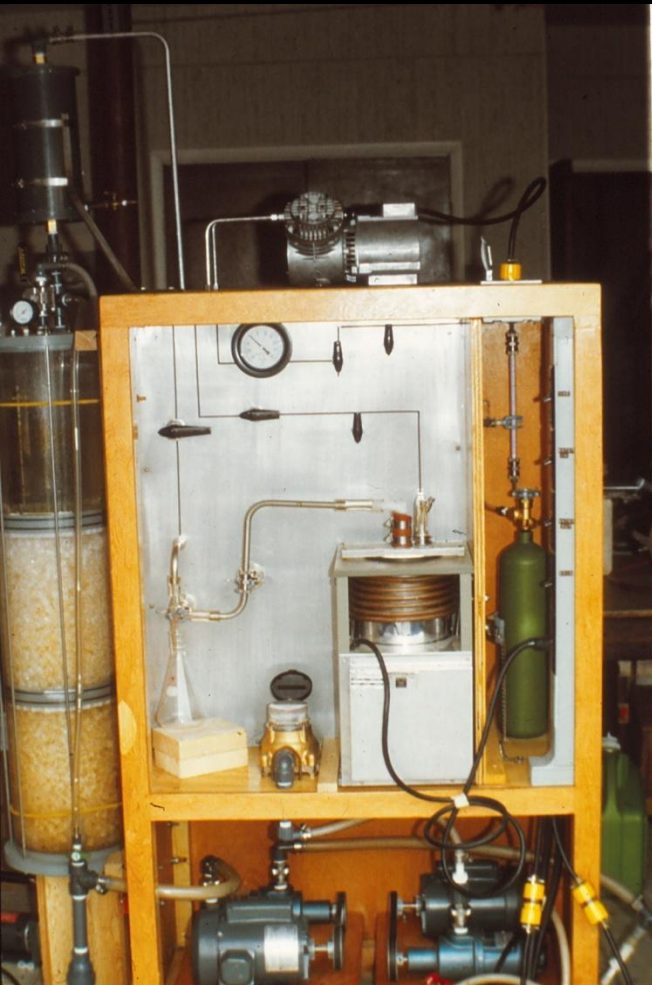


Symposium in Honor of 42 years of Tom Protus's Contribution to Science and Community at LDEO

- Introduction and welcoming comments
 - Bill Smethie
- Air pollution and Tom's simple formula for making equipment
 - Steve Chillrud
- Adventures in mass spectrometry around the world with Tom
 - Gisela Winkler
- How Tom helps us make science discoveries using mass spectrometers in Geochemistry
 - Sidney Hemming
- The Groundwater and sediment needle sampler- a Tom Protus creation deployed in Bangladesh, Nepal, India and Vietnam
 - Lex van Geen
- Revolution in seawater sampling a la Tom
 - Marty Fleisher
- Tom's early days and ocean science
 - John Goddard
- Highlights of 30 letters of support for Tom's nomination for the Lamont Service Award
 - Martin Stute
- Concluding comments
 - Art Lerner-Lam

Symposium in Honor of 42 years of Tom Protus's Contributions to Science and Community at LDEO



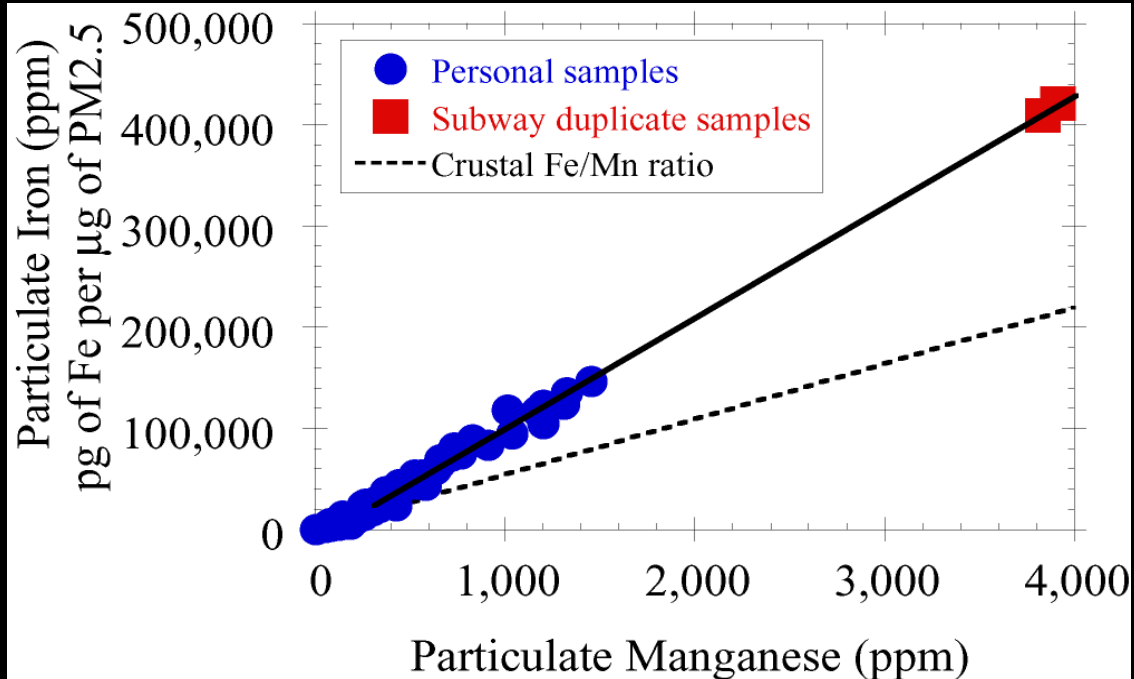
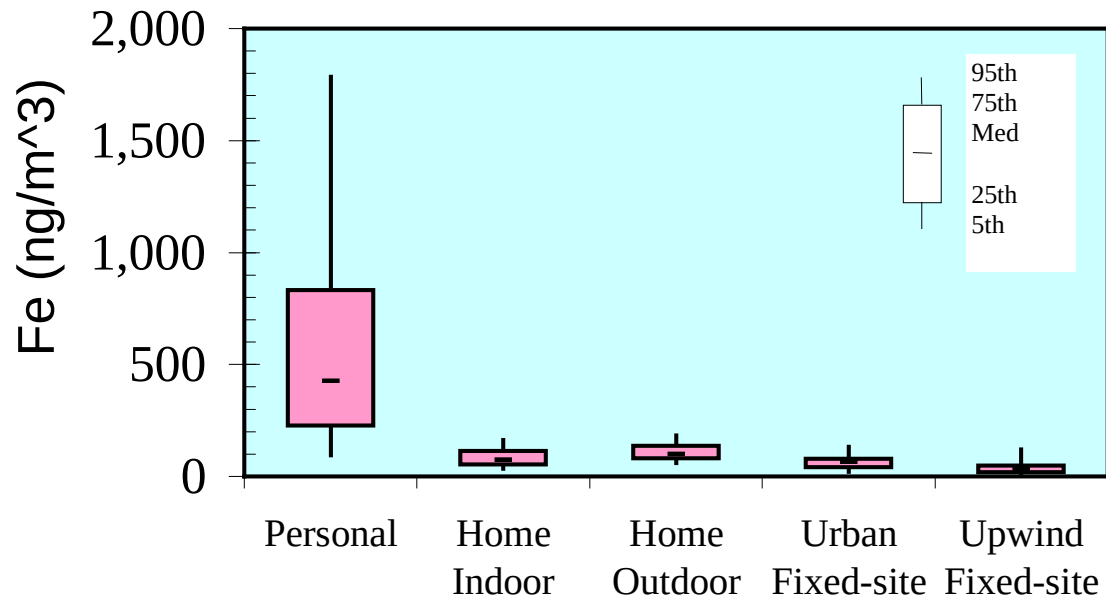
Air pollution and Tom's "simple" formula for equipment making



Alternative title:

