THE NORWEGIAN ACADEMY
OF SCIENCE AND LETTERS

DRAMMENSVEIEN 78, OSLO
THURSDAY, SEPTEMBER 27, 18:00

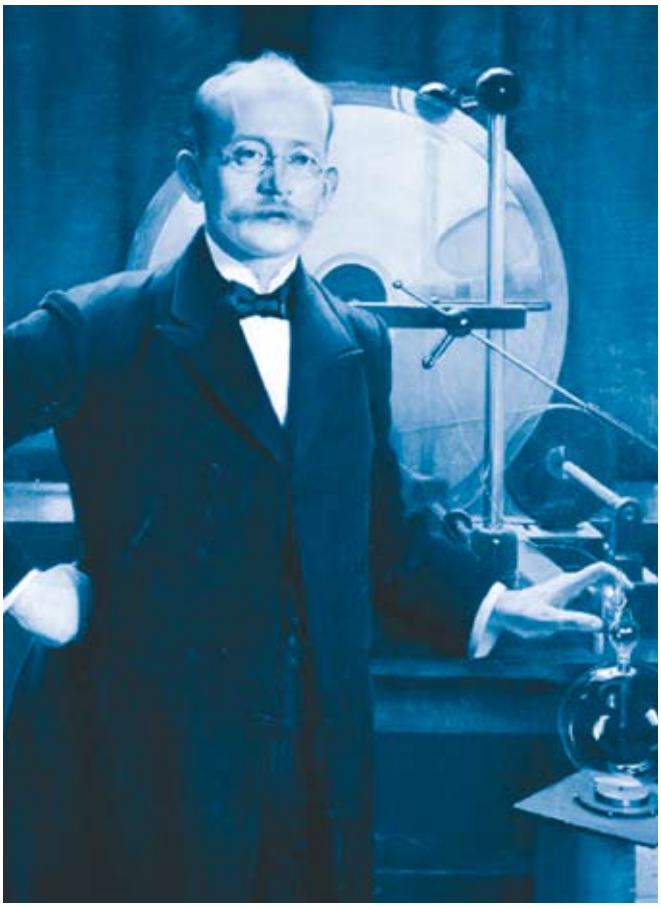
THE BIRKELAND LECTURE 2007

DR. EIGIL FRIIS-CHRISTENSEN
Danish National Space Center, DTU
the Birkeland Lecturer 2007:

"Unrest on the Sun – storms on the Earth. The magnetic connection"

No registration necessary. Free admission

This portrait of Professor Kristian Birkeland was painted by Asta Nørregaard in 1906. © Norsk Hydro



The Birkeland Lecture 1987-2007

The University of Oslo has since 1987 arranged a ”Birkeland Lecture” in cooperation with the Norwegain Academy of Science and Letters and the Norwegian company Norsk Hydro ASA (from 2004: YARA ASA). Except for 1993 – when the lecture was given in Tokyo - the lectures have been given in Norway, most of them at the Academy in Oslo. Some years seminars have been arranged in connection with the lectures, e.g in 1993 when the lecture was part of a ”Joint Japanese-Norwegian Workshop on Arctic Research”, and in 1995 when the lecture was part of a seminar on Norwegian environmental research. Also in 2001, when professor D. Southwood from ESA gave the Birkeland Lecture, a workshop on Norwegian space research with emphasis on the Cluster programme was arranged at the University of Oslo. This cooperation with the Academy and Norsk Hydro and YARA has given the University of Oslo the opportunity to invite many outstanding scientists within the area of geophysical and space research to Oslo, areas which were central in Kristian Birkeland´s own research:

1987: Hannes Alfven , Kungliga Tekniska Høgskolan , Stockholm, Sverige, and University of California, San Diego, USA::
“The Auroral Research in Scandinavia”
(University of Oslo, 3. September 1987)

