

An evolving aminostratigraphic database for Quaternary coastal deposits

J. F. Wehmiller

University of Delaware

GSA Denver 2013

History and purpose

- Needed: Digital inventory of Quaternary coastal geochronological studies (^{14}C , U-Th, AAR, OSL, other.....)
- History of many AAR labs that pre-date the digital world: Hard copies, then spreadsheets, but rarely a common format for data preservation; several labs now decommissioned
- Current location of samples to allow future work

USGS Reactor Hazards Program and “experimental” dating methods – ’70’s and ’80’s



Charleston SC



Coastal
California



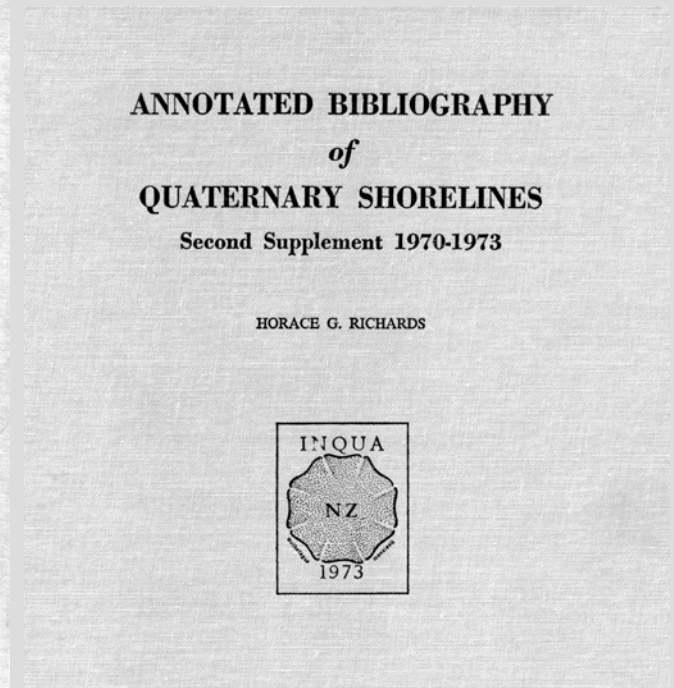
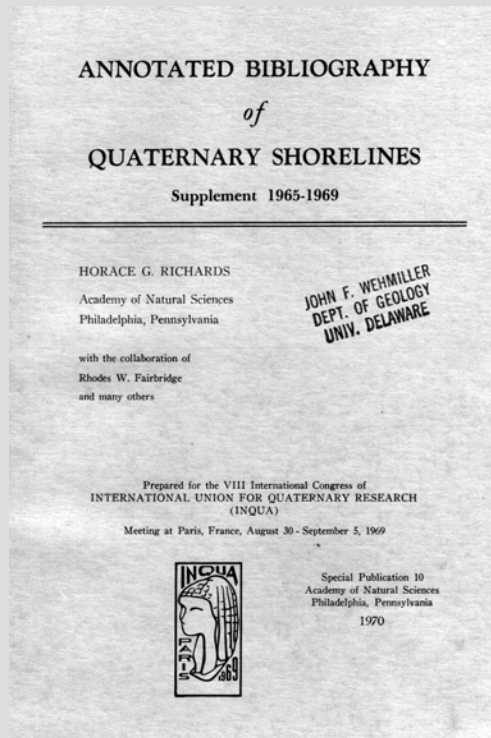
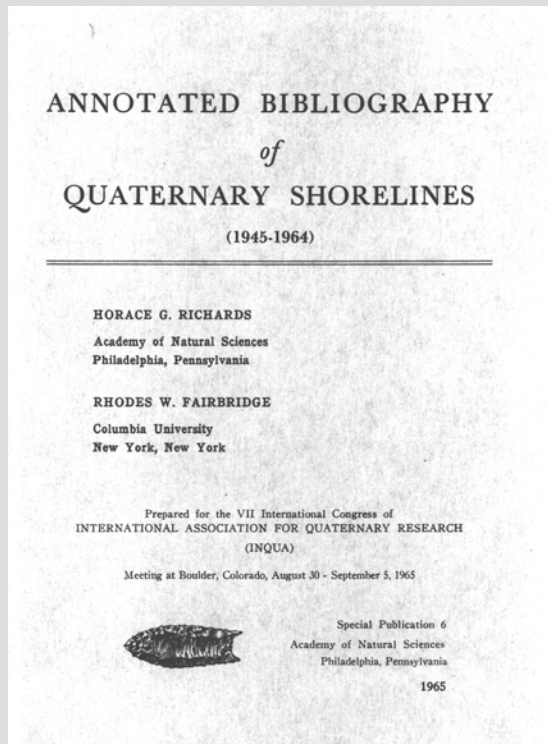
Pt Loma
San
Diego



