

# MEETINGS

## A New Perspective on the Earth's Plasmasphere

*The Earth's Plasmasphere: A Cluster, IMAGE, and Modelling Perspective; Brussels, Belgium, 19–21 September 2007*

Sixty years ago, Owen Storey concluded that "whistler" radio waves propagate along the geomagnetic field lines through a dispersive medium, which is now known as the plasmasphere. This was confirmed by Gringauz's plasma measurements on Lunik 2 in 1962. In recent years, satellites such as NASA's Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) and the European Space Agency's Cluster probes have offered what previous spacecraft could not: a nonlocal perspective.

As IMAGE and Cluster have accumulated more than 6 years of observations, researchers from both communities judged the time was ripe for a review at a workshop organized last September by the Belgian Institute for Space Aeronomy (<http://www.aeronomie.be/en/workshop/plasmasphere/overview.htm>). This meeting report summarizes some highlights of the meeting.

An important topic discussed involved the emergence of new methodologies for analysis of IMAGE and Cluster data. IMAGE, which ceased operations in 2005, carried an extreme ultraviolet (EUV) imager that produced global plasmasphere pictures every 10 minutes by recording resonantly scattered helium ion ( $\text{He}^+$ ) emission at 30.4 nanometers. The rich detail in these images has inspired a new morphological nomenclature (<http://image.gsfc.nasa.gov/poetry/discovers/N47big.jpg>). Presentations at the meeting showed how the EUV team can infer the flow field by cross-correlating details in subsequent images. IMAGE's radio plasma imager (RPI) wave instrument provides a picture of its environment by active radio sounding, thereby discovering, for instance, wave ducts of finite extent along the magnetic field lines.

Other sessions revealed how the four-spacecraft Cluster constellation gives an idea of larger-scale structure in the plasmasphere when the spacecraft separation is large. For small separations, diverse techniques allow computing the magnetic field gradients—and thus the currents—as well as the density gradients (density inferred from the plasma frequency identified by the WHISPER (Waves of High Frequency and Sounder for

Probing of Electron Density by Relaxation) instrument).

These new methodologies have created a greater understanding of plasmasphere dynamics, which evolve in a cyclic pattern. Presentations covered how the plasmasphere is refilled from the ionosphere in a slow bottom-up process when the solar wind is steady and the magnetospheric electric field is constant. The plasmasphere thus becomes wider and denser, and it has no sharp outer boundary. Further, the Cluster/CODIF (Composition and Distribution Function Analyzer) ion spectrometer, in its cold plasma detection mode, has potentially revealed the existence of an outward plasmaspheric wind in this situation. When a strong solar wind disturbance sets in, the electric field intensifies and erodes the outer regions of the plasmasphere. This produces a sharp outer density gradient (the plasma-pause). The eroded material forms a plume, initially in the afternoon sector, sometimes extending up to the dayside magnetopause. The nightside edge of the plume foot point seems to coincide with the intense electric fields associated with ionospheric subauroral ion drifts. As time goes by, the plume rotates around Earth, often at a speed slower than the Earth's rotation. Plumes can extend over a wide local time sector; while IMAGE EUV shows their high-density part (down to about 40 particles per cubic centimeter), Cluster sometimes samples the prolongation of these plumes to earlier local times, at even lower densities. Conference sessions reviewed how numerical simulations support the proposed theories.

Additionally, IMAGE and Cluster contribute to empirical models of the plasma density in the inner magnetosphere, and of the electric field that drives the convection. Models of the broad variety of plasma wave emissions reported by both missions will be useful for understanding the time evolution of the radiation belts.

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## Toward a Networked Publication and Library System for Scientific Data

*World Data Center Conference 2007; Bremerhaven, Germany, 7–9 May 2007*

Almost 50 years ago, the World Data Center (WDC) system was founded through the International Council for Scientific Unions (ICSU) in order to archive and distribute data collected from the observational programs of the 1957–1958 International Geophysical Year. Originally established in the United States, Europe, Russia, and Japan, the WDC system has since expanded to 51 centers in 12 countries. Its current holdings are transdisciplinary and include a wide range of solar, geophysical, environmental, and human dimensions data covering time-scales ranging from seconds to millennia. These data provide the baseline information for research in many ICSU disciplines, but especially for monitoring changes in the geosphere and biosphere.

In order to revise a 50-year-old structure and to develop appropriate short- and medium-term strategies, a WDC conference was convened in Bremen, Germany. Hosted by the World Data Center for Marine Environmental Sciences (WDC-MARE) and the Alfred Wegener Institute for Polar and Marine Research, and supported by the German Science Foundation (DFG) and the ICSU, the conference was dedicated to four main subjects:

1. *WDC and GEOSS*: The current Global Earth Observation System of Systems (GEOSS) effort is conceived for synoptic access and large-scale and complex analysis of all types of empirical data. All subscribing nations have a unique role in developing and maintaining the system, collecting data, enhancing data distribution, and providing models. The WDC system has a large, long-term archiving capacity involving a unique data management expertise and is thus of great importance to GEOSS.

