

## 金坛盐穴天然气储库区地表变形PSI监测

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## MONITORING OF GROUND DEFORMATION IN JINTAN SALT CAVERN GAS STORAGE AREA USING PERMANENT SCATTERER INTERFEROMETRY (PSI)

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摘要

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**摘要** 地面沉降监测对天然气地下储气库安全有效运行具有重要意义。由于盐穴空间分布和应力环境周期性改变的特点, 盐穴储库区地面变形具有空间差异性和时间波动性。因而, 利用监测时空密度较高的技术才能全面细致地反映盐穴储库区地面变形的时空特征。基于永久散射体雷达干涉测量(PSI)技术, 利用PALSAR数据, 对金坛盐穴天然气储库区在2007~2010年的地面变形进行监测。与地面GPS监测结果的对比表明, PSI监测在变形的总体趋势和非线性过程方面都具有较高精度, 并且监测的空间范围更广、空间密度和时间密度更高。储库区地面变形显示明显的空间差异, 沉降高值区与人类工程活动强烈的区域对应。同时, 监测时间段内的储库区非线性变形过程可以被划分为3个沉降阶段和2个抬升阶段。但是因为相关资料的缺乏, 这种沉降和抬升的交替现象是否与各时段的人类活动特征有关, 还有待进一步研究。

**关键词:** 岩石力学 金坛天然气储库区 地表变形 永久散射体雷达干涉测量 PALSAR数据

**Abstract:** Monitoring the ground deformation concerns the safety of gas storages much. The ground deformation in salt cavern gas storage area is characterized by spatial diversity and temporal nonlinearity owing to the spatial distribution of salt caverns and the cyclic variation of stress environment. A technique with high spatial and temporal monitoring density is therefore needed to fully reveal the spatial and temporal characteristics of the ground deformation in salt cavern gas storage area. Based on permanent scattered interferometry(PSI) technique, the ground deformation history in Jintan salt cavern gas storage area from 2007 to 2010 was retrieved using PALSAR data. Compared with GPS data, the PSI results are found to have higher accuracy in both reflecting the general trend and the nonlinear process of ground deformation, and to have higher monitoring density in both spatial and temporal domains. The ground deformation in Jintan gas storage area presents obvious spatial patterns. Area with high settlement velocity corresponds to the area with intense human engineering activities. In addition, nonlinear behaviors were found in the ground deformation history in Jintan gas storage area; and this deformation history could be divided into three stages of settlement and two stages of uplifts. However, owing to insufficiency of relevant data, the problem that whether this fluctuation between settlement and uplift is attributed to human activities requires further research.

**Keywords:** rock mechanics Jintan gas storage area ground deformation permanent scatterer interferometry (PSI) PALSAR data

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