Scanawah Island SC



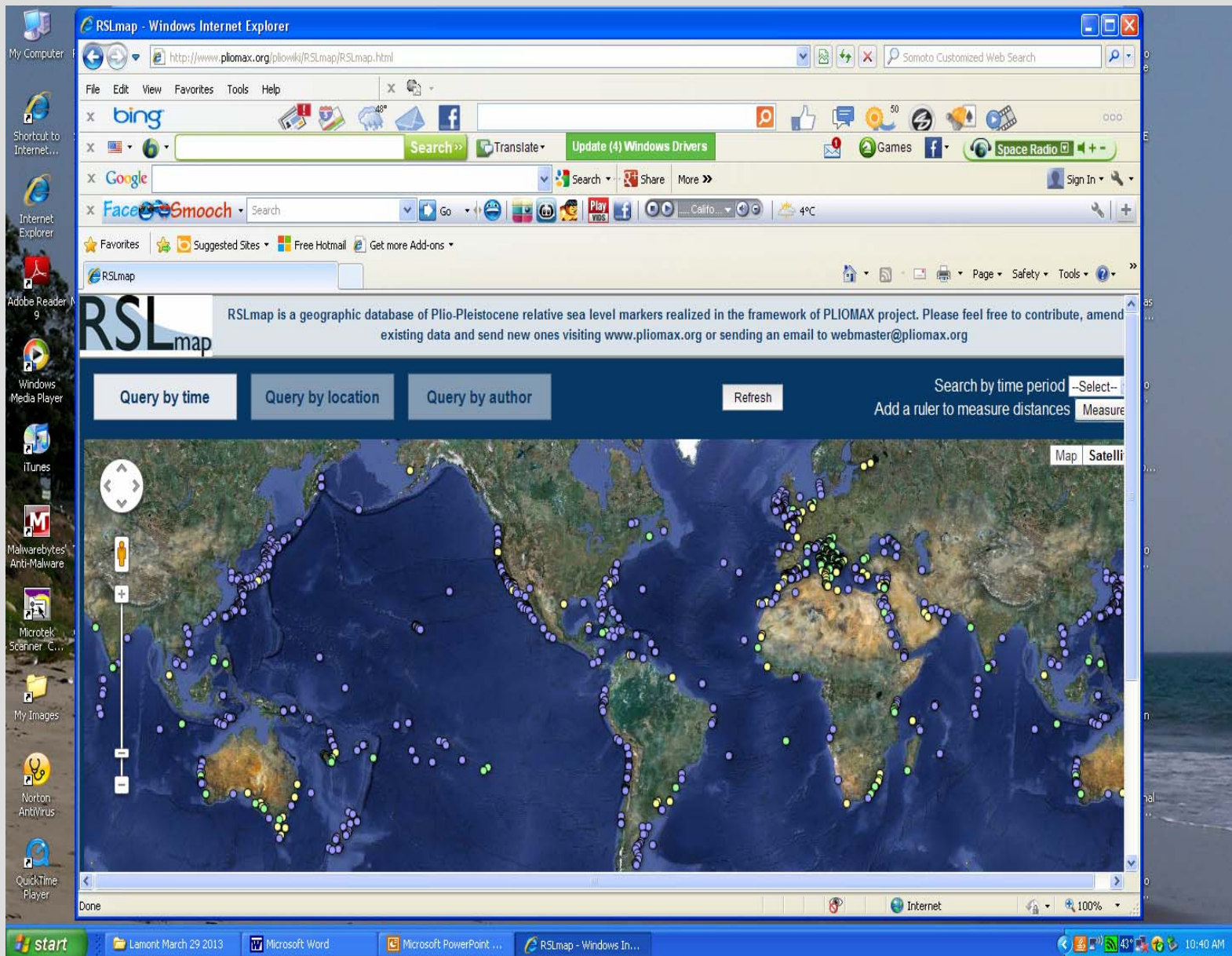
Quaternary Shorelines Inventories: Richards and Fairbridge



