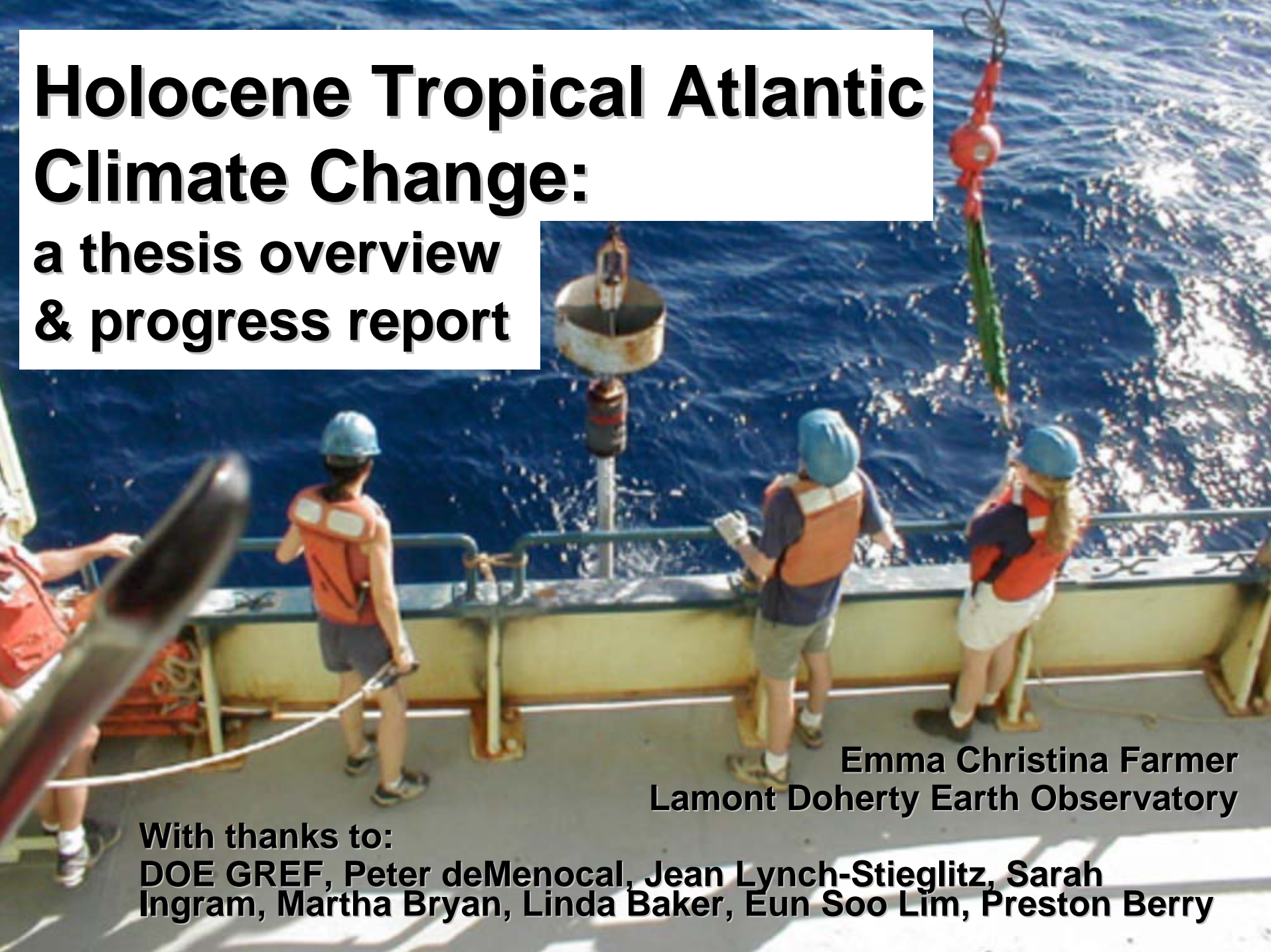


Holocene Tropical Atlantic Climate Change: a thesis overview & progress report

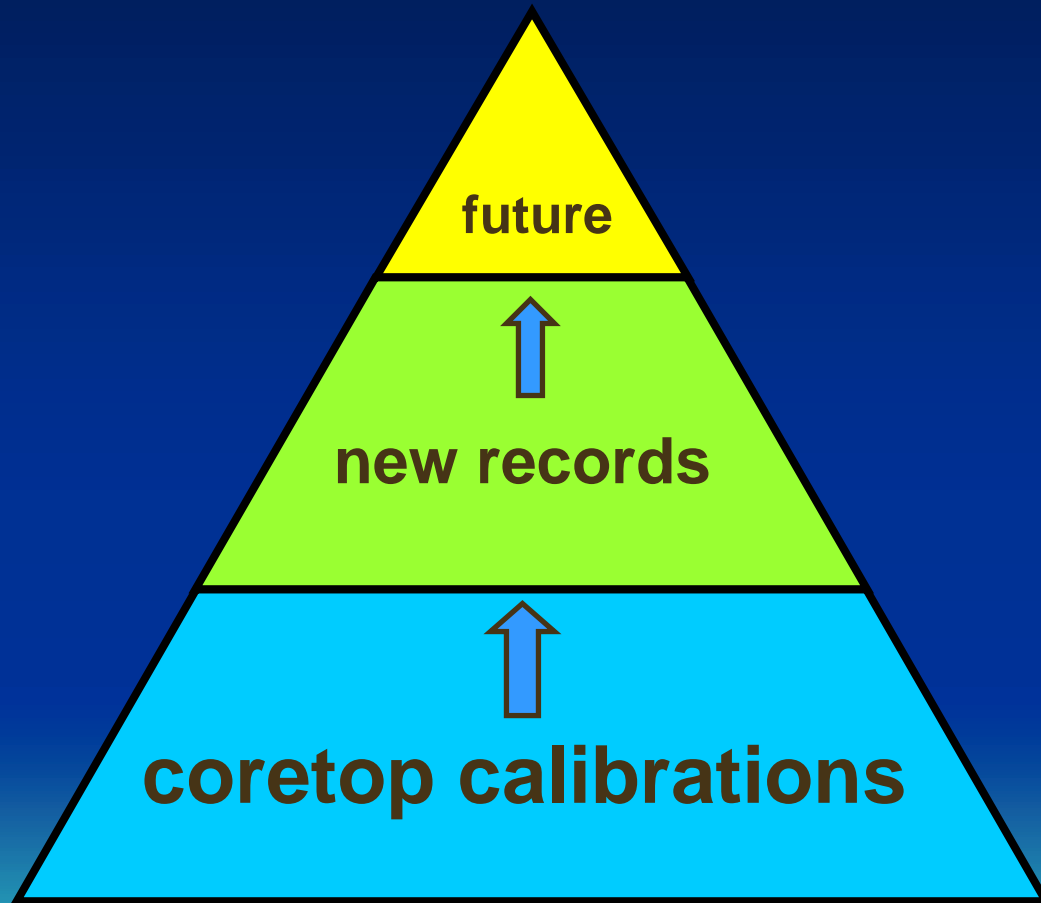


**Emma Christina Farmer
Lamont Doherty Earth Observatory**

With thanks to:

**DOE GREF, Peter deMenocal, Jean Lynch-Stieglitz, Sarah
Ingram, Martha Bryan, Linda Baker, Eun Soo Lim, Preston Berry**

Structure of today's talk:

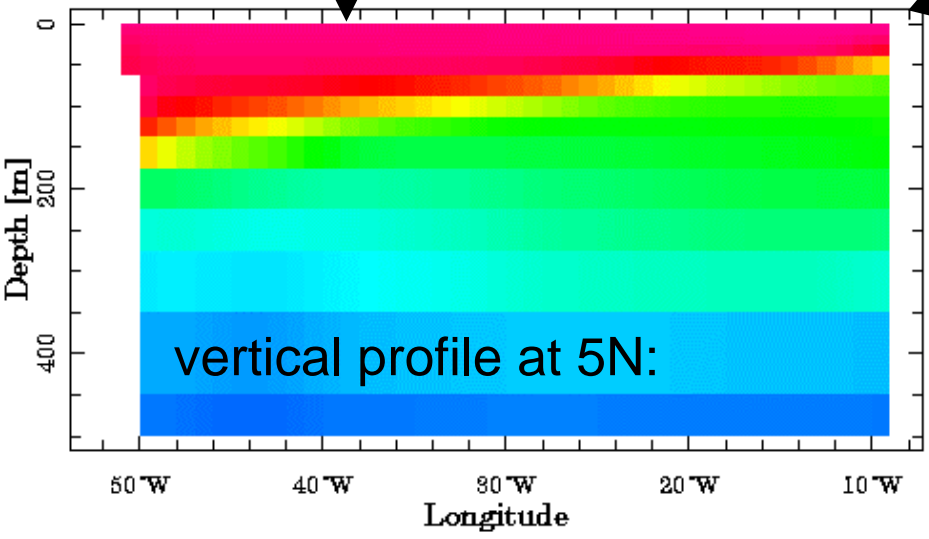
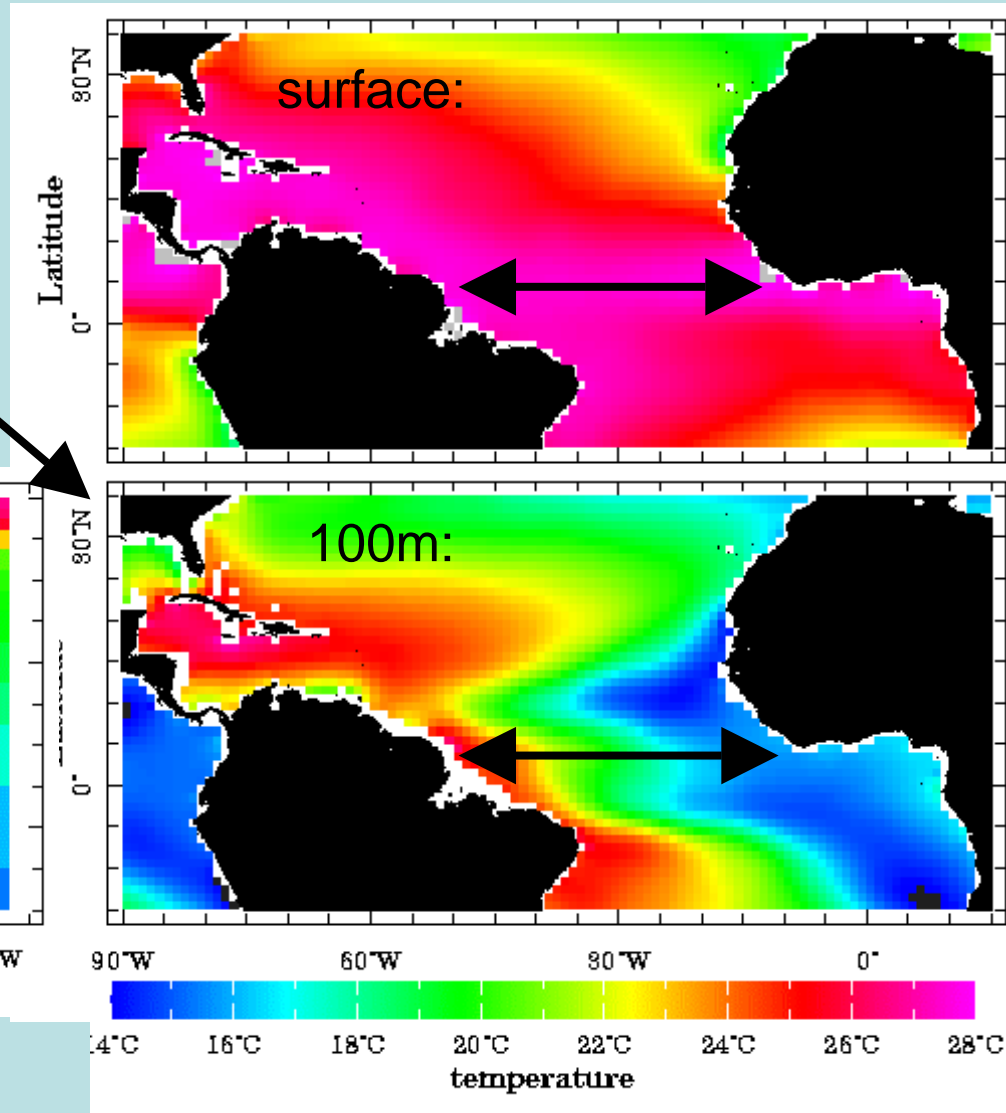


} career workshop!

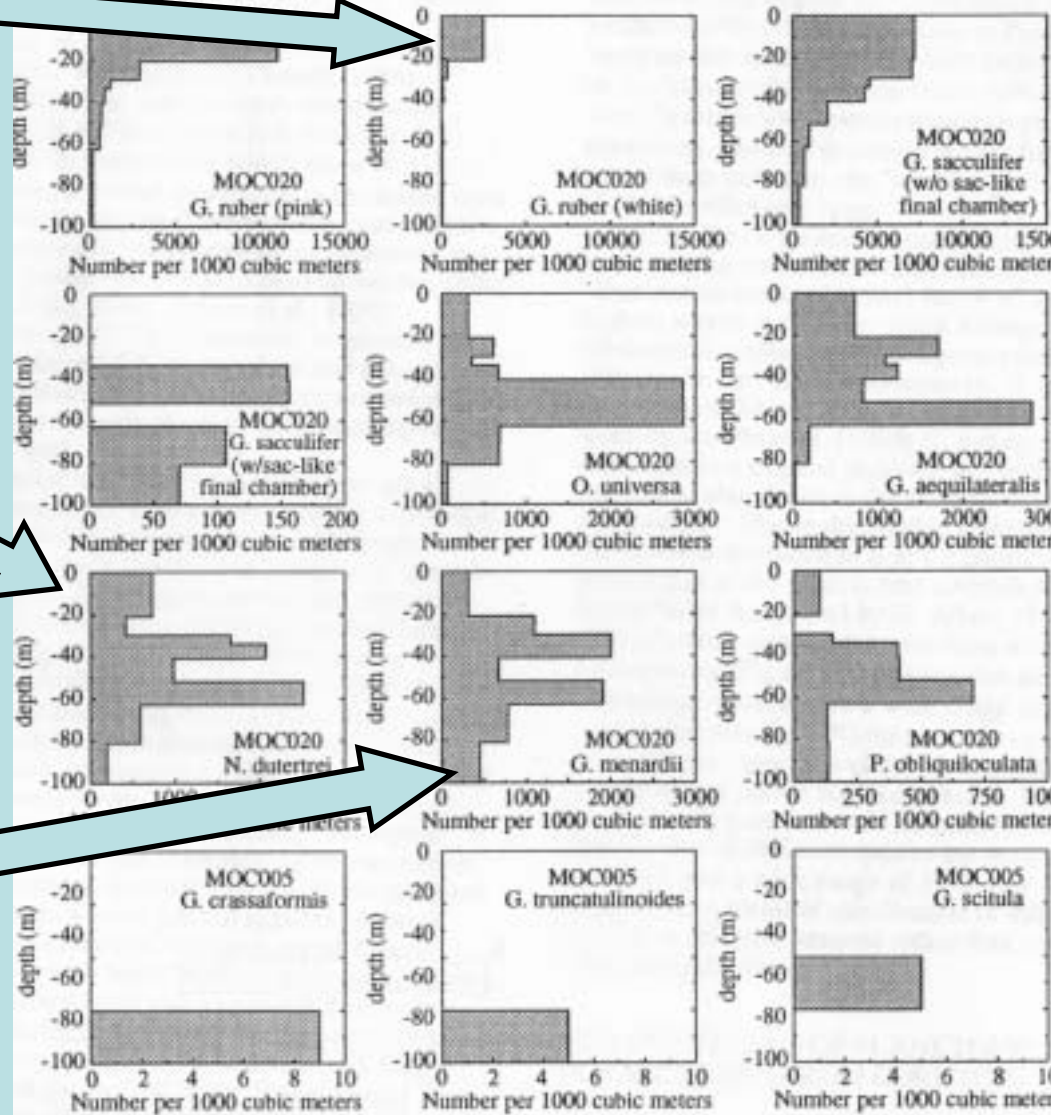
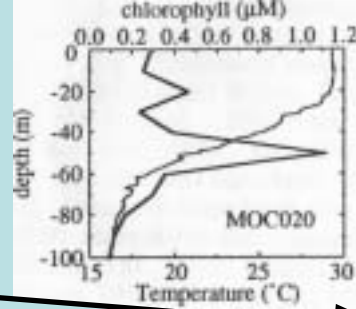
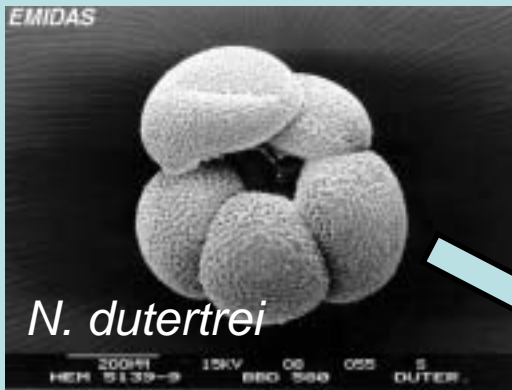
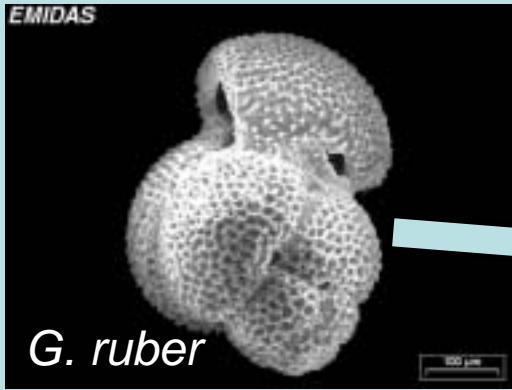
} my dissertation:
tropical Atlantic
paleoclimate

