Verification of summer precipitation in a continental scale with WRF-4km

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Introduction

Motivation

Convective precipitation represent a significant percentage of total precipitation in places such as tropical regions and in central USA.

The convection permitting models (CPM) have improved the simulation of convective precipitation. CPM is still expensive computationally and thus it hasn't been fully tested.

The objective of this work is to describe in more detail the representation of diurnal cycle of summer precipitation in a continental scale, for 10 years, and examine the latitudinal change of the diurnal convection and its dominant mechanisms using observations and numerical simulations.

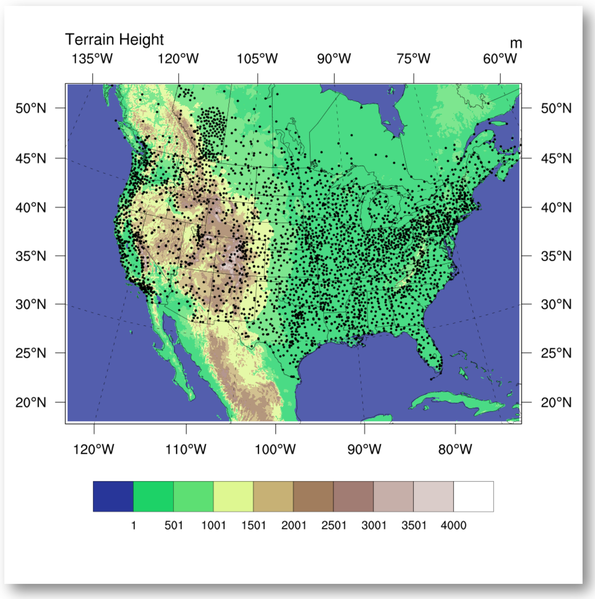
Model setup

The WRF model have been performed in the NCAR facilities. The results have been documented in Liu et. al 2016.

The runs were performed from 2000 to 2013 at 4 km spatial resolution, with a spectral nudging using the Era-Interim as the input. The physics schemes used are described in Table 1.

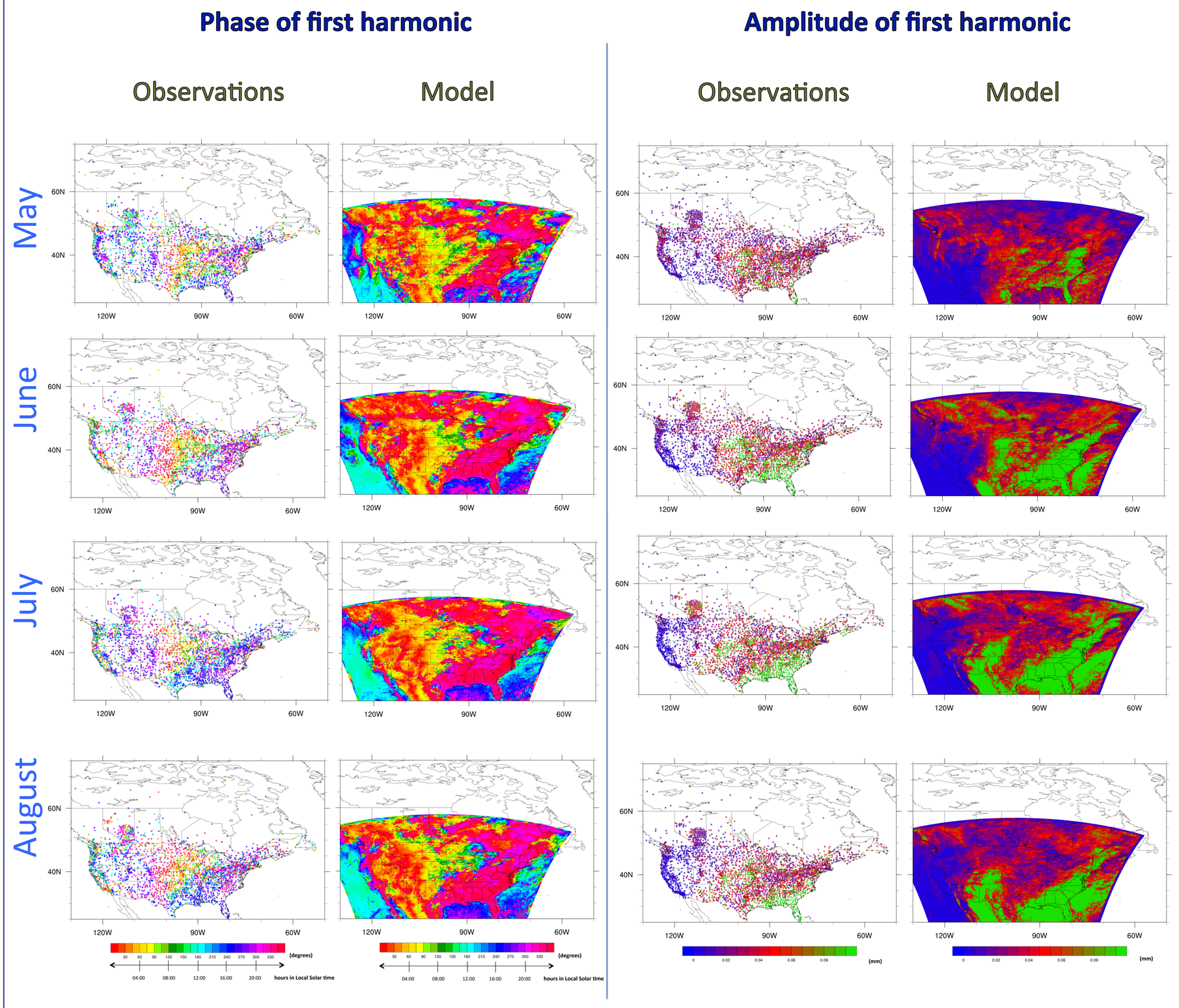
Microphysics	New Thompson et al. scheme
Land-surface	Noah MP (Noah Multi Physics options)
Planetary boundary layer	YSU (Yonsei University)
Cloud or cumulus parameterization	**No Cumulus parameterization**
Long-wave and Short-wave scheme	RRTMG (Radiative Transfer model)

