

## 1 Scope

The subject of this TR is summarized by the term *geodetic reference*, which means all geodetic products used for any scientific or societal activity, such as surveying, mapping, navigation, geo-referencing...More explicitly, the main items are:

- Geodetic datums
- Terrestrial reference systems and frames
- Geodetic ellipsoids
- Coordinate systems used for geo-referencing
- Map projections
- Gravity and geoid (gravity models, geoidal models..)
- Vertical reference systems
- Geodetic networks ( classical triangulations or leveling, space geodesy, gravity stations...) and related metadata (such as station identifiers...)

This work item does not deal with measurements, instruments, observing system or data analysis techniques used in geodesy.

The objective of the project is to investigate:

1. the requirements related to geodetic references, as viewed by various user communities
2. the existing standardization documents relevant to this topic, either ISO/TC 211 documents, other ISO documents or non ISO documents
3. possible subjects for which a standardization document would be desirable

## 2 General overview of the approach for developing this TR

After having clarified the exact meaning of geodetic reference as used in this report, a first step is to establish a state of the art of standardization documents, in particular existing work of ISO/TC 211 related to the topic..

The main items are:

- ISO 19111 « Geographic information- spatial referencing by coordinates »
- ISO 19111\_2 « Geographic information- spatial referencing by coordinates .Extension for parametric values»
- ISO TS 1927 « Geographic information- geodetic codes and parameters »

In order to propose the direction of future standardization in the field of Geodesy, this TR collects and analyzes existing and ongoing relevant activities.

ISO/TC 211 activities and document cover extensively the identification of existing geodetic references as used to express coordinates.

This state of the art also investigates related works in other ISO structures, as well as outside ISO.

The state of the art also intended to go further investigating the importance of geodetic references in various communities: geomatics, space techniques (e.;g., satellites navigation systems), fundamental metrology... However this work is not expected to deal with measurements, instruments, observing system or data analysis techniques used in geodesy.

In particular the following questions should be discussed:

- Interest of standards for interoperability
- Role of a validated basic terminology for common understanding between the various communities of practice
- Role of ISO TC 211 for those aspects

A second step is to discuss the added value of a standardization document describing some of the fundamental geodetic references, such as a global terrestrial reference system (ITRS vs WGS84), a global vertical reference system (including the hydrographic aspects), or a universal identification system of space geodetic stations (including GNSS)

### **3 Terms and definitions**

Some possible terms:

- Coordinate reference system
- Datum
- Ellipsoïd
- Geoid
- Terrestrial reference system
- Vertical reference system

The issue of terminology is an important point to address in this report. Some points of investigation:

- Inventory of terminology already existing in ISO standards (TC211 or not)
- Use of guidelines established by TC211 and general ISO documents on terminomogy

### **4 Definition of geodetic references**

### **5 Standardization activities related to geodetic references**

#### **5.1 Activities within ISO TC211**

- ISO 19111 « Geographic information- spatial referencing by coordinates »
- ISO 19111\_2 « Geographic information- spatial referencing by coordinates .Extension for parametric values»
- ISO TS 1927 « Geographic information- geodetic codes and parameters »
- Activities of the Control Body for the Geodetic Registry Network

#### **5.2 Activities within other ISO bodies**

- ISO TC20/SC14 Space systems and operations
- ISO TC204

#### **5.3 Activities outside ISO**

- IERS conventions
- Inspire
- IHO
- ICAO
- OGP

## **6 Role of geodetic references**

### 6.1 Geosciences

- IAG
- IUGG

### 6.2 Geomatics

- ISO TC211
- UN GGIM
- Inspire

### 6.3 Hydrography

- IHO

### 6.4 Satellite navigation systems

- ICG

### 6.5 Space mechanics

- ISO TC20

### 6.6 Metrology

- BIPM

### 6.7 Engineering

#### 6.8 Transportations

##### 6.8.1 Air

##### 6.8.2 Sea

##### 6.8.3 Land

6.9 Boundary delimitations

6.9.1 Land

6.9.2 Sea

## **7 Proposals**

7.1 Proposed topics for standardization

7.1.1 ITRS

7.1.2 Vertical references

7.1.3 Universal identification of ground geodetic stations

7.2 Organizational issues