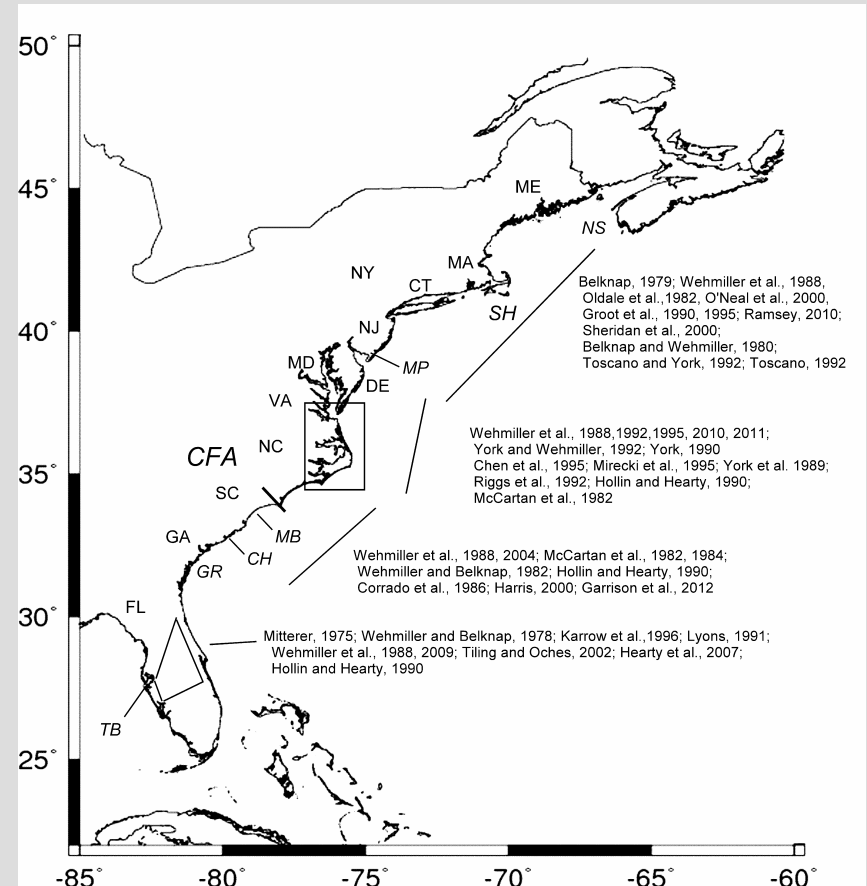
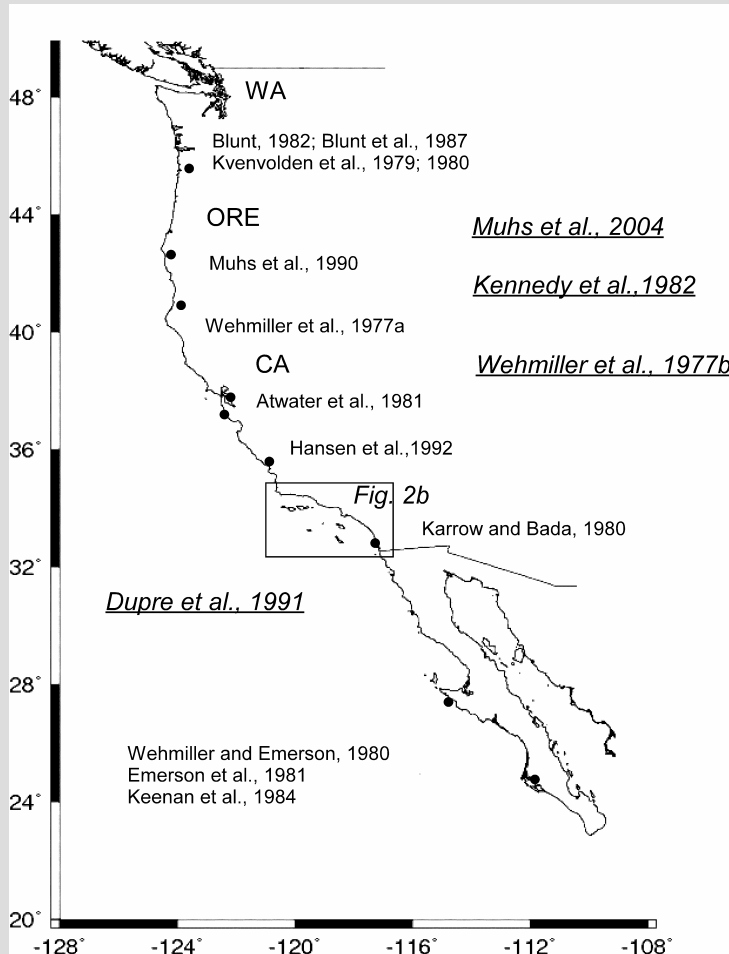
Crowdsourcing in the Quaternary sea level community: insights from the Pliocene

