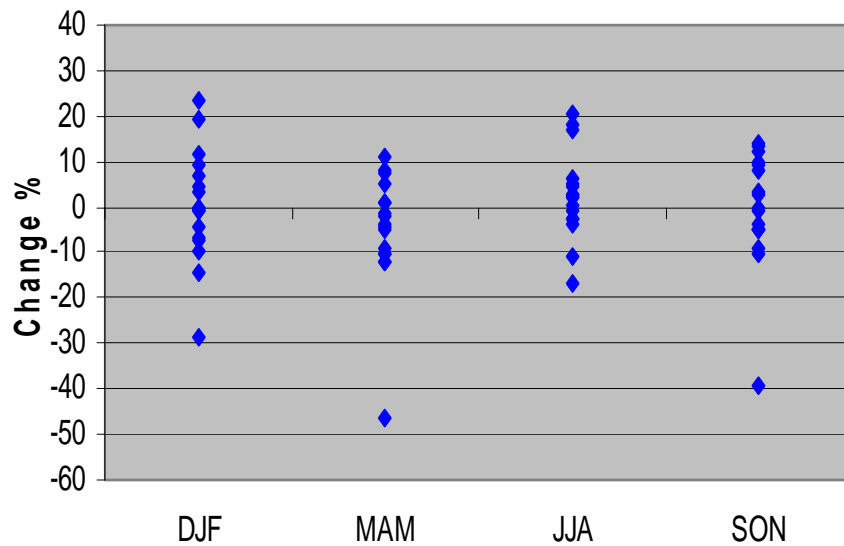


10 km

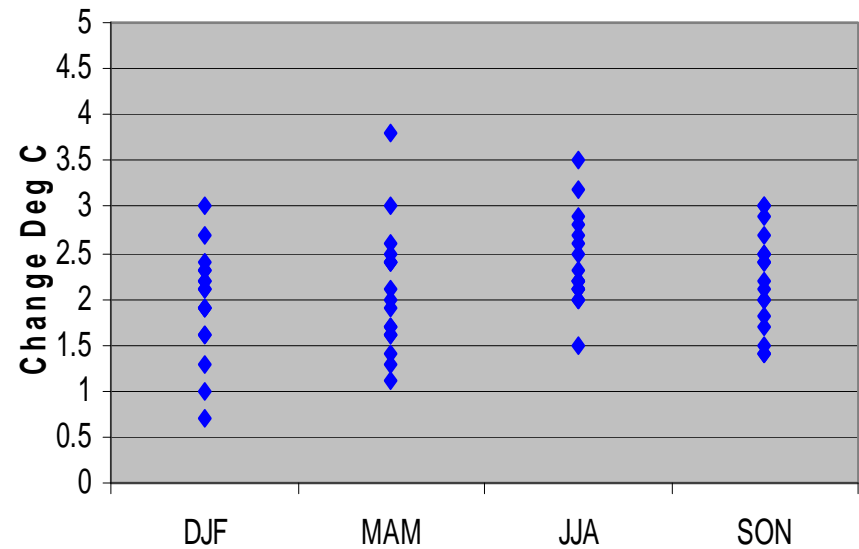
In today's GCM, maybe you could fly from Boulder to Aspen at 9,000 ft

Model results for Northern N.M.

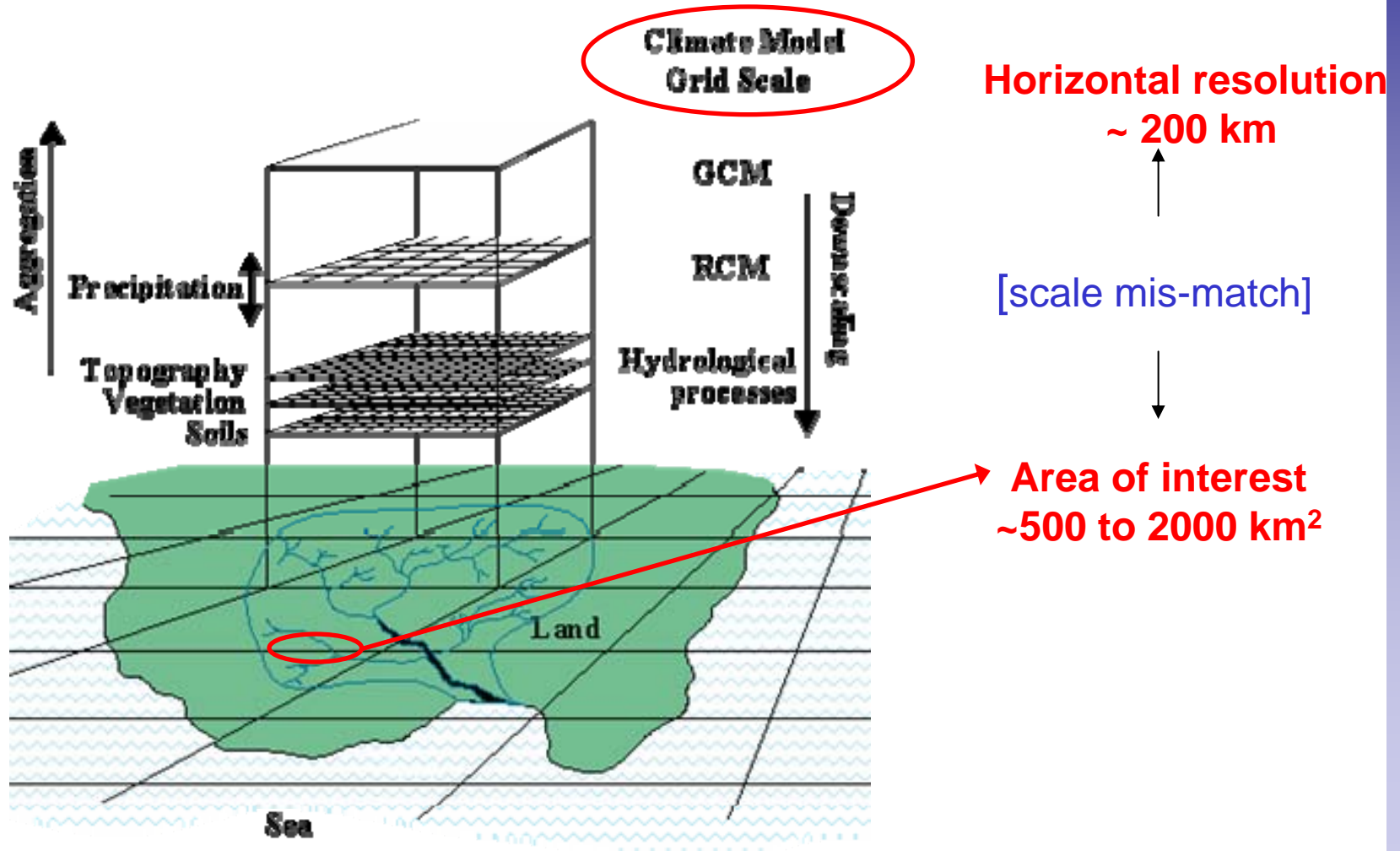
Percent Change in Precip 2050
105-110w 35-40n



Change in Temperature 2050
105-110w 35-40n



Process of Downscaling



Should we rely only on GCMs?

- **No evidence (yet) of reliability of time series statistics of streamflows.**
- **Spells are driven by circulation—a healthy skepticism is warranted.**
- **Compare during overlap period.**
- **Be prepared to trust only norms.**

Why use paleo?

- **Paleo informs us about variability**

“If it exists, it is possible”

Einstein