Magnetic Field Perturbations from Currents in the Dark Polar Regions During Quiet Geomagnetic Conditions

In the day-side sunlit polar ionosphere the varying and IMF dependent convection creates strong ionospheric currents even during quiet geomagnetic conditions. Observations during such times are often excluded when using satellite data to model the internal geomagnetic main field. Observations from the night-side or local winter during quiet conditions are, however, also influenced by variations in the IMF. In this paper we briefly review the large scale features of the ionospheric currents in the polar regions with emphasis on the current distribution during undisturbed conditions. We examine the distribution of scalar measurements of the magnetic field intensity minus predictions from a geomagnetic field model. These 'residuals' fall into two main categories. One category is consistently distributed according to the well-known ionospheric plasma convection and its associated Birkeland currents. The other category represent contributions caused by geomagnetic activity related to the substorm current wedge around local magnetic midnight. A new observation is a strong IMF $B_y$ control of the residuals in the midnight sector indicating larger ionospheric currents in the substorm current wedge in the northern polar region for $B_y > 0$ and correspondingly in the southern hemisphere for $B_y < 0$. 

General information
Publication status: Published
Organisations: National Space Institute, Geomagnetism, University of Bergen
Contributors: Friis-Christensen, E., Finlay, C., Hesse, M., Laundal, K.
Pages: 281–297
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Space Science Reviews
Volume: 206
ISSN (Print): 0038-6308
Ratings:
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 6.81 SJR 3.262 SNIP 2.682
Web of Science (2017): Impact factor 9.327
Web of Science (2017): Indexed yes
Original language: English
DOIs:
10.1007/s11214-017-0332-1

Research output: Contribution to journal › Journal article – Annual report year: 2017 › Research › peer-review
The Swarm Initial Field Model for the 2014 geomagnetic field

Data from the first year of ESA's Swarm constellation mission are used to derive the Swarm Initial Field Model (SIFM), a new model of the Earth's magnetic field and its time variation. In addition to the conventional magnetic field observations provided by each of the three Swarm satellites, explicit advantage is taken of the constellation aspect by including East-West magnetic intensity gradient information from the lower satellite pair. Along-track differences in magnetic intensity provide further information concerning the North-South gradient. The SIFM static field shows excellent agreement (up to at least degree 60) with recent field models derived from CHAMP data, providing an initial validation of the quality of the Swarm magnetic measurements. Use of gradient data improves the determination of both the static field and its secular variation, with the mean misfit for East-West intensity differences between the lower satellite pair being only 0.12 nT.

General information
Publication status: Published
Organisations: National Space Institute, Geomagnetism, IT-Department, University Paris Diderot - Paris 7, Helmholtz Centre Potsdam - German Research Centre for Geosciences, British Geological Survey, NOAA, Planetary Geodynamics Laboratory, Directorate of Earth Observation Programmes
Pages: 1092-1098
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Geophysical Research Letters
Volume: 42
ISSN (Print): 0094-8276
Ratings:
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 4.27 SJR 3.144 SNIP 1.491
Web of Science (2015): Indexed yes
Original language: English
Keywords: Swarm satellites, Earth's magnetic Field, Geomagnetic model
DOIs:
10.1002/2014GL062659
Source: PublicationPreSubmission
Source ID: 105600937
Research output: Contribution to journal › Journal article – Annual report year: 2015 › Research › peer-review

A climatological assessment of ionospheric travelling convection vortices using an automatic detection algorithm

General information
Publication status: Published
Organisations: National Space Institute, Geomagnetism, GTZ Potsdam
Contributors: Kotsiaros, S., Stolle, C., Friis-Christensen, E., Matzka, J.
Number of pages: 1
Publication date: 2013
Peer-reviewed: Yes
Event: Poster session presented at AGU Fall Meeting 2013, San Francisco, United States.
Electronic versions:
AGU-2013.pdf

Bibliographical note
Poster SM31A-2116
Source: dtu
Source ID: u::10073
Research output: Contribution to conference › Poster – Annual report year: 2013 › Research › peer-review

Ionospheric travelling convection vortices observed by the Greenland magnetometer chain

The Greenland magnetometer array continuously provides geomagnetic variometer data since the early eighties. With the polar cusp passing over it almost every day, the array is suitable to detect ionospheric traveling convection vortices (TCVs), which were rst detected by Friis-Christensen et al. [1988]. A climatological assessment of their occurrence properties using Greenland data in 1996 has been presented by Clauer and Petrov [2002]. In our ongoing study, a detection algorithm for TCVs in Greenland magnetic data is being developed and the rst results of their climatological assessment are discussed. Specifically, three years of magnetometer data, from 1986 to 1988, collected at seven stations
at the West coast of Greenland are analysed and TCV events are identified and isolated. The events are classified with respect to their intensity, duration and time of occurrence and they are correlated with values of the interplanetary magnetic field (IMF), solar wind velocity and Kp index. The results indicate that TCVs occur usually around magnetic local noon with a typical duration of approximately 15 minutes. TCV detection is clearly facilitated during times of low geomagnetic background activity.

