QUANTIFYING THE ROLE OF AEROSOLS TO PRECIPITATION VARIABILTY IN EAST ASIA – A SIMULATION FROM WRF-CHEM

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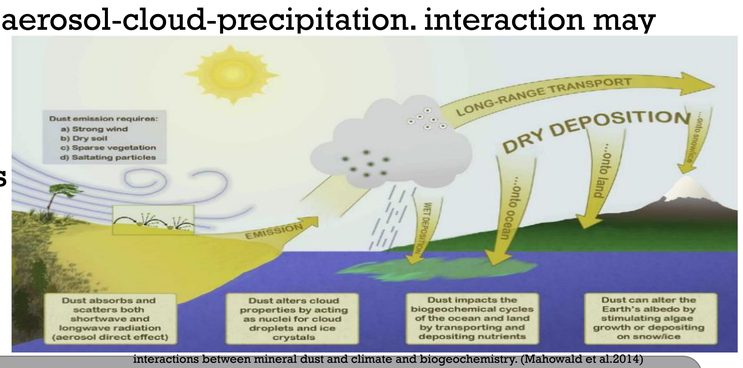
SUMMARY

- Asian aerosol load on precipitation variability was assessed through sensitivity experiment
- uncertainty and complexity of aerosols effect on East Asian monsoon systems at different scales and furthermore stress the significance of aerosol forcing for future climate projection

INTRODUCTION

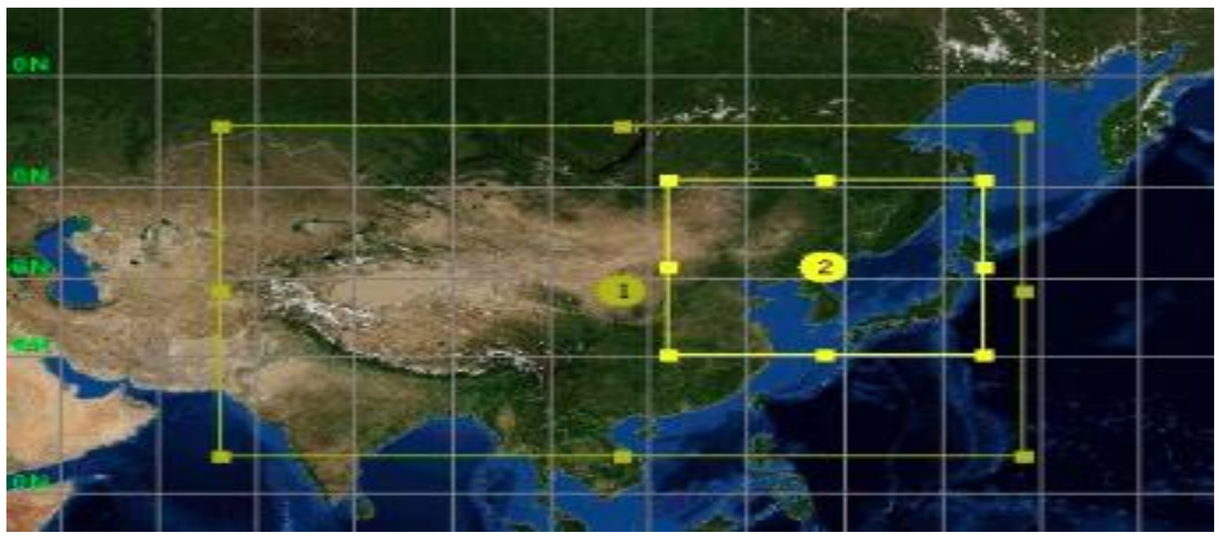
- precipitation variability remain an uncertainty in global climate forcing
- dust influence the properties of parcel -CNN, IN
  - -Changing RH
  - - stability of the atmosphere.
- positive feedback loop in the aerosol-cloud-precipitation. interaction may aggravate extreme inner land
- Aerosols induce feedbacks
  - - alters precipitation,
  - -affect the clouds: depends size and hygroscopicity



interactions between mineral dust and climate and biogeochemistry. (Mahowald et al.2014)

EXPERIMENTAL -SETUP

- **simulation setup was realized using a horizontal grid size of 0.5 (28 km) in both horizontal directions and 40 vertical levels from the surface to about 50 hpa**



- chemistry component of the WRF model was set to dust-only mode, with aerosol the regional scale distribution of aerosols and precipitation over the study

