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Space environment (natural and artificial) — Methods for estimation of future geomagnetic activity

Environnement spatial (naturel et artificiel) — Méthodes d'estimation de l'activité magnétique future

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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).

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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.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

This second edition cancels and replaces the first edition (ISO 16698:2013), which has been technically revised. The main changes compared to the previous edition are as follows:

— addition of 5.9 and 5.10;

— update of reference lists of Clause 6.

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 guidelines for specifying the process of estimating future geomagnetic activity. Geomagnetic indices describe the variation of the geomagnetic field over a certain time period and provide a measure of the disturbance of the magnetosphere. These indices can be used to estimate upper atmospheric and plasmaspheric densities and many other space environment models. They are also used as the input parameters for orbital lifetime prediction and worst-case environment analysis of electrostatic charging.

The accuracy and method of predicting geomagnetic indices depends on the time scale of prediction. This document presents existing works based on three categories of time scale:

a) short-term prediction (1 h to a few days);

b) middle-term prediction (a few weeks to a few months);

c) long-term prediction (half a year to one solar cycle).

These are required as input parameters for the magnetospheric magnetic field (ISO 22009), upper atmosphere (ISO 14222), ionosphere, plasmasphere (ISO 16457), magnetosphere charged particles and other models of the near-Earth space environment. They also serve as the input parameters for orbital lifetime prediction and worst-case environment analysis of electrostatic charging.

Three International Standards deal with the Earth's magnetic field, including ISO 16695 on the internal magnetic field, ISO 22009 on the magnetospheric magnetic field and this document.

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Space environment (natural and artificial) — Methods for estimation of future geomagnetic activity

1 Scope

This document specifies the methods used for estimating geomagnetic indices for time intervals ranging from short-term (hours to a few months) to long-term (months to years). This document is intended for use to predict future geomagnetic indices and space environment.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Symbols and abbreviated terms

Bs	Southward component of the interplanetary field (Bs = 0 when Bz ≥ 0 and Bs = Bz when Bz < 0)
Bz	North-south component of the interplanetary field
F10.7 flux	Measure of the solar radio flux at a wavelength of 10,7 cm at the earth's orbit, given in units of 10^{-22} W·m^{-2}
GLat	Geographic latitude
GLon	Geographic longitude
IMF	Interplanetary magnetic field
MLat	Geomagnetic latitude
MLon	Geomagnetic longitude
MHD	Magnetohydrodynamics
Sq	Daily geomagnetic field variations during quiet conditions (Solar quiet)
UT	Universal time

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