General information
Publication status: Published
Organisations: National Space Institute, Geomagnetism
Contributors: Kotsiaros, S., Stolle, C., Friis-Christensen, E., Matzka, J.
Number of pages: 1
Pages: 31
Publication date: 2013

Host publication information
Title of host publication: Living on a Magnetic Planet - Abstract Volume : 2013 IAGA meeting
Place of publication: Mexico
Publisher: IAGA
Editors: Corona, J. J. S., Böhnel, H.
Electronic versions:
Abstract Book
IAGA_2013.pdf
URLs:
Source: dtu
Source ID: u::8919
Research output: Chapter in Book/Report/Conference proceeding › Conference abstract in proceedings – Annual report
year: 2013 › Research › peer-review

The Swarm Satellite Constellation Application and Research Facility (SCARF) and Swarm data products
Swarm, a three-satellite constellation to study the dynamics of the Earth's magnetic field and its interactions with the Earth system, is expected to be launched in late 2013. The objective of the Swarm mission is to provide the best ever survey of the geomagnetic field and its temporal evolution, in order to gain new insights into the Earth system by improving our understanding of the Earth's interior and environment. In order to derive advanced models of the geomagnetic field (and other higher-level data products) it is necessary to take explicit advantage of the constellation aspect of Swarm. The Swarm SCARF (Satellite Constellation Application and Research Facility) has been established with the goal of deriving Level-2 products by combination of data from the three satellites, and of the various instruments. The present paper describes the Swarm input data products (Level-1b and auxiliary data) used by SCARF, the various processing chains of SCARF, and the Level-2 output data products determined by SCARF.

General information
Publication status: Published
Organisations: National Space Institute, Geomagnetism, IT-Department, Directorate of Earth Observation Programmes, NOAA, British Geological Survey, University Paris Diderot - Paris 7, Delft University of Technology, Swiss Federal Institute of Technology Zurich, Helmholtz Centre Potsdam - German Research Centre for Geosciences, ESTEC, Planetary Geodynamics Laboratory, Charles University
Number of pages: 12
Pages: 1189-1200
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Earth, Planets and Space
Volume: 64
Issue number: 11
ISSN (Print): 1343-8832
Ratings:
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.65 SJR 2.063 SNIP 1.214
Dansk jagt på feer i rummet

General information
Publication status: Published
Organisations: Management, National Space Institute, Solar System Physics
Contributors: Friis-Christensen, E., Neubert, T.
Publication date: 2010
Peer-reviewed: Unknown

Publication information
Journal: Berlingske Tidende
ISSN (Print): 0106-4223
Original language: English
URLs:
http://www.berlingske.dk/danmark/dansk-jagt-paa-feer-i-rummet

Bibliographical note
af Lars Henrik Aagaard, tirsdag den 24. august 2010
Source: orbit
Source ID: 266438
Research output: Contribution to journal › Contribution to newspaper - Newspaper article – Annual report year: 2010 › Communication

Geomagnetic research from Space

General information
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Friis-Christensen, E., Lühr, H., Hulot, G., Haagmans, R., Purucker, M.
Pages: 213-214
Publication date: 2009
Peer-reviewed: Unknown

Publication information
Journal: E O S
Volume: 90
Issue number: 25
ISSN (Print): 0096-3941
Ratings:
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.168 SNIP 1.193
Original language: English
Electronic versions:
EFC_EOS 2009.pdf
DOIs:
10.1029/2009EO250002
Source: orbit
Source ID: 247287
Monitoring and climate predictions

General information
Publication status: Published
Organisations: Management, National Space Institute, Geodynamics
Contributors: Friis-Christensen, E., Forsberg, R., Lauritsen, S. N.
Number of pages: 64
Publication date: 2009

Host publication information
Title of host publication: DTU Climate Change Technologies: Recommendations on accelerated development and deployment of climate change technologies
Volume: 4.1.A
Place of publication: Kgs. Lyngby
Publisher: Technical University of Denmark (DTU)
Edition: 1
ISBN (Print): 978-87-990378-2-7
Electronic versions:
Klimarapport_endelig_version_enkeltsidet.pdf
Source: orbit
Source ID: 251886
Research output: Chapter in Book/Report/Conference proceeding – Annual report year: 2009 – Research

SWARM - An earth Observation Mission investigating Geospace
The Swarm mission was selected as the 5th mission in ESA's Earth Explorer Programme in 2004. This mission aims at measuring the Earth's magnetic field with unprecedented accuracy. This will be done by a constellation of three satellites, where two will fly at lower altitude, measuring the gradient of the magnetic field, and one satellite will fly at higher altitude. The measured magnetic field is the sum of many contributions including both magnetic fields and currents in the Earth's interior and electrical currents in Geospace. In order to separate all these sources electric field and plasma measurements will also be made to complement the primary magnetic field measurements. Together these will allow the deduction of information on a series of solid earth processes responsible for the creation of the fields measured. The completeness of the measurements on each satellite and the constellation aspect, however, implies simultaneous observations of a unique set of important electrodynamical parameters crucial for the understanding of the physical processes in Geospace, which are an important part of the objectives of the International Living With a Star Programme, ILWS. In this paper an overview of the Swarm science objectives, the mission concept, the scientific instrumentation, and the expected contribution to the ILWS programme will be summarized. (C) 2007 Published by Elsevier Ltd on behalf of COSPAR.

