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Monitoring Ground Deformation in Beijing and Analysis of Influencing Factors

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Abstract: Currently, the land subsidence development in Beijing is still at a relatively high rate. It is widely believed to be caused by extensive groundwater extraction, leading to a lowering of the groundwater table and consequent land subsidence. However, precipitation and surface soil moisture are crucial components of the hydrological cycle, replenishing groundwater. Previous research has paid limited attention to the analysis of the impact of precipitation and surface soil moisture on land subsidence. Therefore, this study uses 17 scenes of Sentinel-1A data to obtain surface deformation information in the research area based on SBAS-InSAR technology. It combines surface soil moisture and precipitation data to explore their influence on land subsidence. The results indicate that the Chaoyang-Tongzhou belt experiences the most serious subsidence, with a subsidence rate reaching -144.3mm/a and a maximum cumulative subsidence of -169mm; The surface soil moisture and precipitation data show a positive correlation with land subsidence, indicating that increase in precipitation and surface soil moisture partially alleviates land subsidence; In most regions, surface soil moisture in summer and winter is negatively correlated with land subsidence, while in autumn and spring, it is positively correlated with land subsidence in most areas.

Keywords: precipitation, surface soil moisture, land subsidence, SBAS-InSAR

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