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## 基于小基线DInSAR技术监测太原市2003~2009年地表形变场

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Ground deformation monitoring using small baseline DInSAR technique: A case study in Taiyuan City from 2003 to 2009

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摘要

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**摘要** 基于高相干点目标反演缓慢地表形变已成为当前DInSAR技术的研究热点. 本文通过融合PS方法和相干目标法优点, 采用小基线DInSAR技术提取城市地表形变场, 并重点分析了地表线性形变的反演. 在此基础上, 以太原市为研究区, 利用23景ENVISAT ASAR影像, 提取了该市2003~2009年的地表形变场. 研究表明: (1) 在该阶段太原市存在有4个明显的沉降中心, 即下元、吴家堡、小店、孙家寨, 其中最大沉降中心孙家寨的平均沉降速率为-77.28 mm/a; (2) 老沉降中心万柏林沉降趋于缓和, 北部地区沉降停止, 甚至出现反弹; (3) 沉降中心的变化说明太原市采取的“关井压采”控沉措施取得初步成效; (4) 水准数据验证了监测结果, 精度达到2.90 mm, 表明小基线DInSAR技术可满足城市地表形变监测需求.

**关键词:** 雷达差分干涉测量(DInSAR) 小基线 地表形变场 太原市

**Abstract:** DInSAR technique based on time series of SAR images has been very popular to monitor ground slow deformation in recent years, such as permanent scatterers (PS) method, small baseline subsets (SBAS) method, and coherent targets (CT) method. By taking advantage of PS method and CT method, in this paper, small baseline DInSAR technique is used to investigate the ground deformation of Taiyuan City, Shanxi Province, from 2003 to 2009 by using 23 ENVISAT ASAR images. The experiment results demonstrate that: (1) during this period, four significant subsidence centers have been developed in Taiyuan, namely Xiayuan, Wujiabu, Xiaodian, Sunjiazhai. The largest subsidence center is Sunjiazhai with an average subsidence rate of -77.28 mm/a; (2) The subsidence of the old center, Wanbolin, has slowed down. And the subsidence in the northern region has stopped and some areas even rebounded. (3) The change of subsidence centers indicates that the control measures of "closing wells and reducing exploitation" taken by the Taiyuan government has achieved initial effects. (4) The experiment results have been validated with leveling data and the accuracy is 2.90 mm, which shows that the small baseline DInSAR technique can be used to monitor urban ground deformation.

**Keywords:** Differential interferometric SAR (DInSAR) Small baseline Ground deformation Taiyuan

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