GSRMs session

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Overview

13 presentations

- Global high-resolution models
- Observation and data assimilation

Daniel Klocke

- ICON (1km resolution)
- Benefit of 1km earth system modelling
- Beautiful figures from “Apollo17” data
- Be careful with the river discharge

Cathy Hohenegger

- ICON-Sapphire (5km resolution)
- Higher-resolution leads to better partitioning in cloud top height
- Good partitioning in precipitation between land/ocean, but be careful with the reasons

Shuhei Matsugishi

- NICAM (220m) “Global LES for deep convection”
- Low cloud fraction and shape are dependent on the turbulence scheme

Daisuke Takasuka

- NICAM (3.5km)
- Good representation in mean state v.s. turbulence (e.g., MJO)
- Both have been improved by retuning and the new turbulence scheme

Pier Luigi Vidale

- HadGEM3-GC3.1 (10km)
- The number of TCs increases from 135 to 60km resolution, decreases from 60 to 10km
- Stochastic physics increases the number of TCs
- Not just because adding noises, but the large-scale environment plays an important role

Arlindo Da Silva

- Overview of Atmosphere Observing Systems
- Priorities: Aerosol, cloud, convection, precipitation
- Development of simulators, data assimilation system
- Machine learning approaches are being explored

Chris Terai

- SCREAM (3.25km)
- Better diurnal cycle and intensity of precipitation, well-balanced TOA radiation (as a result of compensation)
- The “popcorn” convection is partly improved from SCREAMv0 to SCREAMv1

Falco Judt

- MPAS (3.75km)
- High-resolution leads to better Tropical waves and cyclones
- 3.75km *with* parameterization exhibit poorer performance
- Large inter-model differences in Hurricanes

Tsung-Lin Hsieh (online)

- X-SHiELD (3.25km)
- Better representation in topographically induced rain and snow fall over western US
- In +4K SST run, the storm track shifts northward

William C. Skamarock

- EarthWorks project (goal: 3.75km resolution)
- MPAS atmos. and ocean is running on GPUs
- Test cases: A Squall line and TC
- Good with WRF physics, poor with CAM6 physics but improved with some updates

Zhiquan (Jake) Liu

- MPAS-JEDI with data assimilation (7.5km) (3km in the near future)
- All-sky radiance data assimilation v.s. clear-sky data assimilation
- Better performance with higher-horizontal resolution (15km vs 30km)

Angel Agustin

- Aqua-planet ICON-Sapphire (1.25km)
- Evaluation of the convergence of model performance with Richardson Extrapolation method
- ITCZ location and shape converge at 1-5km reso, yet ITCZ intensity needs higher reso

Yi Zhang

- GRIST (3.75km)
- Higher resolution leads to better Fine-scale features (e.g., KE spectra)
- 120km experiments with convection parameterization are similar to 5km resolution

Session overview

- Higher resolution modeling basically makes results positive
  - However, some schemes should be modified

Discussion

- Post-process issues
  - storage
  - Human resources
  - Can we access all the output?
- Possibility to adapt machine learning or AI to observation or modeling

Thank you for your attention!