Tropical Atlantic ocean temperatures:

- large horizontal
- & vertical gradients

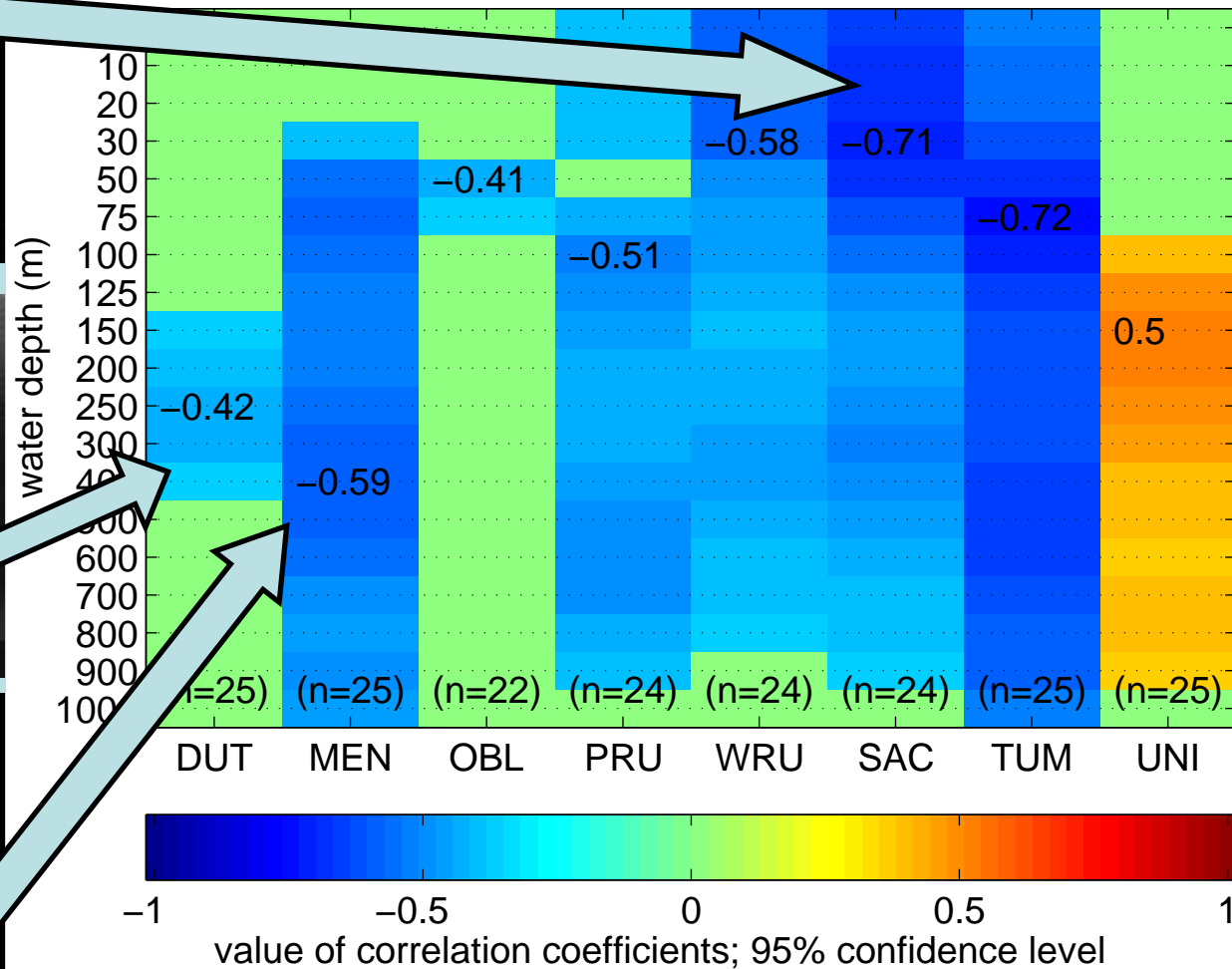
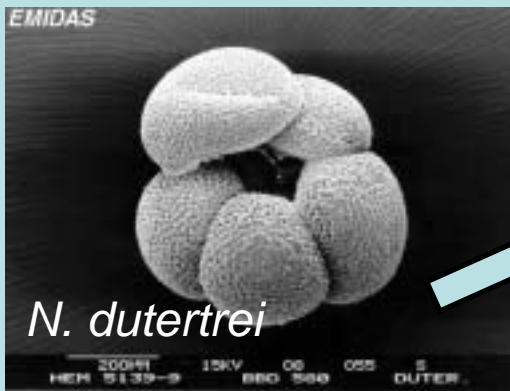
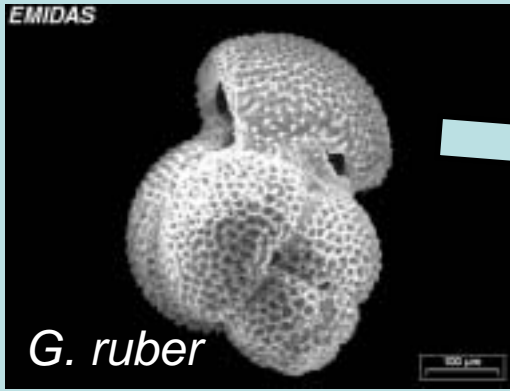


Plankton net tow data:



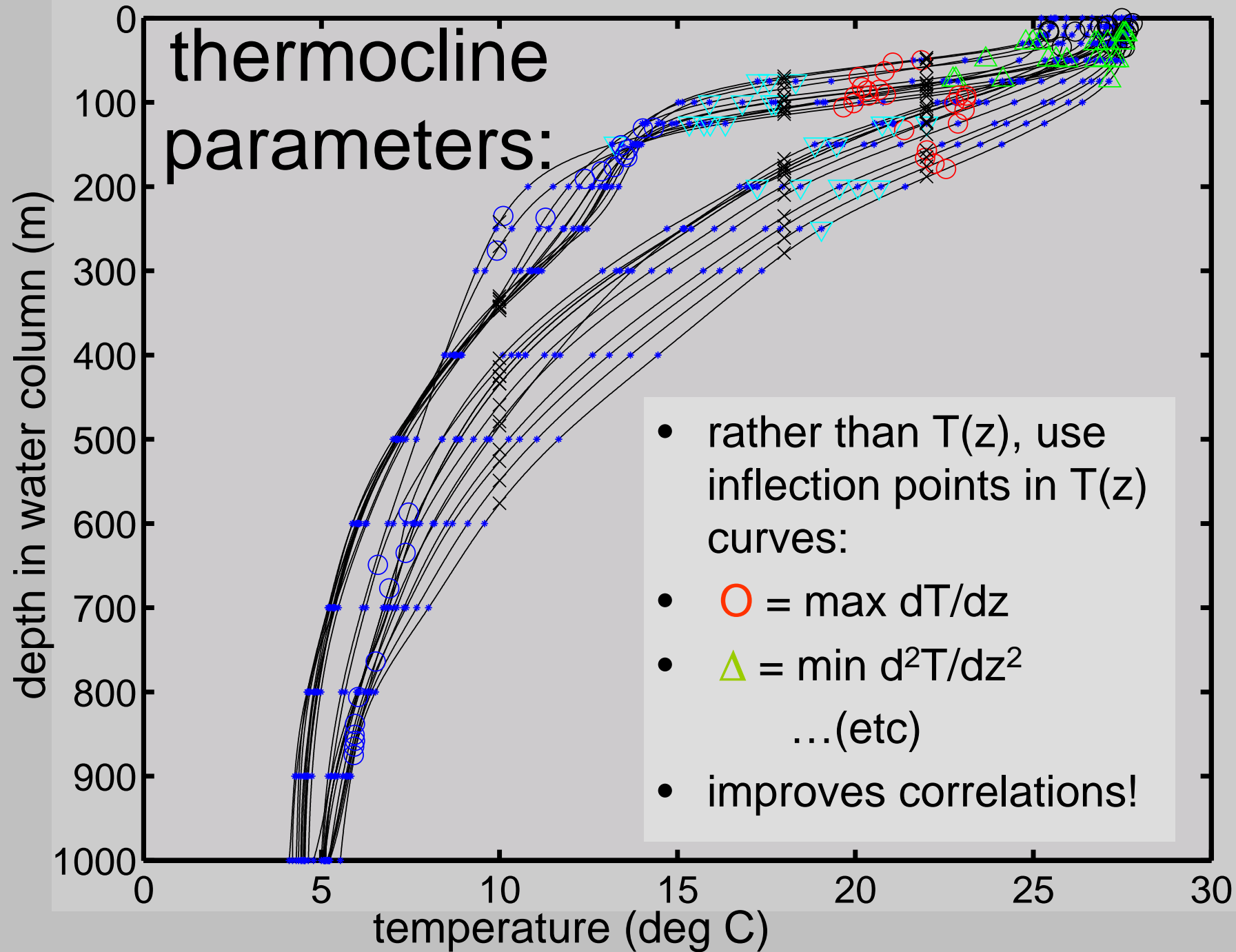
(Ravelo & Fairbanks 1992)

