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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 44146-2024

Specification for crustal deformation monitoring based on InSAR technology

基于InSAR技术的地壳形变监测规范

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1.Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the Chinese Academy of Sciences. This document is under the jurisdiction of the National Remote Sensing Technology Standardization Technical Committee (SAC/TC327). This document was drafted by: National Institute of Natural Disaster

Prevention and Control of the Ministry of Emergency Management, Peking University, Chang'an University, Geological Research Institute of China Earthquake Administration Institute of Space Information Innovation, Chinese Academy of Sciences, Wuhan University, Central South University, China Natural Resources Aerial Geophysical Exploration and Remote Sensing Center, Capital Normal University University, Sun Yat-sen University, Tongji University, Shenzhen University, China Earthquake Administration First Monitoring Center, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Satellite Remote Sensing Application Center of the Ministry of Resources, Hubei Provincial Seismological Bureau, Beijing Municipal Seismological Bureau, and Tianjin Municipal Seismological Bureau. The main drafters of this document are. Zhang Jingfa, Zeng Qiming, Li Zhenhong, Shan Xinjian, Wang Chao, Liu Zhaoyan, Liao Mingsheng, Li Zhiwei, Ge Daqing, Chang Zhanqiang, Li Yongsheng, Tian Yunfeng, Luo Yi, Feng Wanpeng, Jiang Wenliang, Li Qiang, Wang Xinhong, Liang Cunren, Wang Teng, Hu Jun, Chang Ling, Zhang Lei, Wang Chisheng, Zhang Qingyun, Liu Bin, Zhang Lei, Sun Luyi, Li Tao, Qiao Xuejun, Hu Leyin, Qu Chunyan, Gong Lixia, Tian Tian, Zhu Wu, Shen Wenhao.

In recent years, the data resources of spaceborne synthetic aperture radar (SAR) have gradually become abundant, and the interferometric synthetic aperture radar (InSAR) technology has been widely used in the field of space-based radar. SAR is developing rapidly and its application fields are becoming wider and wider, especially in the measurement of crustal deformation. Data sources are diverse, InSAR technical strategies have different focuses, processing procedures are complex, and different InSAR processing software requirements also vary. The professional background and knowledge level of InSAR technology users are different. Therefore, the mature experience at this stage is summarized into In the future, it is necessary to standardize all aspects of InSAR processing to ensure the quality of InSAR processing results and improve standardization and work efficiency. It is also feasible. Specifications for crustal deformation monitoring based on InSAR technology

1 Scope

GB/T 44146-2024 is the Chinese specification for monitoring crustal deformation by interferometric synthetic aperture radar. InSAR measures ground movement at millimetre sensitivity over whole regions from satellite data, which has made it the primary tool for observing fault creep, subsidence from groundwater and mining extraction, reservoir and landslide movement and the deformation preceding and following earthquakes; but the technique is unforgiving of method, since the atmosphere, the orbit, the terrain and the decorrelation of the scatterers can each produce a signal indistinguishable from real motion. The standard sets the basic requirements and the overall workflow, then the materials and data preparation, the collection of basic data and the acquisition of the SAR imagery; the establishment of the deformation reference point, on which every subsequent number depends; and then the processing, the interferometry, the atmospheric and orbital

corrections, the time series analysis, the geocoding, the accuracy assessment, the interpretation of the deformation field and the products and reports to be delivered. It takes effect on 1 January 2025.

This document specifies the basic requirements, overall process, data and information preparation, deformation initiation, and other aspects of crustal deformation monitoring based on InSAR technology. Reference point selection, InSAR data processing, quality assurance and results compilation. This document is applicable to crustal deformation monitoring based on spaceborne SAR data. For reference use in deformation monitoring.

2 Normative references

This document has no normative references.

3 Terms, definitions and abbreviations

3.1 Terms and Definitions The following terms and definitions apply to this document.

3.1.1 Crustal deformation The changes in the geometry of the earth's crust occur under the influence of the earth's internal and external forces. [Source:

GB/T 18207.2-2005, 4.4.1]

3.1.2 coseismic deformation The permanent static displacement of the earth's surface caused by a seismic fault.

3.1.3 The crustal deformation caused between two major earthquakes in the same area.

Note. Interseismic deformation can last for decades, hundreds of years or even thousands of years.

3.1.4 By using the relative motion between the radar and the target, the smaller real antenna aperture is synthesized into a larger equivalent antenna using signal processing methods. Aperture imaging radar. [Source: CH/T 3009-2012, 3.1]

3.1.5 single-look complex image; SLC Complex form of SAR image without multi-look processing. [Source: GB/T 32874-2016, 3.1.8]

3.1.6 line of sight; LOS The radar antenna phase center points in the direction of the ground target.