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Space environment (natural and artificial) — Operational estimation of the solar wind energy input into the Earth's magnetosphere by means of the ground-based magnetic polar cap (*PC*) index

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National foreword

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Foreword

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

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.

Introduction

The polar cap magnetic activity *PC* index was introduced as a measure of the magnetic activity generated in the Earth's polar caps by interplanetary electric field and is regarded at present as a proxy of the solar wind energy input into the magnetosphere in course of solar wind – magnetosphere coupling.

The *PC* index can be required as input parameter for monitoring and nowcasting the space weather influence on various characteristics of magnetosphere and high-latitude ionosphere.

The *PC* index can be applicable for a variety of engineering and scientific domains and can be used to monitor the state of the magnetosphere and high-latitude ionosphere to solve the problems of navigation, radio-connection and induced currents typical of high-latitude regions during magnetospheric disturbances.

Space environment (natural and artificial) — Operational estimation of the solar wind energy input into the Earth's magnetosphere by means of the ground-based magnetic polar cap (PC) index

1 Scope

This document provides guidelines for specifying the qualitative estimation of the solar wind energy input into the magnetosphere with use of operative ground-based information on the polar cap magnetic activity (*PC* index).

The solar wind energy incoming into the magnetosphere predetermines development of the magnetospheric disturbances: magnetic storms and substorms. Magnetospheric disturbances include a wide range of phenomena and processes directly affecting human activity, such as satellite damage, radiation hazards for astronauts and airline passengers, telecommunication problems, outrages of power and electronic systems, effects in the atmospheric processes, and impact on human health.

This document is intended for on-line monitoring the magnetosphere state and nowcasting the intensity and extent of magnetic disturbances as well as parameters of the high-latitude ionosphere. The method and accuracy of estimating is ascertained by close relationship between the *PC* index and interplanetary electric field (as the most geoeffective solar wind parameter), on the one hand, and between the *PC* index and magnetoshpheric disturbances, on the other hand.

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
solar wind
SW
fully ionized, electrically neutral plasma that carries a magnetic field, *B*, and streams outward from the inner solar corona at all times

3.2
interplanetary electric field
$\boldsymbol{E_{KL}}$
electric field, affecting the magnetosphere in course of the *solar wind* (3.1) – magnetosphere coupling, calculated according to formula of *Kan and Lee* [1979]

$$E_{KL} = vB_T \sin^2\theta/2$$

where