

R: North American Precipitation and Convection: Application of the ACME Regionally-Refined Model

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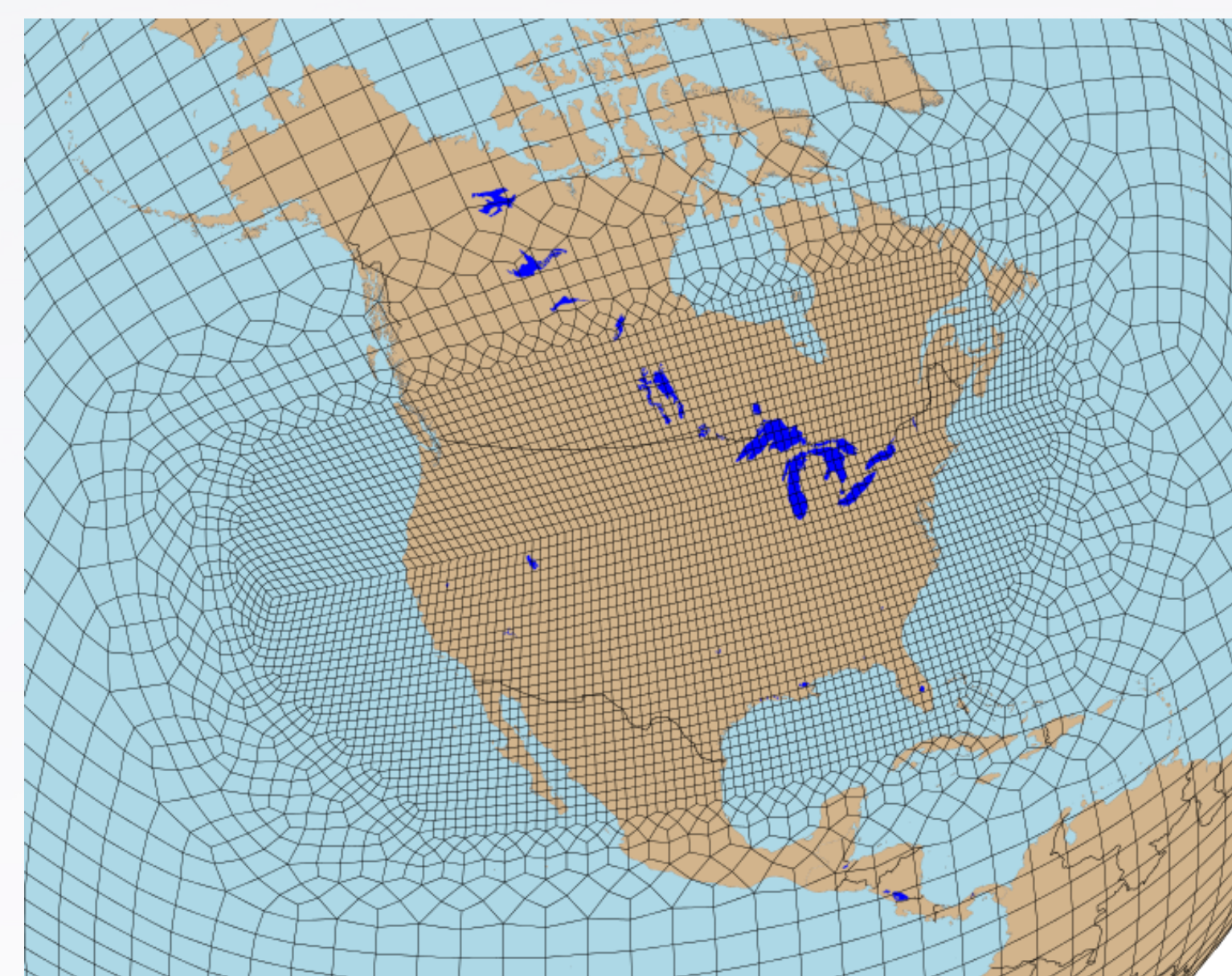
Overview

Current Status

- Continental United States (CONUS) Regional-Refined Model (RRM) is ready for new user!
 - Prototypes of RRM are on Confluence for free-running and nudging
 - <https://acme-climate.atlassian.net/wiki/pages/viewpage.action?pageId=20807739>
 - <https://acme-climate.atlassian.net/wiki/pages/viewpage.action?pageId=20153276>
- RRM for other regions (e.g., Asia, Antarctica, and tropics) is under development.