A. Rovere et al., Quaternary Science Reviews 56 (2012) 164-166



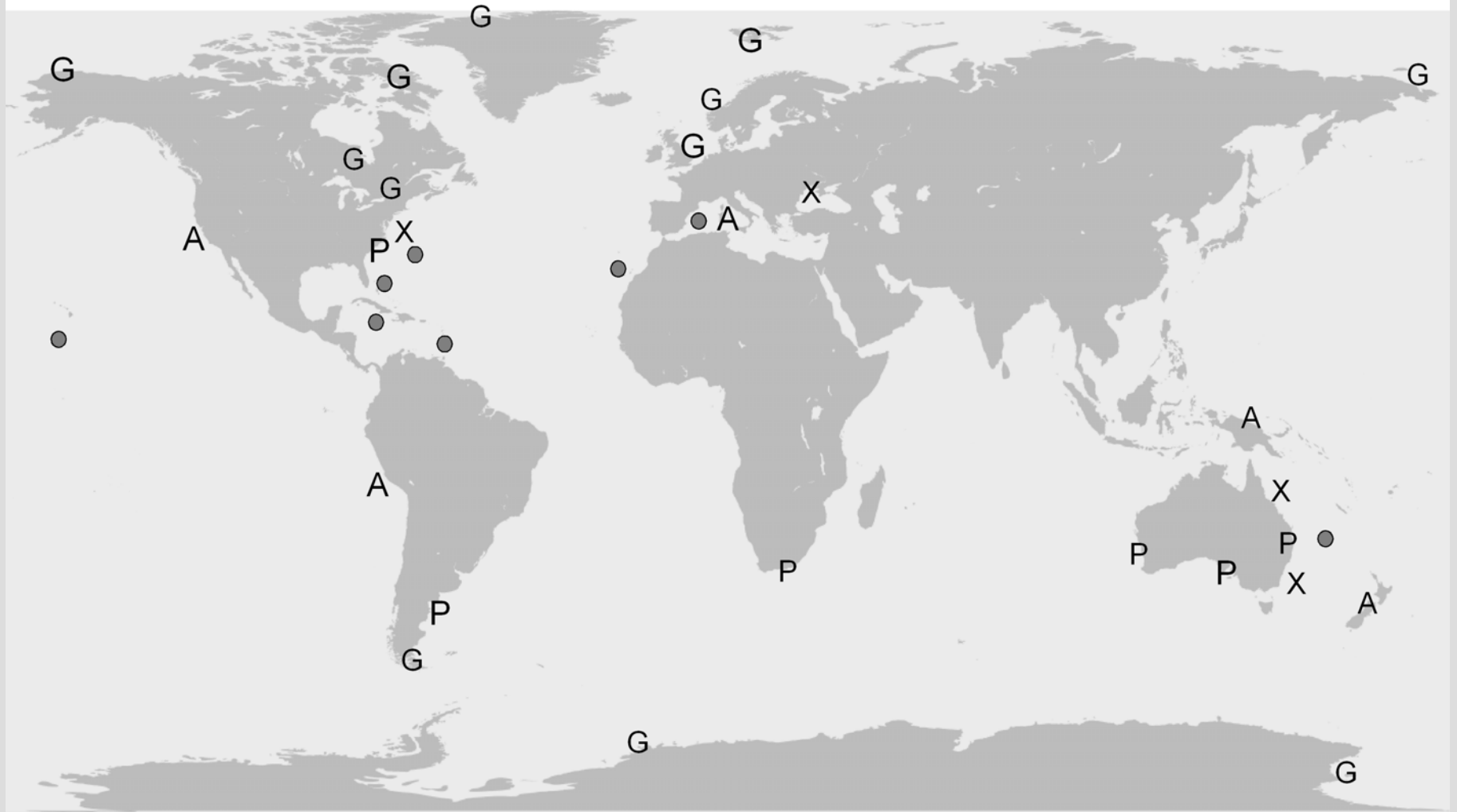


Wehmiller 2013 *Quat. Geochron.* Testing and applying AAR in US Quaternary coastal sequences



A=active; P=passive; G=glacial; X=offshore; ● = island

A=active; P=passive; G=glacial; X=offshore; ● = island



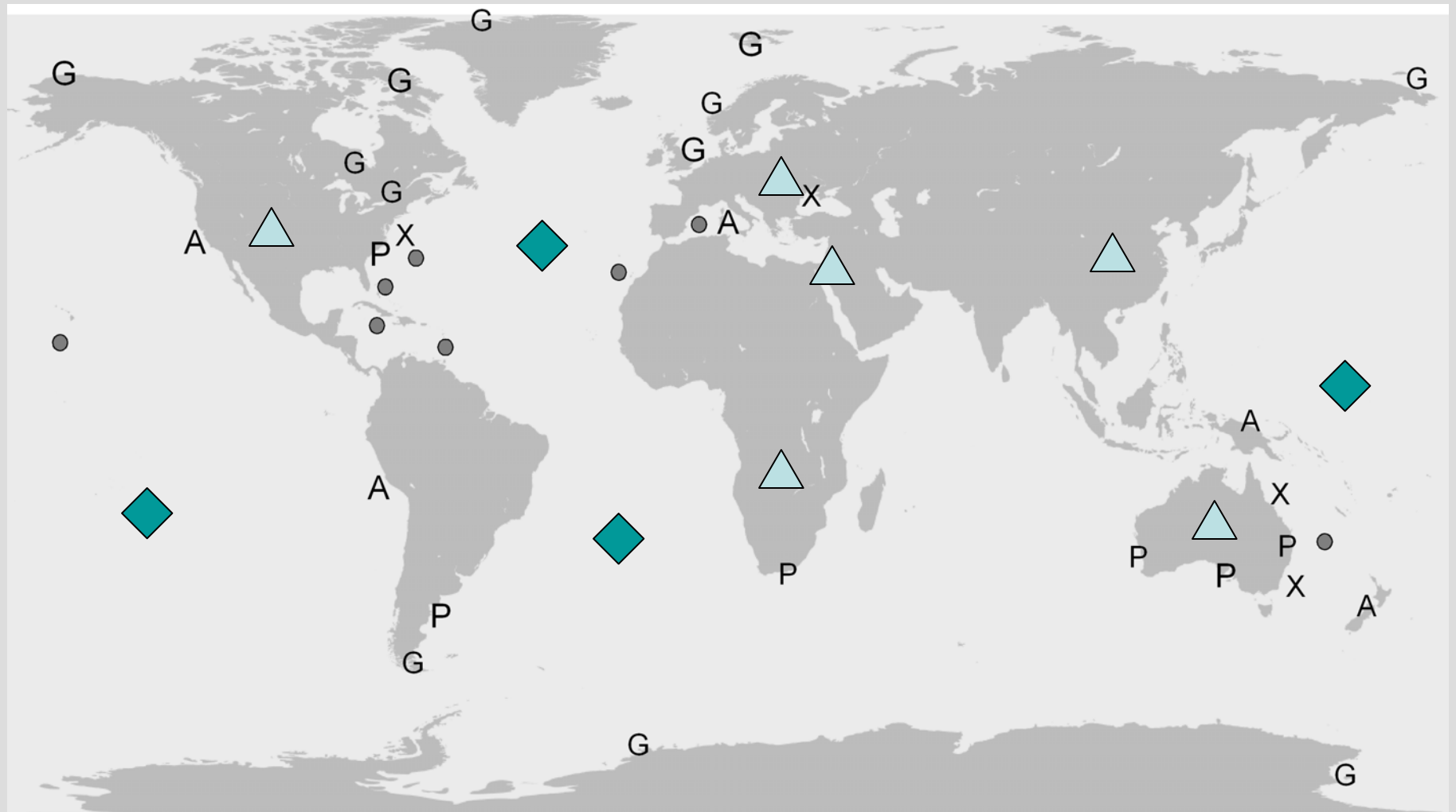
A=active; P=passive; G=glacial; X=offshore; ● = island



Terrestrial



Marine



Data management – NOAA project

- 2010 and 2011 Workshops, Denver and Bern (NSF \$\$)
- AAR labs from US, UK, Spain, Australia
- QG Special Issue Spring 2013
- NOAA site for *published* AAR datasets, established early 2011:
 - <http://www.ncdc.noaa.gov/paleo/aar.html>
 - Dozens more files to be uploaded from numerous labs!