Colorized table of correlation coefficients: temperature at each water depth vs. $\delta^{18}\text{O}$ of each species



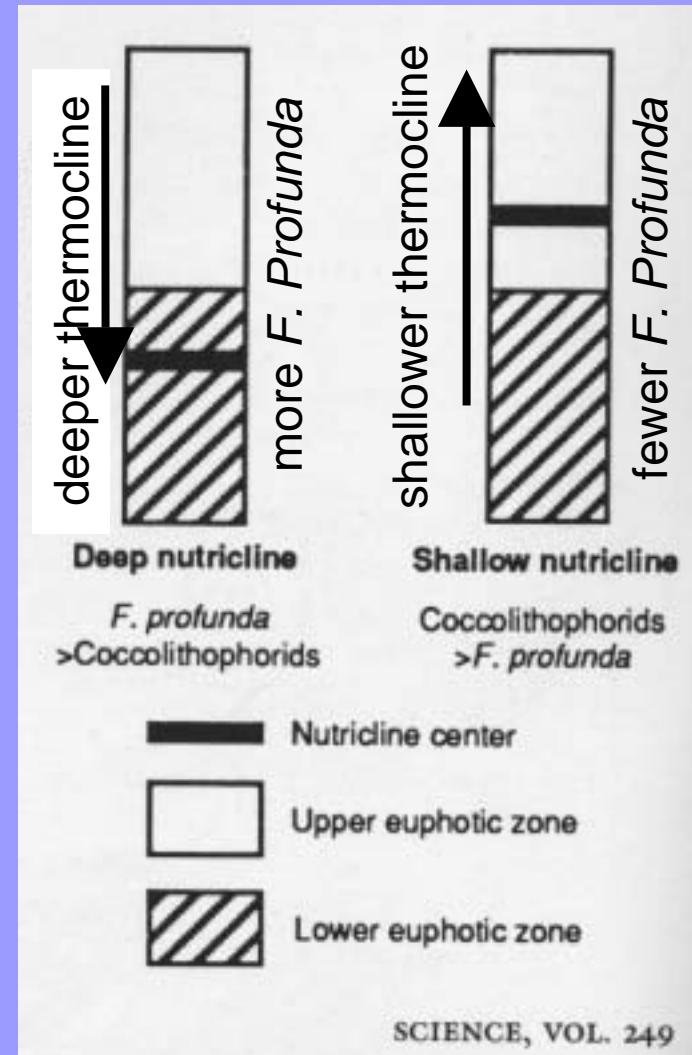
DUT = *N. dutertrei*
 MEN = *G. menardii*
 OBL = *P. obliquilocuta*
 PRU = *G. ruber*
 (pink variety)

WRU = *G. ruber* (white variety)
 SAC = *G. sacculifer*
 (without final chamber)
 TUM = *N. tumida*
 UNI = *O. universa*



Equatorial Atlantic thermocline depth proxy:

Stronger wind-driven divergence means more upwelling, a shallower thermocline and nutricline, and relatively fewer *Florisphaera profunda*

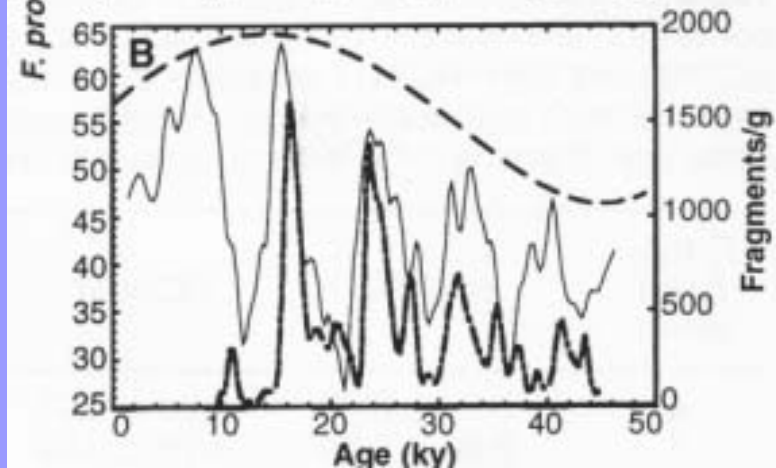
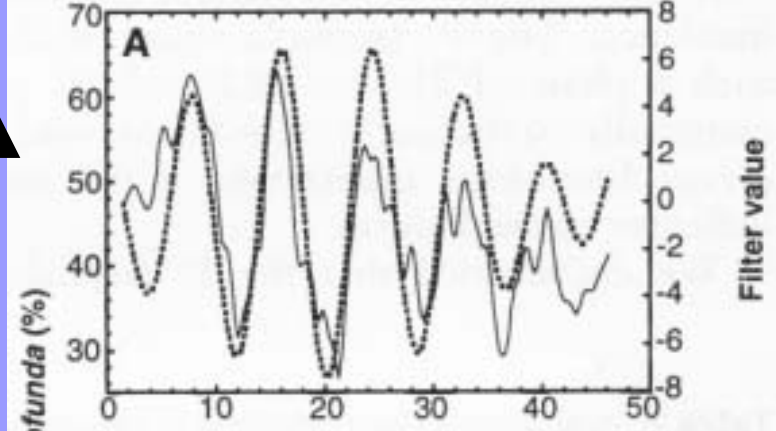
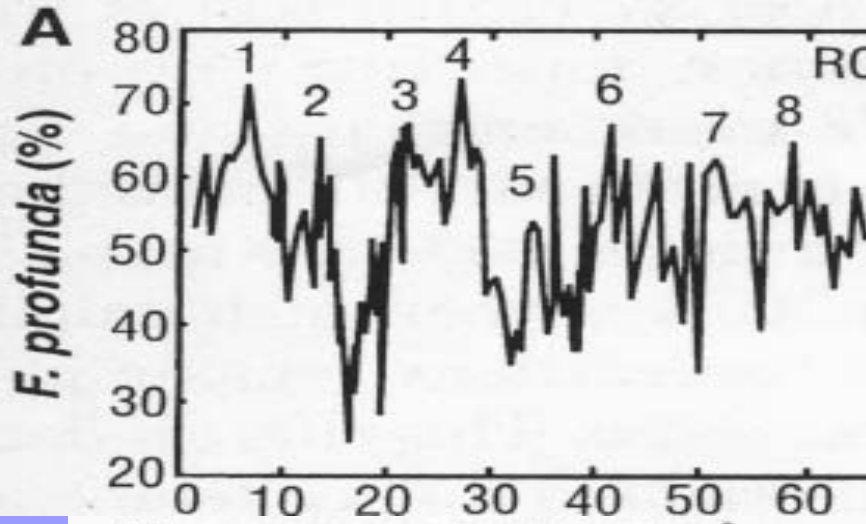


(Molfino & McIntyre 1990)

Changes in tropical Atlantic wind strength influenced by precession:

- precession has a period of ~21,000 years
- what about shorter cycles?
- *F. profunda* is a pain in the \$@#! to measure...