General information
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Friis-Christensen, E., Lühr, H., Knudsen, D., Haagmans, R.
Pages: 210-216
Publication date: 2008
Peer-reviewed: Yes

Publication information
Journal: Advances in Space Research
Volume: 41
Issue number: 1
ISSN (Print): 0273-1177
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.595 SNIP 0.733
Web of Science (2008): Indexed yes
Original language: English
DOIs:
10.1016/j.asr.2006.10.008
Source: orbit
Source ID: 211838
The Swarm Magnetometry Package
The Swarm mission under the ESA's Living Planet Programme is planned for launch in 2010 and consists of a constellation of three satellites at LEO. The prime objective of Swarm is to measure the geomagnetic field with unprecedented accuracy in space and time. The magnetometry package consists of an extremely accurate and stable vector magnetometer, which is co-mounted in an optical bench together with a start tracker system to ensure mechanical stability of the measurements.

General information
Publication status: Published
Organisations: Measurement and Instrumentation Systems, National Space Institute, Management, Measurement & Instrumentation, Department of Electrical Engineering
Pages: 143-151
Publication date: 2008
Peer-reviewed: Yes

Publication information
Journal: Small Satellites for Earth Observation
Original language: English
Source: orbit
Source ID: 209856
Research output: Contribution to journal › Conference article – Annual report year: 2007 › Research › peer-review

Swarm: A constellation to study the Earth's magnetic field
The Swarm mission was selected as the 5th mission in ESA's Earth Explorer Programme in 2004. The mission will provide the best ever survey of the geomagnetic field and its temporal evolution that will lead to new insights into the Earth system by improving our understanding of the Earth's interior and its effect on Geospace, the vast region around the Earth where electrodynamic processes are influenced by the Earth's magnetic field. Scheduled for launch in 2010, the mission will comprise a constellation of three satellites, with two spacecraft flying side-by-side at lower attitude (450 km initial attitude), thereby measuring the East-West gradient of the magnetic field, and the third one flying at higher attitude (530 km). High-precision and high-resolution measurements of the strength, direction and variation of the magnetic field, complemented by precise navigation, accelerometer and electric field measurements, will provide the necessary observations that are required to separate and model the various Sources of the geomagnetic field. This results in it unique "view" inside the Earth from space to study the composition and processes of its interior. It also allows analysing the Sun's influence within the Earth system. In addition practical applications in many different areas, such as space weather, radiation hazards, navigation and resource management, will benefit from the Swarm concept.

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E., Luhr, H., Hulot, G.
Pages: 351-358
Publication date: 2006
Peer-reviewed: Yes

Publication Information
Journal: EARTH PLANETS AND SPACE
Volume: 58
Issue number: 4
ISSN (Print): 1343-8832
Ratings:
Scopus rating (2006): SJR 0.924 SNIP 0.985
Web of Science (2006): Indexed yes
Original language: English
Keywords: Swarm satellites, geomagnetism, magnetic field mission
Source: orbit
Source ID: 205084
Research output: Contribution to journal › Journal article – Annual report year: 2006 › Research › peer-review

Swarm: The Earth's Magnetic Field and Environment Explorers

General information
Swarm Science objectives and challenges

Swarm is the fifth Earth Explorer mission in ESA’s Living Planet Programme to be launched in 2009. The objective of the Swarm mission is to provide the best ever survey of the geomagnetic field and its temporal evolution. The innovative constellation concept and a unique set of dedicated instruments will provide the necessary observations that are required to separate and model the various sources of the geomagnetic field. This will provide new insights into the Earth system by improving our understanding of the Earth’s interior and Sun-Earth connection processes.

The contribution of satellite measurements to our understanding of the Earth’s magnetic field and its variations

Field-Aligned Current Patterns in the Polar Cap Region During Northward IMF Derived by AMIE
Monitoring magnetospheric contributions using ground-based and satellite magnetic data

General information
Publication status: Published
Organisations: Solar System Physics, National Space Institute, Management
Contributors: Olsen, N., Vennerstrøm, S., Friis-Christensen, E.
Publication date: 2003

Host publication information
Title of host publication: Proceedings of the First CHAMP Science Meeting
Publisher: Springer Verlag
Editors: Reigber, C., Lühr, H., Schwintzer, P.
Source: orbit

Ørsted - og hvad så?