How Tom saved my
nascent career

Iron distributions in air in New York City



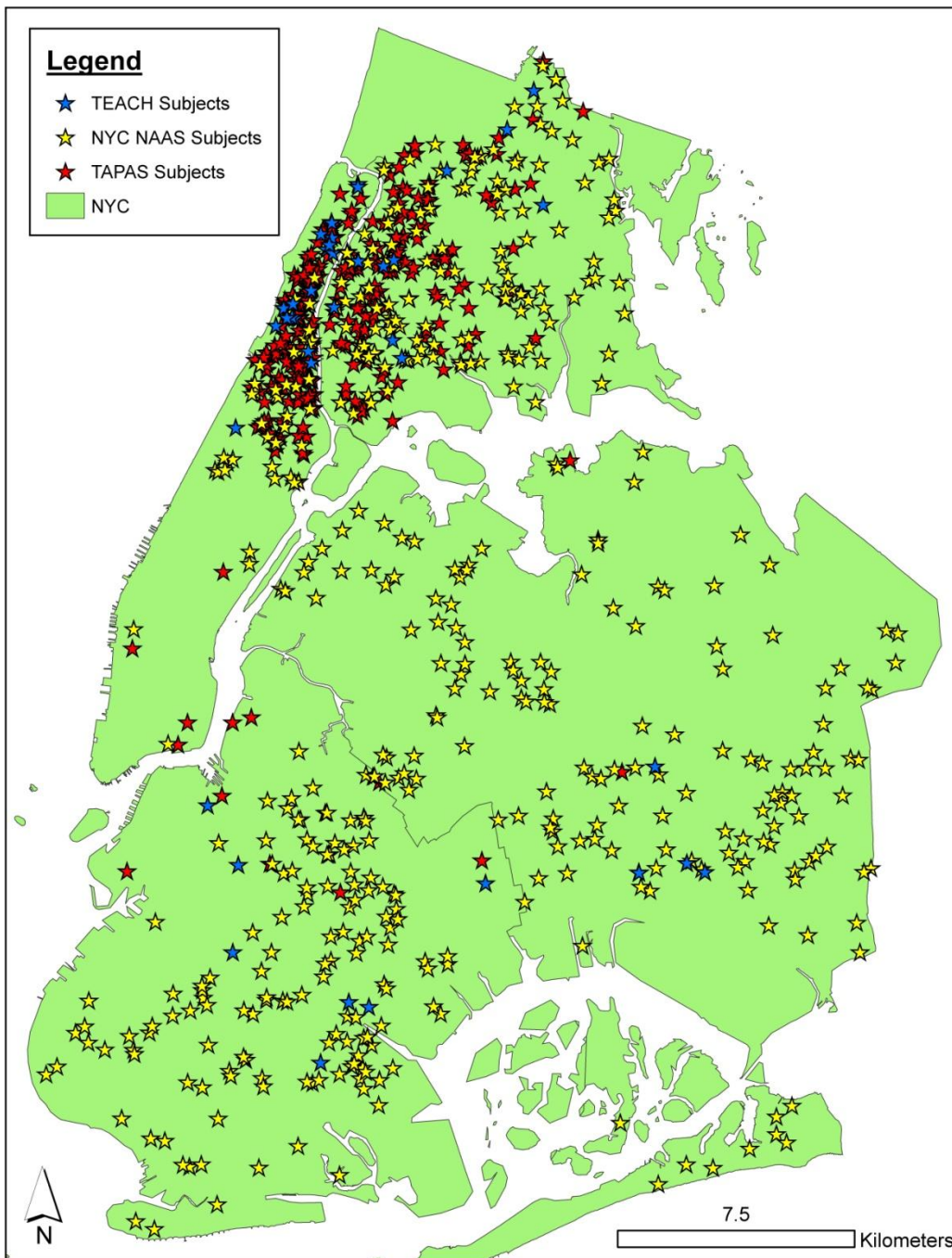


Columbia (Tom's) Black Boxes

Single pump,
Double pump,
Triple pump, and
battery operated boxes

Good flow stability
Easy to maintain

Roughly 1500 home set ups
Many boxes used more than
20,000 hrs each



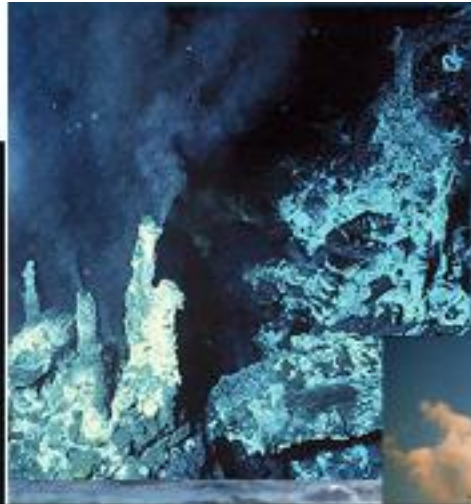
Air pollution equipment for
three studies placed
inside or/and outside NYC
homes and schools

NYC TEACH 1998-2000
NAAS 2005-2013
TAPAS I/II 2002-2016

Over 900 homes and
roughly 1500 home set ups

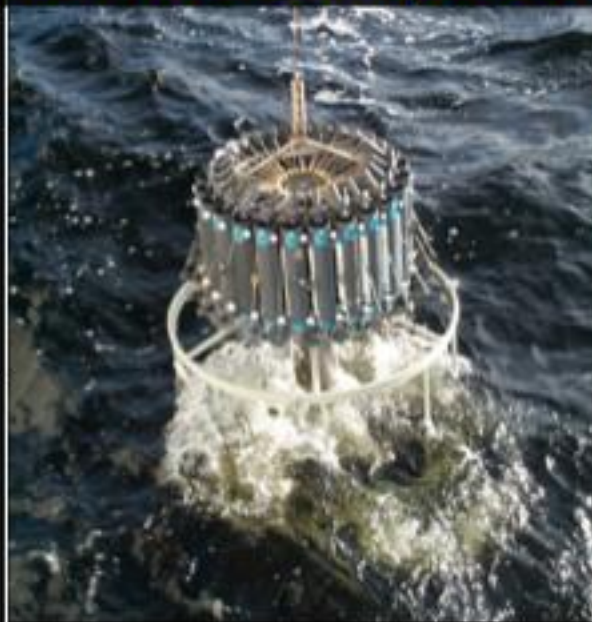
Locations have been jittered for privacy

18	
8, Hg VIIIA	
4,002602	
1s ²	
2He	
-272	-
-269	24.6
Helium	
20,1797	
[He]2s ² 2p ¹	
10Ne	
-249	-
-246	21.6
Neon	
39,948	
[Ne]3s ² 3p ¹	
18Ar	
-189	-
-186	15.8
Argon	
83,80	
[Ar]3d ¹⁰ 4s ² 4p ²	
36Kr	
2	
-157	-
-152	14.0
Krypton	
131,29	
[Kr]4d ¹⁰ 5s ² 5p ²	
54Xe	
2,4,6	
-112	-
-107	12.1
Xenon	

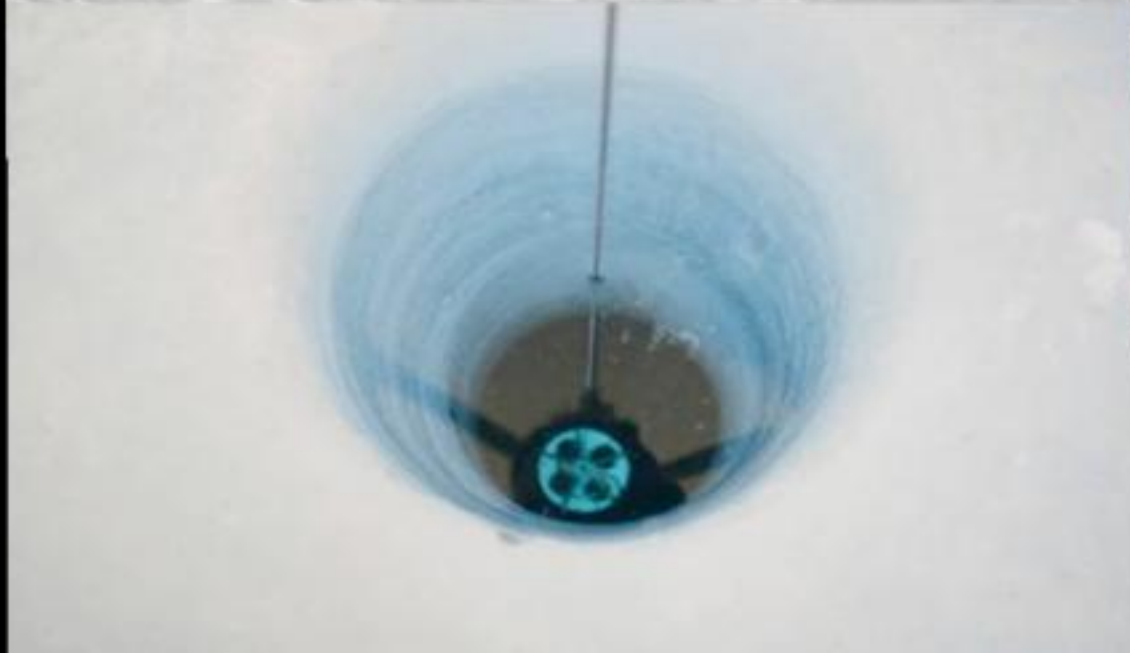


Gisela Winkler

**Adventures in mass spectrometry worldwide –
From outer space to ancient ocean sediments**



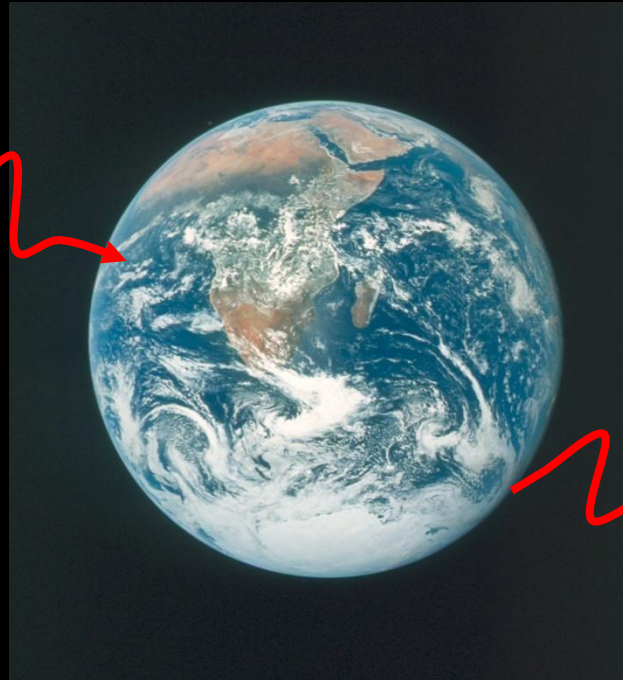
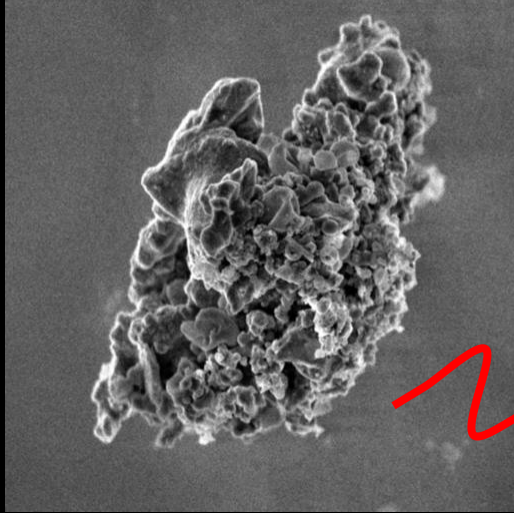
Sampling in The Arctic