weaker trade winds,
deeper thermocline

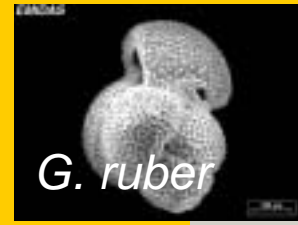
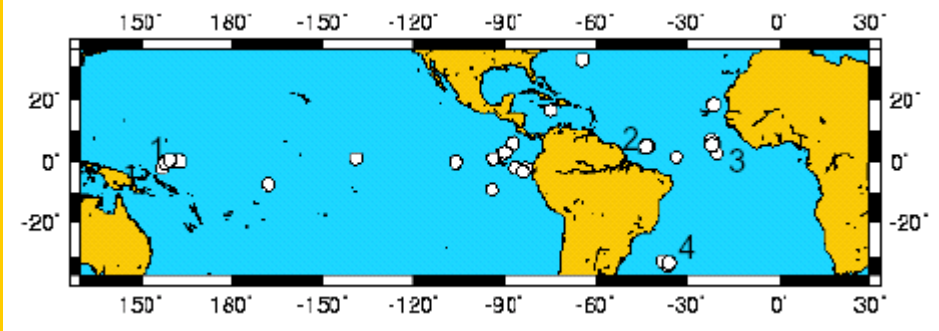


Why Mg/Ca should be better:

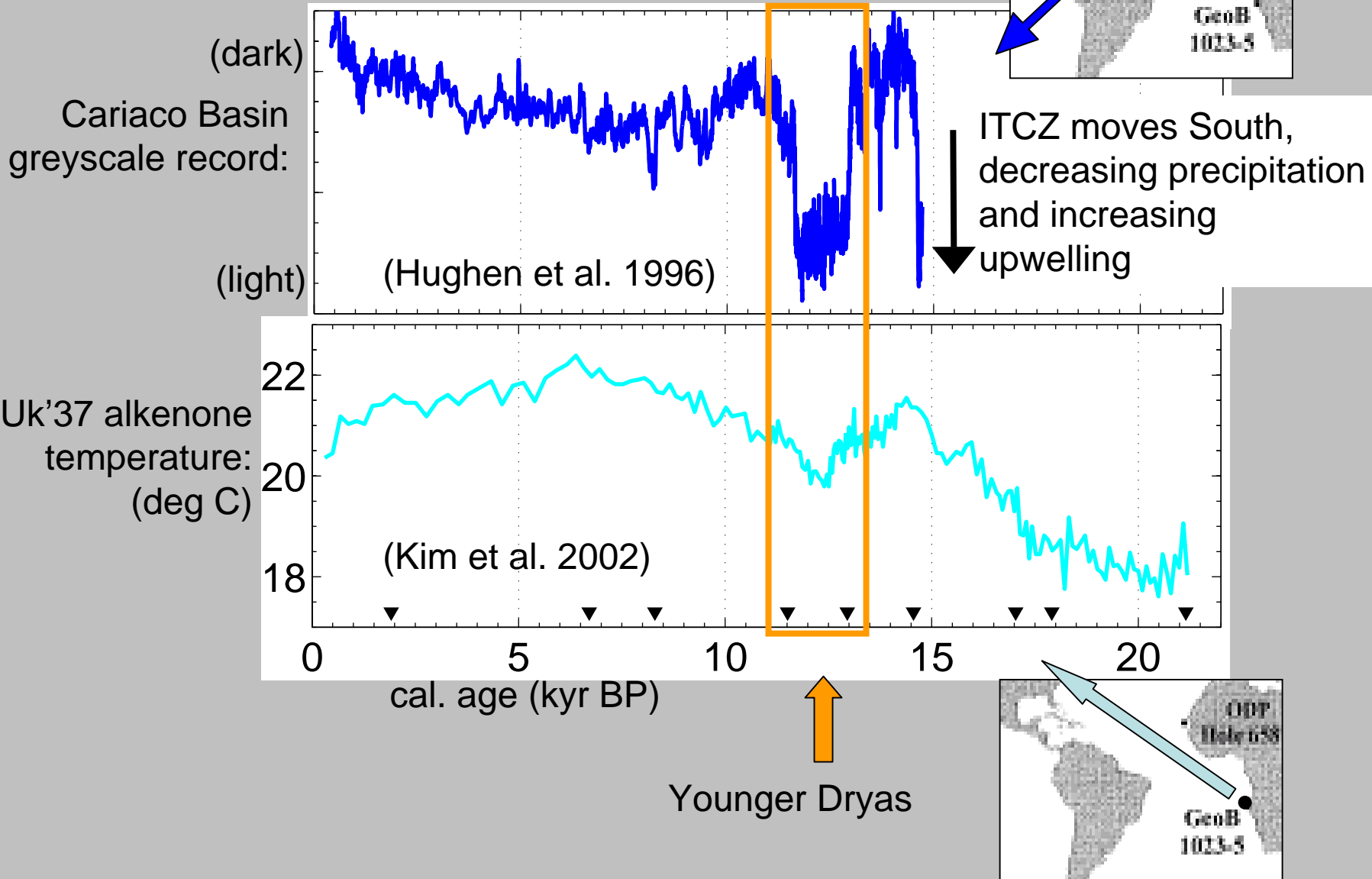
- R^2 of my oxygen isotope correlations:
- Dekens 2002 R^2 of Mg/Ca vs. temperature:
in multi-ocean calibration!

<i>G. ruber</i>	<i>G. sacc</i>	<i>N. duter</i>
0.34	0.50	0.18

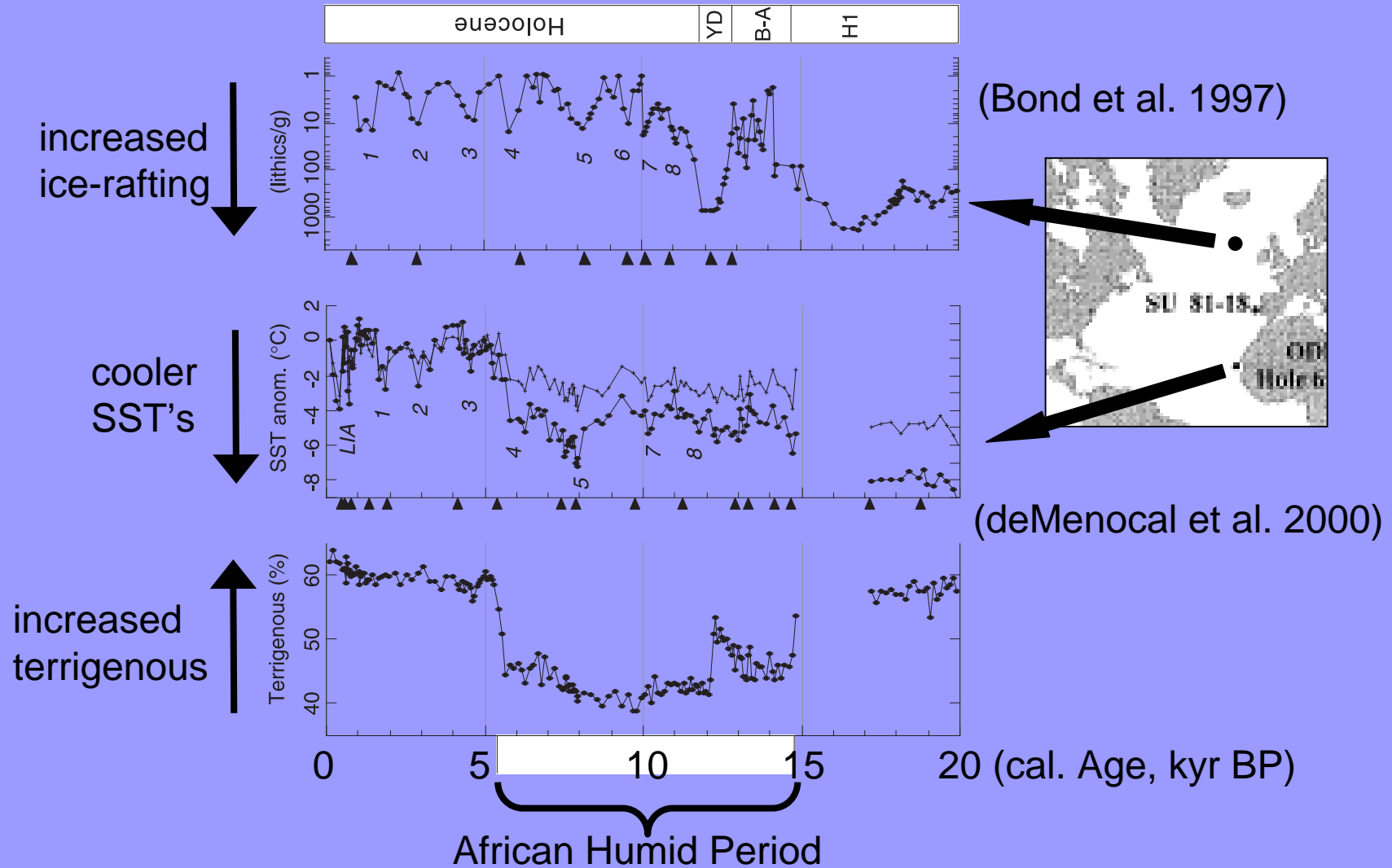
<i>G. ruber</i>	<i>G. sacc</i>	<i>N. duter</i>
0.70	0.67	0.59