General information
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2003
Peer-reviewed: Unknown

Publication information
Journal: Politiken
Original language: English
Source: orbit
Source ID: 208156
Research output: Contribution to journal – Journal article – Annual report year: 2003 – Communication

SWARM - A Constellation to Study the Dynamics of the Earth's Magnetic Field and its Interactions with the Earth System

General information
Publication status: Published
Organisations: National Space Institute, IT-Department, Solar System Physics, Management
Contributors: Thomsen, P. L., Hansen, F., Olsen, N., Friis-Christensen, E.
Publication date: 2003
Peer-reviewed: Yes

Bibliographical note
8 pages
Source: orbit
Source ID: 208003
Research output: Contribution to conference – Conference abstract for conference – Annual report year: 2003 – Research – peer-review

Earth's gravity and magnetic fields from space

General information
Publication status: Published
Organisations: National Space Institute
Publication date: 2002

Publication information
Original language: English
(Journal of Geodynamics; No. vol. 33, no. 1-2).
Source: orbit
Earth's gravity and magnetic fields from space - Preface

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Pages: 1-1
Publication date: 2002
Peer-reviewed: Yes

Field-aligned currents in the dayside cusp and polar cap region during northward IMF
[1] The field-aligned currents in the dayside cusp and polar cap region are examined using magnetic data from the low-altitude polar-orbiting satellite Orsted. The study is confined to cases where the interplanetary magnetic field (IMF) has a steady northward component and to a rather narrow region spanning similar to 4 hours around magnetic noon. We examine individual passes using a maximum variance analysis method, and we complement, for a single event, with ground-based data from the Greenland meridian chain of magnetometers. We suggest that when an east-west component B-y of the IMF exists for positive IMF B-z, the two NBZ (northward B-z) field-aligned currents that prevail over the polar region rotate to form the two field-aligned currents equatorward and poleward of the east-west flowing ionospheric DPY current in the dayside. The high accuracy of the Orsted data makes it possible to uncover details not previously described.

General information
Publication status: Published
Organisations: Solar System Physics, National Space Institute
Contributors: Vennerstrøm, S., Moretto, T., Olsen, N., Friis-Christensen, E., Stampe, A., Watermann, J.
Publication date: 2002
Peer-reviewed: Yes

Monitoring the magnetic signature of the magnetospheric ring-current with Ørsted-2/SAC-C

General information
Publication status: Published
Organisations: Solar System Physics, National Space Institute, Management
Contributors: Olsen, N., Friis-Christensen, E., Vennerstrøm, S.
New approaches to explore the Earth's magnetic field

New strategies are presented for the analysis of the high-precision geomagnetic data that are currently obtained by the low-orbiting satellites Orsted, CHAMP and Orsted-2/SAC-C. The measured magnetic field is the sum of contributions from various sources in the core, crust, ionosphere and magnetosphere, and the accuracy of core and crustal field models is affected by ionospheric and magnetospheric source contributions. A proper parameterization of these external sources, together with a careful data pre-selection, is necessary to avoid spurious effects. In addition, the advantage of having multiple satellite missions measuring simultaneously over different regions of the Earth is discussed, and swarm, a proposed constellation consisting of 6 satellites in two different orbit planes, is presented.

An improved method of inferring interplanetary sector structure, 1905-present

A new method of estimating interplanetary sector polarity from geomagnetic activity is presented. The method is based on a linear multiregression between the By component of the interplanetary magnetic field and hourly values of the magnetic perturbation (DeltaX, DeltaY, DeltaZ) at selected magnetic observatories. B-y simultaneous use of all three components, and by using all hours of local time, the method yields an improved accuracy compared to previous subjective assessments of the sector polarity. Using this method, it is possible to derive the interplanetary sector structure at least back to 1926, with an accuracy which is sufficient to follow the development of large-scale unipolar structures in the interplanetary medium. Furthermore, we present results indicating that it may be possible to derive sector polarity even further back in time to 1905, but with less accuracy. This is accomplished by including the two subauroral stations Sitka and Sodankyla, which have not previously been used for polarity determination. A major problem with this early polarity determination is a strong asymmetry favoring toward sectors.
**Long-term and short-term climate variability**

**General information**
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2001

**Host publication information**
Title of host publication: Encyclopedia of Astronomy & Astrophysics
Source: orbit
Source ID: 208154
Research output: Chapter in Book/Report/Conference proceeding – Annual report year: 2001 – Communication

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**Ørsted (efter H.C. Ørsted), Danmarks første satellit**

**General information**
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2001

**Host publication information**
Title of host publication: Den Store Danske Encyklopaedi
Publisher: Gyldendal
Source: orbit
Source ID: 208152
Research output: Chapter in Book/Report/Conference proceeding – Annual report year: 2001 – Communication

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**Cusp currents observed with Ørsted**

**General information**
Publication status: Published
Organisations: Solar System Physics, National Space Institute, Management
Contributors: Vennerstrøm, S., Moretto, T., Olsen, N., Friis-Christensen, E., Stampe, A.
Publication date: 2000
Peer-reviewed: Yes
Source: orbit
Source ID: 207227
Research output: Contribution to conference – Poster – Annual report year: 2000 – Research – peer-review
Direct estimation of average field-aligned current patterns from high-precision magnetic satellite data

General information
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Friis-Christensen, E., Moretto, T.
Publication date: 2000

Host publication information
Title of host publication: Proceedings of the Ørsted 3rd international science team meeting
Source: orbit
Source ID: 206590
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2000 › Research › peer-review

