

e-Science应用

计算不确定性对IAP-AGCM大气环流模式的影响

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摘要: 本文旨在研究计算不确定性对IAP-AGCM模式的长时间积分的影响。通过对大气环流模式IAP-AGCM在不同计算平台计算时获得的长时间积分结果进行分析, 发现由于计算不确定性对模拟结果的十年平均月平均500hPa高度场随机误差在正负3gpm范围内。而850hPa温度场的差别也很小, 不同计算机系统结果未有大面积通过显著性检验的差别区域, 因此模拟结果无本质上的差别。对于气候平均场而言, 本文的试验表明IAP-AGCM在计算时由于计算不确定而引起的误差在可接受范围之内。然而, 虽然舍入误差的全球平均值不大, 但其误差分布的方差范围并不小。赤道地区和南半球极区的数值试验得到的不同模拟结果之间方差大小与模拟结果的年际变化大小在同样的量级, 因此对于“年际变化”这样的问题来说, 其影响是不可忽略的, 必须要使用集合预报的办法来减小误差的影响。

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关键词:

A Study on the Influence of the Computational Uncertainty on the IAP-AGCM Model

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Abstract: Computational Uncertainty has an influence on the numerical model computations. When we analysis the differences between the results of the model IAP-AGCM with different computation platforms, we found that the error range of ten year global mean height at 500 hPa is within 3gpm. The error of 850 hPa temperature is also small and there has no significant difference areas when using statistical T-test. So we know that the result of IAP-AGCM are equivalence and acceptable in climatic study. Though the global mean error is not very large, the standard error of the difference is not small. The estimation shows that it has the same magnitude as the annual change of the simulation results especially at the North Pole and South Pole. Therefore, the distribution of mean error cannot be ignored when the model is used to study such cases as annual climate change. The ensemble forecast method should be applied to reduce these errors.

Keywords:

收稿日期 1900-01-01 修回日期 1900-01-01 网络版发布日期

DOI:

基金项目:

通讯作者:

作者简介:

作者Email:

参考文献:

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