1988: Alex J. Dessler , Rice University, Housten, USA:
“I have it” - Birkeland´s quest for research founding”
(University of Oslo, 16. June 1988)

1989: T.A. Potemra, The John Hopkins University, Laurel, USA:
“Satelite measurements of Birkeland currents”
and
Naoshi Fukushima, Tokyo University, Japan:
“Birkeland´s work with the geomagnetic disturbances in relation to modern research”
(The Norwegian Science Museum, Oslo, 24 October 1989)

1990: James van Allen , University of Iowa, USA:
“On the future of space science and applications”
(The Norwegian Academy of Science and Letters, Oslo, 10. October 1990)

1991: Syun-Ichi Akasofu , Geophysical Institute, Fairbanks, Alaska:
“Helio-magnetism”
(University of Oslo, 24. October 1991)

1992: W. Ian Axford , Max-Planck Institut, Lindauer, Tyskland:
“The origin of cosmic rays”
(University of Oslo, 24. September 1992)

1993: Takasi Oguti, Solar-Terrestrial Environment Laboratory, Tokyo, Japan:
“Sun-earth energy transfer”
(Tokyo University, Japan, 7. October 1993)

1994: Stanley W.H. Cowley, Imperial College, UK:
“The Solar wind – Magnetosphere-Ionosphere connection”
(The Norwegian Academy of Science and Letters, Oslo, 22. September 1994)

1995: Anthony L. Peratt, Los Alamos National Laboratory, USA:
“The legacy of Birkeland´s plasma torch”
(University College, Notodden, Norway, 21.september 1995)

1996: Gerard Haerendel, Max Planck Institute, Garching, Tyskland:
“Physics along auroral magnetic field lines”
(University of Oslo, Norway, 19 September 1996)

1998: No lecture, but a ***”Birkeland event”*** at Tokyo University 30 September with presentation of a Birkeland bust to Tokyo University, and a mini-seminar at the Norwegian Embassy.

2001: David Southwood, Imperial College, London / Director of Research ESA, Paris:
“Kristian Birkeland, Science Forever, Lessons for Today”
(The Norwegian Academy of Science and Letters, 20. September 2001)

2002: Alain F. Roux, Centre dÈtude des Env. Terrestres et Planetaires, CETP, Paris:
”Role of Kristian Birkeland curents in the dynamics of the geomagnetic tail”
(The Norwegian Academy of Science and Letters, Oslo, 19. September 2002)

