ishing the net C sink or converting a peatland to a net C source.

Two challenges emerged from the meeting: (1) effective upscaling of CO_2 and CH_4 emissions from plots and sites to regional and global scales, and (2) integrating peatlands into coupled carbon-climate modeling efforts. Most of the land surface schemes of global climate models that include a formal representation of the C cycle do not include a realistic representation of organic peatland soils. A few groups are working on this integration, but closer collaborations are needed between peatland researchers and the carbon-climate community. This integration needs to link peatland CO_2 and CH_4 cycling with ecohydrology, changing temperature regimes, changing atmospheric N deposition, ongoing permafrost melt, and fire impacts, the effects of which may differ among peatland types. Future workshops will help achieve such integration. The organizers envision a Second International Symposium on Carbon in Peatlands, in 2009 or 2010.

For more information, see the symposium Web site at http://www.peatnet.siu.edu/CC07MainPage.html.

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Sahel Climate Change

Workshop on Sahel Climate Change, Columbia University, New York, 19–21 March 2007

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The Sahel transition to persistent drought in the early 1970s is an archetypal example of recent abrupt climate change. This workshop assessed the mechanisms for variability at interannual and interdecadal timescales, and discussed mechanisms of future climate change and sources of model disagreement. Participating scientists brought a diverse range of expertise: mesoscale and paleo observationalists; atmospheric dynamicists; dust and vegetation modelers.

There was strong agreement that the main driver of the Sahel drought was sea surface temperature (SST) variations and not land use or cover changes associated with human activity. This conclusion stems from general circulation model studies reporting successful simulations of multidecadal Sahel rainfall variations given the long-term history of observed SST. Attribution is uncertain, as possible ultimate causes of SST and rainfall variability include anthropogenic forcing by greenhouse gases and aerosols, variations to the Atlantic meridional overturning circulation, and dust forcing from the Sahara. Specific atmospheric mechanisms connecting SST anomalies to the Sahel region remain uncertain, as do the relative roles of the Indo-Pacific warming and North Atlantic SST anomalies. Atmospheric changes from aerosols may directly influence Sahel rainfall without mediation from SST.

Simple extrapolation of twentieth-century SST-Sahel rainfall relationships to 21st-century Sahel rainfall changes is unlikely to work, because of nonlinear interactions with the basic state. Other remote influences might become more relevant, in particular, those resulting from convection changes in neighboring South America and equatorial Africa. Different model sensitivities to the direct radiative effect of carbon dioxide and to land/atmosphere and cloud/radiative feedbacks can amplify or reduce ocean-forced precipitation changes. If these feedbacks are crucial, a correct representation of mesoscale convective systems and African easterly waves and the diurnal cycle may be essential.

There is urgent need for a more authoritative attribution of twentieth-century Sahel drought. Attribution studies with standard methodologies are readily performed using the latest Coupled Model Intercomparison Project (CMIP) archive and uncoupled atmospheric simulations of the Climate of the 20th Century International Project (C20C) and the Global Land-Atmosphere Coupling Experiment (GLACE), if these can be supplemented with complementary coupled simulations from some major modeling groups with individual forcing agents. These attribution studies face difficulty since estimates of natural variability in these models are suspect, given the difficulty of simulating droughts of the Sahel's magnitude.

To address variability among different models, a suite of idealized atmospheric general circulation model experiments exploring regional SST, aerosol, or tropospheric warming influences with multiple models as well as multiple configurations (fixed SST or slab ocean; interactive or fixed vegetation) are recommended.

New dynamical insights arising from the African Monsoon Multidisciplinary Analyses (AMMA) effort could shed light. Finally, more paleoclimate information is needed to determine whether the Sahel is sensitive to abrupt climate changes in the North Atlantic, as suggested by model studies, and also by the Indian monsoon analog.

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