Ocean and estuarine chemistry: Modern dynamics and paleotracers

Ann Russell

Department of Earth & Planetary Sciences
Collaborators, postdocs, and students

- Tessa Hill
- Brian Gaylord
- Eric Sanford
- Michael Kennedy
- Jennifer Fehrenbacher
- Barbel Hoenisch, LDEO
- Steve Eggins, ANU
- Howie Spero
- Kate Davis
- Ted Grosholz
- John Largier
- Adina Paytan, UCSC
- Alex Gagnon, UW
- Steve Doo
- Edward Chu
Research foci

• Developing geochemical tools for reconstructing past ocean parameters (temperature, salinity, pH, upwelling strength)

• Understanding the controls and time scales over which modern ocean and estuarine chemistry varies
Developing geochemical tools for reconstructing past ocean parameters: U/Ca as pH proxy
Relating shell geochemistry to ocean conditions: experiments with living forams

~500 um across

Juvenile *O. universa*

*G. bulloides*

*Photos courtesy of H. Spero; movie by S. Doo*
Developing geochemical tools for reconstructing past ocean parameters: U/Ca as pH proxy
Current research focuses on non-spinose forams

Tessa Hill, Jenn Fehrenbacher, Kate Davis, Edward Chu

J. Fehrenbacher & K. Davis deploy plankton net off Catalina Island, August 2014

K. Davis off Bodega, January 2014

E. Chu & T. Bergamaschi examine CTD data off Catalina, Aug 2014
Developing Mg/Ca as paleothermometer for thermocline reconstructions

*N. dutertrei* with Artemia nauplius

$^{87}$Sr label in culture water allows us to identify calcite grown under culture conditions – *even when no new chamber forms*. 
Other research

• Using coupled radiocarbon in charcoal and mussel calcite from archaeological middens to reconstruct changes in upwelling intensity (Kennedy, Betttinger)

• Examining scales of intertidal pH variability along the Oregon-California coast (Hill, Gaylord, Sanford)

• Teasing apart the relative contributions of terrestrial versus marine influences on estuarine acidification in Tomales Bay (Grosholz, Largier, Hill)
Catalina 2014 crew celebrates the end of a successful culture season

Let’s talk!