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## Study on Temporal-Spatial Variability of Climatic Factors and Its Influence on Net Primary Production of Grassland in Inner Mongolia, China

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The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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## Study on temporal-spatial variability of climatic factors and its influence on net primary production of grassland in Inner Mongolia , China

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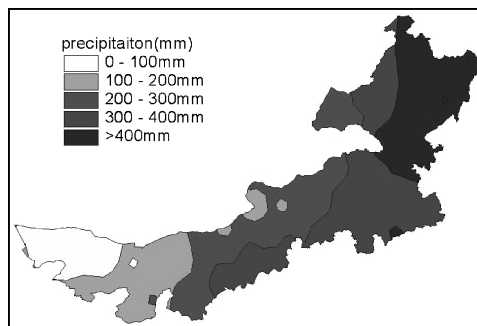
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**Key words :** climatic factor , net primary production , GIS , water deficit , grassland

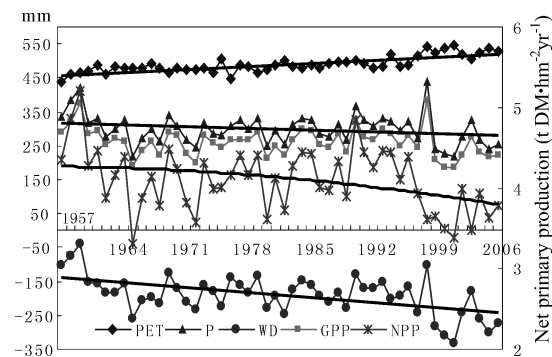
**Introduction** The climatic factors , especially rainfall in semiarid and arid areas , have overriding effects on grassland productivity . The purpose of this study was to identify the relationship among precipitation , temperature , evaporation and net primary production and then to estimate on effect of climate change on grassland productivity .

**Materials and methods** The meteorological data sets from 1957 to 2006 that we used were collected from 47 weather stations in Inner Mongolia . The spatial distribution of climatic factors was analyzed with the Inverse Distance Weighted (IDW) method embedded in ARC/INFO , which was based on GIS . The net primary production was calculated with the Synthetic model (Zhou *et al.* , 1996) .

**Results** The mean precipitation of all 47 stations in both May-September and the whole year showed slight decreasing linear trends , but neither was statistically significant (Figure 2) . In contrast to rainfall amount , there was profound and significant increase in the aspects of the temperature and evapotranspiration characteristics ; the biological temperature has been increasing by 0.18°C average per 10 years (data not shown) . As a result of the precipitation decreasing and the potential evapotranspiration increasing , the water deficit has become more and more severe (Figure 2) . Because of climate change , the net primary production of the grassland ecosystem has been decreasing year by year (Figure 2) . Otherwise , the spatial distribution of climatic factors showed an extreme imbalance , the distribution of precipitation descended gradually from east to west (Figure 1) , however , that of temperature and evapotranspiration was opposite .



**Figure 1** Spatial distribution of average annual rainfall in the Inner Mongolia , 1957-2006 .



**Figure 2** Average annual amount of precipitation (P) , potential evapotranspiration (PEP) , water deficit (WD) , growth period Precipitation (GPP) and net primary production (NPP) .

**Conclusions** The precipitation decreasing , climate warming , evapotranspiration increasing , and the spatial distribution imbalance of climatic factors resulted in the severe water deficit in the Inner Mongolia . This water deficit was the main limiting factor of the grassland productivity . The reasons above led to the drastic drop of net primary production of grassland ecosystem in Inner Mongolia in the past 50 years .

### Reference

Zhou Guang-sheng , Zhang Xin-shi , 1996 . Study on NPP of natural vegetation in China under global climate change . *Acta phytocologica sinica* , 20(1)11-19 .