Amino Acid Racemization (AAR) Data - Windows Internet Explorer

http://www.ncdc.noaa.gov/paleo/aar.html

File Edit View Favorites Tools Help

bing

Google

Facebook Smooch

Search

Sign In

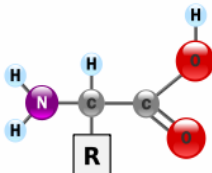
NOAA NATIONAL CLIMATIC DATA CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA Paleoclimatology

Home • Data • Projects • Perspectives • Outreach • About Paleo • Site Map

SHARE

Amino Acid Racemization (AAR) Data



Most amino acids can have two different configurations, "D" or "L". Living organisms generally have amino acids in the "L" configuration, but when the organism dies, the ratio of D/L moves slowly toward equilibrium, a process called racemization. Measuring the ratio of D/L in a geologic sample containing preserved amino acids can therefore allow calculations of the age of the sample.

▶ **Obtaining Data** *Please Cite Data Contributors!*

- Fletcher (1994) 6MYr Caribbean Foraminiferal AAR Data, [Text](#) or [Excel](#)
- Kaufman et al. (2008) Central Arctic Ocean 150KYr Amino Acid Racemization Data, [Text](#) or [Excel](#)
- Kennedy et al. (1982) US Pacific Coast Marine Terrace Quaternary Aminostratigraphy, [Text](#) or [Excel](#)
- Kern and Rockwell (1992) San Diego County Marine Terrace Quaternary Aminostratigraphy, [Text](#) or [Excel](#)
- King and Neville (1977) 800KYr Equatorial Pacific Foraminiferal AAR Data, [Text](#) or [Excel](#)
- Kvenvolden et al. (1973) 2MYr Atlantic Foraminiferal AAR Data, [Text](#) or [Excel](#)
- Miller et al. (2005) 140KYr New South Wales Australia AAR Data, [Text](#) or [Excel](#)
- Oches and McCoy (2001) 700KYr Chinese Loess Plateau AAR Data, [Text](#) or [Excel](#)
- Riggs et al. (1992) Dare County, North Carolina Quaternary Subsurface Aminostratigraphy, [Text](#) or [Excel](#)
- Rockwell et al. (1992) Santa Barbara County Marine Terrace Quaternary Aminostratigraphy, [Text](#) or [Excel](#)
- Wehmiller et al. (2010) Albemarle Embayment Quaternary Aminostratigraphy, [Text](#) or [Excel](#)
- Wehmiller and Hare (1971) Atlantic and Pacific Foraminiferal AAR Data, [Text](#) or [Excel](#)
- York and Wehmiller (1992) Cape Lookout, North Carolina Quaternary Aminostratigraphy, [Text](#) or [Excel](#)

start

Lamont March 29 2013

Lamont lecture march ...

Amino Acid Racemizat...

