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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **2**
5 ITRS: overview **3**
6 Realizations of ITRS **4**
6.1 Description of a realization of ITRS 4
6.2 Classification of realizations 4
6.2.1 General 4
6.2.2 Primary realization of ITRS 4
6.2.3 Secondary realization of ITRS 4
6.3 Types of TRF 4
6.3.1 General 4
6.3.2 Crust-based TRF 5
6.3.3 Satellite Ephemerides based TRF 5
6.4 Methods for secondary realizations of ITRS 5
7 Conformance of a secondary realization of ITRS **5**
Annex A (normative) **Methods of determining positions in an ITRS realization** **7**
Annex B (informative) **Description of ITRS and ITRF** **10**
Annex C (informative) **Major reference frames aligned to primary and secondary ITRS realizations** **13**
Bibliography **15**

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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.

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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.

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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

This document provides the basic information and definitions related to the International Terrestrial Reference System (ITRS), its realizations and how to access these realizations. These are consistent with the conventions adopted by the international scientific organizations that created this concept, which are the International Union of Geodesy and Geophysics (IUGG), specifically its association in charge of geodesy, the International Association of Geodesy (IAG), and the International Astronomical Union (IAU).

The various realizations of ITRS are then presented as crust-based reference frames, which are global, regional or local, and as satellite ephemerides, such as those broadcasted by satellite navigation systems.

Annex A of this document describes the access methods to ITRS and the various processes required to determine positions expressed in this system.

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Geographic information — Geodetic references —

Part 1:
International terrestrial reference system (ITRS)

1 Scope

This document provides the basic information and the requirements related to the International Terrestrial Reference System (ITRS), its definition, its realizations and how to access and use these realizations.

This document:

— describes ITRS following the definitions and terminology adopted by the International Union of Geodesy and Geophysics (IUGG), the International Association of Geodesy (IAG) and the International Astronomical Union (IAU);

— describes different categories of ITRS realizations: its primary realization, labelled the International Terrestrial Reference Frame (ITRF), other existing realizations of reference systems that are mathematically derived from the ITRS, and realizations that are aligned to the ITRF, such as GNSS-specific reference frames;

— categorizes procedures for realizing the ITRS.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

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

3.1
coordinate system
set of mathematical rules for specifying how coordinates are to be assigned to points

[SOURCE: ISO 19111:2019, 3.1.11]

3.2
geocentric terrestrial reference system
GTRS
system of geocentric space-time coordinates within the framework of General Relativity, co-rotating with the Earth and related to the Geocentric Celestial Reference System by a spatial rotation which takes into account the Earth's orientation parameters

[SOURCE: IAG and IUGG resolutions of 1991 and 2007]

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3.3
positioning process
computational process that determines, directly from measurements, the geodetic coordinates of points (absolute positioning), or that derives geodetic coordinates of points from previously determined geodetic coordinates (relative positioning)

3.4
satellite ephemeris
numerical representation of the trajectory of the centre of mass of an Earth orbiting artificial satellite expressed in an Earth centred *terrestrial reference frame* (3.5)

3.5
terrestrial reference frame
TRF
realization of a *terrestrial reference system* (TRS) (3.6), by specifying its origin, orientation, scale, and its time evolution

Note 1 to entry: The realization is achieved through a set of physical points with precisely determined coordinates in a specific *coordinate system* (3.1), which may include the rate of coordinate change.

Note 2 to entry: The realization is called static when no rates of coordinate change are defined, and kinematic when rates of coordinate change are defined without considering the underlying forces causing the motion. The realization may be called dynamic when these external forces are considered. "Dynamic" is also used colloquially to describe both the dynamic and kinematic cases without distinction.

[SOURCE: IERS Conventions 2010]

3.6
terrestrial reference system
TRS
set of conventions defining the origin, scale, orientation and time evolution of a spatial reference system co-rotating with the Earth in its diurnal motion in space

Note 1 to entry: The abstract concept of a TRS is realized through a *terrestrial reference frame* (3.5).

Note 2 to entry: In such a system, positions of points attached to the solid surface of the Earth have coordinates which undergo only small variations with time, due to geophysical effects (tectonic or tidal deformations). In the Newtonian framework, the physical space is considered as a Euclidean affine space of dimension 3, with an origin, a scale and an orientation.

[SOURCE: ISO 19111:2019, 3.1.66 — modified: Note 1 to entry has been modified, Note 2 to entry has been added from IERS Conventions 2010]

4 Symbols and abbreviated terms

BeiDou	Chinese satellite-based navigation system
BIH	Bureau International de l'Heure
CGCS2000	China Geodetic Coordinate System 2000
CTRS	Conventional Terrestrial Reference System
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
EOP	Earth Orientation Parameter(s)
EUREF	IAG Sub-Commission 1.3a, Reference Frame Sub-Commission for Europe
GLONASS	Globalnaya Navigatsionnaya Sputnikovaya Sistema

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