



Progress on developing ISO 19124-1 Calibration and Validation Standard

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Executive Summary



- ISO TC 211 is an ISO technical committee responsible for setting international standards on geospatial information, including remote sensing information
- ISO 19124 is a series of international technical specifications dedicated to calibration and validation of remote sensing data and derived products
- Currently ISO TC 211 is working on the ISO 19124-1 Fundamentals
 - Defining the common framework, methods, and UML structure
 - Allowing plug in other parts of the TS
- CEOS, particularly the Cal/Val working group, is heavily participating in and contributing to the project
- Currently in the working draft (WD) stage, expected to submit for Draft Technical Specification (DTS) in 2/2022





ISO TC 211



- ISO stands for International Organization for Standardization.
- ISO Technical Committee 211 (TC 211) is responsible for setting international standards on geographic information
- ISO has published 79 standards (including update) and 21 standards are under development
- Currently TC 211 has 39 participating member countries and 21 observing member countries
- ISO TC 211 has set up liaison relationship with many related external organizations, including CEOS WGISS
 - CEOS WGISS is a class-A liaison of ISO TC 211
 - ISO TC 211 appointed as its liaison to CEOS WGISS
 - Currently, Dr. Liping Di as ISO TC 211 liaison to CEOS WGISS and also CEOS WGISS liaison to ISO TC 211





Scope of ISO TC 211



- Standardization in the field of digital geographic information.
- TC 211 aims to establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth.
- These standards may specify, for geographic information, methods, tools and services for data management (including definition and description), acquiring, processing, analyzing, accessing, presenting and transferring such data in digital/electronic form between different users, systems and locations.
- The work of TC 211 shall link to appropriate standards for information technology and data where possible, and provide a framework for the development of sector-specific applications using geographic data.





Current Working Groups in ISO TC 211



- WG 1 Framework and reference model
- Working group 4 Geospatial services
- Working group 6 Imagery
- Working group 7 Information communities
- Working group 9 Information management
- Working group 10 Ubiquitous public access





Status of ISO 19124 project



- ISO 19124: Calibration and validation of remote sensing data and derived products
 - Proposed by USA
 - A multi-part international technical specification (TS)
- Multiple parts
 - Part 1: Fundamentals
 - Possible other parts of the TS including:
 - Part 2: Data from Optical sensors
 - Part 3: Data from Hyperspectral sensors
 - Part 4: Data from Lidar
 - Part 5: Data from SAR/InSAR
 - Part 6: Data from Microwave
 - Part 7: Thematic products
 - Part 8: Cal/Val sites

• Currently the project team is working on part 1





Status of ISO 19124-1 project



- A project team was formed in December 2019
- The first project team meeting was held in during ISO TC 211 49th Plenary in Japan in December 2019
- Since December 2019, multiple virtual project team meetings have been held to develop the TS
 - Large contributions from CEOS Cal/Val and WGISS, IEEE GRSS, and ASPRS
 - Multiple people from CEOS are the project team members
- Currently, WD version 0.9 has been released to the project team for review and comments





The scope of ISO 19124-1



- The ISO 19124 series is focused on calibration and validation (cal/val) of remote sensing data, which are collected by a sensor onboard a platform in a mission, and products derived in part or whole from the data. The ISO 19124 series will define the metadata related to calibration and validation process that has not been defined in other ISO/211 standards. The metadata allows the data providers to provide standardized description of cal/val process they have applied to the data and the data users to get the same forms of metadata from different data providers.
- Part 1 addresses the overall framework and common calibration and validation processes related to earth observation data and derived products from different types of remote sensors
- Derived products mean the products are not directly measured by sensors but derived from direct sensor measures by algorithms or models





Overall structure of 19124-1



- Cal/Val of remote sensing data and derived products
 - Cal/Val methods
 - Cal/Val reference sources
 - Sensor Calibration
 - Validation of derived products
- Sensor calibration
 - Provide support to data calibration
 - Pre-launch calibration- defined in ISO 19159
 - Post-launch calibration – to validate and modify the results of pre-launch calibration
- Cal/Val methods
 - Define common methods, including on-board cross calibration, vicarious calibration, and Sensor performance trending



- Calibration Reference Sources
 - calibrations are done by evaluating the sensor measurements against sources that have been measured with higher accuracy or known quantities.
 - Different types of sensors may use different types of sources for calibration
 - Common sources are defined in 19124-1. Sensor or product specific sources are to be defined in subsequential parts
- Validation of derived products
 - Deal with validation of thematic products derived at least partially from remote sensing data
 - Common validation procedure is defined in 19124-1
- Other parts of 19124
 - Introducing possible parts of 19124



Product level definition



- One of key elements in ISO 19124 is product level
 - Currently there is no standardized product levels and definitions accepted by all remote sensing data providers
 - Each space agency and even a program within a space agency has its own product level and definition
- CEOS Cal/Val and WGISS on product level definition
 - In order to support the development of ISO 19124, CEOS Cal/Val and WGISS have communicated on developing a standardized product level schema and definition
 - Task force has been planned to develop it but will take time
 - The schedule is not allowed for the ISO 19124-1 project to wait for the result of the task force
- For the current version of ISO 19124-1 development, we take a temporary measure
 - Accommodating all current level schema and definition
 - Modifying it when the TS is revisited within 3 years





Product level scheme in ISO 19124-1



- Idea: standardizing description instead of the level and definition
- Product level scheme in current version with the following elements:
 - Product_level: the level destination
 - Agency: the agency defining the level
 - Domain: Optional, the specific domain within the agency the level applies
 - BriefDefinition: definition of the level
 - Contact: Contact info for the level definition
 - MoreInfo: URL link to the level definition document/website





Schedule



- Current version is WD 0.9
- Project team meeting to discuss the current version in late Nov in conjunction with 53rd ISO TC 211 plenary
- Draft WD 1.0 expected at the end of this year
- Project team meeting to finalize WD 1.0 in Jan. 2022
- Submission of WD 1.0 for Draft Technical Specification (DTS) vote by TC 211 member countries in Feb 2022
- Editing Committee meeting in June 2022 to edit DTS
- Publication of the TS expected at end of 2022 or early 2023





ISO TC 211 Meetings



- The 53rd ISO TC 211 plenary will be held virtually in the first week of December 2021
- **I need WGISS inputs for giving a WGISS liaison report to the 53rd ISO TC 211 plenary**

