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Climate of the 20th and 21th century simulations by a 60-km mesh global atmospheric model

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1. Introduction

Climate of the 20th and 21th century simulation was conducted with a 60-km mesh global atmospheric model for 228 years from 1872 to 2099. Variability of surface air temperature, precipitation, the East Asian summer monsoon and tropical cyclone are investigated.

2. Model

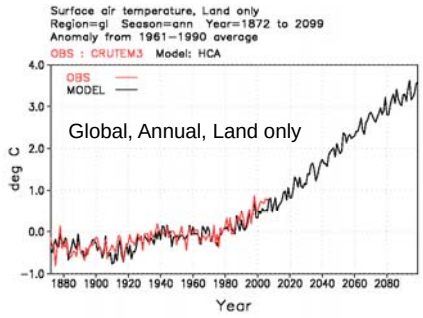
MRI-AGCM3.2H, 60km

Item	Content
Horizontal resolution	60km, TL319
Vertical resolution	64 levels 0.01 hPa top
Time step	15 minutes
Cumulus	Yoshimura (AS/Tiedke hybrid)
Cloud	Tiedtke (1993)
Radiation	JMA (2004r1)
Gravity drag	Iwasaki et al. (1989)
Top condition	Rayleigh friction
Sea surface	MRI-scheme + skin SST
Land surface	SIB0109
Boundary layer	Mellor-Yamada Level 2
Aerosol direct	5 species
Aerosol indirect	None

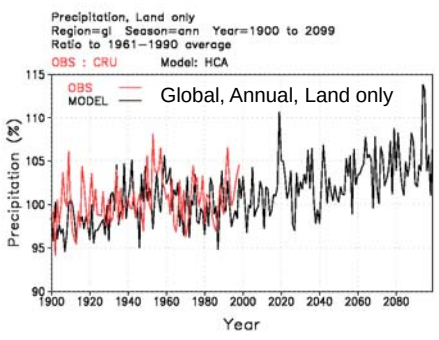
3. Experimental design

Period	1872-2000	2001-2005	2006-2099
SST Sea ice	HadISST		HadISST+CMIP3 Multi-model ensemble, A1B
See ice thickness	Observed climatology Bourke and Garrett (1987)		CMIP3 Multi-model ensemble, A1B
Greenhouse Gas	CO2,CH4,N2O,CFC Observation	CO2,CH4,N2O,CFC A1B	
Aerosol	MRI-ESM, 5-year average, A1B - Volcanic eruption: Oct 1986 - Present - Before1970: 1969-1973 average - After 2097: 2092-2096 average		
Ozone O3	MRI-CCM CCMVal , 5-year average, A1B - Before1960: 1959-1963 average		

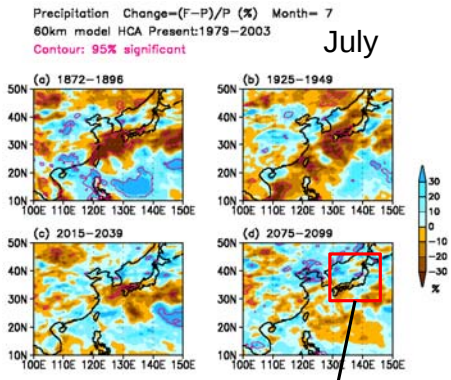
4. Surface air temperature

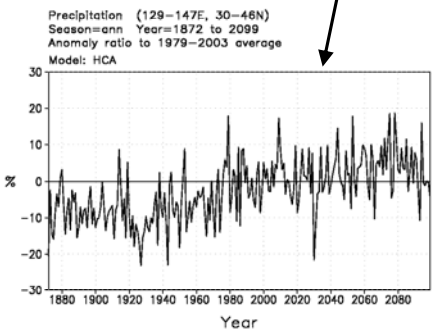


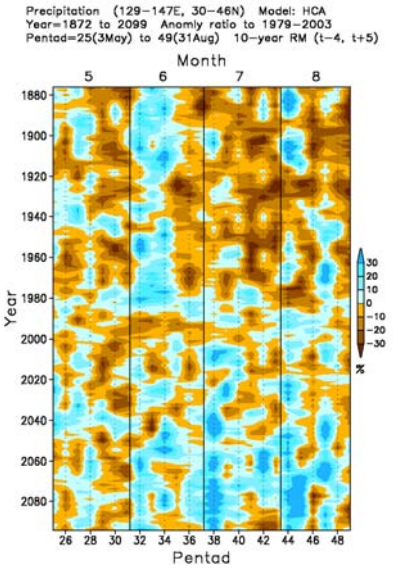
5. Precipitation



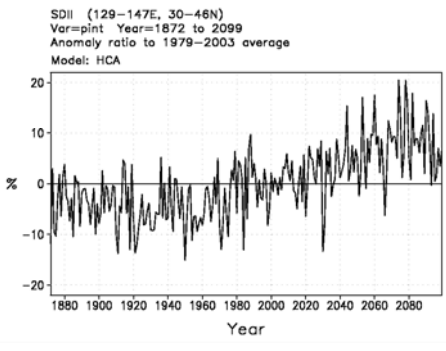
6. East Asian summer monsoon





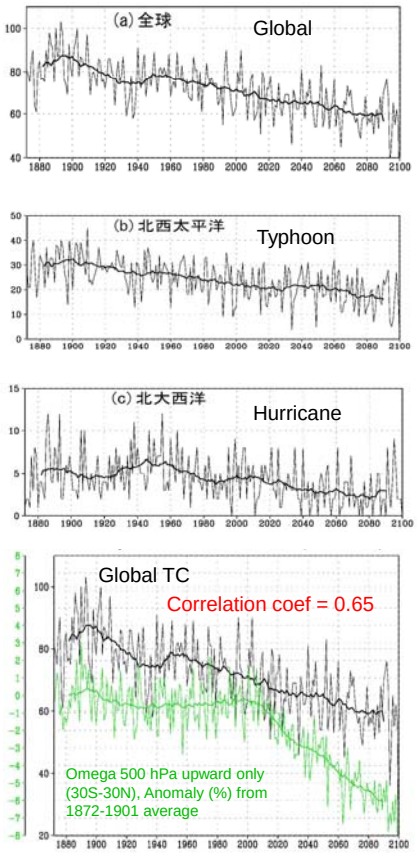


Simple Daily precipitation Intensity Index (SDII)



7. Tropical cyclone (TC)

Number of TC



8. Summary

(1) Model well simulates global average surface air temperature in 20th Century.

(2) Precipitation intensity increase over Japan in 21st Century.

(3) Number of tropical cyclone decreases in 21st Century associated with the weakening of circulation in the tropics.

Acknowledgements

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