Introduction

- RRM provides an economical way to study the behavior of a global uniform high-resolution model in refined area
- How does the RRM in the refined portion characterize the uniformly global high-resolution simulation?
- We examine the North American precipitation and convection using the nudged RRM in this study.

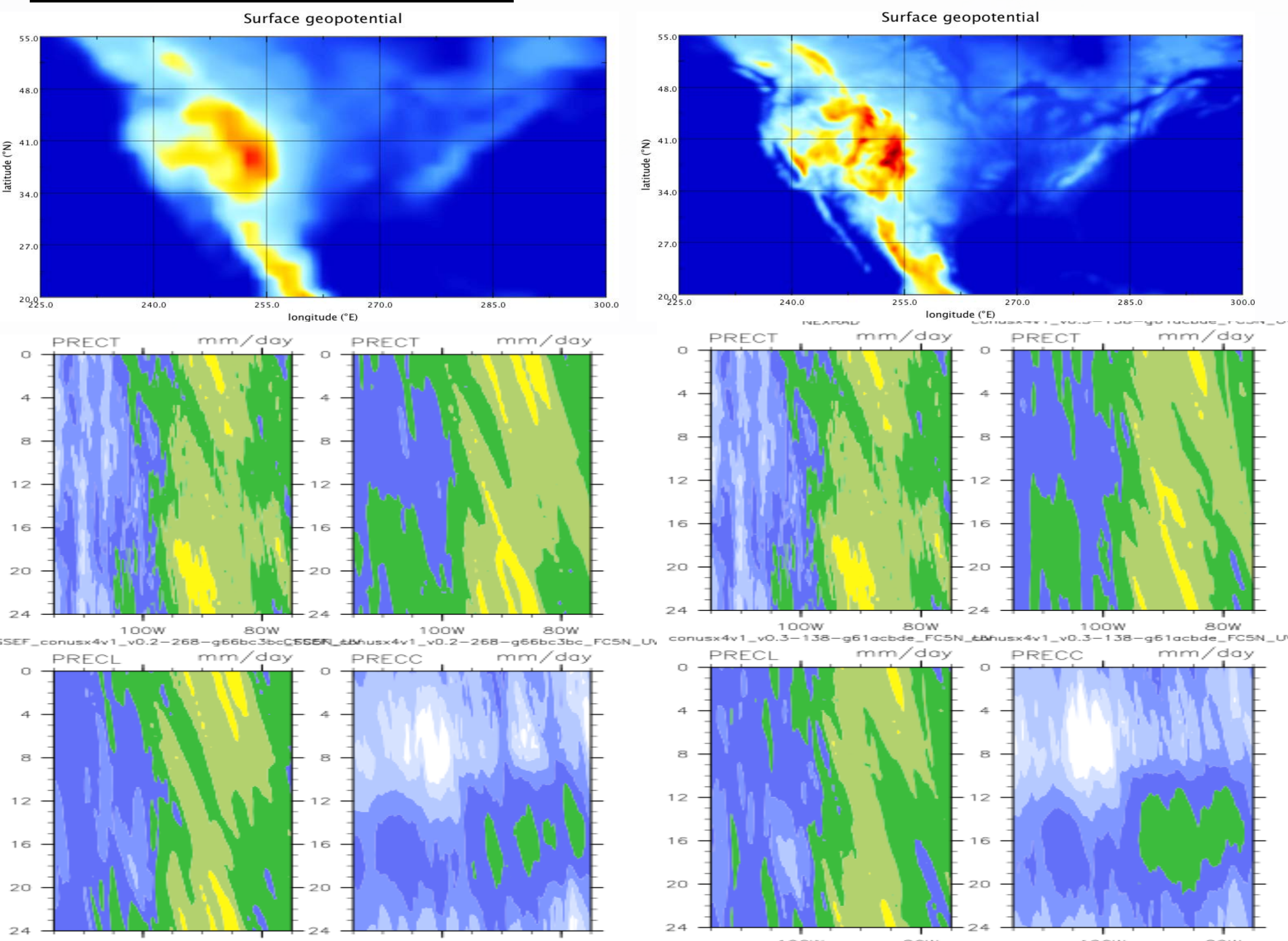


Methodology & Results

Nudged Simulations

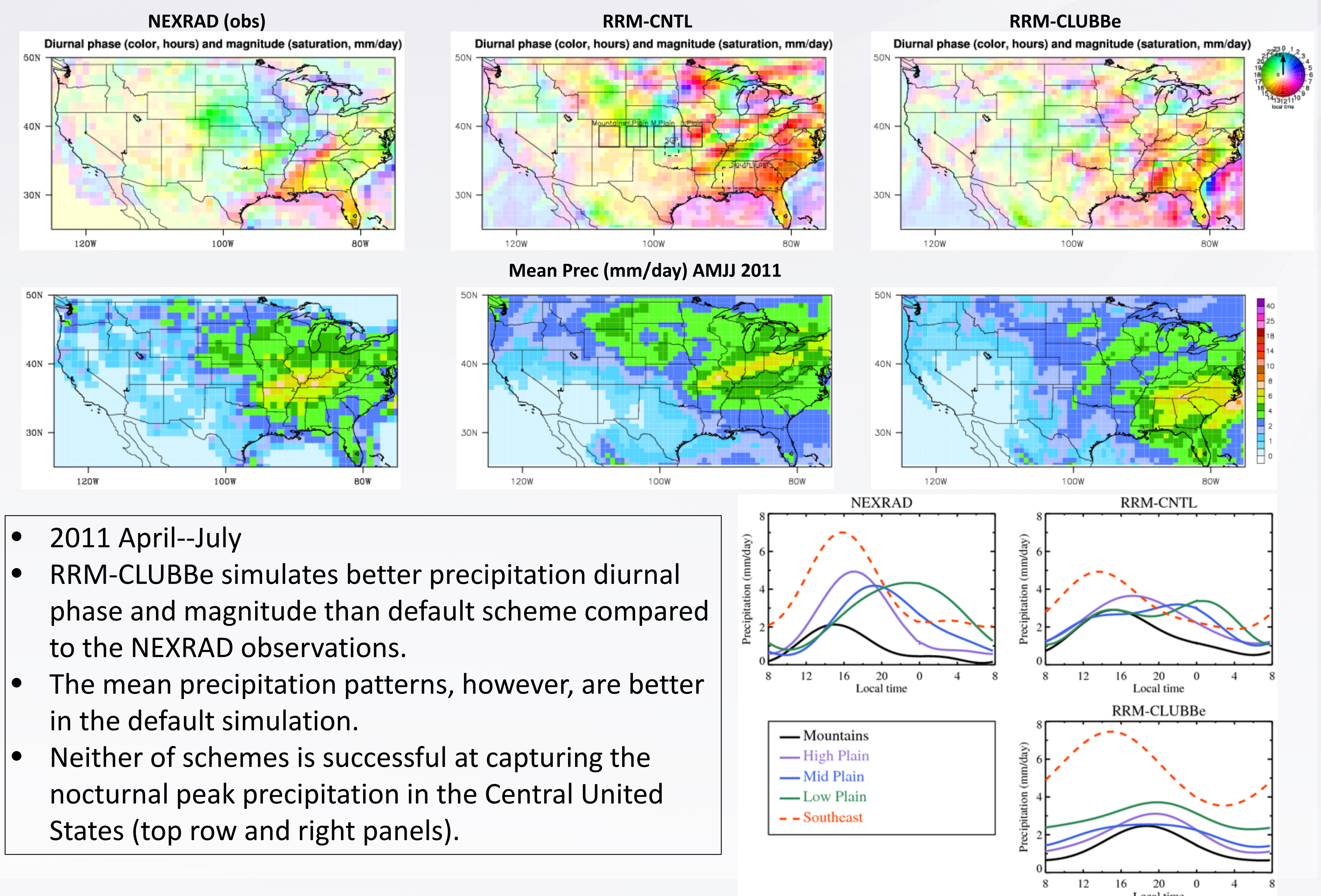
- Resolution: High-resolution region: 0.125°—0.25°, low-resolution: 1.0°
- Nudged U & V to the ECMWF-Interim analysis data for the low-resolution region
- Period: 2011 January—August

