

引用本文(Citation):

刘喜迎, 刘海龙. 大气变率对北极地区近期海冰变化趋势影响数值模拟研究. 地球物理学报, 2012, (9): 2867-2875, doi: 10.6038/j.issn.0001-5733.2012.09.006

LIU Xi-Ying, LIU Hai-Long. Investigation of influence of atmospheric variability on sea ice variation trend in recent years in the Arctic with numerical sea ice-ocean coupled model. Chinese J. Geophys. (in Chinese), 2012, (9): 2867-2875, doi: 10.6038/j.issn.0001-5733.2012.09.006

## 大气变率对北极地区近期海冰变化趋势影响数值模拟研究

刘喜迎<sup>1,2</sup>, 刘海龙<sup>2\*</sup>

1. 解放军理工大学气象海洋学院, 南京 211101;
2. 中国科学院大气物理研究所大气科学和地球流体物理学数值模拟国家重点实验室, 北京 100029

Investigation of influence of atmospheric variability on sea ice variation trend in recent years in the Arctic with numerical sea ice-ocean coupled model

LIU Xi-Ying<sup>1,2</sup>, LIU Hai-Long<sup>2\*</sup>

1. Institute of Meteorology and Oceanography, PLA University of Science and Technology, Nanjing 211101, China;
2. State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China

摘要

参考文献

相关文章

Download: [PDF \(2289KB\)](#) [HTML KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要 为研究近期21年(1989—2009年)北极地区海冰变化原因,本文利用欧洲中期天气预报中心ERA-Interim数据集资料和美国麻省理工学院MITgcm全球海冰-海洋耦合模式开展了不同大气强迫条件下海冰变化的数值模拟研究.研究工作中共设计了6个数值试验,除1个试验全部采用1989—2009年每日4个时次的大气强迫场外,其余5个试验各有一种大气强迫(地表气温、地表大气比湿、向下短波辐射通量、向下长波辐射通量和地表风)采用1989年月平均结果.分析了各模拟试验结果中3月和9月北极地区海冰面积的年际变化特征及最小二乘拟合意义下的线性变化趋势,并以ERA-Interim结果为参照标准对各模拟试验结果进行了对比和检验,以说明不同大气强迫量变率对海冰变化的作用.结果表明:地表气温变率和向下长波辐射通量变率是造成海冰面积减少的主要原因;向下短波辐射通量变率对海冰面积变化影响几乎可以忽略;地表大气比湿变率对海冰面积线性变化趋势影响较小,但对海冰面积年际变化特征有调制作用;地表风变率对海冰季节变化、海冰面积线性变化趋势及年际变化特征均有明显影响,说明提高大气风应力精度是改善海冰数值模拟结果的重要手段.

关键词 大气变率, ERA-Interim, MITgcm, 海冰, 数值模拟

Abstract: To investigate the cause of Arctic sea ice variation in the recent 21 years (from 1989 to 2009), numerical experiments were performed with the global sea ice-ocean coupled model MITgcm (Massachusetts Institute of Technology general circulation model) using the ERA-Interim reanalysis dataset from ECMWF (European Centre for Medium-Range Weather Forecasts). In the 6 experiments, one used atmospheric forcing quantities of 4 times a day from 1989 to 2009 and the other 5 each used almost identical forcing fields except that one of the 5 quantities (surface air temperature, surface air specific humidity, surface downward solar radiation flux, surface downward thermal radiation flux and surface wind) is the monthly mean of that in 1989 for corresponding experiment respectively. Simulated features of interannual variations and linear least squares fitting trends of sea ice area in March and September in the Arctic were analyzed. It is shown that, the variability of surface air temperature and downward thermal radiation flux in recent years gives the main contribution to decreasing of Arctic sea ice; the influence of the variability of surface downward solar radiation flux on sea ice area variation is almost negligible; the variability of surface air specific humidity has little effect on linear decreasing trend of sea ice, but it can modulate the interannual variation of sea ice area; surface wind variability has significant influence on seasonal variation, linear trend and interannual variation of sea ice, which implying that increasing the accuracy of wind stress is an important factor for improving numerical sea ice modeling.

Keywords Atmospheric variability, ERA-Interim, MITgcm, Sea ice, Numerical simulation

Received 2011-09-05;

Fund: 国家自然科学基金项目(40876101,41276190)和国家863计划项目(2010AA012304)资助.

链接本文:

<http://118.145.16.227/geophy/CN/10.6038/j.issn.0001-5733.2012.09.006> 或 <http://118.145.16.227/geophy/CN/Y2012/V/19/2867>

### Service

- [把本文推荐给朋友](#)
- [加入我的书架](#)
- [加入引用管理器](#)
- [Email Alert](#)
- [RSS](#)

### 作者相关文章

- [刘喜迎](#)
- [刘海龙](#)