2. *WDC Networking*: Usually, data are available from scattered sources, in heterogeneous formats, and conflicting semantic specifications and are thus unequal in representation and quality. Conversely, the holistic understanding of the Earth system requires data sharing, harmonization, and integration. The already successful interoperability among WDCs is the key to a further integration into other communities.

As a next step, a limited number of data centers shall validate the network's backbone through an all-WDC data portal via open and international information standards and protocols that promote GEOSS data sharing principles.

3. *WDC Data Access and Quality*: WDCs provide online access to scientific data free of charge and without discrimination. A common concept for the advancement of data quality and access is necessary. Scientific knowledge is communicated through scientific literature and knowledge is ultimately derived from data, and thus consistent data publication is paramount. Development of standards for peer review, persistent identification, open access, and long-term availability are necessary for good scientific practice, and to fulfill intergovernmental and funding policies.

4. *WDC and IPY*: Since the first International Polar Year in 1881–1884, IPYs have always been large-scale scientific enterprises. The International Polar Year Data and Information Service (IPYDIS) is an international federation of data centers, archives, and networks working to ensure proper stewardship of IPY and the long-term preservation of, and broad, interdisciplinary, and nonexpert access to, IPY data. The WDC system will provide support for close partnership among IPY data centers and organizations around the world to contribute to an internationally distributed data management system.

Within the past half century, an enormous technical evolution in computer techniques and a fundamental change in clients' requirements have occurred that have changed scientific data management. Overcoming heterogeneity in the data centers' equipment and the work flow in the WDC system are important challenges to the goals of open access to scientific data and transdisciplinarity that are unique benefits of a strong WDC.

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### ICDP Workshop on Testing the Extensional Detachment Paradigm: A Borehole Observatory in the Sevier Desert Basin

(Basin and Range Province, Western United States)

July 15–18, 2008

Salt Lake City and Snowbird Mountain Conference Center, Utah, USA

Low-angle normal faults or detachments are widely regarded as playing an important role in crustal extension and the development of passive continental margins. However, no consensus exists on how to resolve the mechanical paradox implied by such faults or to account for the general absence of evidence for seismicity. Proposed drilling in the Sevier Desert basin in the western United States will test the extensional detachment paradigm (1) by making *in situ* measurements at depth of pore pressure, permeability, fluid chemistry, temperature and stress orientation and magnitude at a fault that is thought by most workers to have large normal-sense offset (< 47 km), to have been active over most of its history near its present 11° dip, and to be associated with contemporary surface extension; 2) by obtaining critical core of fault rocks at a down-dip site where offset should be large; and 3) by establishing more clearly the relationship between basin development, displacement along the interpreted fault, and footwall exhumation.

A workshop is being organized under the auspices of the International Continental Scientific Drilling Program (ICDP), to flesh out objectives, strategies and operational details of a research and drilling program, and to develop a consensus on the location of a drill site. The workshop will consist of a day in Salt Lake City, Utah, a day in the field in the Sevier Desert and adjacent Canyon Range, and two days at the Snowbird Mountain Conference Center. The principal product of the meeting will be a full drilling proposal, to be submitted to ICDP in January, 2009. A website has been established to provide information about the project as it develops: <http://www.ldeo.columbia.edu/sepier/icdp/>.

We invite applications from the international community of interested scientists and engineers with pertinent expertise in borehole geophysics and instrumentation, drilling and coring techniques, structural geology, rock mechanics, reflection seismology, neotectonics/geodesy, stratigraphy, geochronology and geochemistry to participate in the workshop. Applications should be sent to **Nicholas Christie-Blick** ([nch@ldeo.columbia.edu](mailto:nch@ldeo.columbia.edu)), **Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964-8000, USA** no later than **February 15, 2008**. Please provide complete contact information, a brief summary of your expertise, and your intended contribution to the project.

Decisions on participation will be made by the steering committee (N. Christie-Blick and M. H. Anders, Lamont-Doherty Earth Observatory, USA; G. Dresen, GeoForschungsZentrum Potsdam, Germany; G. S. Lister, Australian National University, Australia; G. Manatschal, Université Louis Pasteur, France; and B. P. Wernicke, California Institute of Technology, USA). Preference for participation and available travel funds will be given to those from ICDP member countries.

## M E E T I N G S A N N O U N C E M E N T S

■ 6–10 April 2008 **235th American Chemical Society (ACS) National Meeting and Exposition**, New Orleans, Louisiana, USA. Sponsors: ACS; American Institute of Chemical Engineers (AIChE). (Conference Manager, ACS, 1155 Sixteenth Street, NW, Washington, D.C., USA; Tel.: +1-202-872-4600; E-mail: [help@acs.org](mailto:help@acs.org); Web site: <https://portal.acs.org/portal/acs/corg/memberapp>)

Individual society programming will cover a broad range of topics. In addition, select symposia cosponsored with the AIChE are in the areas of computation, entrepreneurship, fuel petrochemicals and petroleum, materials and nanotechnology, safety, and sustainability and alternative fuels. There will also be a showcase event highlighting the meeting theme, "Energy and the Environment."