Field-aligned currents associated with the auroral electrojets

General information
Publication status: Published
Organisations: Solar System Physics, National Space Institute
Contributors: Stampe, M., Vennerstrøm, S., Olsen, N., Moretto, T., Friis-Christensen, E.
Publication date: 2000
Peer-reviewed: Yes
Source: orbit
Source ID: 207121
Research output: Contribution to conference › Conference abstract for conference – Annual report year: 2000 › Research › peer-review

Hans Christian Ørsted - the discoverer of electromagnetism

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2000

Host publication information
Title of host publication: American Geophysical Union
Source: orbit
Source ID: 206892
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2000 › Research › peer-review

Reply to comments on "Variation of cosmic ray flux and global cloud coverage - a missing link in solar-climate relationships"

General information
Publication status: Published
Organisations: Solar System Physics, National Space Institute
Contributors: Svensmark, H., Friis-Christensen, E.
Pages: 79-80
Publication date: 2000
Peer-reviewed: Yes

Publication information
Journal: Journal of Atmospheric and Solar-Terrestrial Physics
Volume: 62
Issue number: 1
ISSN (Print): 1364-6826
Ratings:
Scopus rating (2000): SJR 1.157 SNIP 0.774
Solar activity variations and possible effects on climate

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2000

Host publication information
Title of host publication: NATO
Source: orbit
Source ID: 206983

Solar cycle lengths and climate: A reference revisited - Reply
In a critical assessment of the results regarding a possible association between solar activity variations and climate by Friis-Christensen and Lassen [1991] and Lassen and Friis-Christensen [1995], Laut and Gundermann [this issue] conclude that the correlation between the solar cycle length parameter and the Northern Hemisphere land temperature is weak. In this short reply we confirm our earlier conclusion, on the basis of new and independent temperature data, that during 400 years, from 1570 to 1970, there is a significant statistical correlation between these parameters, indicating that solar forcing constitutes an important contribution to the natural temperature fluctuations. This does not exclude, as also stated previously, that other climate forcings may have an effect on global temperature, including the effect of man-made greenhouse gases, in particular, after 1970.

General information
Publication status: Published
Organisations: Management, National Space Institute
Contributors: Lassen, K., Friis-Christensen, E.
Pages: 27493-27495
Publication date: 2000
Peer-reviewed: Yes

Publication information
Journal: Journal of Geophysical Research-space Physics
Volume: 105
Issue number: A12
ISSN (Print): 2169-9380
Ratings:
Scopus rating (2000): SJR 3.403 SNIP 1.834
Web of Science (2000): Indexed yes
Original language: English
DOIs: 10.1029/2000JA900067
Source: orbit
Source ID: 205265

Solar variability and climate - A summary

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Pages: 411-421
Publication date: 2000
Peer-reviewed: Yes
Sun, clouds and climate: An editorial comment

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Pages: 1-5
Publication date: 2000
Peer-reviewed: Yes

Sun-Earth coupling and possible effects on Earth's climate

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2000
Peer-reviewed: Yes
Event: Abstract from 1st STEP Results, Applications and Modelling Phase conference, Sapporo, Japan.
Source: orbit
Source ID: 206984
Research output: Contribution to conference › Conference abstract for conference – Annual report year: 2000 › Research › peer-review

The Harang discontinuity in auroral substorms, magnetospheric currents, geophysical monographs

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Gjerløv, J., Friis-Christensen, E., Hoffman, R., Cummer, S.
Pages: 209-216
Publication date: 2000

Host publication information
Title of host publication: AGU Geophysical Monograph 118 on magnetospheric current systems
The near-Earth magnetic satellite missions Ørsted and SAC-C/Ørsted-2, in relation to the Cluster II mission

General information
Publication status: Published
Organisations: National Space Institute, Solar System Physics
Contributors: Moretto, T., Friis-Christensen, E., Gjerløv, J., Olsen, N., Primdahl, F.
Pages: 363-366
Publication date: 2000

Host publication information
Title of host publication: Proceedings of the Cluster II workshop on multiscale, multipoint plasma measurements
Publisher: ESA Publications Division
Source: orbit
Source ID: 206658
Research output: Chapter in Book/Report/Conference proceeding – Article in proceedings – Annual report year: 2000

Upcoming and proposed geomagnetic missions with Danish participation during the decade of geopotential research

General information
Publication status: Published
Organisations: National Space Institute
Contributors: Friis-Christensen, E.
Publication date: 2000

Host publication information
Title of host publication: American Geophysical Union
Source: orbit
Source ID: 206894
Research output: Chapter in Book/Report/Conference proceeding – Article in proceedings – Annual report year: 2000

Verdens bedste Ørsted

General information
Publication status: Published
Organisations: Management, National Space Institute, Solar System Physics
Contributors: Friis-Christensen, E., Olsen, N.
Publication date: 2000
Peer-reviewed: Unknown

Publication information
Journal: Aktuel Astronomi
Volume: 2/00
Original language: Danish
Source: orbit
Source ID: 207278
Research output: Contribution to journal – Journal article – Annual report year: 2000

