

First edition  
2002-09-01

---

---

## Geographic information — Temporal schema

*Information géographique — Schéma temporel*

**Adopted by INCITS (InterNational Committee for Information Technology Standards) as an American National Standard.**

Date of ANSI Approval: 2/4/2003

Published by American National Standards Institute,  
25 West 43rd Street, New York, New York 10036

Copyright 2003 by Information Technology Industry Council (ITI).  
All rights reserved.

These materials are subject to copyright claims of International Standardization Organization (ISO), International Electrotechnical Commission (IEC), American National Standards Institute (ANSI), and Information Technology Industry Council (ITI). Not for resale. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of ITI. All requests pertaining to this standard should be submitted to ITI, 1250 Eye Street NW, Washington, DC 20005.

Printed in the United States of America



Reference number  
ISO 19108:2002(E)

© ISO 2002

This is a preview of "INCITS/ISO 19108:200...". [Click here to purchase the full version from the ANSI store.](#)

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland

INTERNATIONAL ISO  
STANDARD 19108

This is a preview of "INCITS/ISO 19108:200...". Click here to purchase the full version from the ANSI store.

First edition  
2002-09-01

---

---

## Geographic information — Temporal schema

*Information géographique — Schéma temporel*



Reference number  
ISO 19108:2002(E)

© ISO 2002

This is a preview of "INCITS/ISO 19108:200...". [Click here to purchase the full version from the ANSI store.](#)

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland

This is a preview of "INCITS/ISO 19108:200...". Click here to purchase the full version from the ANSI store.

## Contents

	Page
Foreword .....	v
Introduction.....	vi
<b>1 Scope.....</b>	<b>1</b>
<b>2 Conformance .....</b>	<b>1</b>
2.1 Conformance classes and requirements.....	1
2.2 Application schemas for data transfer.....	1
2.3 Application schemas for data with operations .....	1
2.4 Feature catalogues.....	1
2.5 Metadata element specifications .....	1
2.6 Metadata for data sets .....	1
<b>3 Normative references.....</b>	<b>1</b>
<b>4 Terms, definitions and abbreviated terms.....</b>	<b>2</b>
4.1 Terms and definitions .....	2
4.2 Abbreviated terms.....	6
<b>5 Conceptual schema for temporal aspects of geographic information .....</b>	<b>6</b>
5.1 Structure of the schema .....	6
5.2 Geometry of time.....	7
5.2.1 Time as a dimension .....	7
5.2.2 Temporal objects.....	7
5.2.3 Temporal geometric primitives.....	8
5.2.4 Temporal topological objects .....	13
5.3 Temporal reference systems .....	16
5.3.1 Types of temporal reference systems.....	16
5.3.2 Calendars and clocks .....	17
5.3.3 Temporal coordinate systems .....	19
5.3.4 Ordinal temporal reference systems.....	20
5.4 Temporal position .....	21
5.4.1 Introduction .....	21
5.4.2 TM_Position .....	21
5.4.3 TM_TemporalPosition.....	21
5.4.4 Position referenced to calendar and clock.....	23
5.4.5 Position referenced to a temporal coordinate system .....	23
5.4.6 Position referenced to an ordinal temporal reference system .....	24
5.5 Time and components of geographic information .....	24
5.5.1 Temporal aspects of geographic information components .....	24
5.5.2 Temporal feature attributes.....	25
5.5.3 Temporal feature operations.....	26
5.5.4 Time and feature associations.....	27
5.5.5 Temporal metadata elements.....	29
<b>Annex A (normative) Abstract test suite .....</b>	<b>31</b>
A.1 Application schemas for data transfer.....	31
A.2 Application schemas for data with operations .....	31
A.3 Feature catalogues.....	31
A.4 Metadata element specifications .....	32
A.5 Metadata for data sets .....	32
<b>Annex B (informative) Use of time in application schemas .....</b>	<b>33</b>
B.1 Temporal feature attributes.....	33
B.1.1 TM_GeometricPrimitive as a data type .....	33

This is a preview of "INCITS/ISO 19108:200...". [Click here to purchase the full version from the ANSI store.](#)

B.1.2	TM_GeometricPrimitive as a temporal attribute .....	33
B.1.3	TM_TopologicalComplex as an attribute .....	34
B.1.4	Recurring attribute values .....	34
B.2	Temporal feature associations .....	35
B.2.1	Simple temporal associations.....	35
B.2.2	Feature succession .....	36
B.3	Feature associations with temporal characteristics.....	37
Annex C	(normative) Describing temporal reference systems in metadata.....	38
C.1	Metadata for temporal reference systems .....	38
Annex D	(informative) Description of calendars.....	41
D.1	Internal structure of calendars.....	41
D.2	Describing a calendar .....	42
D.3	Examples .....	43
D.3.1	Julian calendar .....	43
D.3.2	Modern Japanese calendar .....	44
D.3.3	Ancient Babylonian calendar .....	45
D.3.4	Global Positioning System calendar.....	47
Bibliography	.....	48

This is a preview of "INCITS/ISO 19108:200...". [Click here to purchase the full version from the ANSI store.](#)

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 19108 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

Annexes A and C form a normative part of this International Standard. Annexes B and D are for information only.

## Introduction

This International Standard defines the standard concepts needed to describe the temporal characteristics of geographic information as they are abstracted from the real world. Temporal characteristics of geographic information include feature attributes, feature operations, feature associations, and metadata elements that take a value in the temporal domain.

The widespread application of computers and geographic information systems has led to the increased analysis of geospatial data within multiple disciplines. Geographic information is not confined to a three-dimensional spatial domain. Many geographic information systems require data with temporal characteristics. A standardized conceptual schema for temporal characteristics will increase the ability of geographic information to be used for certain types of applications such as simulations and predictive modelling.

As a fundamental physical reality, time is of interest to the whole range of scientific and technical disciplines. Many of the concepts described in this International Standard are applicable outside of the field of geographic information. ISO/TC 211 does not intend to develop independent standards for the description of time, but the technical committee believes that it is necessary to standardize the way to describe the temporal characteristics of geographic data sets and features. Geographic information system and software developers and users of geographic information will use this schema to provide consistently understandable temporal data structures.

Historically, temporal characteristics of features have been treated as thematic feature attributes. For example, a feature "Building" may have an attribute "date of construction". However, there is increasing interest in describing the behaviour of features as a function of time. This can be supported to a limited extent when time is treated independently of space. For example, the path followed by a moving object can be represented as a set of features called "way point", each of which is represented as a point and has an attribute that provides the time at which the object was at that spatial position. Behaviour in time may be described more easily if the temporal dimension is combined with the spatial dimensions, so that a feature can be represented as a spatiotemporal object. For example, the path of a moving object could be represented as a curve described by coordinates in  $x$ ,  $y$  and  $t$ . This International Standard has been prepared in order to standardize the use of time in feature attributes. Although it does not describe feature geometry in terms of a combination of spatial and temporal coordinates, it has been written to establish a basis for doing so in a future standard within the ISO 19100 series.