论文

基于相干目标短基线InSAR的矿业城市地面沉降监测研究

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摘要：

针对煤矿区非线性地表沉降特征，探讨了相干目标短基线InSAR用于矿业城市地面沉降监测研究的方法与效果。该方法以相干目标短基线差分相位时序分析为技术核心，综合相干系数阈值法和振幅离散指数最大化提取有效相干目标，以此构建相干目标Delaunay三角网，进而分析相邻目标的时序相位差，根据差分相位构成中各分量的时空特性，对短基线条件下干涉相位序列进行逐个分离，最终获取地表下沉速率和下沉累积量。以唐山市为例，选用2004—2010年27景 ENVISAT ASAR 影像进行分析，查明了唐山市城区地面沉降量及其空间分布特征，最大年沉降速率达到-46.8 mm/a，主城区沉降速率普遍低于-11 mm/a。连续动态监测也显示了矿区开采沉陷不同阶段的地面沉降特征。

关键词： 相干目标；短基线；InSAR；矿业城市；地面沉降监测

Study on monitoring land subsidence in mining city based on coherent target small baseline InSAR

Abstract:

Referring to the non linear surface deformation in coal mining area，the method and effect that coherent target small baseline InSAR was used to monitor land subsidence in mining city was studied.With the small baseline coherent targets differential phase time series analysis being the technical cores，the effective coherent targets were maximally extracted by combining the coherence coefficient threshold method with the amplitude dispersion index，and the Delaunay triangulations based on coherent targets were built.The time series phase difference of adjacent targets was analyzed，and interferometric phase sequence was separated one by one under the condition of small baseline，according to the temporal and spatial characteristics of each component in the differential phase composition.Finally，the rate of land subsidence and the amount of accumulative subsidence were extracted effectively.Tangshan City was taken as an example in this study，27 ENVISAT ASAR images of this area acquired between 2004 and 2010 were applied for analysis.The amount and its spatial distribution of land subsidence in urban districts of Tangshan were ascertained，of which the largest average subsidence rate was up to -46.8 mm/a，and the overall subsidence rate was lower than -11 mm/ a in the main city zone.Besides，continuous dynamic monitoring results also show the various land subsidence features of mining area at different stages.

Keywords: coherent target；small baseline；InSAR；mining city；land subsidence monitoring

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