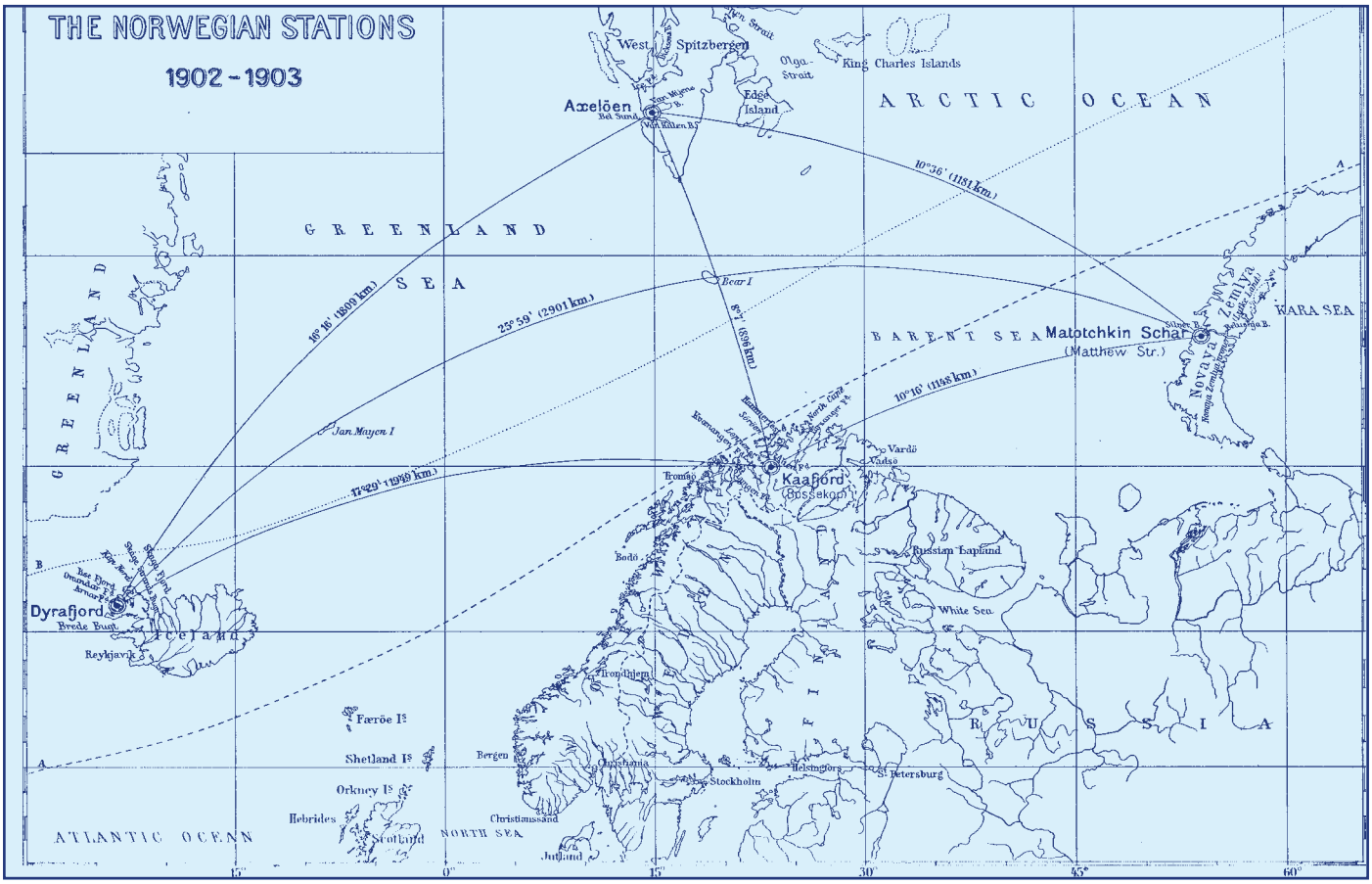
2003: Lev M Zelenyi, Space Research Institute, IKI, Moscow, Russia:
“Space Weather”
(The Norwegian Academy of Science and Letters, Oslo, 19. September 2003)

2004: Catherine G. Coleman, NASA, Houston, USA:
“Our Earth seen from Space”
(University of Oslo, 23. September 2004)

2005: Wiliam J. Burke, Air Force Geophysics Laboratory, USA:
“Kristian Birkelands Message from the Sun – Its meaning then and now”
(University of Oslo, 22. September 2004)

2006: Margaret Kivelson, University of California, Los Angeles (UCLA), USA:
“A century after Birkeland: Auroras and related phenomena at moons and planets”
(The Norwegian Academy of Science and Letters, Oslo, 21. September 2006)

To improve the experimental basis for his theory of the geomagnetic effects in the polar region, Birkeland carried out a large scale expedition in the Arctic . The expedition took place in the years 1902-03, and the map shows the position of the experimental stations which he had equipped with modern instruments. These stations were of central importance for this enterprise, and he called them "The Norwegian Stations". (Map from Birkeland´s main research contribution "The Norwegian Auroral Polaris Expeditions", 1908).



"Unrest on the Sun – storms on the Earth The magnetic connection"

Eigil Friis-Christensen, Danish National Space Center, DTU

The magnetic field of the Earth and its dependence on solar activity was central in the research of Kristian Birkeland. One of his big quests was to understand "the message from the Sun". Another prominent Norwegian Physicist, Christopher Hansteen, was listening to another message: "the Earth is talking about the motions in its interior in the low voice of the magnetic needle".