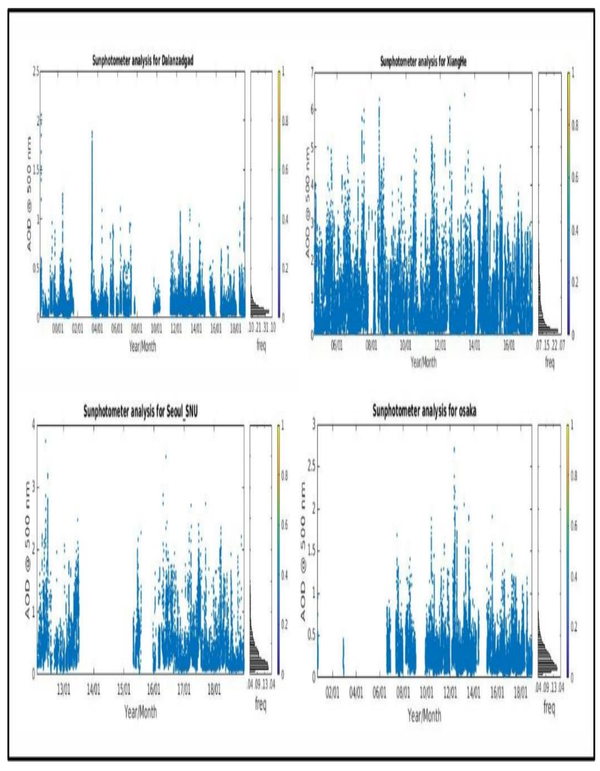
RESEARCH AIM

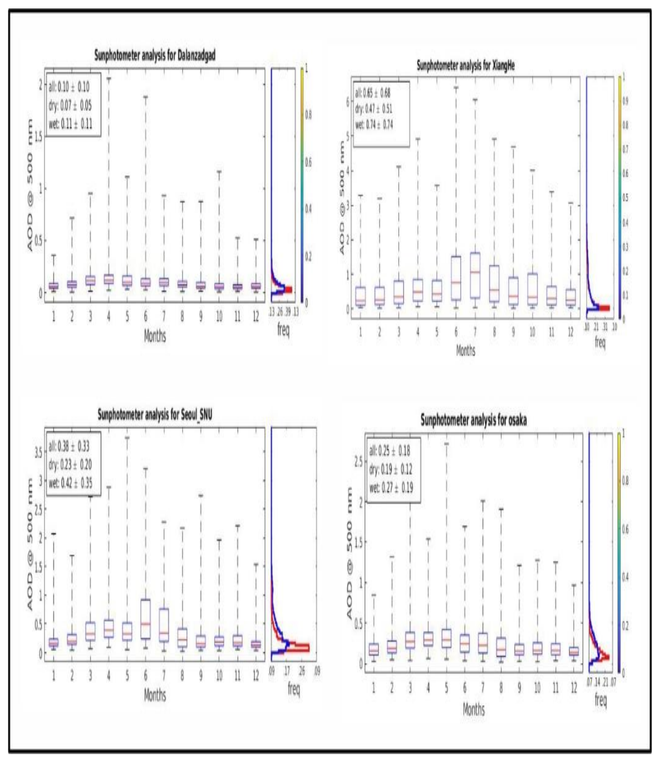
The study goal is to quantify the role of Asian dust to precipitation variability in East Asian region through aerosol-cloud interaction and access its impact on extreme Rainfall Characteristics

OBJECTIVES

Analyze the regional scale distribution of aerosols and precipitation over the study area;
Investigate the comparism of regional climate simulation over the study region – statistical access extreme precipitation pattern over the study area using multi-model and multi-method
Assess how precipitation in East Asia is altered due to interactions between aerosols, topography, and cloud droplets;
Introduce into the model a new anthropogenic scenario based on our emissions inventories of aerosols and simulate the model with and without aerosols-cloud feedbacks;
Validate the result of simulation using ground observations data over the study area

