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Title: THE EAST ASIAN REGIONAL OCEAN-ATMOSPHERE COUPLED CLIMATE MODEL AND ITS PERFORMANCE

Abstract: THE EAST ASIAN REGIONAL OCEAN-ATMOSPHERE COUPLED CLIMATE MODEL AND ITS PERFORMANCE QIAN Yongfu, REN Xuejuan, ZHANG Yaocun (Department of Atmospheric Sciences, Nanjing University) ABSTRACT China is a country strongly affected by monsoon. The seasonal variations of the offshore current and the SST in the adjacent oceans of China are both most obvious in the world, which shows that the air-sea interaction in the China's offshore region may be very strong. China has also the highest and largest Tibetan Plateau over the world. Therefore, the impacts on China's weather and climate are not only from the tropical regions, but also from the mid-latitude and the Plateau. The global atmospheric general circulation models (AGCM) do not produce ideal simulations in China and the East Asian area. Since the 1980's the regional climate models (RCM) have been fairly developed and tested. However, in such models the SSTA in the regional oceans are pre-specified as in the AGCM, so the RCM does not well describe the regional air-sea interaction. However, in the formation and abnormality of the East Asian monsoon, the coupling process of the atmosphere with the ocean and the land is crucial important, hence it is evidently necessary to develop the coupled regional climate models (CRCM). In this paper a CRCM for the East Asian area is developed and tested by taking the P-s incorporated coordinate regional climate model developed by Qian et al. as the atmospheric component and the Princeton University ocean model (POM) developed by Blumberg and Mellor and improved by Chu, Fu and Qian as the ocean component. The NCAR/NCEP reanalysis data set is first used for running the P-s model and evaluating its performance, and then it is used for driving the POM and assessing its results. At last, the P-s model and the POM are coupled to form a CRCM that is further used for simulations of the East Asian monsoon. Results show that the P- regional climate model independently fairly simulates the developing process of the East Asian summer monsoon circulation including the advance and the burst of the low level southwesterly in the South China Sea (SCS) area, the 500hPa geopotential pattern, the sea level pressure and the upper level velocity fields. The POM also independently fairly simulates the basic features of the Kuroshio, the large scale anticyclonic warm gyre to its right, the SCS warm current and the evident influence of the monsoon on it. By use of the synchronous coupling technique the CRCM consisted with the P-s model and the POM is proved having ability to fairly simulate the seasonal variations from winter to summer of the geopotential height, the temperature, the precipitation and the southwesterly in the monsoon regions. It also well simulates the time variations of the 1998 summer monsoon. Compared with the independent POM's results, it is found that the coupled model gets almost the same oceanic current but the lower sea surface temperature.

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