Now, 125 years after the first International Polar Year 1882-83, we have just entered a new International Polar Year, IPY, dedicated to a wide spectrum of coordinated international research projects including some of the very same scientific challenges that occupied Kristian Birkeland and colleagues. Protection of our planet will be in the focus of much research but we have also realized that our planet is not isolated in Space. It is exposed to forces originating from the Sun, which we are just beginning to understand. With the current and the planned high precision measurements of the magnetic field of the Earth and with a solar mission giving us a stereoscopic view of the solar atmosphere, we are entering a new era of geomagnetic and solar magnetic field research.

An important aspect of the Sun-Earth connection is the possible link between solar variations and cloud formation through solar modulation of the cosmic ray flow. If such an effect can be understood and quantified it has significant implications for the possibility of predicting and mitigating societal effects of climate changes, natural or manmade.

FRONT PAGE PHOTO: Jeffry M. Holmes, Auroral Station in Adventdalen, The University Centre in Svalbard (UNIS)

Professor Dr. Eigil Friis-Christensen

Danish National Space Center, DTU

Eigil Friis-Christensen is Director of the Danish National Space Center (DNSC) since 1997. During a major reorganisation of the research institutions in Denmark DNSC merged with the Technical University of Denmark (DTU) in 2007. From 1996 to 2006 he was Adjunct Professor in Geophysics and Space Physics at the Niels Bohr Institute of the University of Copenhagen. His research interests are in the fields of geomagnetism and solar-terrestrial physics.

Eigil Friis-Christensen completed his ph.d. at the University of Copenhagen in 1971. He was employed as a Research Scientist at the Division of Geophysics at the Danish Meteorological Institute (DMI). Here he took part in the establishment of the Greenland Magnetometer Array of which he became the leader in 1976. He became Head of the Solar-Terrestrial Physics Division (DMI) 1991-1997, and was appointed project scientist of the first Danish satellite, Ørsted, launched in February 1999. He was leading the Danish research and instrument teams and established an international science team consisting of more than 60 research groups from 16 countries.

Eigil Friis-Christensen is author or co-author of more than 140 research papers and has presented more than 50 invited papers at international conferences in addition to a large number of contributed papers. He has been invited as a visiting scientist at several major research institutions and universities in USA and Russia. In 1995 he was elected member, and in 2003 VICE-President, of the executive committee of the International Association of Geomagnetism and Aeronomy, IAGA.

He has been – and is – engaged in many international projects. He has been a member of the International Steering Committee of the Solar-Terrestrial Energy Programme, STEP and S-RAMP, established by the International Council of Scientific Unions (ICSU) and Scientific Committee on Solar-Terrestrial Physics (SCOSTEP). In 2002 he was appointed as Lead Investigator and chair of the Mission Advisory Group (MAG) for Swarm "The Earth's Magnetic Field and Environment Explorers", which was selected as the 5th Explorer mission in the Earth Observation "Living Planet" Programme of ESA.

Eigil Friis-Christensen was elected Associate member of the Royal Astronomic Society, London, in 1996, and joined ESA's Science Programme Committee, SPC, in 1998. He was appointed member of ESA's Earth Science Advisory Committee, ESAC, in 2003.

Organizing committee:

Professor Tore Amundsen, Department of Physics, University of Oslo
Professor Alv Egeland, Department of Physics, University of Oslo
Professor Reidun Sirevåg, Secretary General, the Norwegian Academy of Science and Letters
Ingegerd K. Rafn, Senior Vice President, Yara International ASA
Bo Andersen, Director General, Norwegian Space Centre

The Birkeland Lecture is open for everybody. There is no registration. Free admission.

For more information about the Birkeland Lecture 2007:
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