Domain and Data



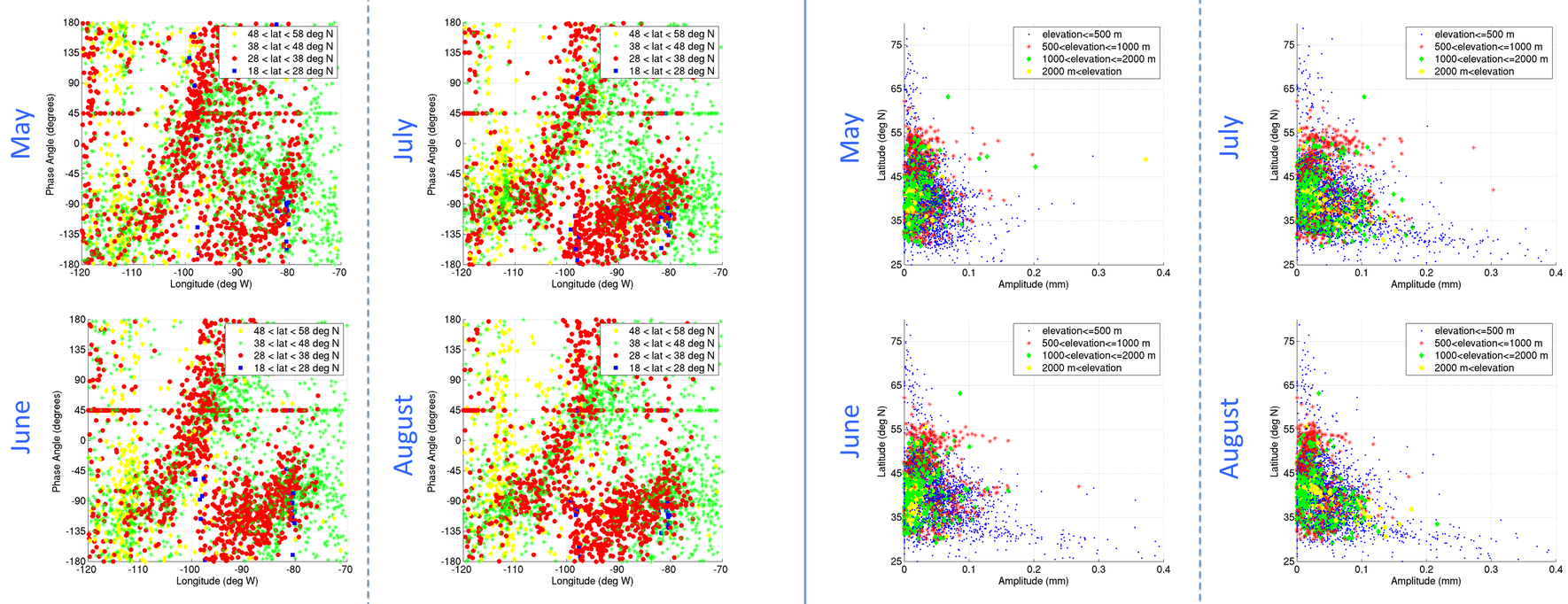
Observations of hourly precipitation from surface weather stations are used to perform this verification. The datasets are from the rda-TD3240 for stations in United States and from Environment Canada, Agriculture Alberta Environment and FOPEX field campaign.

Verification



Application

Analysis of the change in phase and amplitude



Conclusions

- The diurnal amplitude decays northward and this change is statistically significant in the mean amplitude values. The WRF 4-KM CONUS simulation represent relatively well the main phase and amplitude feature changes in summer months.
- The phase, as expected, increases from west to east in central United States and southern Canada, representing the eastward propagation of summer precipitation. The model also capture part of this feature.
- We will examine how summertime diurnal convection diminishes and convection triggering mechanisms alter with increasing latitude.