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**NATIONAL STANDARD OF THE
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GB/T 42647-2023

In-orbit field calibration method for spaceborne laser altimeter

星载激光测高仪在轨场地定标方法

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Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
3 Measurement environment	2
3 Spaceborne laser altimeter data	3
2 Calculation method	4
3 Uncertainty calculation formula	6

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 contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents: This document is proposed and managed by the National Aerospace Technology and Its Application Standardization Technical Committee (SAC/TC425): This document was drafted by: China Resources Satellite Application Center, China Siwei Surveying and Mapping Technology Co., Ltd., Aerospace Information Innovation of Chinese Academy of Sciences Research Institute, Wuhan University, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Chinese Academy of Surveying and Mapping, Beijing Zhongkan Maipuke Technology Co., Ltd., the Fourth Topographic Survey Team of the Ministry of Natural Resources, Xi'an Jiaotong University, Taiyuan University of Technology, and China Aerospace Standardization Institute: The main drafters of this document: Han Qijin, Ma Lingling, Long Xiaoxiang, Li Jingmei, Li Song, Min Xiangjun, Xu Zhaopeng, Li Dacheng, Wang Yupeng, Li Qingpeng, Chen Jun, Zeng Jian, Zhao Hang, Di Zhizhong, Ma Yue, Lian Zhipeng, Cui Lin, Zhang Xuwen, Li Xiaojin, Ma Xiuxiu, Du Xiaozheng, Zhao Yongguang, Zhao Yuanchun, Zhang Zexing, Li Zonghe:

On-orbit calibration is the premise and basis for ensuring the quality and accuracy of spaceborne laser altimeter products: In order to ensure the land observation satellite laser measurement In order to realize the standardization and reliability of Altimeter's on-orbit site calibration method, this document is formulated, so as to realize the distance measurement error and The high-precision calibration of the pointing angle error provides reliable calibration parameters for the laser data processing of the ground processing system of the spaceborne laser altimeter, and improves the accuracy of the laser altimeter: The quality and accuracy of optical altimetry data products: On-orbit site calibration method

for spaceborne laser altimeter

1 Scope

GB/T 42647-2023 describes how a laser altimeter on a satellite is calibrated once it is in orbit. Such an instrument measures the distance to the ground by timing a laser pulse, and it is used where centimetres matter: ice sheet elevation change, forest canopy height, and the vertical control that anchors large-scale topographic mapping. The measurement is only as good as several quantities that cannot be held fixed through launch and cannot be measured from the ground - the pointing of the laser relative to the spacecraft, the range bias in the timing chain, and their drift with thermal cycling and time. In-orbit calibration recovers them by flying the instrument over a ground site whose elevation and position are known far better than the instrument can measure. This document specifies the general requirements for in-orbit calibration of spaceborne laser altimeters, the acquisition of calibration data, the technical process and the calculation methods, and the analysis of calibration uncertainty. It applies to in-orbit field calibration of spaceborne laser altimeter ranging and pointing. Under ICS 49.020 and CCS V75, it is written for satellite payload teams, calibration site operators and the geodetic and remote sensing users of the data.

This document specifies the general requirements for on-orbit calibration of spaceborne laser altimeters, calibration data acquisition, technical process and calculation methods, calibration Uncertainty analysis, etc: This document is applicable to the on-orbit site calibration of spaceborne laser altimeter ranging and laser pointing angle system errors: Other similar spaceborne lasers The calibration of the load can refer to the use:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document:

GB/T 18314 Global Positioning System (GPS) measurement specification

GB 22021 National Geodetic Basic Technical Regulations

GB/T 34509:2-2017 On-orbit site radiometric calibration method for optical remote sensors of land observation satellites Part 2: Thermal infrared

3 Terms and Definitions

The following terms and definitions defined in GB 22021 apply to this document: 3:

1 Mounted on a satellite, it is an active detection lidar system that precisely measures the

distance from the satellite to the earth's surface or the fluctuation of the earth's surface: 3:

2 Calibration test site for correcting system errors of pointing angle and ranging value of spaceborne laser altimeter: 3:

3 The phenomenon that the optical path time caused by atmospheric refraction in laser ranging is longer than the actual transmission time in vacuum:

4 General requirements

1 Laser calibration field 4:1:

1 Site requirements The requirements for the laser calibration site are as follows:

- a) The side length of the site should be greater than the sum of the diameter of the laser footprint and the error range of the laser altimeter point forecast;
- b) The overall inclination of the site should be less than 2° ;
- c) The site is open, and there are no obstacles around that affect the work of the laser ground detector;