Internet

100%

34°

11:49 AM

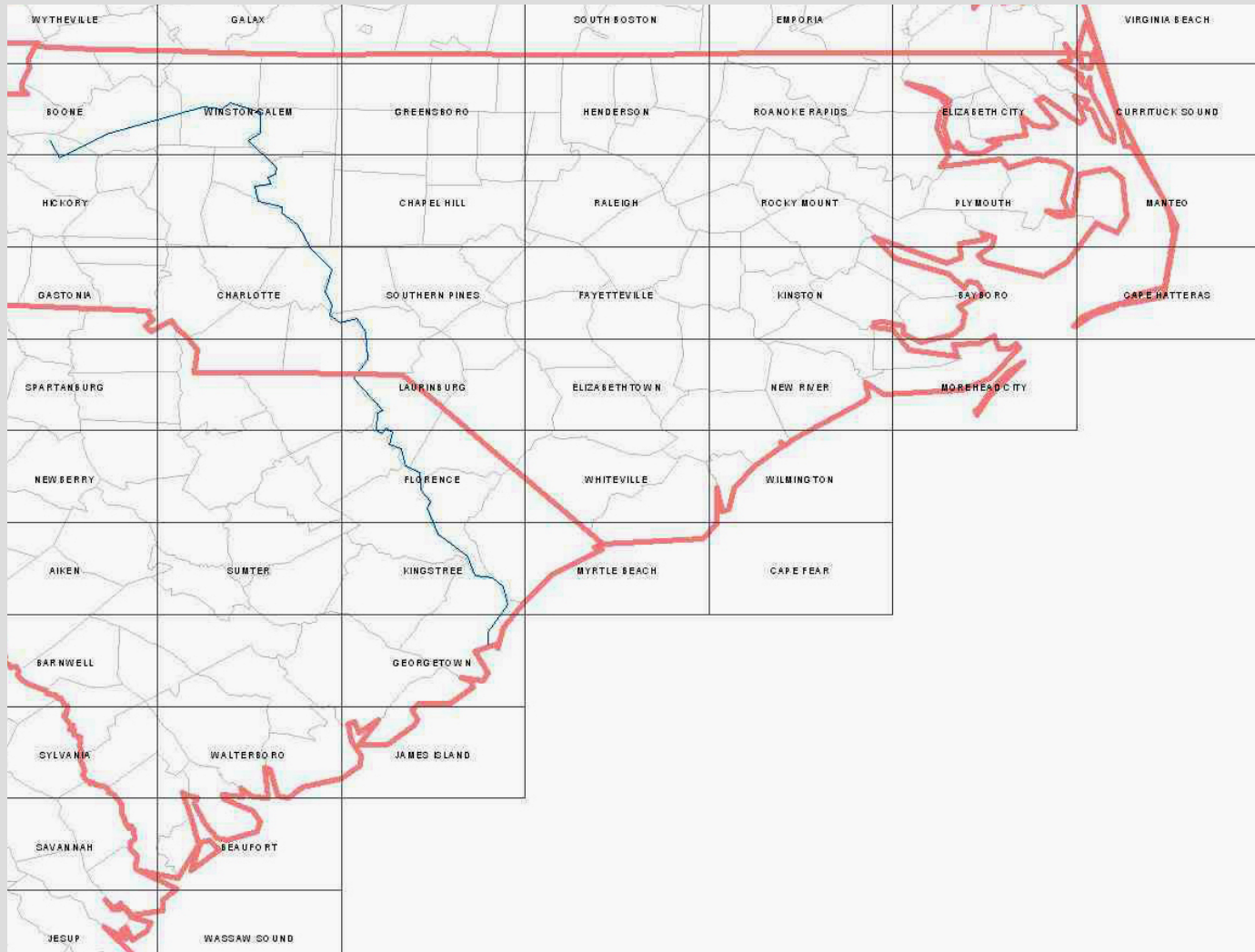
AARDB: >2800 localities, >7000 collections, >70,000 D/L values

The screenshot shows a Windows XP desktop environment. The main application window is titled 'AARDB' and contains a table of locality data. The table has the following columns: UDAMS, LocalityID, Map100k, Lat, Long, Coordinate, SurfaceE, and Notes and/or Referen. The data is sorted by UDAMS, showing localities from 08009 to 08144. The notes column contains various survey details and references.

UDAMS	LocalityID	Map100k	Lat	Long	Coordinate	SurfaceE	Notes and/or Referen
+ 08009	ICW-9	Myrtle Beach	33.816371	-78.722542	same as ICW		survey with msh 6 02
+ 08010	ICW-10	Myrtle Beach	33.83287	-78.68938	same as ICW		Sr analysis survey with msh 6 02
+ 08011	ICW-11	Myrtle Beach	33.8633	-78.5749	same as ICW		survey with msh 6 02
+ 08012	ICW-A	Myrtle Beach	33.703991	-78.93664	75		survey with msh 6/02
+ 08013	ICW-B	Myrtle Beach	33.70834	-78.930622	75		survey with msh 6/02
+ 08014	ICW-C	Myrtle Beach	33.71425	-78.9227	same as ICW		survey with msh 6/02 SAME AS ICW-1 AND MB-3
+ 08015	ICW-Ca	Myrtle Beach	33.71425	-78.9227	50		Formerly ICW C'
+ 08016	ICW-D	Myrtle Beach	33.719876	-78.9052	100		survey with msh 6/02
+ 08017	ICW-E	Myrtle Beach	33.746634	-78.857156			survey with msh 6/02
+ 08018	ICW-F	Myrtle Beach	33.75797	-78.82953			survey with msh 6/02 very near WA20
+ 08019	ICW-Fa	Myrtle Beach	33.76134	-78.82105	100		Formerly ICW F'
+ 08020	ICW-G	Myrtle Beach	33.8633	-78.5749	same as LR		survey with msh 6 02
+ 08022	ICW-I	Myrtle Beach	33.816371	-78.722542	same as ICW		survey with msh 6 02
+ 08023	ICW-Ia	Myrtle Beach	33.816371	-78.722542			Formerly ICW-I'
+ 08024	ICW-J	Myrtle Beach	33.769162	-78.810185	same as ICW		survey with msh 6 02 reposition in GE 4 23 10 lat Ic
+ 08025	ICW-K	Myrtle Beach	33.795686	-78.762818	same as ICW		survey with msh 6 02
+ 08026	ICW-L	Myrtle Beach	33.797258	-78.758157			survey with msh 6 02
+ 08027	ICW-M	Myrtle Beach	33.798507	-78.754111			survey with msh 6 02
+ 08028	ICW-N	Myrtle Beach	33.83287	-78.68938	same as ICW		survey with msh 6 02
+ 08029	ICW-CCSC	Myrtle Beach	33.86262	-78.639024			survey with msh 6 02
+ 08043	MB-317	Myrtle Beach	33.770369	-78.808192	similar to ICW		survey with msh 6 02
+ 08044	MB-AP-3	Myrtle Beach	33.817099	-78.72172	50		msh survey 6 02
+ 08045	LRN	Myrtle Beach	33.8633	-78.5749	same as ICW		equivalent to ICW-11 and ICW G Liddicoat reported
+ 08049	MB-3	Myrtle Beach	33.713534	-78.923646	see ICW 1 s		SAME AS ICW-C AND ICW-1
+ 08139	5/19/93 #1	Myrtle Beach	33.747168	-78.855786	50		survey with msh 6 02
+ 08140	5/19/93 #2	Myrtle Beach	33.766397	-78.814784	50		survey with msh 6 02
+ 08143	LLY 3/15/93	Myrtle Beach	33.76875	-78.76875	50		
+ 08144	LITTLE RIVER INLET	Myrtle Beach	33.85	-78.55	200		

