

论文

基于GRACE时变重力场的三峡水库补给水系水储量变化

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摘要 利用22个月的GRACE时变重力场,反演了三峡水库补给水系的水储量变化,并按月给出了数值结果.与水文学同化模型(CPC)的两组比较说明基于GRACE重力的反演结果是合理的.当高斯平均半径为1000 km时,该区总水储量变化的峰谷差为14 cm,其年变化振幅为5~8 cm,相位为-40~8天,与CPC模型合成重力数据的反演结果进行比较,其总水储量变化均方差为1~3 cm,年变化振幅相差0~1 cm,相位相差1~0天.为进一步检验GRACE能否监测该区真实水储量变化,还将其反演结果与CPC模型的真实平均结果进行比较,结果发现总体均方差为2~1 cm,年变化振幅相差1~7 cm,相位相差9~3天.因此,第一种比较过高地估计了GRACE监测该区水储量变化的能力,第二种比较则较真实地反映了实际情况,尽管反演结果与水文学的结果差别较大,但仍然显示GRACE能监测该区每月的水储量变化.

关键词 [GRACE卫星](#) [时变重力场](#) [补给水系](#) [三峡](#) [水储量](#)

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**Water storage changes in Three Gorges water systems area inferred from GRACE time variable gravity data**

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**Abstract** Twenty two monthly water storage changes are predicted for the supply water systems of the Three Gorges Reservoir from GRACE time variable gravity data. In order to assess the results, the CPC hydrological models are used to establish two benchmarks. It is found that the results are very reasonable in this area. For Gaussian averaging radius of 1000 km, the total water storage changes in the area have a peak to peak value of 14 cm, and the annual component has an amplitude of 5~8 cm and a phase of -40~8 days. The RMS difference compared with the inversion results with the same averaging radius using the synthetic gravity data from the CPC models is 1~3 cm for the total water storage changes, and the differences are 0~1 cm and 1~0 day for the amplitude and phase of the annual component. However, for checking the ability of GRACE to monitor the true water storage changes within the area, it is also very necessary to compare the inversion results from GRACE gravity models with the true average results of CPC models. For this comparison the RMS difference is 2~1 cm for the total water storage changes, and the differences are 1~7 cm and 9~3 days for the amplitude and phase of the annual component. Comparing the assessment results of the two comparisons, it is found that the first comparison has overestimated the effectiveness of GRACE. Nevertheless, the second comparison shows that the monthly water storage changes can be roughly determined from GRACE data in this area.

**Key words** [GRACE satellite](#); [Time variable gravity](#); [Supply water systems](#); [Three Gorges Reservoir](#); [Water storage](#)

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