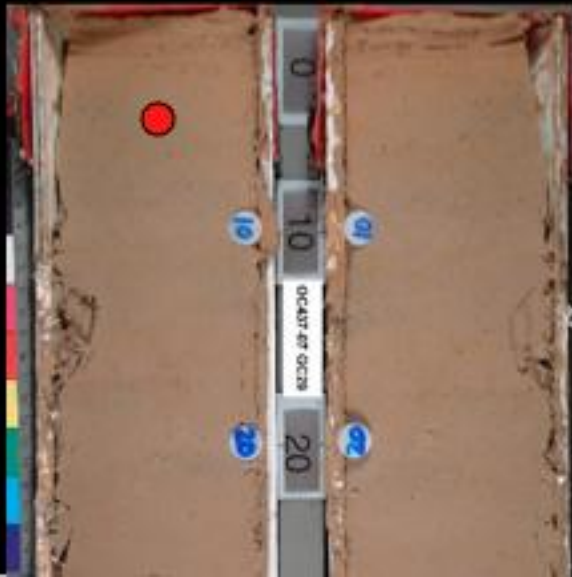
Sampling Groundwater



From space to the Earth surface



From the sampling site to the analysis





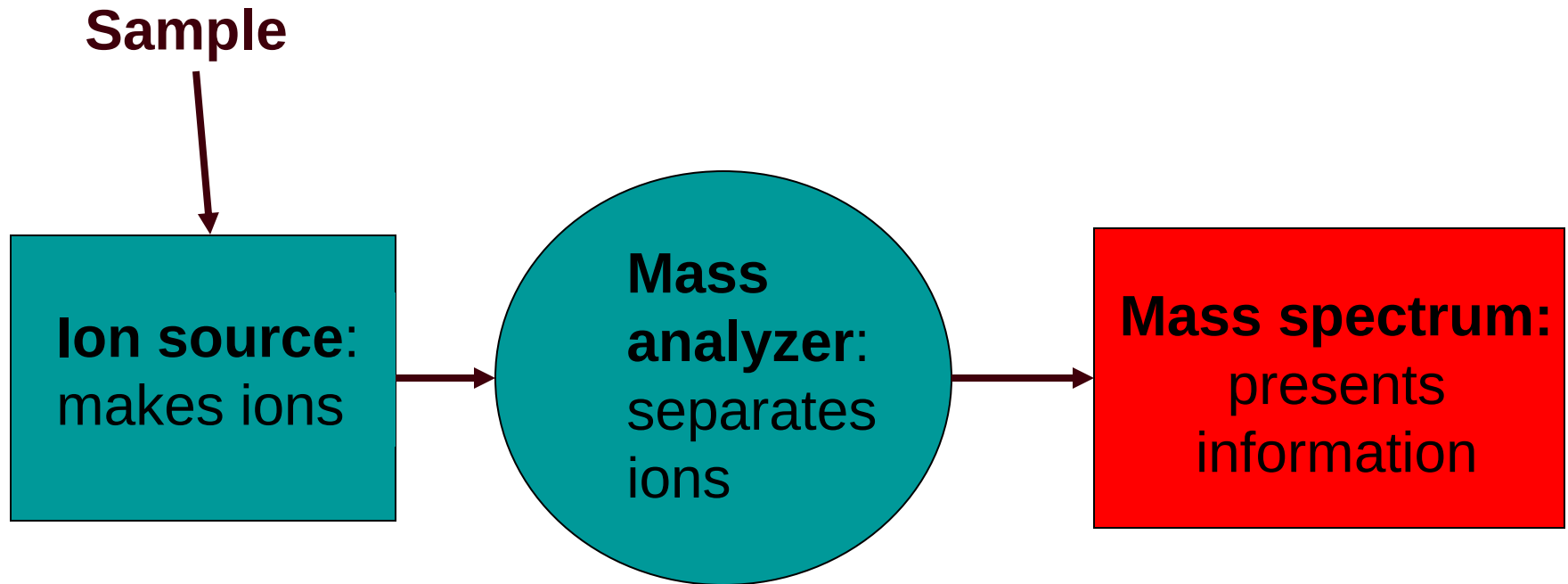


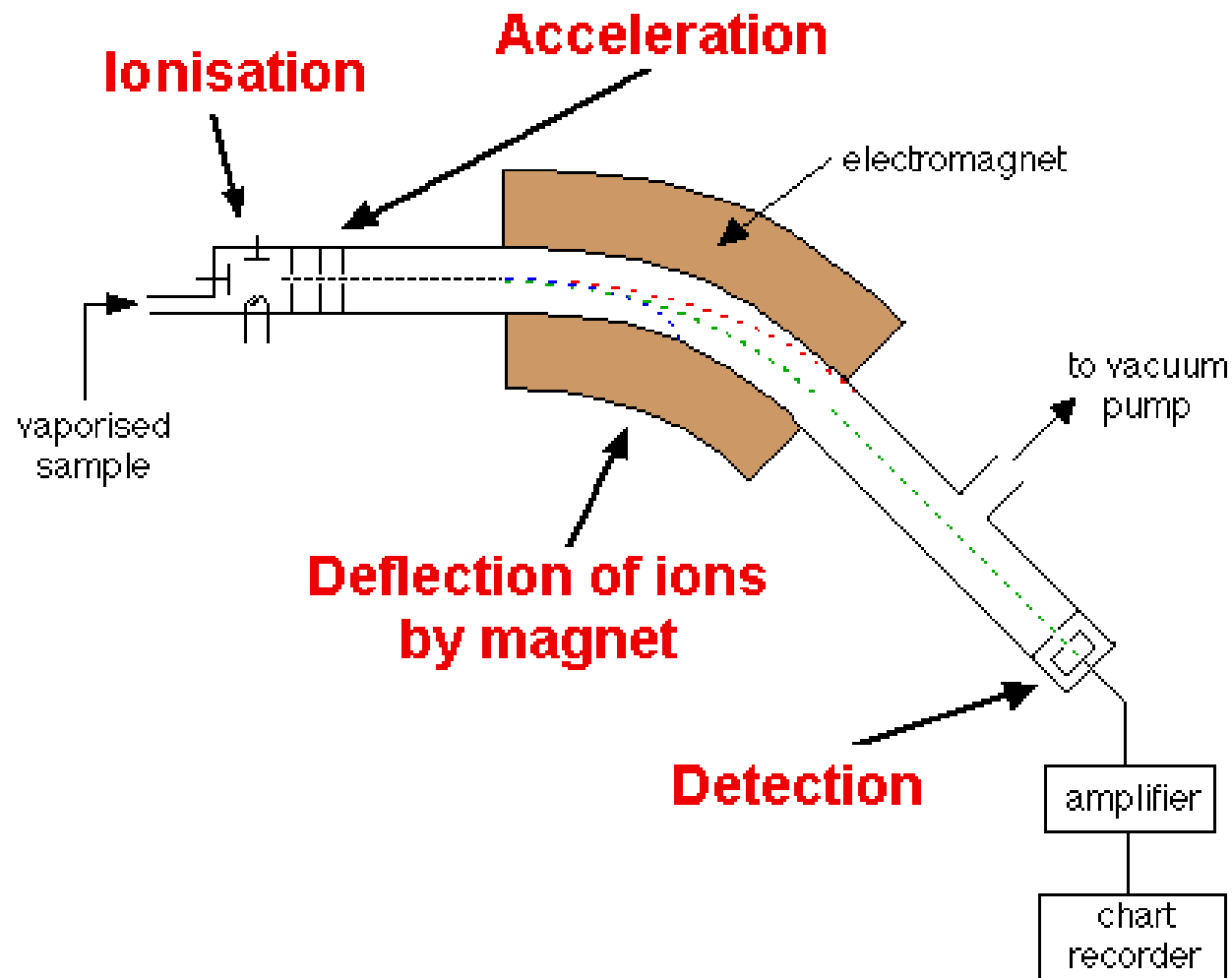
THANKS TOM !

DANKE TOM !



How Tom Protus helps us make science discoveries using mass spectrometers in Geochemistry