A multipoint study of a substorm occurring on 7 December, 1992, and its theoretical implications

On 7 December 1992, a moderate substorm was observed by a variety of satellites and ground-based instruments. Ionospheric flows were monitored near dusk by the Goose Bay HF radar and near midnight by the EISCAT radar. The observed flows are compared here with magnetometer observations by the IMAGE array in Scandinavia and the two Greenland chains, the auroral distribution observed by Freja and the substorm cycle observations by the SABRE radar, the SAMNET magnetometer array and LANL geosynchronous satellites. Data from Galileo Earth-encounter II are used to estimate the IMF B-z component. The data presented show that the substorm onset electrojet at midnight was confined to closed field lines equatorward of the preexisting convection reversal boundaries observed in the dusk and midnight regions. No evidence of substantial closure of open flux was detected following this substorm onset. Indeed the convection
reversal boundary on the duskside continued to expand equatorward after onset due to the continued presence of strong southward IMF, such that growth and expansion phase features were simultaneously present. Clear indications of closure of open flux were not observed until a subsequent substorm intensification 25 min after the initial onset. After this time, the substorm auroral bulge in the nightside hours propagated well poleward of the pre-existing convection reversal boundary, and strong flow perturbations were observed by the Goose Bay radar, indicative of flows driven by reconnection in the tail.
Correlation between solar activity and global climate

SWARM - a multi-satellite mission to investigate the dynamics of the Earth's magnetic field: Proposal for ESA Earth Explorer Opportunity Missions

Projects:

Cosmic radiation influence on aerosol and cloud formation over short time periods
Bondo, T., PhD Student, National Space Institute
Svensmark, H., Main Supervisor
Friis-Christensen, E., Examiner
Pierce, J. R., Examiner
Shaviv, N. J., Examiner
Centerfinansieret
01/07/2007 → 03/03/2010
Award relations: Cosmic radiation influence on aerosol and cloud formation over short time periods
Project: PhD
Influence of Solar activity on planetary environments - Future Mars explorations
Falkenberg, T. V., PhD Student, National Space Institute
Vennerstrøm, S., Main Supervisor
Madsen, M. B., Supervisor
Friis-Christensen, E., Examiner
Jørgensen, T. M., Examiner
Veronig, A., Examiner
Technical University of Denmark
01/05/2008 → 22/06/2011
Award relations: Influence of Solar activity on planetary environments - Future Mars explorations
Project: PhD

Activities:

**EGU General Assemblies**
Period: 24 Apr 2005 → 29 Apr 2005
Eigil Friis-Christensen (Participant)
National Space Institute
Management

Description
Observed and simulated field-aligned currents during northward

Place: EGS Spring Meeting, Vienna, Austria

**Related event**

**EGU General Assemblies**
24/04/2005 → 29/04/2005
Vienna, Austria
Activity: Attending an event › Participating in or organising a conference

Magnetometry missions during the International Decade for Geopotential Field Research: Results, opportunities and challenges
Period: 1 Jan 2003 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Place: European Geophysical Union meeting, Nice

**Related external organisation**

**Unknown Organization**
Activity: Talks and presentations › Conference presentations

SWARM - a constellation to study the dynamics of the Earth's magnetic field and its interactions with the Earth system
Period: 1 Jan 2003 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Place: European Geophysical Union meeting, Nice

**Related external organisation**

**Unknown Organization**
Swarm, a new opportunity to improve global magnetic field models
Period: 1 Jan 2003 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Description
Place: International Union of Geodesy and Geophysics, Sapporo, Japan
Related external organisation
Unknown Organization
Activity: Talks and presentations › Conference presentations

Swarm, a perfect mission to further advance our understanding of the geomagnetic field
Period: 1 Jan 2003 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Description
Place: International Union of Geodesy and Geophysics, Sapporo, Japan
Related external organisation
Unknown Organization
Activity: Talks and presentations › Conference presentations

Monitoring magnetospheric contributions using data from Ørsted, CHAMP and Ørsted-2/SAC-C
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Description
Note: AGU spring meeting
Related event

Monitoring magnetospheric contributions using data from Ørsted, CHAMP and Ørsted-2/SAC-C
01/01/2002 → …
Washington DC, USA
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Monitoring magnetospheric sources with Ørsted, CHAMP and Ørsted-2/SAC-C
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Description
Note: EGS XXVII general assembly
Related event
Monitoring magnetospheric sources with Ørsted, CHAMP and Ørsted-2/SAC-C
01/01/2002 → …
Nice, France
Activity: Talks and presentations › Conference presentations

Multi-satellite observations of field-aligned currents in the day-side cusp and polar cap
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Note: AGU spring meeting

Related event

Multi-satellite observations of field-aligned currents in the day-side cusp and polar cap
01/01/2002 → …
Washington DC, USA
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

New results from the Ørsted and CHAMP satellites
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Related event

New results from the Ørsted and CHAMP satellites: Field-aligned currents in the polar cap and cusp during northward IMF
01/01/2002 → …
NASA, Goddard Space Flight Center, USA
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Night-side current systems in the polar region during quiet geomagnetic conditions
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Note: AGU spring meeting