Sensitivity to Topography



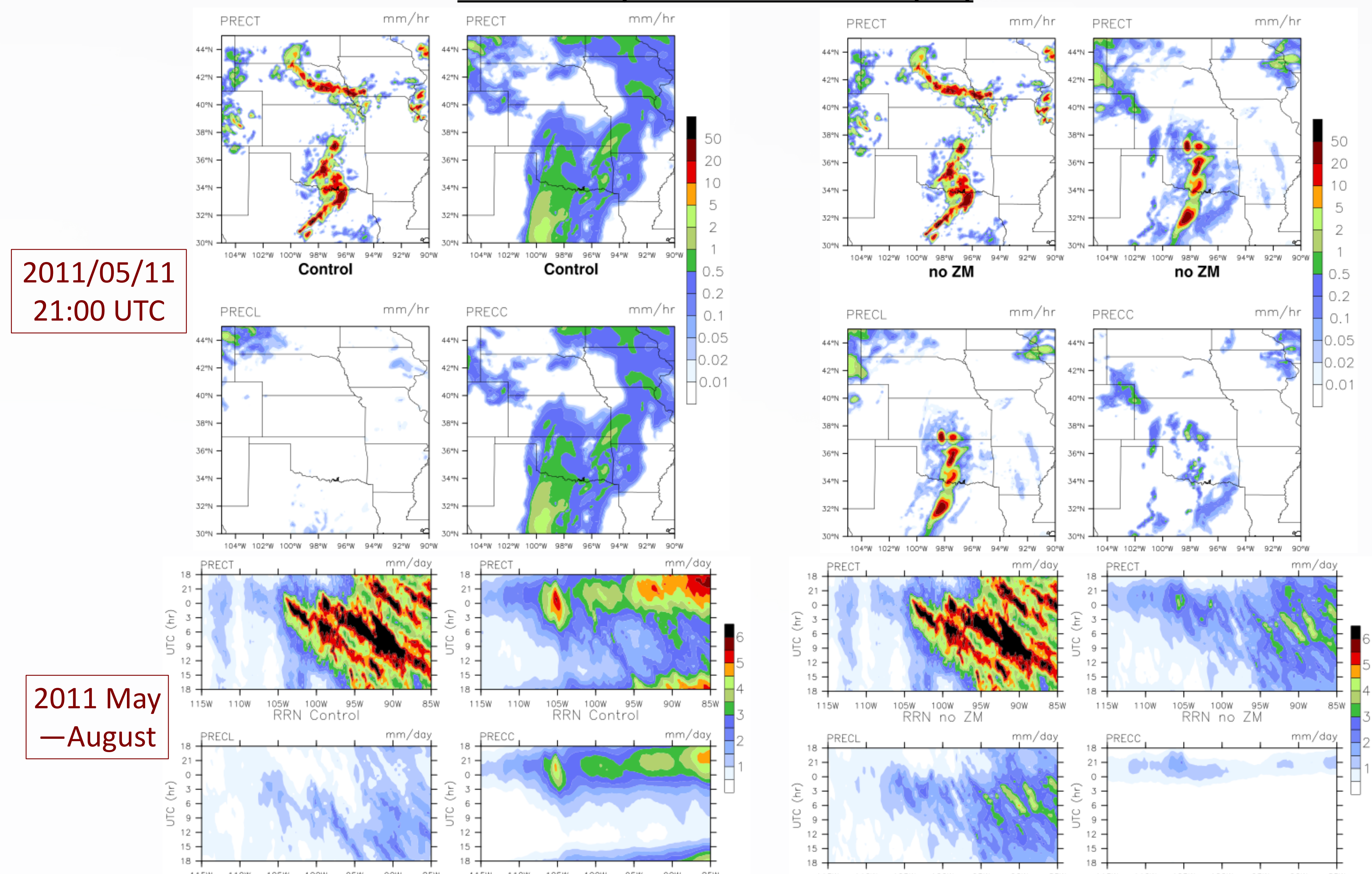
- 2011/04/22-05/15
- Subtle differences in precipitation are found along the front-range of the Rocky.
- The large-scale precipitation features are less intense with fine/steeper topography.
- However, features such as resolving Sierras are more marked.

Sensitivity to Convection Schemes



- 2011 April--July
- RRM-CLUBbe simulates better precipitation diurnal phase and magnitude than default scheme compared to the NEXRAD observations.
- The mean precipitation patterns, however, are better in the default simulation.
- Neither of schemes is successful at capturing the nocturnal peak precipitation in the Central United States (top row and right panels).

Turn off Deep Convection Scheme (ZM)



2011/05/11
21:00 UTC

2011 May
—August

- 2011/05/11 21:00 UTC (top 8 panels), 2011 May—August (bottom 8 panels)
- Removing the deep convection scheme (Zhang-McFarlane) improves certain event (top 8 panels).
- However, it does NOT simulate enough nocturnal precipitation, and the propagation speed is too low (bottom 8 panels).