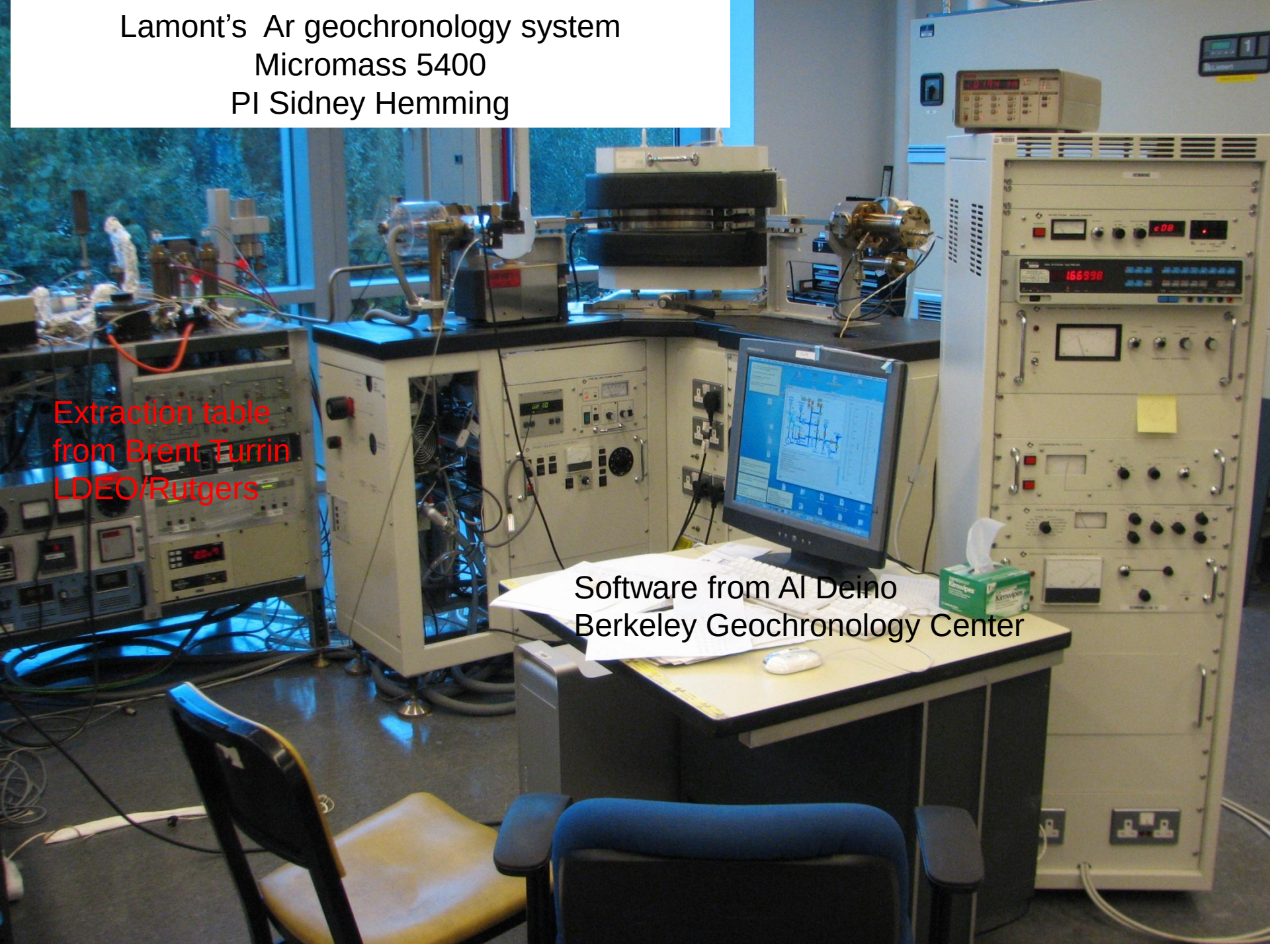




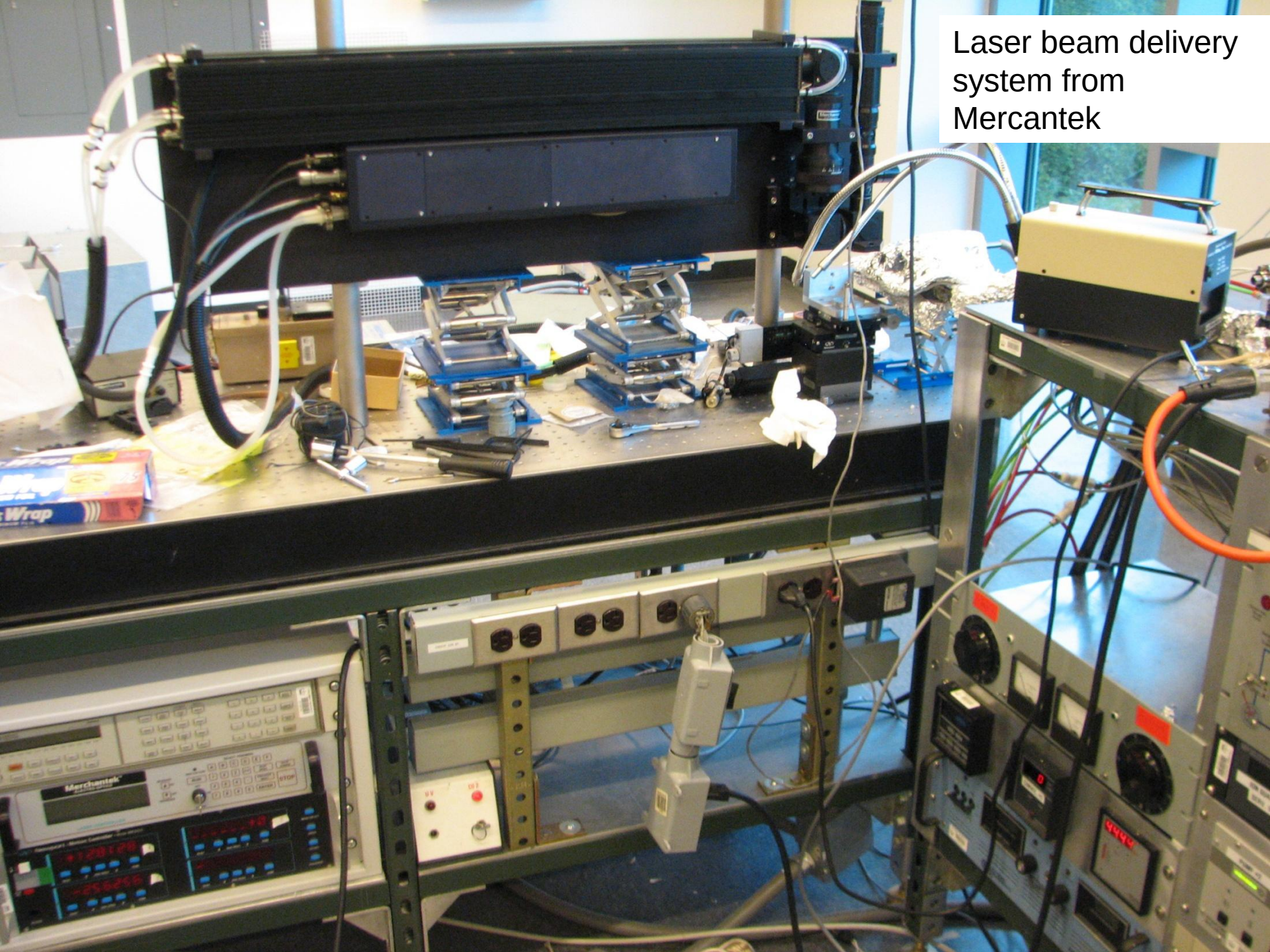
Lamont's Ar geochronology system
Micromass 5400
PI Sidney Hemming

Extraction table
from Brent Turrin
LDEO/Rutgers

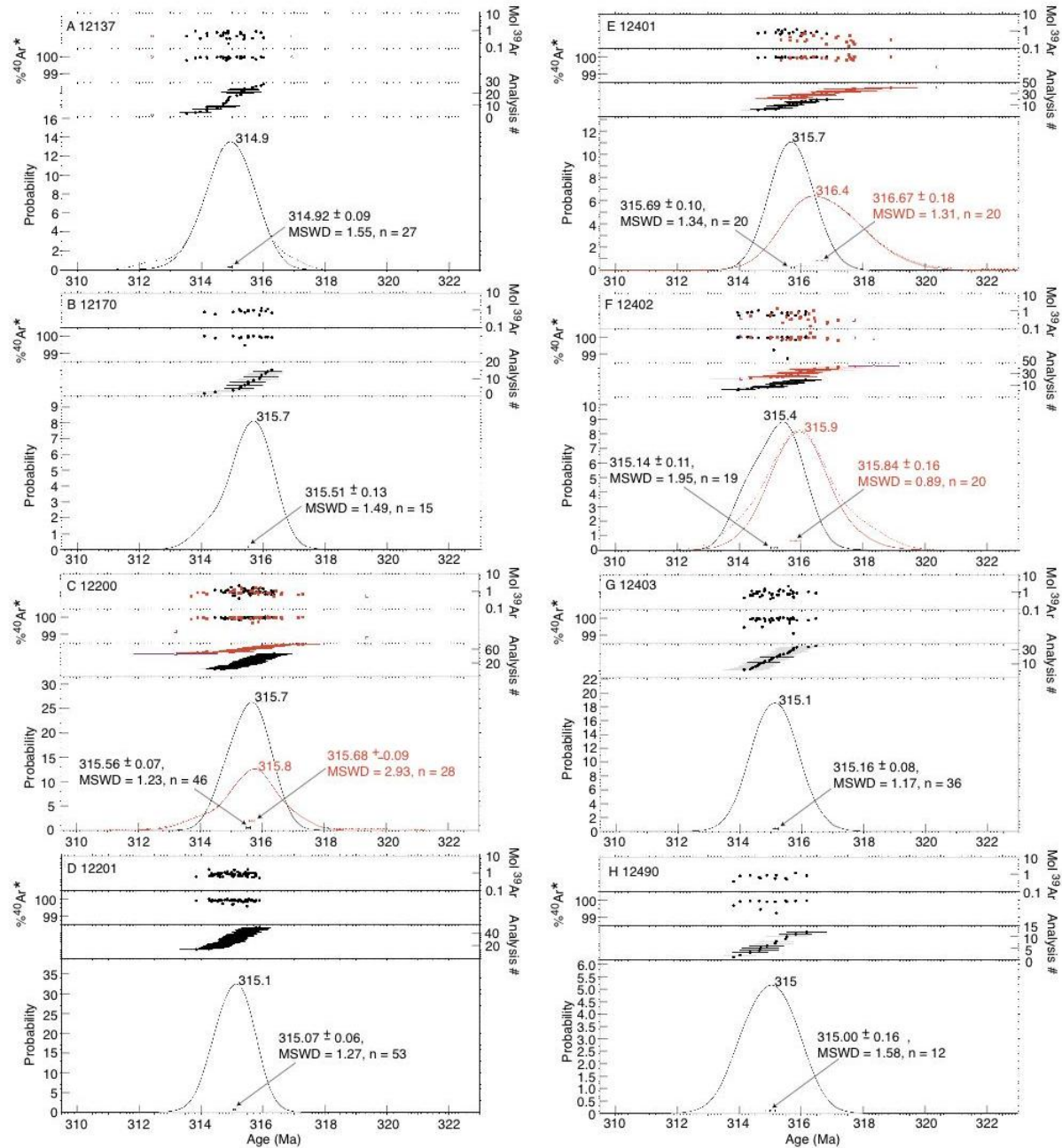
Software from Al Deino
Berkeley Geochronology Center



