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Geographic information — Calibration and validation of remote sensing imagery sensors and data

Part 4: Space-borne passive microwave radiometers

bsi.

National foreword

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics.*

A list of all parts in the ISO 19159 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Imaging sensors are one of the major data sources for geographic information. The image data captures spatial and spectral measurements and has numerous applications ranging from road/town planning to geological mapping. Typical spatial outcomes of the production process are vector maps, digital elevation models and 3-dimensional city models.

In each case the quality of the end products fully depends on the quality of the measuring instruments that have originally sensed the data. The quality of measuring instruments is determined and documented by calibration.

Calibration is often a costly and time-consuming process. Therefore, a number of different strategies are in place that combine longer time intervals between subsequent calibrations with simplified intermediate calibration procedures that bridge the time gap and still guarantee a traceable level of quality.

This document standardizes the calibration of remote sensing imagery sensors and the validation of the calibration information and procedures. It does not address the validation of the data and the derived products.

Many types of imagery sensors exist for remote sensing tasks. In addition to the different technologies, the need for standardization of the various sensor types takes into account different priorities. In order to meet such needs, the ISO 19159 series has been split into several parts. ISO/TS 19159-1 addresses the optical sensors. ISO/TS 19159-2 addresses the airborne lidar (light detection and ranging) sensors. ISO/TS 19159-3 addresses synthetic aperture radar (SAR) and interferometric SAR (InSAR). ISO/TS 19159-4 (this document) covers space-borne passive microwave radiometers.

In accordance with the ISO/IEC Directives, Part 2, 2018, *Rules for the structure and drafting of International Standards*, in International Standards the decimal sign is a comma on the line. However, the General Conference on Weights and Measures (Conférence Générale des Poids et Mesures) at its meeting in 2003 passed unanimously the following resolution:

“The decimal marker shall be either a point on the line or a comma on the line.”

In practice, the choice between these alternatives depends on customary use in the language concerned. In the technical areas of geodesy and geographic information it is customary for the decimal point always to be used, for all languages. That practice is used throughout this document.

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Geographic information — Calibration and validation of remote sensing imagery sensors and data —

Part 4: Space-borne passive microwave radiometers

1 Scope

This document defines the calibration of space-borne passive microwave radiometers and the validation of the calibrated information.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19103, *Geographic information — Conceptual schema language*

ISO/TS 19159-1, *Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 1: Optical sensors*

ISO/TS 19159-2, *Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 2: Lidar*

ISO/TS 19159-3, *Geographic information — Calibration and validation of remote sensing imagery sensors and data — Part 3: SAR/InSAR*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
antenna beam width
half-power full width
half-power beam width
full angle at which the antenna's pattern (in power units) is at half its maximum value

Note 1 to entry: In engineering convention, this is also known as the "3 dB beam width."

3.2
antenna main-beam efficiency
η_M
fraction of the total radiant energy that is received from the *main beam* (3.29), which is defined as the ratio of the power received within the "main lobe" to that of the total power received by the antenna

Note 1 to entry: η_M is calculated using the following formula:

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