shifts in Earth system feedbacks, helping researchers to project global changes and anticipate their effects on society.

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MEETINGS

European Biospheric Network Takes Off

Opening Symposium of the TERRABITES Network; Hamburg, Germany, 9–11 February 2010

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The huge amount of recently acquired information about the functioning of the terrestrial biosphere and the ever increasing spatial resolution of Earth system models call for a new level of integrating efforts among biosphere modelers, developers of ecological theory, and data-gathering communities. Responding to this call, a new European network, Terrestrial Biosphere in the Earth System (TERRABITES), held its opening symposium in Germany.

The meeting was organized jointly with another recently founded European network, Advancing the Integrated Monitoring of Trace Gas Exchange Between Biosphere and Atmosphere (ABBA). Almost 100 scientific contributions covered the latest advances in modeling ecophysiological and biogeochemical processes; analyses of model constraints set by measurements of water and carbon dioxide (CO_2) fluxes, including carbon isotopes; and new perspectives in using remote sensing data for evaluation of global terrestrial biosphere models.

Several presentations underlined challenges in using the growing amount of ground-based ecological observations for better quantification of vegetation processes on different scales. A key talk introduced the TRY database, which currently contains more than 2.4 million plant trait records with a focus on 47 key traits such as leaf nitrogen content and litter decomposition rates. Subsequent presentations demonstrated how accounting for trait variability within plant functional types affects the behavior of dynamic global vegetation models and forest gap models. Other presenters took a more radical approach and showed how optimality analysis could predict trait values for a given set of environmental conditions and how trait values could be applied to predicting plant functional types.

Implementing fire occurrences into global biosphere and Earth system models is another challenging task. Recent results from the Spread and Intensity of Fire (SPITFIRE) model suggest that changes in wood usage for fuel by humans could alter the future trend in fire-related CO_2 emissions. Another modeling study found a weak upward trend in twentieth-century fire emissions, in contrast to previous inventory-based estimates that suggested a stronger increase in emissions. Comparison of model results with recent satellite-based products on burned area not only identified regions for model improvement but also stressed remarkable differences among various satellite products.

Presentations of the remote sensing community, organized by specialists from the European Space Agency, focused on the challenge of providing the global modeling community with reliable data. An overview talk highlighted recent advances in

multisensor and multiangular techniques that, together with the latest improvements in accurate modeling of radiative properties of vegetation, allow for the retrieval of a broad range of vegetation properties at the leaf, canopy, and stand levels. Other presentations stressed the importance of data assimilation techniques to include observational data into Earth system models.

The TERRABITES and ABBA networks, funded by the intergovernmental framework for European Cooperation in Science and Technology (COST), plan to continue to organize symposia and workshops for the next 4 years. Scientists from North America as well as other parts of the globe are welcome to take part in these meetings to ensure international cooperation. More information is available at the network Web sites http://www.terrabites.net and http://www.ileaps.org/multisites/cost0804.

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Facilitating Progress on the Quaternary History of Sea Level Change

Understanding Future Sea Level Rise: The Challenges of Dating Past Interglacials; Woods Hole, Massachusetts, 20–25 September 2009

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Substantial uncertainty exists in projections of future sea level rise, due primarily to a lack of understanding about ice sheet dynamics. Paleo Constraints on Sea Level Rise (PALSEA) is a working group of the Past Global Changes (PAGES) project and the International Marine Global Change Studies (IMAGES) program that aims to extract information about ice sheet response to temperature change by examining the history of sea level over the Quaternary (spanning the past ~2.5 million years). In particular, PALSEA focuses on the past 800,000 years, particularly interglacial periods, with a range of temperatures bracketing the modern.

PALSEA recently held a workshop at Woods Hole Oceanographic Institution (WHOI). Funded by IMAGES, PAGES, and WHOI's Ocean and Climate Change Institute, the workshop focused on challenges in uranium-thorium (U-Th) coral dating. The meeting also included a public outreach event, "Where land and sea meet: Managing shoreline change over the next 100 years," funded by WHOI's Morss Colloquium.

Discussion at the workshop encompassed three themes. The first theme covered technical issues in U-Th mass spectrometry. As new developments in mass spectrometry continue to improve analytical precision, ensuring comparability of ages reported by different labs becomes crucial. Ideally, all measurements should be traceable to the same set of reference standards. Unfortunately, internationally recognized standards are not currently available. The consensus at the PALSEA workshop was that the time is ripe for the development of such standards, and a strategy for their production and distribution is under way, drawing on the experiences of EARTHTIME, an international initiative aimed at integrating high-precision geochronology and quantitative chronostratigraphy (http://www.earth-time.org).

The meeting included an informal U-Th dating interlab comparison involving 14 labs. Aliquots of mineral solutions (aragonite, uraninite) and powder (carbonate) were distributed and measured. The insight gained from this exercise was very useful, and a more comprehensive intercomparison is being planned.

Another theme covered was the open-system behavior of U-series nuclides. The impact of open-system behavior on age quality is well known, yet best practices for sample screening and age correction are still keenly debated. PALSEA workshop participants considered these key points: (1) Multiple replicates are crucial for establishing the uncertainty associated with sample heterogeneity; (2) stratigraphic consistency is useful for evaluating ages, and publications should include more stratigraphic detail; and (3) uniform initial $^{234}U/^{238}U$ criteria should be adopted for quality assurance and correction methods.

The third theme discussed was the development of a Quaternary sea level database. Relative sea level histories permit the reconstruction of former ice sheets, a fundamental boundary condition for modeling past climate. PALSEA suggests the following ice sheet guidelines for the Paleoclimate Modelling Intercomparison Project (PMIP): (1) Alternative ice sheet boundary conditions, generated by independent glacial isostatic adjustment (GIA) models, must be considered. (2) An existing database (see A. S. Dyke et al., *Quat. Sci. Rev., 21,* 9–31, 2002) that uses evidence of ice sheet extent should be used. (3) GIA models use different relative sea level databases, many with inconsistent or outdated reconstructions. To address this problem, PALSEA will develop an open-access, quality-controlled, and self-consistent database of relative sea level for use in isostatic models.

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