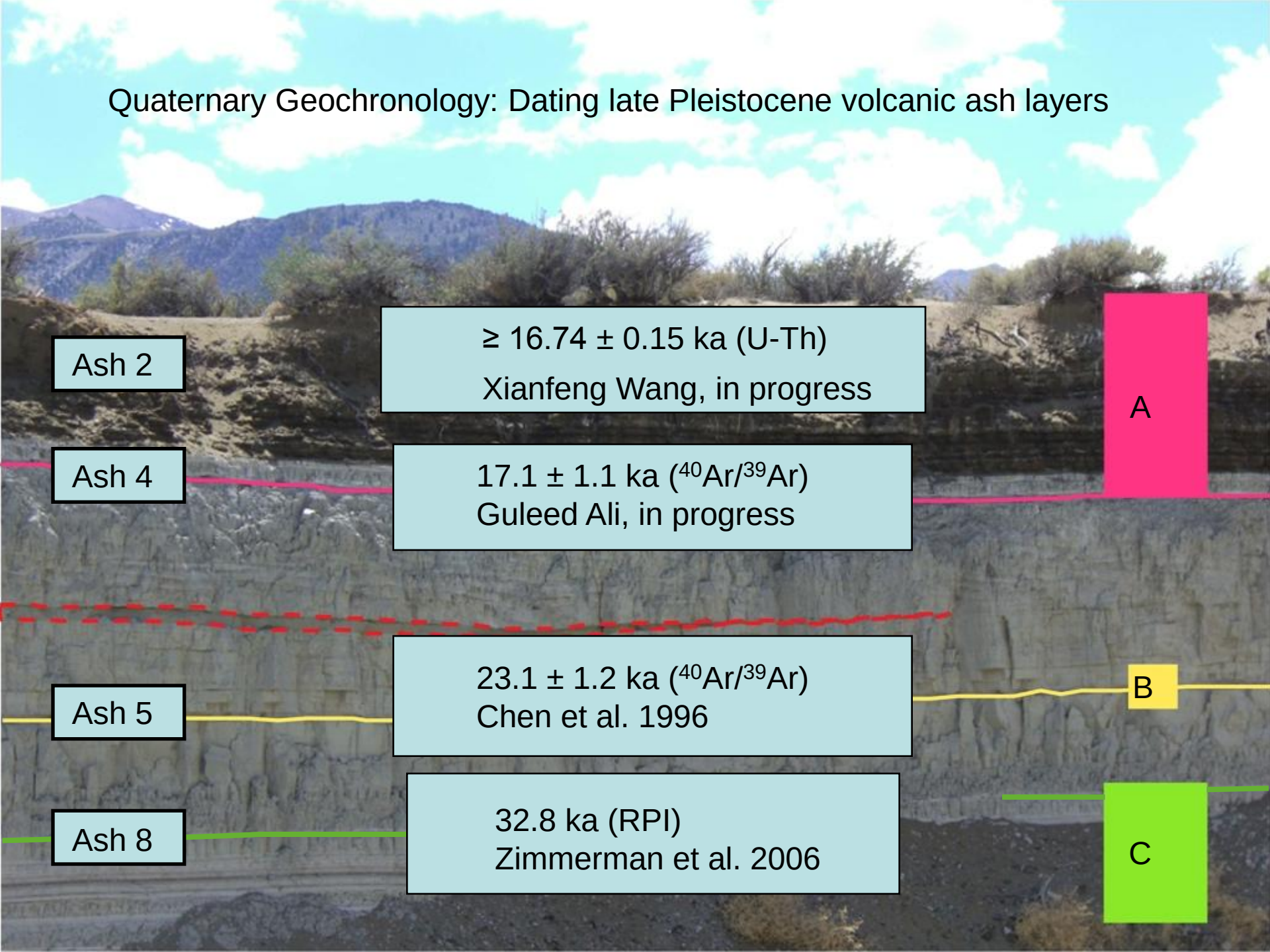
Laser beam delivery
system from
Mercantek



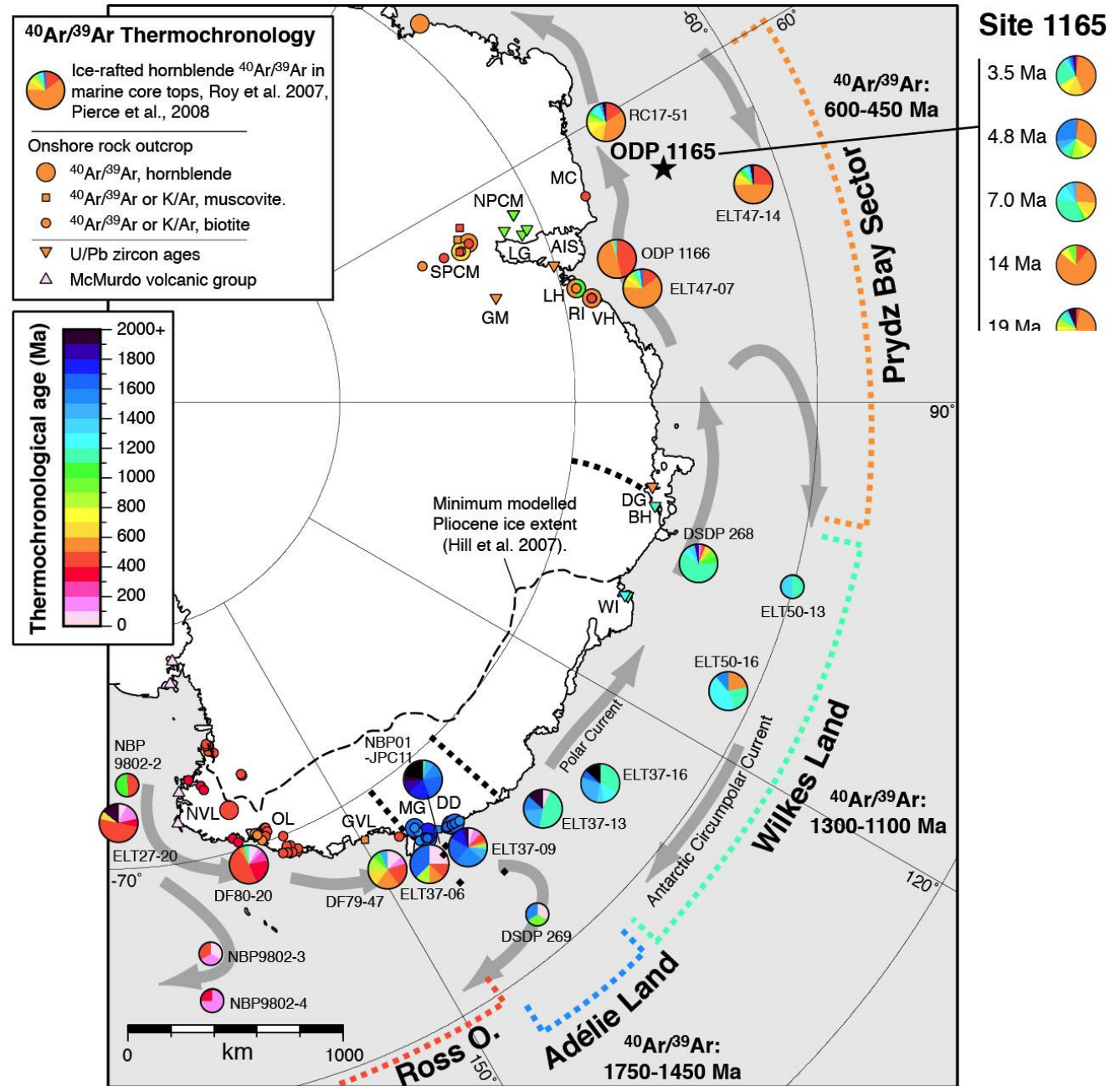
EARTHTIME: Fireclay Tonstein as a potential monitor standard