The desktop also shows a taskbar with several open applications, including 'Microtek Sc...', 'Switchboard...', 'Show Table...', 'tblLocation...', 'GSA 2013', and 'Microsoft P...'. The system clock in the bottom right corner indicates the date and time: 10:30 AM, Thursday, 9/26/2013.

USGS 1:100K topo maps: NC and SC



My AARDB

File Edit View Insert Format Records Tools Window Help Adobe PDF

cboMap100k

Type a question for help

Query Mean AAR Ratios

Mean Ratios Query

Step 1. Choose Fields to display in Query.
NOTE: If no fields are selected, default is Show All.

Step 2. Specify query parameters by category.
(i.e. Restrict query with constraints)

Fields

Available

- UDAMS
- Map100k
- LocalityID
- Lat
- Long
- SurfElev_m
- SamplingType
- SmpldIntTop_m
- SmpldIntBot_m
- SampleID
- SampleType

ALL

Selected

Field Order

Parameters

Location Collection and Sample SubSample Results Procedure Taphonomy

Location

UDAMS

OR

Range TO NOT

Map Sheet 100K

Myrtle Beach

Latitude TO

Longitude TO

Locality

051-GC43

101 Ranch Pit

101 Ranch Pit -2 site 1 Bed

10620

10621

10622

You can choose more than one.

Output

Include Std. Dev.

(Field choices will have to be re-selected)

Calc. Sample Elevation

Save Query As...

Export/Save to Excel

Open Excel File

Note: Only records with D/L entries are queried.

Run Query

List Saved Queries

Refresh Form

Form View

NUM

Slide 5 of 7

Default Design

English (U.S.)

Teacher advice.pdf

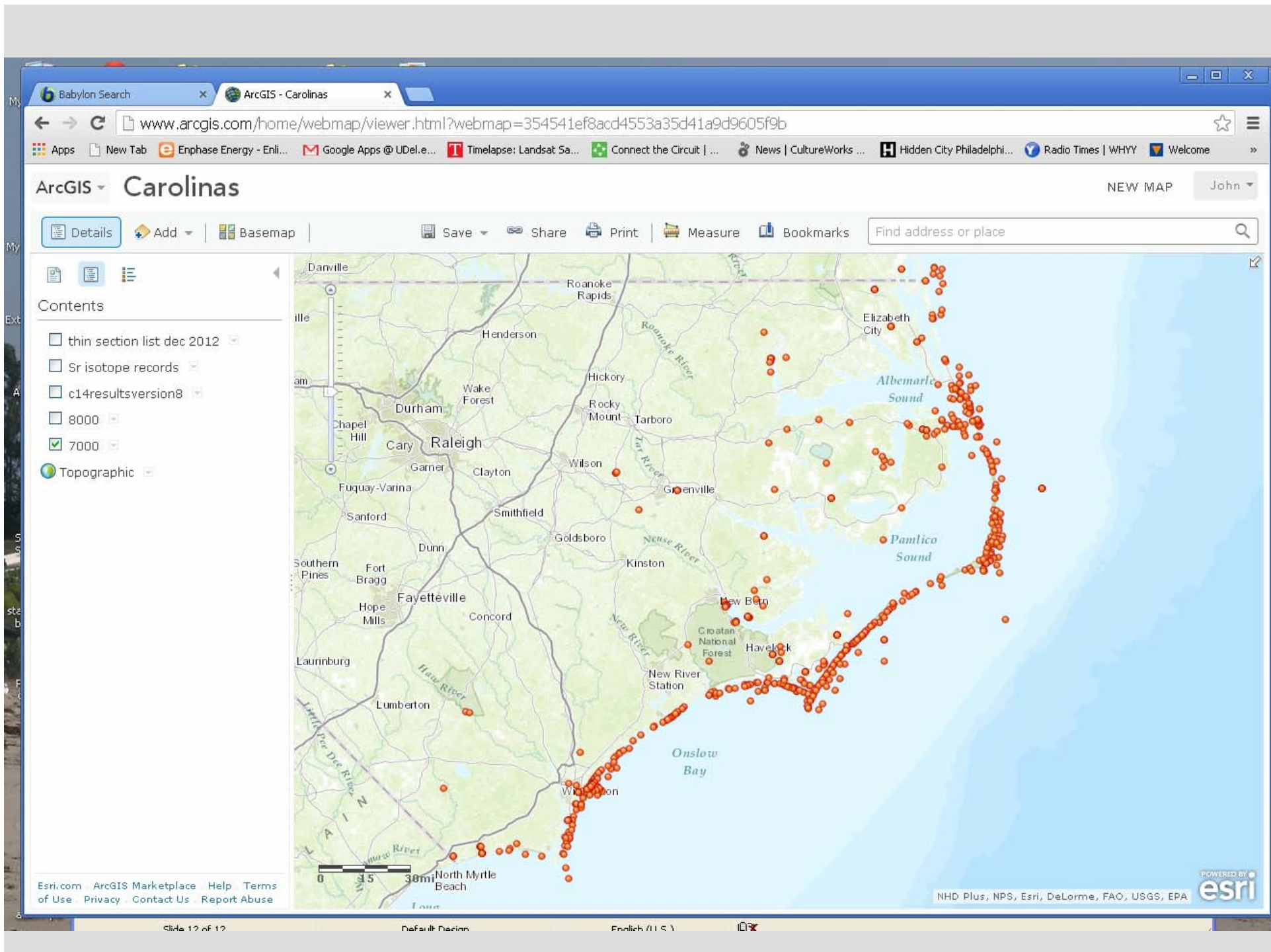
type: Microsoft PowerPoint Presentation Author: JOHN Hiler: GSA AARDB Date Modified: 8/30/2013 10:41 AM Size: 6.96 MB