Related event

Night-side current systems in the polar region during quiet geomagnetic conditions
01/01/2002 → …
Washington DC, United States
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

S-RAMP Climate Activities
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute

Description
Place: COSPAR meeting in Houston, USA
Related external organisation

Unknown Organization
Activity: Talks and presentations › Conference presentations

Swarm: a new generation of magnetic field research satellites
Period: 1 Jan 2002 → …
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Place: Ørsted International Science Team Meeting No., 4, Copenhagen

Related external organisation

Unknown Organization
Activity: Talks and presentations › Conference presentations

Do solar variations affect our climate?
Period: 17 Dec 2001 → 19 Dec 2001
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Space weather workshop: Looking towards a European space weather programme, ESTEC.

Related event

Looking towards a European Space Weather Programme, ESTEC.
17/12/2001 → 19/12/2001
Noordwijk, Netherlands
Activity: Talks and presentations › Conference presentations

Solens formodede indflydelse på klimavarierer
Period: 27 Nov 2001
Eigil Friis-Christensen (Participant)
National Space Institute
Management

Description
Debate meeting on the global warming of the Earth. Are the reasons for global warming caused by an interaction between the physics of the Sun the Earth's atmosphere or in a man-made increase of the green-house effect? Educational course for high school teachers.

Related event

Solens formodede indflydelse på klimavarierer
Frederiksberg, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Klimaændringer - solpletter eller drivhusteori?
Period: 23 Oct 2001
Eigil Friis-Christensen (Lecturer)
Management
National Space Institute

Description
Lecture given as a part of a series of lectures on research results arranged by the Ministry of Education in co-operation with Grønt Forum.

Related external organisation
Steno Museet
C. F. Møllers Allé 2, 8000, Aarhus C, Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Klimaændringer - solpletter eller drivhusteori?
Period: 9 Oct 2001
Eigil Friis-Christensen (Speaker)

National Space Institute
Management

Description
Lecture given as a part of a series of lectures on research results arranged by the Ministry of Education in co-operation with Grønt Forum, Institute of Geography.

Related external organisation
University of Copenhagen
Dyrlægevej 100, 1871, Copenhagen, Denmark
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

The Danish national satellite programme for space science
Period: 5 Sep 2001 → 6 Sep 2001
Eigil Friis-Christensen (Participant)

National Space Institute
Management

Description
Workshop on space science mission in the European context. Swedish National Space Board and the Italian Space Agency.

Related event
The Danish national satellite programme for space science
05/09/2001 → 06/09/2001
Stockholm, Sweden
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Global opvarmning - har Solen en rolle?
Period: 1 Jun 2001
Eigil Friis-Christensen (Participant)

National Space Institute
Management

Description
Seminar on climatic changes.

Related event
Global opvarmning - har Solen en rolle?
01/06/2001 → 01/06/2001
DHL
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Why Mercury?**
Period: 30 May 2001 → 31 May 2001
Eigil Friis-Christensen (Participant)
National Space Institute
Management

**Related event**

**Why Mercury?**
30/05/2001 – 31/05/2001
London, United Kingdom
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Er Solens variede aktivitet årsag til klimavariationer?**
Period: 16 May 2001
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

**Description**
Lecture and panel discussion on "Climatic variations, natural or anthropogenic?", Svenska Geofysiska Föreningen (SGF), in co-operation with Sällskabet Riksdagsmän och Forskare (RIFO).

**Related external organisation**

Svenska Geofysiska Föreningen
Stockholm, Sweden
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

**Danmark i rummet**
Period: 26 Apr 2001
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

**Description**
Lecture arranged by "Unges Naturvidenskabelige Forening" (UNF).

**Related external organisation**

Aarhus University
Inge Lehmanns Gade 10, 8000, Aarhus C, Denmark
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

**Er kosmisk stråling årsag til klimaforandringer?**
Period: 19 Apr 2001
Eigil Friis-Christensen (Participant)
National Space Institute
Management

**Description**
Theme meeting: "Global opmarmning - fup eller fakta", Interessegruppen for Gasanalyse, Dansk Selskab for Miljøkemi og GOGCI.

**Related event**
Is climate change due to our varying Sun?
Period: 2 Apr 2001
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Related event
Is climate change due to our varying Sun?
02/04/2001 → 02/04/2001
Paris, France
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Solen som klimamotor
Period: 25 Sep 2000
Eigil Friis-Christensen (Lecturer)
National Space Institute
Management

Description
Note: Lecture in connection with "Dansk Naturvidenskabsfestival"

Related external organisation
Tycho Brahe Planetarium
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Solar system science in Denmark
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Note: Space Science International Partnership Conference

Related event
Solar system science in Denmark
15/05/2000 → 17/05/2000
Washington, USA
Activity: Talks and presentations › Conference presentations

Space astrophysics in Denmark
Eigil Friis-Christensen (Speaker)
National Space Institute
Management

Description
Note: Space Science International Partnership Conference
**Related event**