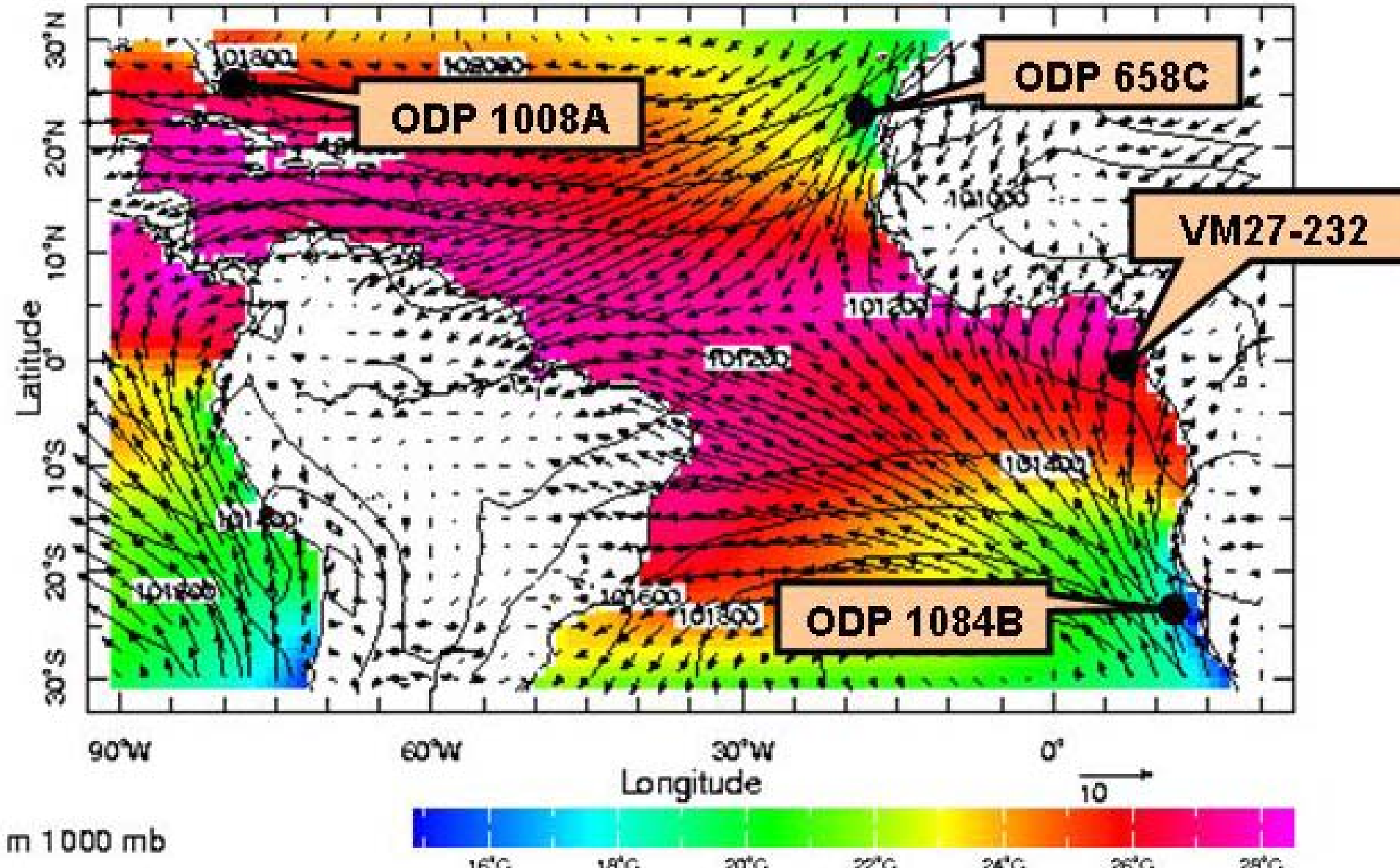
tropical Atlantic deglacial climate records:



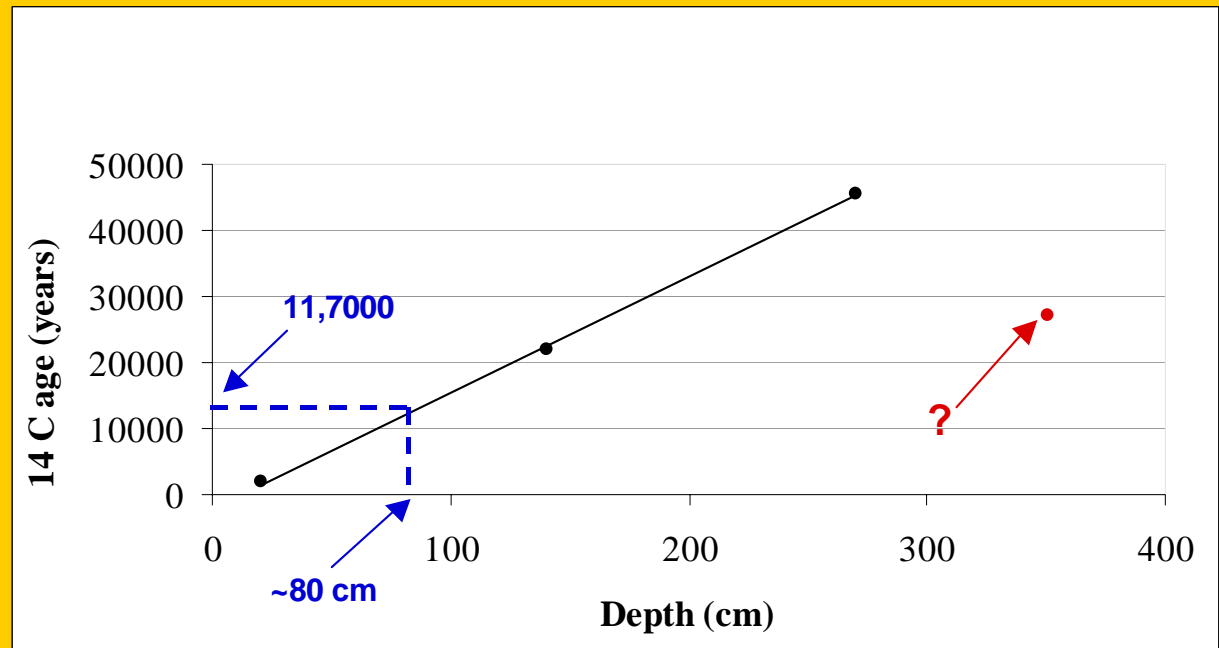
Holocene climate change in the Northern and subtropical Atlantic:



core locations of new records:



VM27-232 age model:

