

Final Report
Synthesis of Transient Climate Evolution of the Last 21-kyr (SynTraCE-21)
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**SynTraCE-21k Workshop
Mount Hood, Oregon, 10-13 October 2010**

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Climate evolution in the last 21,000 years provides critical observations for testing state-of-the-art climate models on the simulation of climate evolution and abrupt climate changes. Proxy evidences and new modeling activities have led to rapid advances in our understanding of climate change for this past time period. A new PAGES working group, SynTraCE-21k, was initiated in 2009 to synthesize the transient climate evolution of the last 21-kyr. The overarching goals of the working group and the associated workshop series are (i) to facilitate an international effort at a comprehensive synthesis of proxy climate records in order to better describe the major features of global climate evolution of the last 21 kyr, and (ii) to conduct data comparison to transient model simulations. The first international SynTraCE-21k workshop has been held at Mount Hood, Oregon from 10-13 October, 2010. More than 40 participants from around the world with expertise from terrestrial and marine proxies to climate modeling attended this recent workshop sponsored by PAGES, NOAA, and the Department of Energy.

Two pilot workshops were previously held with the support from the US NSF, NOAA, and NCAR. The first held in Madison, Wisconsin in August 2008, focused on marine records, while the second in Boulder, Colorado in August 2009, focused on terrestrial records. After a review of these past two workshops, the first day started with an update of the meltwater history, which is the most uncertain component of climate forcing in the last deglaciation. The rest of the day was devoted to preliminary model-data comparisons in three models, two coupled general circulation models (CCSM3 by UW-Madison and NCAR, and HadCM3 by Univ. Bristol) and a climate model of intermediate complexity (ECBilt, Univ. Hawaii). These transient simulations mark a new era beyond the “snapshot” studies on “time-slice” climate in paleoclimate model-data comparison because they allow for a direct comparison of time series between the model and data. The studies presented ranged from the evolution of monsoons and global surface climate to regional abyssal circulation variability, showing the great potential of these transient simulations for model-data comparison.

Transient simulations provide an unprecedented opportunity to the paleoclimate community for model/data comparison and for improved understanding of climate evolution and abrupt climate change. As a result, it has become critical to develop a major data synthesis to better characterize the global climate evolution and to compare with the new generation of transient model simulations. The second day focused on the

terrestrial proxies, with synthesis discussions of each of the major proxies: lake records, pollen, fire-charcoal, ice core and cave records. A special session was also arranged around discussing several model-data comparison strategies, including both forward and inverse modeling. The third day was devoted to marine proxies. Reconstructing the character of the deep and intermediate waters with the major proxies of radiocarbon, sedimentological records, radiogenic isotopes and other stable isotopes were described. The meeting then discussed surface ocean proxies, both sea surface temperatures and sea surface salinities. Each day ended with a discussion of the major issues of the day.

The presentation along each major proxy provided a great learning opportunity to all the participants, greatly promoting the interdisciplinary approach towards a multi-proxy data synthesis. To examine model robustness, the meeting also recommended coordinated modeling activities among different groups. To better assess model-model difference and climate sensitivities to external forcing, notably the meltwater forcing, while allowing for flexibility for such long simulations, one strategy proposed was to design a few common standard sensitivity experiments for different models. Finally, given the large amount of model data, a coordinated data distribution was also discussed. The workshop participants agreed that the next meeting be held in the fall of 2011. This workshop will focus on several key topics using an interdisciplinary synthesis approach. Notably, the topics include the meltwater history and sea level reconstructions for the deglaciation, climate and terrestrial ecosystem in the North America region, and tropical hydrology.



Publications

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