$\delta^{13}C$ of opal-bound organic matter and opal B content in fossil diatoms of different sizes and geometries

*L.M. MEJIA[1], L. ABREVAYA[1], A. MÉNDEZ-VICENTE[1], C. BOLTON[1] AND H. STOLL[1]

[1]Universidad Oviedo, C/ Arias de Velasco s/n, 33005 Oviedo, Spain. *correspondence: [luzmamera2@yahoo.com]

Diatom cell geometry and size limit CO_2 availability by diffusion, which has been shown to be an important factor, together with growth rate, in controlling $\delta^{13}C$ and ε_p. Large centric diatoms (CD) may be more sensitive to CO_2 limitation and use a higher proportion of HCO_3^- for photosynthesis at low [CO_2]. Consequently, bulk diatom $\delta^{13}C$ may differ from that of diatoms with different geometries and/or sizes, whose ε_p may depend on form/size-specific adaptations to variable atmospheric [CO_2].

Diatoms from sediments in the Eastern Equatorial Pacific (EEP) over the last ~13 Ma were separated into pennate (PD) and different size fractions of centric (20-41, 41-70, 70-100 and 100-150 μm) diatoms by microfiltration, centrifugation and/or settling. Diatoms were cleaned to remove clays and external organic matter. $\delta^{13}C$ was measured in small samples (typically 500-1000 μg) using a NanoEA-IRMS and foraminiferal (*Globigerinoides sacculifer* and *Neogloboquadrina dutertrei*) $\delta^{13}C$ values were used to calculate diatom ε_p.

Radiolaria contamination was significant in the > 70 μm fraction and its $\delta^{13}C$ values were used to correct $\delta^{13}C$ of the more pure 41-70 μm CD. Different approaches to correct $\delta^{13}C$ from PD, either using the corrected $\delta^{13}C$ from 41-70 μm CD or $\delta^{13}C$ from 20-41 μm CD produced similar PD trends.

Overal, PD were found to have ε_p several permil higher than CD. Whereas ε_p in CD is nearly invariant, PD show a significant temporal evolution in ε_p. PD may be more sensitive to CO_{2aq} variations due o their comparatively higher surface area to volume ratio (1.0 for PD vs. 0.3 for smallest CD measured). Efficient carbon concentration mechanisms may have already been in operation in the 41-150 μm CD by ~13 Ma and therefore, size does not appear to impose a primary control on CO_2 supply for these cells.

Since B content of diatom opal has been reported to potenially record the extent of active HCO_3^- uptake in cultured diatoms, B being positively correlated with pH and active HCO_3^- uptake [1], we present preliminary [B] in EEP fossil diatoms, which may give an insight into HCO_3^- uptake for photosynthesis under variable [CO_2].

[1] Mejía, Isensee, Méndez-Vicente, Pisonero, Shimizu, González, Monteleone & Stoll (2013), *GCA* **123**, 322-337