

The evolving landscape of U-series sea level chronologies

ANDREA DUTTON

Department of Geological Sciences, University of Florida,
Gainesville, FL 32611, USA (*correspondence:
adutton@ufl.edu)

Several factors have contributed to the recent movement within the U-series dating community to promote more consistent practices that will ultimately produce more robust chronologies both within and between individual laboratories. First, instrumental and methodological advances have greatly increased the precision of the U-series technique. One consequence of this improved analytical capability is the amplification of the impact of interlaboratory differences in standardization techniques. Second, publication of revised decay constants for ^{230}Th and ^{234}U as well as inconsistent adoption of these constants across the community have led to issues in the appropriate comparison to and conversion of legacy data. This becomes a problem when new data are contextualized with regional or global datasets generated with different decay constants, and requires the availability of raw data and standardization procedures that have not always been routinely published. Third, there has been an increasing demand for more precise constraints on both the absolute and relative timing of past sea level changes to provide empirical constraints on future sea level behavior. This pressure comes from both within and beyond the scientific community, and routinely encourages scientists to push their interpretations to the very limits prescribed by the data.

All of these issues play into the ongoing debate about the appropriate identification, interpretation, and handling of data from corals that have been compromised by open-system behavior. It is increasingly apparent that modeled open-system ages versus screened closed-system ages lead to notable discrepancies in chronologies of past sea level change. This debate is compounded by the recognition that uranium isotope ($^{234}\text{U}/^{238}\text{U}$) ratios of seawater may have varied significantly over the last glacial cycle. Understanding this variability, and its cause, are critical to both the modeled open-system and closed-system approaches to building chronologies of sea level change.

These considerations will be addressed in the context of amalgamating and integrating disparate datasets of sea level change during the last interglacial. This analysis provides impetus to establish more consistency in the analysis, reporting, and treatment of U-series data that will pave the way to advancing our understanding of ice sheet dynamics.

Multiscale modeling of ionic transport in charged clays

M. DUVAİL^{1,2*}, D. COELHO², S. BÉKRI³ AND B. ROTENBERG¹

¹CNRS and UPMC-Paris6, Laboratoire PECSA UMR 7195, 4 place Jussieu, F-75005 Paris, France

(*correspondence: magali.duvail@upmc.fr)

²Andra, 1 – 7 rue Jean Monnet, F-92298 Châtenay-Malabry, France

³IFP Energies nouvelles, 1 et 4 avenue du Bois-Préau, F-92852 Reuil-Malmaison, France

Modeling the solute transport through a pore network in clays is a crucial issue in better understanding its macroscopic transfer processes. Indeed, although the microscopic (sub-nanometer scale) and macroscopic (multi-microns scale) transport properties in such materials are now well known, a lack remains between these two scales.

This study aims at developing a model representing as accurately as possible the main macroscopic properties of a clay sample. In our model, the material is represented by a pore network in which each pore is connected to an other by a channel.

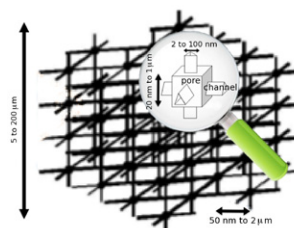


Figure 1: Zoom on an unit cell of the Pore Network Model lattice.

A Lattice-Electrokinetics scheme [1,2] is used to model the microscopic transport properties through the interporal channels (nm scale). Then macroscopic properties (μm scale) are calculated from the microscopic ones using a Pore Network Model (PNM) [3]. Indeed, the calculation of the macroscopic transport properties through a pore and channel network using PNM requires a good understanding of the microscopic ion transport processes (at the channel scale), that depend on the pore and channel properties. Thus, the key question we address here is “How do the transport properties depend on these pore and channel properties?”

[1] B. Rotenberg *et al.* (2008) *Europhysics Letters* **83**, 34004-6. [2] B. Rotenberg *et al.* (2010) *Faraday Discussions* **144**, 223-243. [3] S. Bekri *et al.* (2002) *Developments in Water Science* **47**, 1115-1122.