Technology for Sustainability
Room 320 - Session AT-ThA

Science and Technology Related to Global Effects: Emissions, Climate, and Transport

Moderator: S. Raoux, Applied Materials

2:20pm **AT-ThA2 SeaWiFS Land and Ocean Vegetation Measurements - A Six-year Set of Climate Change Records**, ***R.A. Barnes,*** Science Applications International Corporation and SeaWiFS Project

SeaWiFS (the Sea-Viewing Wide Field-of-View Sensor) was launched in August 1997. It commenced on-orbit operations in September 1997 and continues to make images of the Earth surface at a 1 km areal resolution to this day. The SeaWiFS data set currently contains two transitions of the El Nino-Southern Oscillation (ENSO). With an electronic design that includes bi-linear gains, SeaWiFS makes measurements of both the dark ocean and the much brighter surface of the land. As a result, SeaWiFS provides the first truly global measurement set of vegetation changes from a single instrument. SeaWiFS also provides a baseline for one of the multi-decadal climate change data sets proposed by NASA. This data set includes Earth surface measurements from the MODIS (Moderate Resolution Imaging Spectroradiometer) sensors currently flying onboard the Terra and Aqua spacecraft and from the VIIRS (Visible and Infrared Imaging Radiometer Suite) instrument to be flown onboard the NPP (NPOESS Preparatory Program) spacecraft, which is currently scheduled for launch in 2007. Subsequent VIIRS instruments are planned to be flown for several decades into the future, as part of NPOESS (the National Polar-orbiting Operational Environmental Satellite System). For ocean vegetation measurements in particular, the requirements for the Climate Data Records (CDRs) include extensive calibration/validation and atmospheric correction programs, since approximately 90% of the top-of-the-atmosphere radiance measured by the satellite instruments comes from the atmosphere.

2:40pm **AT-ThA3 Environmental Transformation of Uranium-Organic Complexes: Implications for Transport and Remediation**, ***C.W. Eng,*** *G.P. Halada,* State University of New York at Stony Brook*; A.J. Francis, C.J. Dodge,* Brookhaven National Laboratory

Transportation and fate of uranium are fundamentally affected by the nature of their association with pervasive organic environmental molecular constituents resulting from natural or man-made sources. Understanding the role of organic ligands and the transformation of these complexes is essential to the development and optimization of remediation technologies. For example, u-organic complexation adversely affect the ability of certain bacteria to reduce soluble uranium (U(VI)) to a more insoluble form (U(IV)).@footnote 1@ Organic ligands can coordinate with uranium in aqueous solution and perhaps decrease the effectiveness of the ZVI. In literature, the fate of the uranium and organic ligands are not fully elucidated in these systems. Our research provides fundamental information about the structure and transformation of uranium-organic complexes through electrochemical and spectroscopic analyses. The organic ligands chosen in this study will be relatively simple molecules (e.g. salicylic acid, catechol), which are used as analogs for more complex molecules found in the environment. The objectives of this work include a) characterization of the uranium and organic ligands; b) the electrochemical behavior of u-organic complexes; c) the relative stability and mobility of the uranium-organic complexes; and d) the ultimate fate of the uranium and ligands. X-ray Photoelectron Spectroscopy , laboratory and synchrotron-based Fourier Transform Infrared analysis, and in-situ electrochemical experiments will be combined with synchrotron-based X-ray Absorption and Raman spectroscopies. The resulting structural and molecular spectroscopic data is then used to generate computational molecular models, so that molecular orbital structures of complexes can be related to both stability and reactivity of uranium-organic ligands. @FootnoteText@@footnote 1@ Biotransformation of uranium and other actinides in radioactive wastes, A.J. Francis, Journal of Alloys and Compounds (1998), 271-273, 78-84.

3:00pm **AT-ThA4 Managing Greenhouse Gas Emissions using ISO 14064 as a Quantification, Reporting and Verification Guide**, ***J.C. Shideler,*** *J.H. Schaarsmith,* Futurepast: Inc. **INVITED**

Organizations increasingly are identifying greenhouse gas emissions as significant environmental aspects of their operations and activities. Emissions may be direct, such as with the use of SF6 in manufacturing operations, or indirect, such as with the use of energy resources derived from fossil fuel sources. The increasing focus on control and reduction of greenhouse gas emissions from anthropogenic sources has stimulated the development of a management system standard -- ISO 14064 -- that provides a common template for quantification, reporting, and verification of greenhouse gas emissions data. The authors survey the US and international legal and regulatory environment pertaining to greenhouse gas emissions, and describe how ISO 14064 can help organizations develop and report data for internal management purposes or for US or international emissions reporting or trading.

3:40pm **AT-ThA6 Climate, Technology and the Energy Dimension of Sustainable Development**, ***J. Edmonds,*** *G. Stokes, J. Clark,* Pacific Northwest National Laboratory **INVITED**

The global energy system will need to evolve to provide both abundant resources at reasonable prices while simultaneously addressing environmental quality issues ranging from acid rain to mercury emissions to regional air pollution and climate change. Focusing on the goal of the UN Framework Convention on Climate Change, stabilization of greenhouse gas concentrations, we have looked into the inevitable transformation of the global energy system over the next century and beyond. These results suggest that a range of technologies, some likely permanent parts of the future energy and some transitional technologies, will be required to meet the challenge. What emerges are a variety of possible global energy technology strategies where the ability of a particular technology system to meet the cost and environmental goals of society determine the ability of the technology to compete and succeed in meeting the demand for primary energy which may well triple over the course of this century.

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