Quaternary Geochronology: Dating late Pleistocene volcanic ash layers



East Antarctic $^{40}\text{Ar}/^{39}\text{Ar}$ source provinces

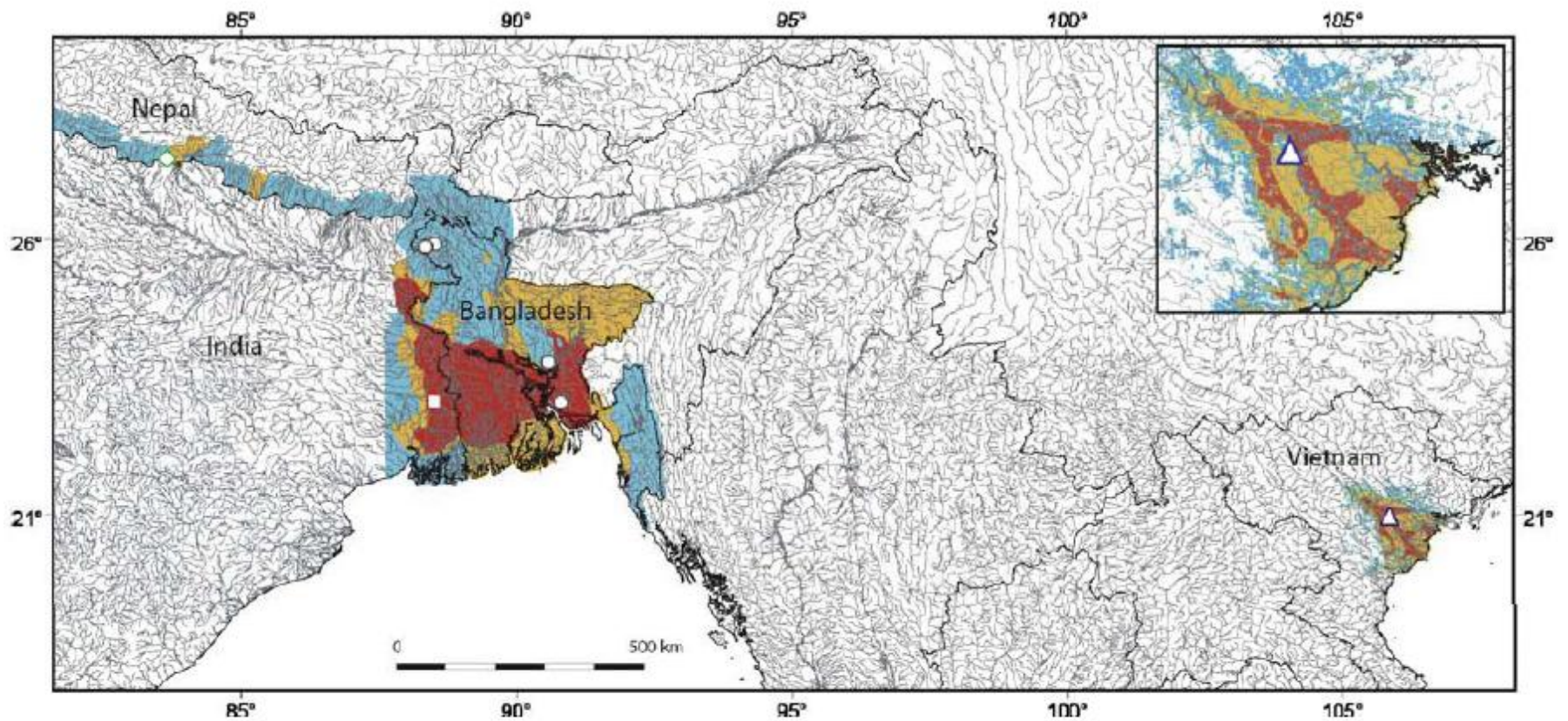


Thanks Tom, we couldn't do
most of this without you!



Photo credit Guleed Ali

**The groundwater and sediment needle-sampler:
a Tom Protus creation
deployed in Bangladesh, Nepal, India, and Vietnam**





Click photo to play movie of needle sampler



Testing Groundwater for Arsenic in Bangladesh before Installing a Well

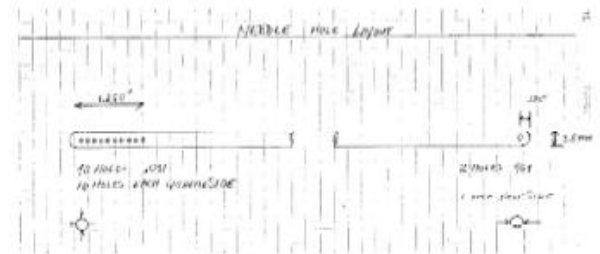
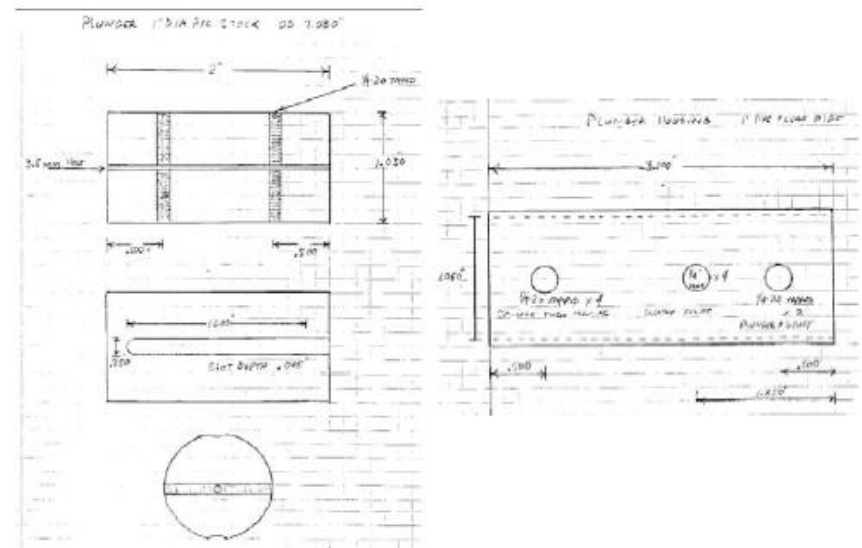
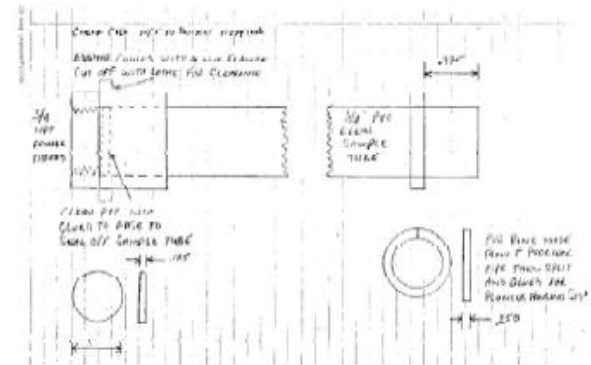
A. VAN GEEN,* T. PROTUS,
Z. CHENG, AND A. HORNE MAN

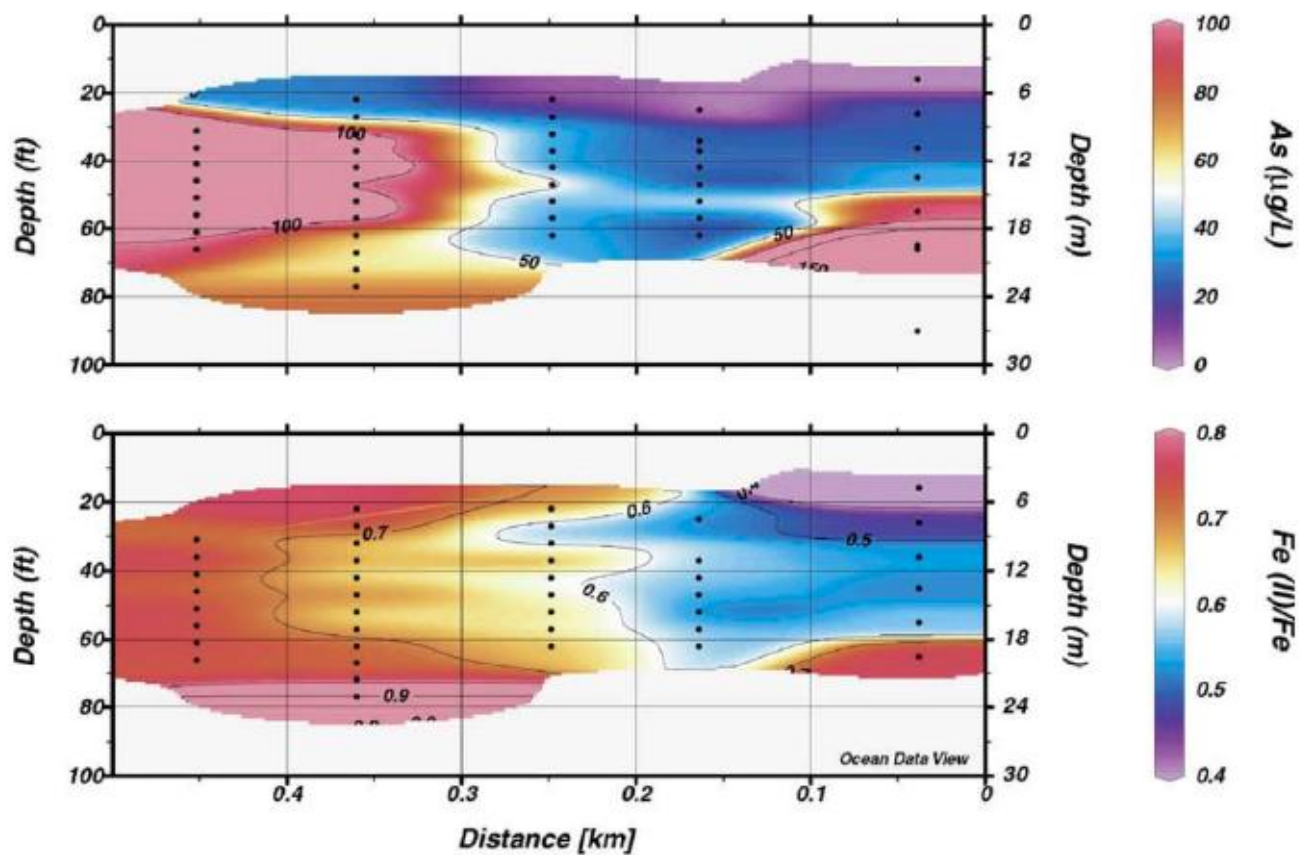
Lamont-Doherty Earth Observatory of Columbia University,
Route 9W, Palisades, New York 10964

