



Development and application of BCC high resolution model prediction system

All members of BCC model group

The 7th EASCOF November 2019, Ulaanbaatar, Mongolia







- Introduction of BCC models
- The simulation ability of BCC high resolution model
- Application of BCC high resolution model











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1. The simulation ability for the temperature and the vertical structure of wind in the stratosphere and the middle atmosphere and their seasonal changes







The vertical structure of temperature













The vertical structure of wind

BCC-CSM2-HR

JRA55/CIRA-86

T266L56









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- 2. Climate variations at different timescales, such as the stratospheric quasi-biennial oscillation (QBO), the Madden–Julian Oscillation (MJO)









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Quasi-Biennial Oscillation (QBO) in BCC-AGCM



Monthly tropical zonal winds between 5°N and 5°S in the lower stratosphere from 1979 to 2008

Increase of vertical resolution is better to represent large-scale waves. But a mesoscale GW parameterization is more important to provide unresolved wave forcing of the QBO.

BCC-AGCM can

spontaneously generate the QBO with realistic periods, amplitudes, and asymmetric features between westerly and easterly phases.

Reference:

 Lu, Y., T. Wu, W. Jie, A. A. Scaife, M. B. Andrew, and J. H. Richter, 2019: Variability of the stratospheric quasi-biennial oscillation (QBO) and its wave forcing simulated in the Beijing Climate Center atmospheric general circulation model (BCC-AGCM), J.Atmos.Sci. in press.





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BCC-CSM2-HR (T266L56)



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Representation of the Arctic Oscillation (AO)



Regressions of SLP anomalies in winter on the AO index derived from (a) the NCEP/NCAR reanalysis and (b) the BCC-CSM3 model simulations. The percentage of variance explained by the winter AO pattern is given at the top right-hand corner of each panel.







Representation of the North Atlantic Oscillation (NAO)



The leading EOF mode of winter SLP derived from (a) the NCEP/NCAR reanalysis and (b) the BCC-CSM3 model simulations. The percentage of variance explained by the winter NAO pattern is given at the top right-hand corner of each panel.







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3. Improve the simulation of Intertropical Convergence Zone (ITCZ)







Precipitation climate mean from BCC-CSM2-HR













Precipitation climate mean from BCC-CSM2-HR



















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- 4. Improve the simulation of surface air temperature, precipitation, and atmospheric circulation for China and East Asia regions





Annual mean surface temperature (K)























- Introduction of BCC models
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MAM

JJA











MAM

JJA



T2m







MAM

JJA



precipitation







MAM

JJA



SST







ENSO forecast skill of 2001-2010 from March BCC-CSM2-HR(T266L56)

ENSO hindcast skill (the NINO3.4 SSTA;2001-2010)













Thanks !