**Space astrophysics in Denmark**
15/05/2000 → 17/05/2000  
Washington, United States  
Activity: Talks and presentations › Conference presentations

**Dansk indsats i rummet, visioner og muligheder**
Period: 14 Apr 2000  
Eigil Friis-Christensen (Participant)  
National Space Institute  
Management

Description
Dansk indsats i rummet, visioner og muligheder

Place: Danish Space Research Institute, Copenhagen

**Related event**

**Dansk indsats i rummet, visioner og muligheder**
14/04/2000 → 14/04/2000  
Copenhagen, Denmark  
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Space Research, Space Technology and Space Industry**
Period: 14 Apr 2000  
Eigil Friis-Christensen (Participant)  
National Space Institute  
Management

Description
Den nationale dimension i et internationalt samarbejde

Note: Conference on Space Research, Space Technology and Space Industry  
Place: Danish Space Research Institute, Copenhagen

**Related event**

**Space Research, Space Technology and Space Industry**
14/04/2000 → 14/04/2000  
Copenhagen, Denmark  
Activity: Attending an event › Participating in or organising a conference

**Climatic effects of energetic particles**
Period: 5 Mar 2000  
Eigil Friis-Christensen (Speaker)  
National Space Institute  
Management

Description
Note: NASA Sun-Climate Workshop

**Related event**

**Climatic effects of energetic particles: An overview**
05/03/2000 → 05/03/2000  
Tucson, United States  
Activity: Talks and presentations › Conference presentations
Danish space activities
Period: 14 Feb 2000
Eigil Friis-Christensen (Speaker)
National Space Institute

Description
Note: Arctic Winter Cities Conference

Related event

Danish space activities
14/02/2000 → 14/02/2000
Kiruna, Sweden
Activity: Talks and presentations › Conference presentations

Scientific problems and practical applications related to the magnetic field in the Earth's environment
Period: 9 Jul 1999
Eigil Friis-Christensen (Participant)
National Space Institute

Related event

Scientific problems and practical applications related to the magnetic field in the Earth's environment: Festkolloquium
09/07/1999 → 09/07/1999
Potsdam, Germany
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Solar wind - magnetosphere coupling processes, solar-terrestrial relationships: Forum for climate and global change
Period: 2 Jul 1999
Eigil Friis-Christensen (Participant)
National Space Institute

Related external organisation

The Swiss Academies of Arts and Sciences
Bern, Switzerland
Activity: Other

The Danish Space Research Institute
Period: 7 Sep 1998 → 8 Sep 1998
Eigil Friis-Christensen (Participant)
National Space Institute

Related external organisation

University of Copenhagen
Dyrlægevej 100, 1871, Copenhagen, Denmark
Activity: Other

DSRI: Present projects and the future
Period: 3 Jun 1998
Eigil Friis-Christensen (Speaker)
National Space Institute

Related event
Climate variations with solar activity
Period: 26 May 1998
Eigil Friis-Christensen (Participant)
National Space Institute

The dual role of the magnetic field in controlling and disclosing the physics of planets and their environment in the solar system: Lecture at the annual meeting of the German Geophysical Society
Eigil Friis-Christensen (Lecturer)
National Space Institute

Påvirker solens varierede aktivitet vores klima
Period: 2 Feb 1998
Eigil Friis-Christensen (Participant)
National Space Institute

Global warming - is the Sun the culprit ?: Colloquium at the Institute of Physics, University of Odense
Period: 1 Jan 1998 → …
Eigil Friis-Christensen (Speaker)
National Space Institute

Space Research in Denmark and the Ørsted satellite
Period: 1 Jan 1998 → …
Eigil Friis-Christensen (Participant)
National Space Institute

Space Research in Denmark and the Ørsted satellite: Lecture for "Forskerspirer" 01/01/1998 → …
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.
Do variations in solar activity affect our climate?
Period: 28 Nov 1997
Eigil Friis-Christensen (Speaker)
National Space Institute

Description
Place: Oulu University, Oulu, Finland

Related external organisation
Unknown Organization
Activity: Talks and presentations › Conference presentations

Press clippings:

Svensmark og hans solteorier er troværdige: Peter Laut mangler forståelse for videnskabelig metode, og derfor er hans forsøg på karaktermord på en lødig forsker forfejlet
Eigil Friis-Christensen
31/10/2009
National Space Institute, Solar System Physics

Media contribution (1)

Svensmark og hans solteorier er troværdige: Peter Laut mangler forståelse for videnskabelig metode, og derfor er hans forsøg på karaktermord på en lødig forsker forfejlet
31/10/2009
Information, Print
Eigil Friis-Christensen
http://www.information.dk/213645
Eigil Friis-Christensen
National Space Institute, Solar System Physics
Press/Media: Press / Media

Til Mars fra Danmark
Eigil Friis-Christensen
01/05/2005
National Space Institute, Management

Media contribution (1)

Til Mars fra Danmark
01/05/2005
Ud & Se, s. 60-64, Print
Eigil Friis-Christensen
National Space Institute, Management
Press/Media: Press / Media