地球物理学报 2007 50 (5): 1383-1389 ISSN: 0001-5733 CN: 11-2074/P

GRACE和SLR观测的地球动力学扁率最大熵谱及小波相关分析

张子占[1,2],陆洋[1],许厚泽[1]

1 中国科学院测量与地球物理研究所 动力大地测量重点实验室，武汉 430077;2 中国科学院研究生院，北京 100049

收稿日期 2007-1-12 修回日期 2007-5-20 网络版发布日期 2007-10-18 接受日期

摘要 卫星重力测量技术的实现为测定地球动力学扁率提供了新的方式和途径，GRACE卫星是目前最新的重力测量卫星，据其恢复的低阶重力场较以往精度得到大大提高，然而其观测地球动力学扁率（二阶项）却与卫星激光测距（SLR）结果相差较大.本文采用最大熵谱和小波分析方法对GRACE和SLR观测的地球动力学扁率时间序列信号进行定量比较分析，结果表明：GRACE观测的地球动力学扁率年际周期变化振幅仅为SLR观测结果的25%，并且目前GRACE观测的地球动力学扁率数据中含有系统输入信息和相位差，但前者较后者包含有较强的短周期 （2～6月）信息.造成这种差异的主要原因可能来自于GRACE与SLR全球观测数据时空分布不同.

关键词 GRACE 卫星激光测距 地球动力学扁率 最大熵谱分析 小波分析

分类号 P228

DOI:

Maximum entropy spectral analysis and wavelet coherence analysis of the dynamic ellipticity of the earth from GRACE and SLR measurements

ZHANG Zi-Zhan[1,2], LU Yang[1], XSU Hou-Ze[1]

1 Key Laboratory of Dynamic Geodesy, Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan 430077, China;2 Graduate University of the Chinese Academy of Sciences, Beijing 100049, China

Received 2007-1-12 Revised 2007-5-20 Online 2007-10-18 Accepted

Abstract With the advent of the satellite gravity measurements, this new technique which is different from Satellite Laser Ranging (SLR) provides a new approac
h to determine the Earth's Dynamic Ellipticity (EDE). The Gravity Recovery and C
limate Experiment (GRACE) is the latest satellite gravity mission, the accuracy of low degree Stokes coefficients of the gravity field models derived from GRACE has been greatly improved. However, the results of EDE from GRACE do not agree well with that from SLR measurements. In this paper, the maximum entropy spectral analysis and wavelet analysis are used to assess the data sets EDE from GRACE and SLR. The results show that the interannual amplitude of the EDE signal from GRACE is only 25% of that from SLR, and GRACE EDE signals contain inputted system information and great phase difference, but the former reveals stronger short-term (2～6 months) signals than the later. These differences might be caused by the un-synchronism of the global measurements from GRACE and SLR.

Key words GRACE;Satellite Laser Ranging;The Earth's Dynamic Ellipticity(EDE);Maximum entropy spectral analysis;Wavelet analysis

通讯作者:
张子占 zzhang@asch.whigg.ac.cn
作者个人主页: 张子占[1;2];陆洋[1];许厚泽[1]