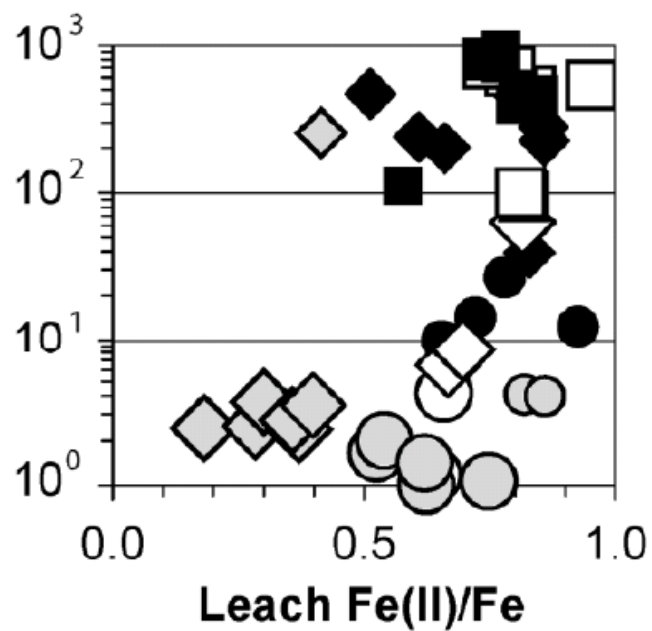
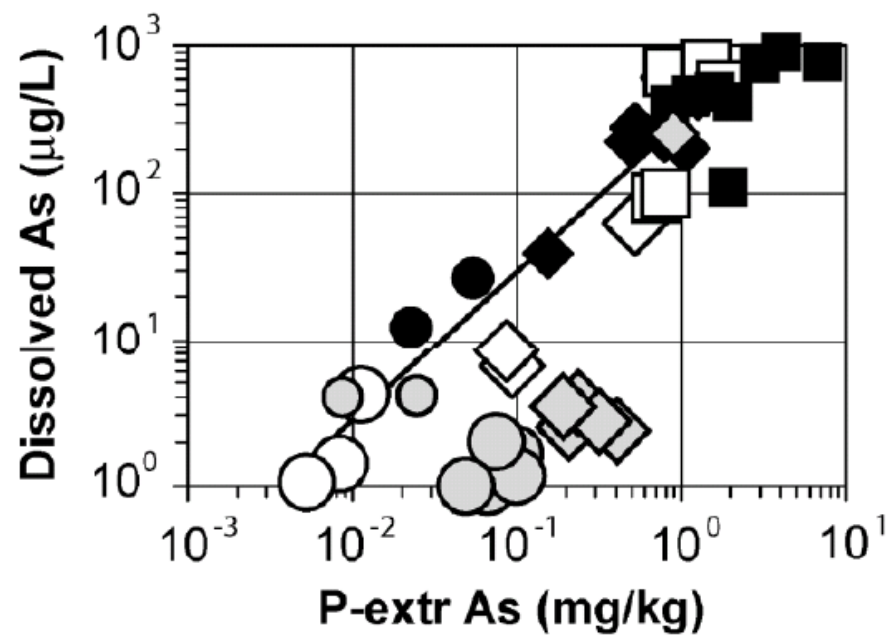
A. A. SEDDIQUE, M. A. HOQUE AND
K. M. AHMED

Geology Department, University of Dhaka, Dhaka, Bangladesh

Profiles of groundwater and sediment properties were collected at three sites in Bangladesh with an inexpensive sampling device that is deployed by modifying the local manual drilling method. Dissolved As concentrations in the groundwater samples ranging from 5 to 600 $\mu\text{g/L}$ between 5 and 50 m depth closely matched vertical profiles from nearby nests of monitoring wells. In combination with a field kit, the device provides a means of targeting aquifers for the installation of tube wells that meet the drinking water standard for As. The device is also a useful research tool for unraveling the relationships between the As content of groundwater and the complex structure of flood plain and deltaic environments throughout South Asia.







- van Geen, A, K Radloff, Z Aziz, Z Cheng, MR Huq, KM Ahmed, B Weinman, S. Goodbred, M. Berg, PTK Trang, L Charlet, J Metral, D Tisserand, S Guillot, S Chakraborty, AP Gajurel, BN Upreti, Comparison of arsenic concentrations in simultaneously-collected groundwater and aquifer particles from Bangladesh, India, Vietnam, and Nepal, *Applied Geochemistry*, 23, 3244-3251, 2008.
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- van Geen, A., Y. Zheng, S. Goodbred Jr., A. Horneman, Z. Aziz, Z. Cheng, M. Stute, B. Mailloux, B. Weinman, M.A. Hoque, A.A. Seddique, M.S. Hossain, S.H. Chowdhury, and K. M. Ahmed, Flushing history as a hydrogeological control on the regional distribution of arsenic in shallow groundwater of the Bengal Basin, *Environmental Science and Technology*, 42, 2283-2288, 2008.
- Métral, J., L. Charlet, S. Bureau, S. B. Mallik, S. Chakraborty, K.M. Ahmed, M.W. Rahman, Z. Cheng, and A. van Geen, Comparison of dissolved and particulate arsenic distributions in shallow aquifers of Chakdaha, India, and Araihasar, Bangladesh, *Geochemical Transactions* 9:1 doi:10.1186/1467-4866-9-1, 2008.
- Radloff, K.A., Z. Cheng, M.W. Rahman, K.M. Ahmed, B.J. Mailloux, A.R. Juhl, P. Schlosser, and A. van Geen. Mobilization of arsenic during one-year incubations of grey aquifer sands from Araihasar, Bangladesh, *Environmental Science and Technology* 41, 3639-3645, 2007.
- van Geen, A., Y. Zheng, Z. Cheng, Z. Aziz, A. Horneman, R. K. Dhar, B. Mailloux, M. Stute, B. Weinman, S. Goodbred, A. A. Seddique, M. A. Hoque, and K. M. Ahmed, A transect of groundwater and sediment properties in Araihasar, Bangladesh: Further evidence of decoupling between As and Fe mobilization, *Chemical Geology* 228, 85-96, 2006.
- Zheng, Y., A. van Geen, M. Stute, R. Dhar, Z. Mo, Z. Cheng, A. Horneman, I. Gavrieli, H.J. Simpson, R. Versteeg, M. Steckler, A. Grazioli-Venier, S. Goodbred, M. Shahnewaz, M. Shamsudduha, M. Hoque, and K. M. Ahmed, Geochemical and hydrogeological contrasts between shallow and deeper aquifers in two villages of Araihasar, Bangladesh: Implications for deeper aquifers as drinking water sources, *Geochim. Cosmochim. Acta*, 69(22), 5203-5218, 2005.
- van Geen, A., T. Protus, Z. Cheng, A. Horneman, A.A. Seddique, Hoque, M.A., and K.M. Ahmed, Testing groundwater for arsenic in Bangladesh before installing a well, *Environmental Science and Technology*, 38(24); 6783-6789, 2004.

10-yr plan for collaborative studies across S/SE Asia

International Drilling to Recover Aquifer sands (IDRAs)



Hanoi workshop April 25-28, 2011



Revolution in seawater sampling a la Tom



Katharina Pahnke using the pressurized rosette for large volume sea water samples

