

# Detection and projection of climate change over East Asia and China for the 20<sup>th</sup> and 21<sup>st</sup> centuries

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## Abstract

In this research, the simulations of seven AOGCMs (CCC, CCSR, CSIRO, DKRZ, GFDL, HADL and NCAR) have been used to investigate the detection of climate change in 20<sup>th</sup> century and projection of 21<sup>st</sup> century over East Asia (70~140E, 15~60N) and China.

The detection of 20<sup>th</sup> century over East Asia shows that the warming for the last 50 and 100 years might be partly attributed to human activities (both greenhouse gases and sulphate aerosols). The correlation coefficients between the model control run (AOGCMs-CT), the greenhouse gases run only (AOGCMs-GG), or both greenhouse gases and sulphate aerosols run (AOGCMs-GS) and the observations (OBS) for the 20<sup>th</sup> century were about 0.02, 0.55 (0.39~0.70) or 0.39 (0.15~0.56), respectively. The linear trend of the observed temperature change in East Asia for the 20<sup>th</sup> century was 0.84C/100years. The linear trends for the AOGCMs-CT, AOGCMs-GG and AOGCMs-GS were 0.08C/100years, 1.45C/100years (0.81~2.89C/100years) and 0.50C/100years (-0.07~0.88C/100years), respectively. It is found from the calculations that the greenhouse gases experiments overestimated the warming in East Asia and the greenhouse gases/sulphate aerosols experiment underestimated the warming in East Asia.

The impacts of human activities on precipitation over East Asia in 20<sup>th</sup> century are unobvious.

As projected by the climate models, the significant warming of 4.06C/100years (1.73~7.45C/100years) and 2.92C/100years (0.38~5.53C/100years) for the AOGCMs-GG and AOGCMs-GS in 21<sup>st</sup> century over East Asia due to human activities has been noticed. The precipitation over East Asia might increase due to the human activity in the 21<sup>st</sup> century.

Besides, the detection and projection of extreme temperatures (Tmax and Tmin) over China for the 20<sup>th</sup> and 21<sup>st</sup> centuries have also been conducted in this research.

There are some uncertainties in the regional climate change as simulated by the global climate models with the coarse resolutions. The NCC AOGCM (T63L16/T63L30) is going to do this simulation. The RegCM2 (60km) over China will be nested into the global model.