6.96 MB

My Computer

Data management: ArcGis

- Compilation of AAR, 14C, U-Th, OSL, and other analytical data for US Pacific and Atlantic sites – see Wehmiller 2012 QG review paper
- South American sites are in progress
- Ultimately hope to coordinate with locality databases from various museums (LACM, FLMNH, PRI,)



ArcGIS - Carolinas

NEW MAP

Details

Add

Basemap

Save

Share

Print

Measure

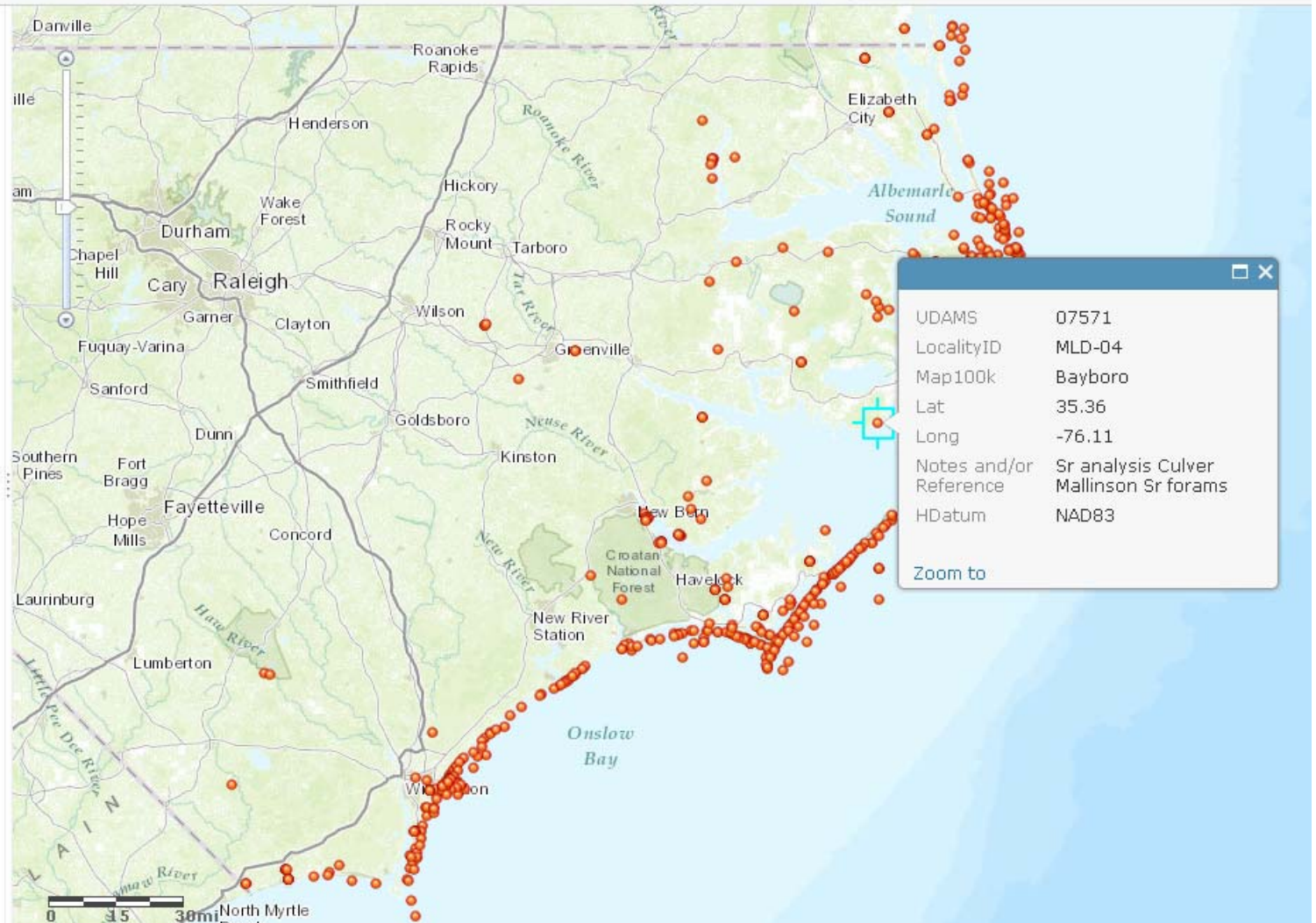
Bookmarks

Find address or place



Contents

- ☐ thin section list dec 2012
- ