Comment on "Will the Magnetic North Pole Move to Siberia?"

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MEETINGS

Synchrotron Radiation Needs for Molecular Environmental Science

EnviroSync Workshop;
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Synchrotron facilities provide exceptionally high brightness, tunable X-ray sources that make possible a range of novel techniques allowing molecular-scale and sometimes time-resolved characterization of diverse types of materials. Focusing the X-ray beam to nanometer to micrometer sizes enables spectroscopic and scattering measurements at high spatial resolution, thereby allowing study of complex, heterogeneous environmental samples in which elements of interest are commonly dilute. Such molecular-scale characterization provides the basis for understanding fundamental reaction mechanisms, chemical speciation of trace and major elements, contaminant mobility/bioavailability, and element cycling in the hydrosphere.

It is no surprise therefore that synchrotron radiation techniques, such as X-ray absorption spectroscopy and scattering, have become core techniques in the fields of molecular environmental science (MES) and low-temperature geochemistry (LTG). The synchrotron user group EnviroSync organized a workshop in Rockville, Md., to assess current capabilities at U.S. synchrotron facilities and future needs for these communities. Sponsorship was provided by the U.S. Department of Energy's Office of Basic Energy Sciences and Office of Biological and Environmental Remediation and by the U.S. National Science Foundation's Earth Sciences Directorate. The 50+ participants included academic and national laboratory researchers, beam line scientists, instrument designers, and facility directors and representatives. Program managers from funding agencies provided perspectives from Washington.

Workshop goals included prioritization of beam line development efforts within the context of planned construction (e.g., National Synchrotron Light Source II (NSLS II) and future upgrades (e.g., at the Advanced Photon Source (APS)). Directors and representatives of the eight U.S. synchrotrons provided overviews of current usage and future initiatives. Highlights included presentations of the conceptual design for the NSLS II at Brookhaven National Laboratory and the proposed upgrade at the APS at Argonne National Laboratory. Facility reports were presented by representatives from each of the U.S. synchrotrons. These reports confirmed that robust and growing usage of synchrotron facilities by the MES/LTG communities is on par with or exceeds that of many other disciplines, and argued that meeting the growing demand must be a high priority.

Five working groups were assembled to assess the current status and future prospects for synchrotron methods of most relevance for MES/LTG; these included bulk spectroscopy, hard X-ray microprobe/tomography, spectromicroscopy, bulk scattering, and surface/interface scattering. Leading practitioners highlighted new developments in ultrafast X-ray science, surface and interface analysis, and imaging/spectromicroscopy.

A major outcome of the workshop will be a comprehensive workshop report, to be posted on the EnviroSync Web page, which will inform facility directors and funding agencies of future needs in these fields and will capture important discussion topics such as the growing need for beam line support personnel and greater involvement of our community at the design stage.

The workshop agenda and presentations can be viewed on the EnviroSync Web page (http://www.envirosync.org).

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LETTERS

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In a recent *Eos* article, *Olsen and Mandea* [2007] commented on the rapid motion of the north magnetic pole (NMP) and the ability of recent magnetic field models based on satellite data to give accurate positions for the magnetic poles. The most recent local survey to determine the position of the NMP, carried out in April 2007, confirms their observations concerning the movement of the NMP and supports their thesis that reference field models can now accurately locate the magnetic poles.

We were able to observe at four locations all within approximately 100 kilometers of the estimated pole position. This small sample, plus one observation made in 2005, is sufficient to reveal that the position of the NMP on 29 April 2007 was 83.95°N, 121.02°W, with a positional uncertainty of approximately 40 kilometers (L. R. Newitt et al., manuscript in preparation, 2007). This is in close agreement with positions derived from recent spherical harmonic models that are based on satellite magnetic data. For example, the NMP position derived from the CHAOS model is within 35 kilometers of the observed position.

The new position also confirms the continued rapid motion of the NMP first noticed by *Newitt and Barton* [1996] and confirmed by *Newitt et al.* [2002]: now approximately 53 kilometers per year. While the NMP is still accelerating, there is some indication that the acceleration has moderated. *Olsen and Mandea* [2007] actually show a deceleration after 2003. The time interval between surveys is too long for us to confirm this.

Although local surveys are still useful, it appears that they are no longer essential for tracking the NMP as long as low-Earth-orbiting satellites such as Ørsted and CHAMP are providing high-precision magnetic data. These satellites are timely, since the increasingly remote location of the NMP has made such surveys logistically challenging.

References

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