■ 13–18 April 2008 **European Geosciences Union (EGU) General Assembly 2008**, Vienna, Austria. Sponsor: EGU. (Conference Secretariat, Copernicus Meeting Office, Max-Planck-Strasse 13, Katlenburg-Lindau, Germany; Tel.: +49-5556-99555-20; Fax: +49-5556-99555-70; E-mail: [egu2008@copernicus.org](mailto:egu2008@copernicus.org); Web site: <http://meetings.copernicus.org/egu2008/>)

The EGU General Assembly, which will bring together geoscientists from Europe and the rest of the world, includes topics covering all disciplines of the Earth, planetary, and space sciences. Abstract deadline is 14 January 2008.

■ 8–11 July 2008 **SCAR/IASC IPY Open Science Conference: Polar Research: Arctic and Antarctic Perspectives in the International Polar Year**, St. Petersburg, Russia. Sponsors: Scientific Committee on Antarctic Research (SCAR); International Arctic Science Committee (IASC); World Meteorological Organization (WMO); others. (J. Raiskaja; Tel.: +7-812-335-2055; Fax: +7-812-335-2039; E-mail: [osc2008@onlinereg.ru](mailto:osc2008@onlinereg.ru); Web site: <http://www.scar-iasc-ipy2008.org/>)

Topics include Earth structure and geodynamics at the poles, polar/global biological connections, polar weather and climate forecasting, polar observing systems, and Arctic and Antarctic archeology. This conference will be held in conjunction with the 30th SCAR Meeting that includes science business sessions (5–7 July) and the Delegates' Meeting (14–16 July in Moscow). Abstract deadline is 15 January 2008.

■ 20–23 July 2008 **Symposium on Planning for Climate Change: Weathering Uncertainty**, Iqaluit Nunavut, Canada. Sponsors: Canadian Institute of Planners; Alberta Association; City of Iqaluit; others. (D. Nielsen, Symposium Coordinator, City of Iqaluit, Iqaluit, NU, Canada; Tel.: +1-867-979-5605; Fax: +1-867-979-3763; E-mail: [d.nielsen@city.iqaluit.nu.ca](mailto:d.nielsen@city.iqaluit.nu.ca); Web site: <http://www.planningforclimatechange.ca/>)

This symposium will examine climate change mitigation and adaptation.

■ 22–26 September 2008 **Chapman Conference on Shallow Mantle Composition and Dynamics Fifth International Orogenic Lherzolite Conference**, Mount Shasta, California, USA. Sponsor: AGU. (Conference Manager, AGU Meetings Department, 2000 Florida Avenue, NW, Washington, D.C., 20009, USA; Tel.: +1-202-777-7329; Fax: +1-202-777-7385; E-mail: [chapman-help@agu.org](mailto:chapman-help@agu.org); Web site: <http://www.agu.org/meetings/chapman/2008/ccall/>)

Topics will include melting processes, melt transport, metasomatism, localized and regional deformation, the formation and nature of plate boundaries, mechanisms of intermediate-depth earthquakes, and the geochemistry and physical processes of low-temperature alteration.

■ 5–9 October 2008 **SSSA-ASA-CSSA-GSA 2008 Joint Annual Meeting**, Houston, Texas, USA. Sponsors: Soil Science Society of America (SSSA); American Society of Agronomy (ASA); Crop Science Society of America (CSSA); Geological Society of America (GSA); others. (L. Nelson; Tel.: +1-608-268-4963; E-mail: [lnelson@agronomy.org](mailto:lnelson@agronomy.org); Web site: <https://www.acsmeetings.org/2008/>)

This joint meeting will highlight and stimulate discussions in areas of common interest across the diversity of disciplines and organizations represented by members of the different organizations. Areas of mutual interest include energy, water resources, education, and Earth systems. Abstract deadline is 4 December.

■ 4–6 November 2008 **22nd Colloquium of African Geology and the 13th Conference of the Geological Society of Africa**, Hammamet, Tunisia. Sponsors: Geological Society of Africa; Tunisian Association of Applied Geology (M.H. Inoubli, Faculté des Sciences de Tunis, Campus Universitaire, Tunis, Tunisia; Tel.: +216-71-872-600 ext. 305; Fax: +216-70-860-325; E-mail: [afric2008@gmail.com](mailto:afric2008@gmail.com); Web site: <http://www.iugs.org/Calendar/2008/callforpaperCAG22C13.pdf>)

Topics at this conference on African geology include geodynamics of Africa, basin analyses and petroleum exploration, water and soils resources, geochemistry and geochronology, geophysics and geohazards, and geomatics and remote sensing. Abstract deadline is 21 January 2008.