

研究论文

南极地区气候系统变化: 过去、现在和将来

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摘要 南极科学委员会 (SCAR) 下属的"南极与全球气候系统 (AGCS) 计划"专家委员会发布了"南极与南大洋气候系统 (SASOCS) "白皮书, 重点评估了过去50 a南极地区气候系统的变化并预估了未来100 a情景。白皮书总体认为, 过去50 a南极气候系统变化表现出很强的区域特征。南极半岛地区升温明显, 半岛及亚南极岛屿上的冰川均处于退缩状态; 南半球环状模 (SAM) 转为正位相, 西南极上空的暖湿气团入侵加强, 南极冬季对流层有升温趋势, 平流层变冷, 极涡消退日期推迟; 东南极外围的南极底层水变淡, Weddell海区的底层水有变暖趋势。虽有上述区域变化, 整个南极地区在过去50 a中近地面气温并无明显升高, 降水亦无明显增加。自20世纪80年代以来海冰面积也无明显变化, 只在某些扇区变化强烈。模式预估结果为: 到21世纪末南极内陆地区将增暖 (3.4±1.0) °C, 海冰面积将缩小约30%。现有的冰盖模式尚不足以回答未来气候变暖情景下冰盖融化与海平面变化之间的定量关系, 有待更深入研究。

关键词 [南极地区](#) [南大洋](#) [冰盖](#) [预估](#) [不确定性](#)

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Changes in Antarctic Climate System: Past, present and future

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Abstract White paper on "status of Antarctica and the Southern Ocean Climate System" (SASOCS) has been submitted to Science Committee of Antarctic Research (SCAR) by the Scientific Steering Committee of "Antarctica in Global Climate System"(AGCS). Changes in Antarctic climate system in the past 50 years are assessed and changes for the future 100 years are projected. It is concluded that: 1) large spatial differences were found in the past 50 years in the changes of the Antarctic climate system, rapid warming and glacier retreating occurred over the Antarctic Peninsula and islands in the southern oceans; enhanced warm air masses were detected over the West Antarctica, and winter warming occurred in the mid-troposphere while cooling in the stratosphere. The date of polar vortex decay was delayed. Bottom water in the sector of East Antarctica was purified, and also warmed in some areas such as Weddell Sea. However, there was no obvious changes in surface air temperature and precipitation in the overall Antarctica. Sea ice extent had no obvious changes either in the last 50 years, although large changes were observed in some sectors. 2) It is projected that air temperature over the inland of Antarctica will increase by (3.4±1.0)°C, and sea ice extent will decrease by 30% in the end of the 21st century. Current models are not able to predict the quantitative relations between ice sheet melting and sea level changes under future climate warming scenarios.

Key words [Antarctica](#) [South Ocean](#) [ice sheet](#) [projection](#) [uncertainty](#)

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