Climate Models in Deep Time Require Tight Temporal and Latitudinal Constraints: The Colorado Plateau as a Case in Point

(Add to My Sessions)

Date: Monday, June 8

Time: 8:25 am - 8:45 am

Location: 102/104/106

Speakers: Olsen, Paul, Kent, Dennis V., Olsen, Paul E.

Track: Grand Challenges that Limit Our Ability to Understand Paleoclimate and Paleoceanography in Deep Time

Description: The last few decades have seen increasing comparisons between numerical climate models and deep-time geological data to inform both the validity of the models and the processes responsible for the geological patterns. However, as the models have become increasingly sophisticated, the tacit assumption that the geological data have appropriate temporal and geographic constraints is often unsupported. Early Mesozoic strata of the Colorado Plateau and environs provide an excellent case in point illustrating the substantial geochronological and paleogeographic challenges and opportunities for paleoclimate research. These classic continental and paralic Triassic-Jurassic strata show profound changes in climate sensitive facies, yet most of the strata still have temporal constraints no better than 5 or 10 million years and direct paleolatitudinal constraints no better than 20°. Because the early Mesozoic was a time when North America witnessed fast plate motion, the poor paleogeographic age registry makes conclusions of model data comparisons highly questionable. For example, the aridification seen in the upward transition from Chinle to Glen Canyon has been ascribed to climate change related to the deterioration of a Pangean mega-monsoon or global climate change when it could just as well be due to the northward drift of that part of central Pangea from humid to more arid climate belts. Likewise, based on model-data comparison, it has recently been proposed (1) that the giant sand sea represented by the Navajo Sandstone was deposited in equatorial latitudes, in stark contrast with the northward drift implied by putatively coeval strata of eastern North America (2). Moreover, age constraints on are often woefully inadequate for global comparisons of climatically relevant data as demonstrated by the 10 Myr mismatch between biostratigraphic age estimates of the lower Chile Group and new U-Pb dates (3). A new approach that augments traditional fieldwork is necessary: the acquisition and analysis of continuous oriented core spanning optimal sequences through the entire Early Mesozoic. This strategy has been proposed in the Colorado Plateau Coring Project and would result in a transformative improvement in paleoclimate resolution and understanding. References: 1, Rowe, CM. et al. 2008: Science 318:1284; 2, Kent DV & Tauxe L. 2005, Science 307:240; Mundil R & Irmis R. 2008, IUGS abstracts Oslo 2008 (http://www.cprm.gov.br/33IGC/1342538.html).

Speakers

Olsen, Paul

Kent, Dennis V.