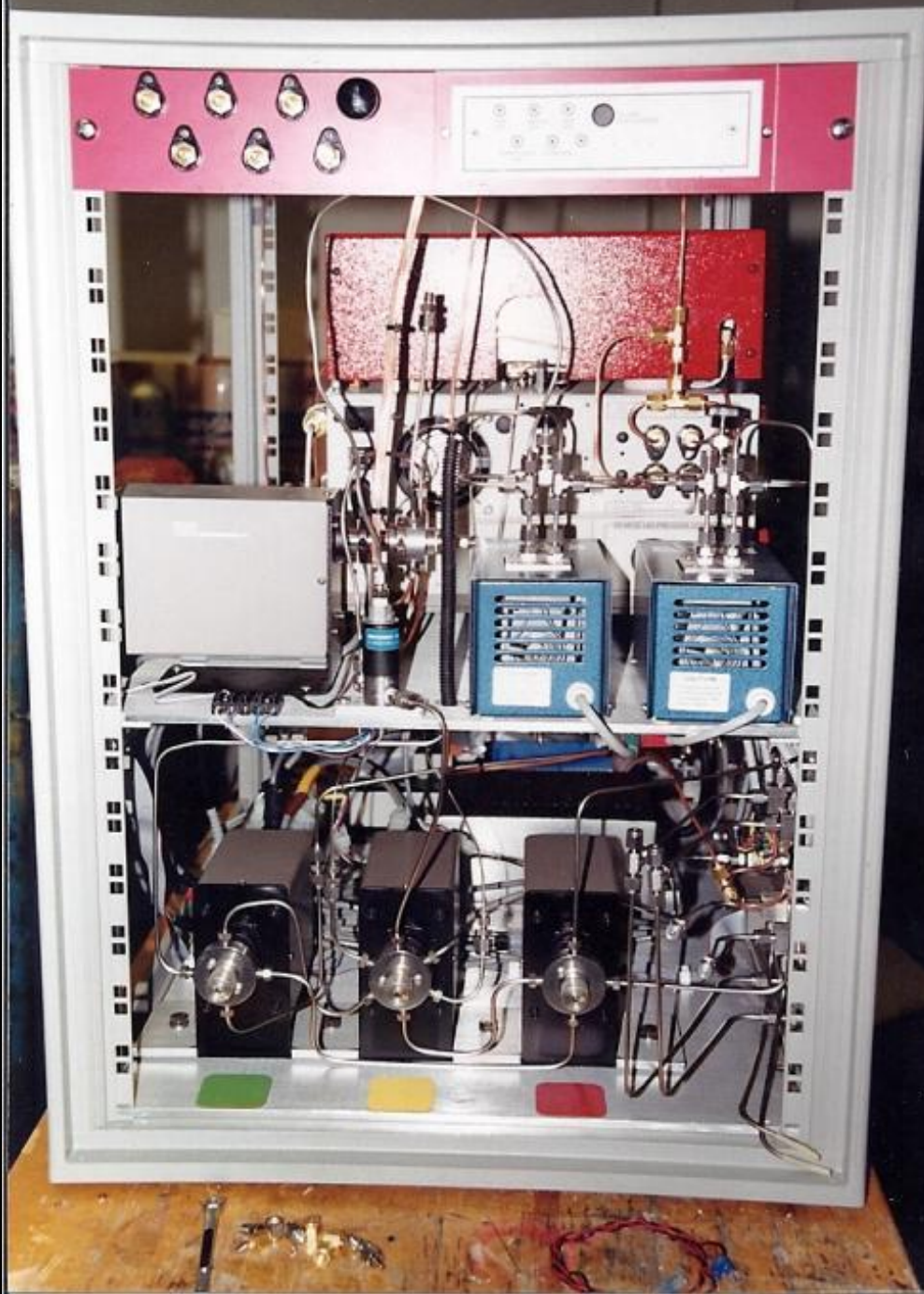
John Goddard

Tom's early years and ocean science



Packaging of the pCO₂ gas chromatograph system





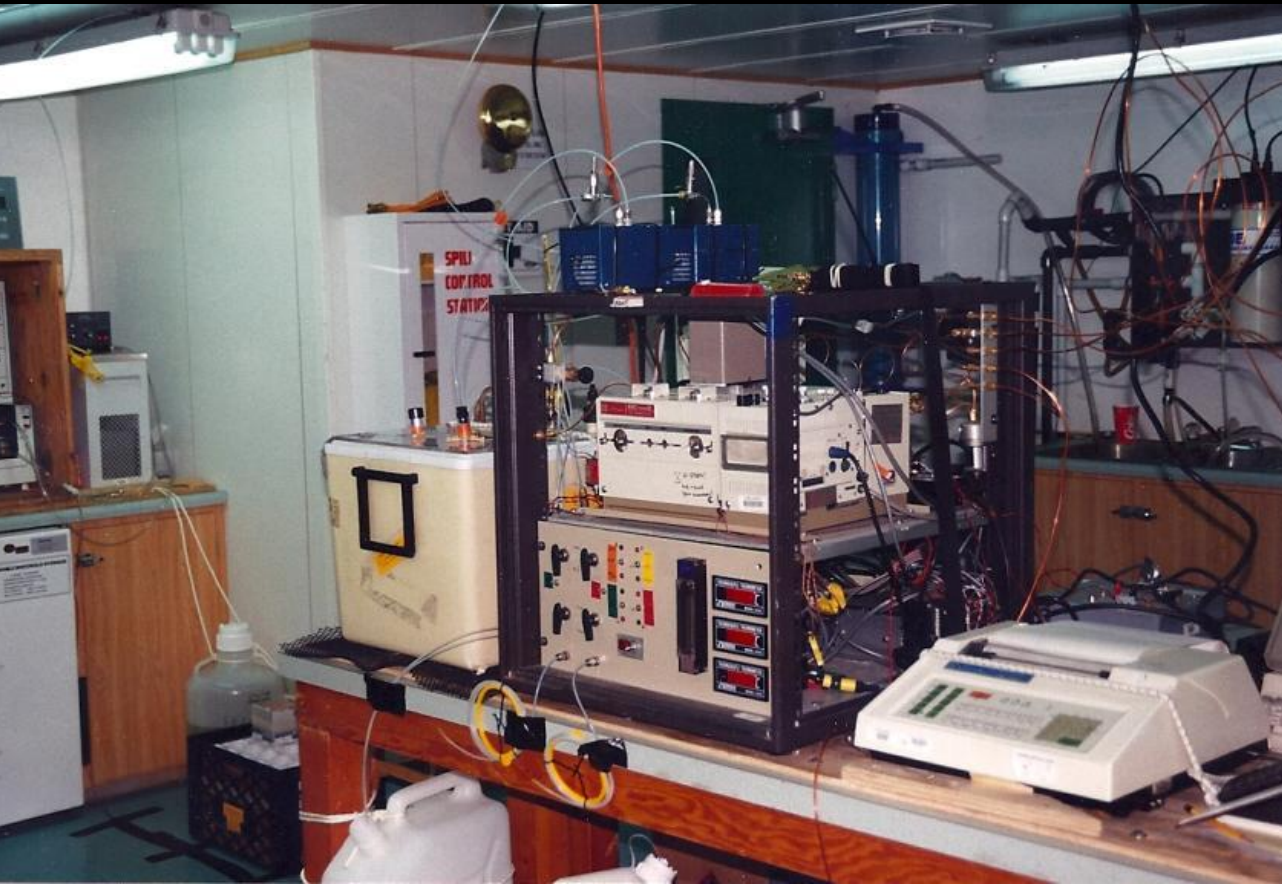
Back side of the
pCO₂ GC system

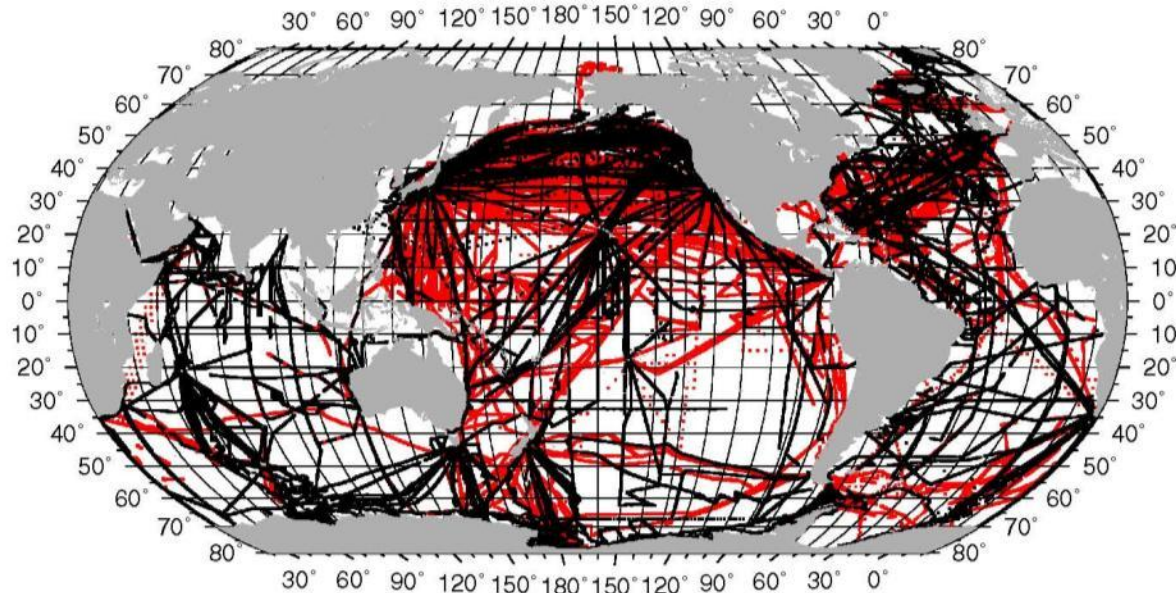


Another system packaged by
Tom for Taro's Ocean work

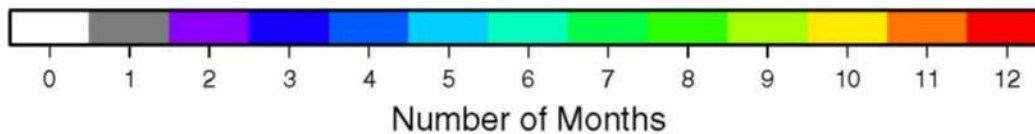
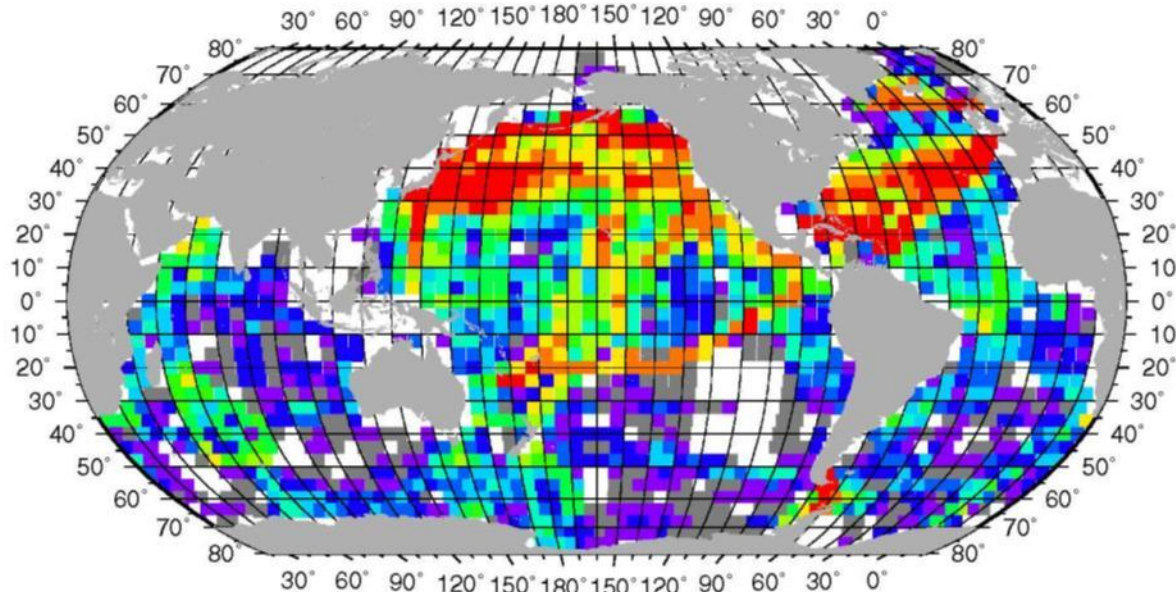
Real-time pCO₂
IR Analyzer

pCO₂ GC and IR systems aboard the RV/IB N B Palmer





Taro's cruises
with real-time
pCO₂ equipment
packaged by
Tom Protus



[illegible]