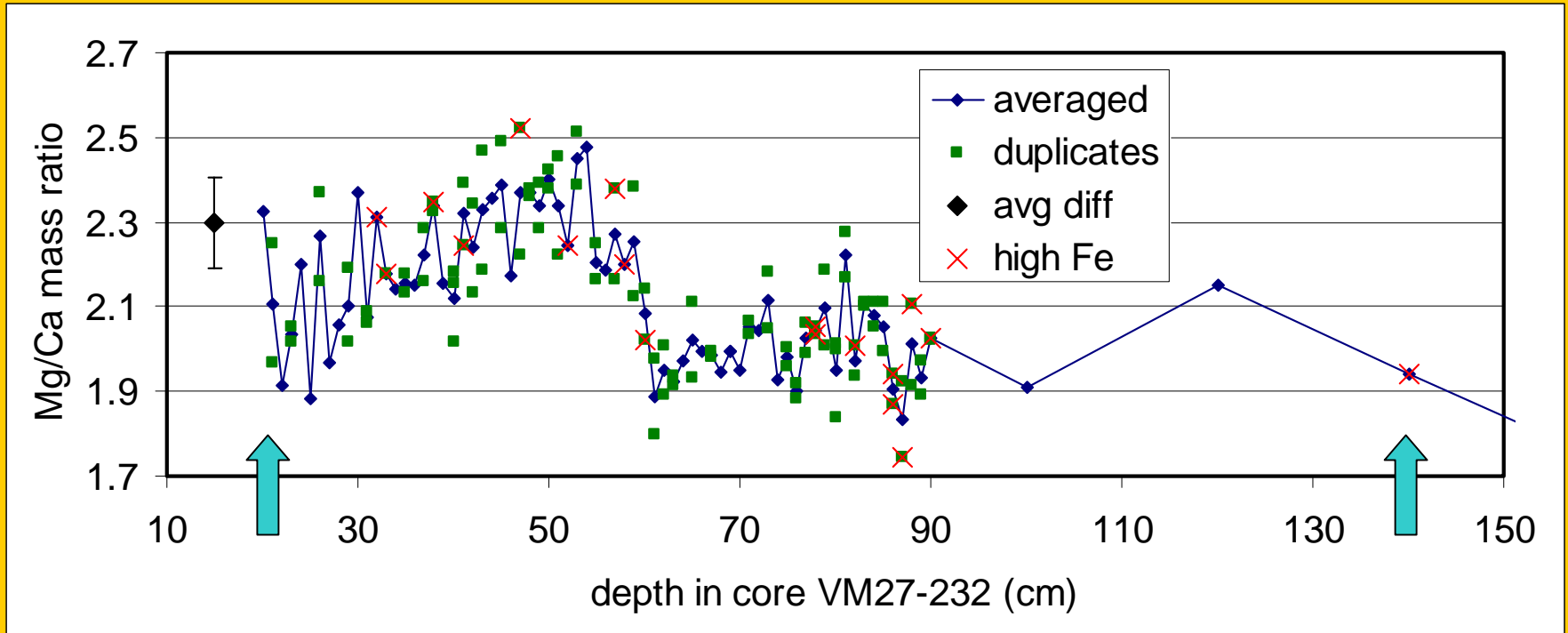


Depth (cm)	¹⁴ C age	Calendar age (yr BP)
20	1930 ± 60	1489
140	21910 ± 110	25124
270	45600 ± 1700	--
350	27140 ± 500	--

- four ¹⁴C dates collected at LLNL CAMS in Jan 2003
- blue line: date in progress

(figures by Eun Soo Lim for Barnard College senior thesis)

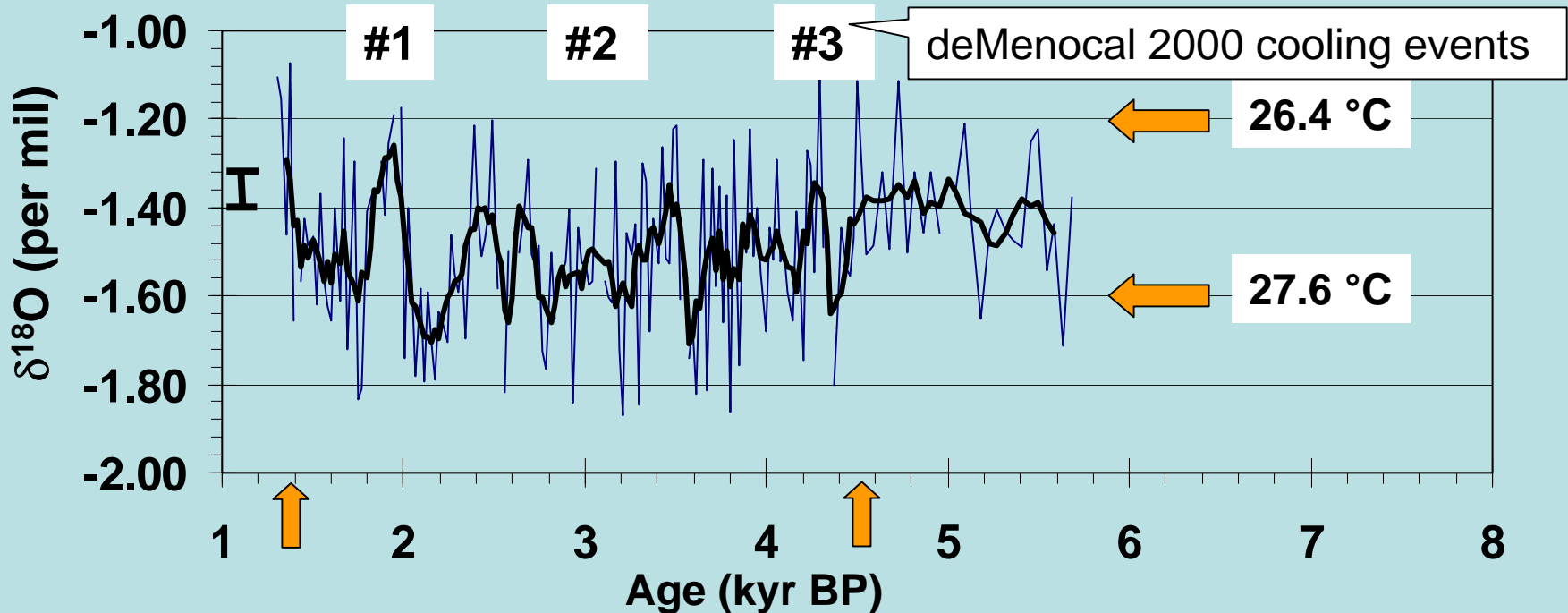
VM27-232 record:



- what age is step shift in temperature at ~60cm?
Younger Dryas or mid-Holocene?
- still waiting for new data...

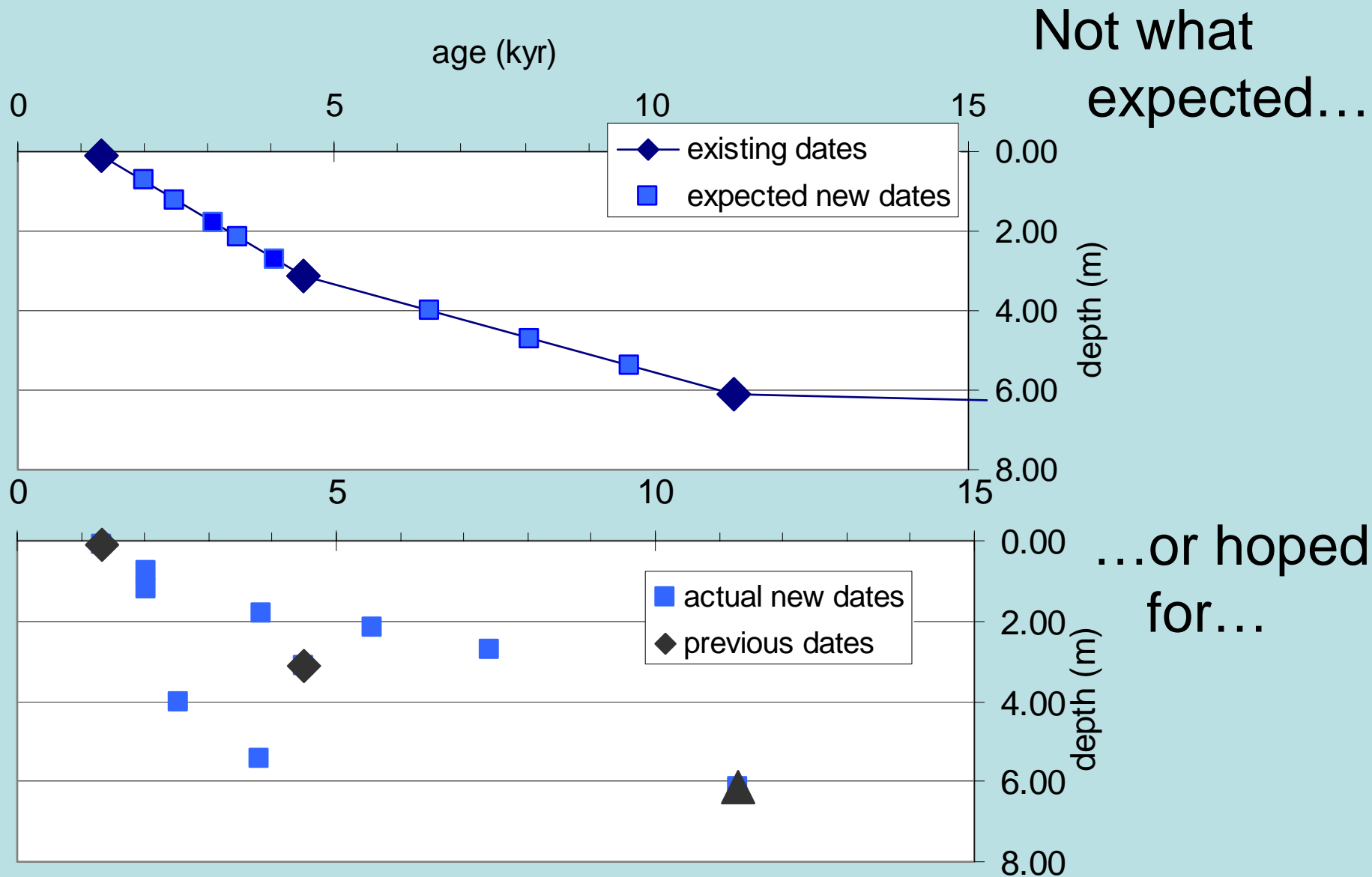
ODP1008A:

$\delta^{18}\text{O}$ of *G. sacculifer* (w/o)



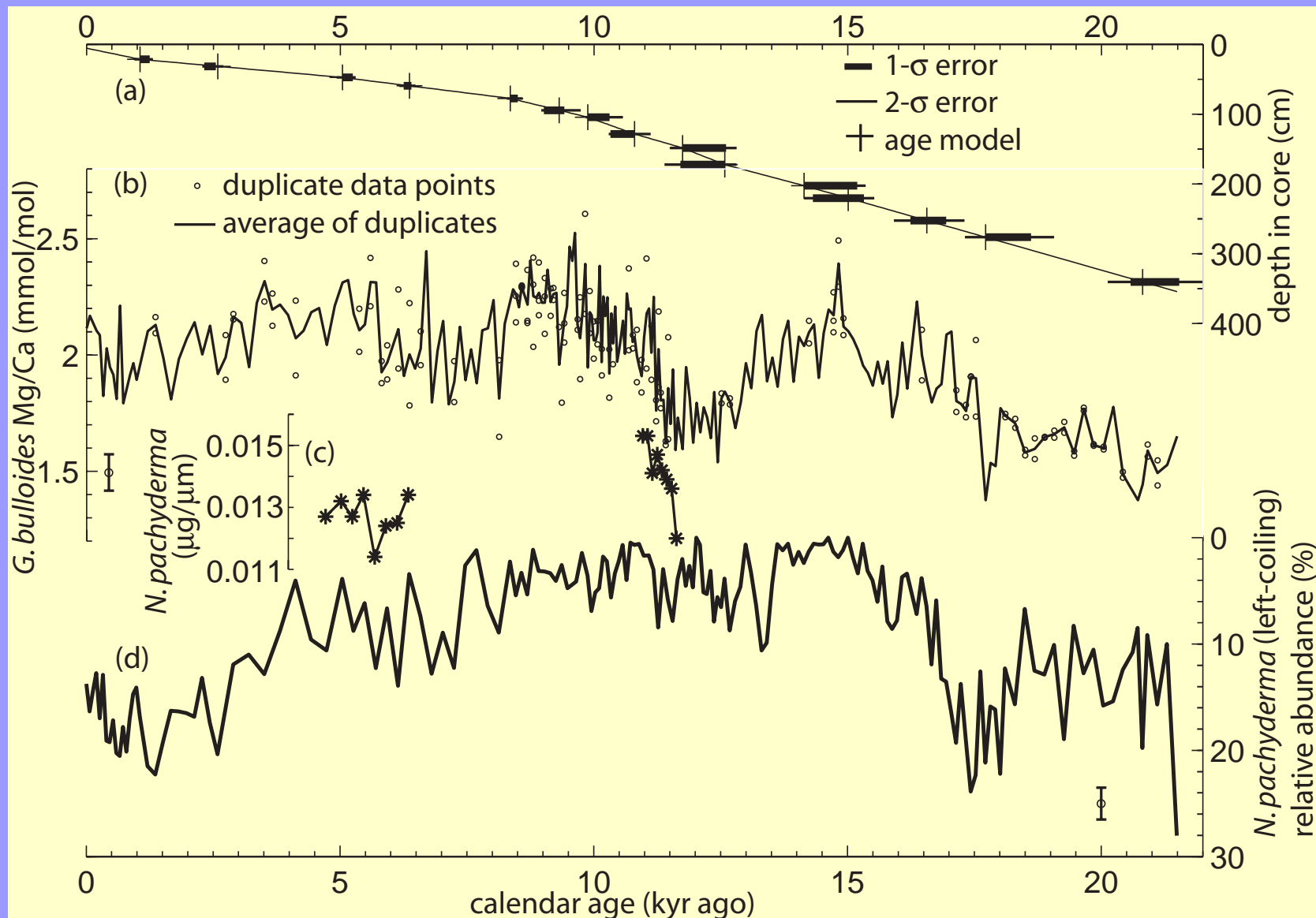
- last ~1 kyr missing: coretop ~1309 cal yr old
- age model incomplete: more dates needed
- standard deviation of standards: 0.09 (per mil)
- does this record shift 8 kyr ago? → further data collection needed

ODP1008A age model:



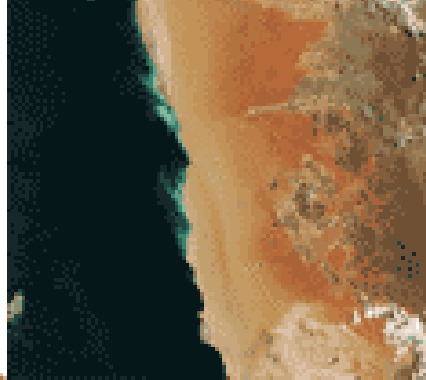
ODP1084B: lucky!

- decent age model
- good reproducibility



On the Cutting Edge

WORKSHOPS



Preparing for an Academic Career in the Geosciences:

A Workshop for Graduate Students and Post-Doctoral Fellows

Stanford University, Stanford, CA

...fascinating facts i learned:

~1/3 of all U.S. K-12 Earth Science teachers have never taken an Earth Science class!

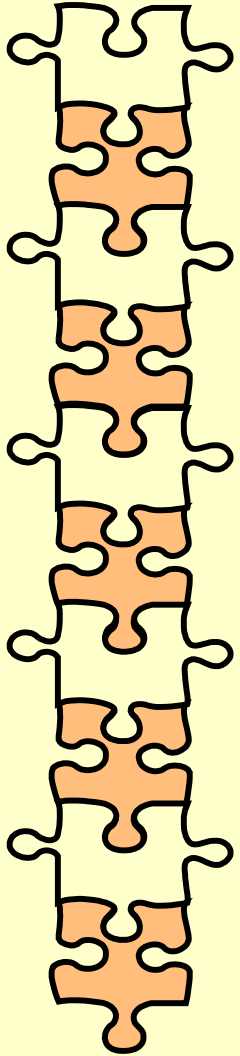
NSF is spending millions of \$\$ on ~5 conferences like this to improve all teaching: K-12, college, graduate school

<http://serc.carleton.edu/NAGTWorkshops/careerprep03/index.html>

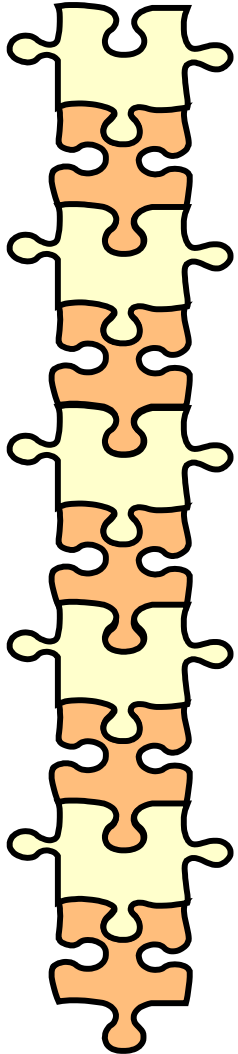
*will be linked from my website: www.LDEO.columbia.edu/~christa

human cognition (knowledge construction)

- disrupted by **MISCONCEPTIONS**
- improved by:
 - **ACTIVE** learning,
 - repeated **PRACTICE**,
 - constructive **FEEDBACK**
- characterized by **LEARNING STYLES**:
continuum of habits/tendencies



3 best tips on job searching:



- “next-step”:
demonstrate ability at next level
- “shotgun” rather than “rifle” approach
a few well-researched applications are better
than lots of generic ones
- for aspiring faculty:
Tomorrow’s Professor listserve!
“desktop faculty development 100 times per year”
<http://ctl.stanford.edu/Tomprof/index.shtml>