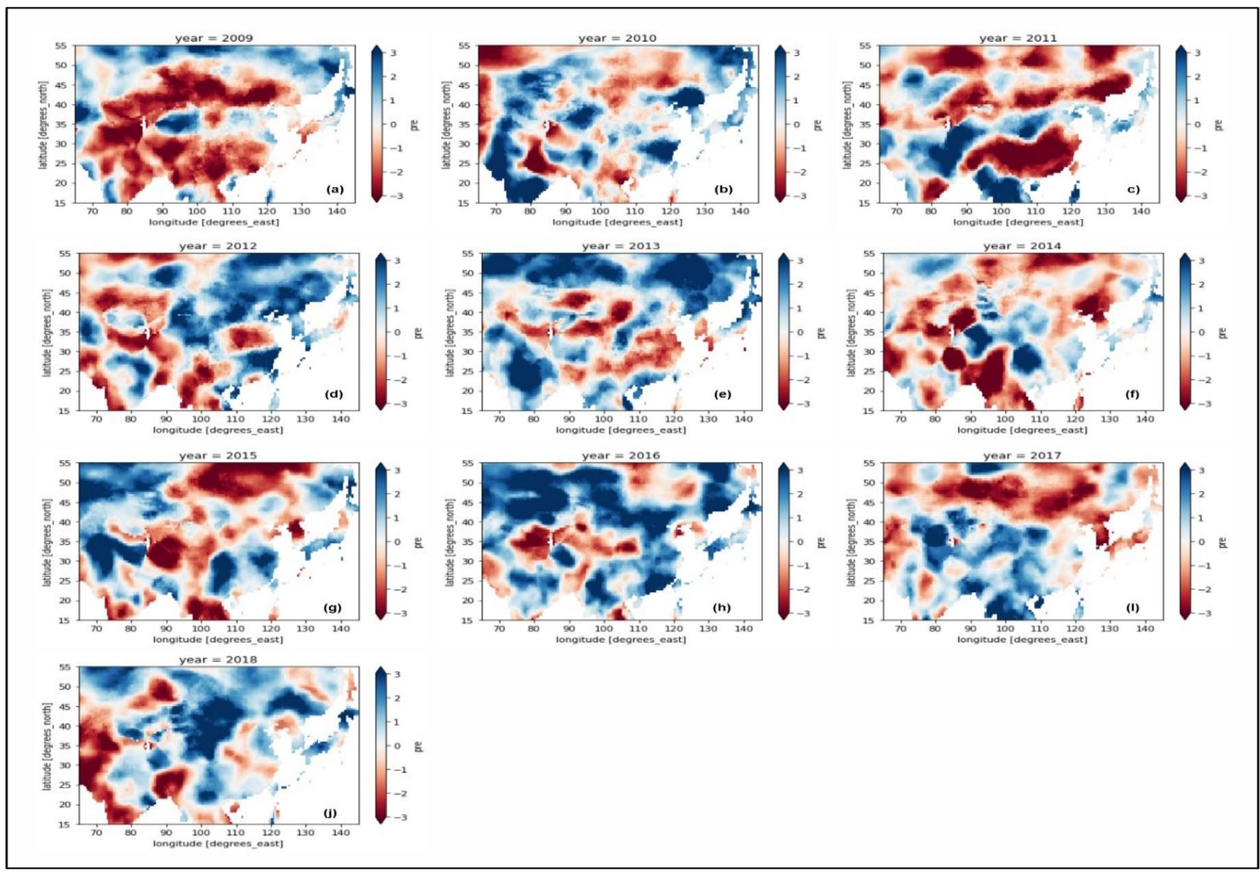
DISTRIBUTION OF AEROSOLS





- dust concentration is highest Surface
- In May, increased emission of dust over the Middle East desert and West Asia arid regions due to differential heating

DECADAL PRECIPITATION EXTREME



- Strong correlation exist between AOD and rainfall
- negative anomalies in regions of increased high clouds
- In June southwesterly transport more dust and moisture over region, resulting in anomalous warming
- AOD concentration is mostly confined to the desert but less pronounced over the rest adjacent oceans during , due to removal by wet deposition and washout from increased precipitation
- July-August removal of dust aerosol by increasing precipitation washout.
- Continuous increased precipitation continues to evolve due to cloud radiation dynamical feedback, enhancing the meridional surface temperature

REFRENCES

A.R.Naeger (2018) Impact of dust aerosols on precipitation associated with atmospheric rivers using WRF-Chem simulations *Elsevier result in physics*

CONCLUSION: Our result suggest that changes in desert dust have significant impact on precipitation extreme over East Asia, coupled, through radiation-precipitation-circulation feedback processes, and also increased in other anthropogenic aerosols (GHG, CO2), this agrees with (LI eat al the increased anthropogenic aerosols forcing during historical period are also a dominant drivers of the drying trend, aerosols also generate large response not only in the emission region but as far as there transport part.

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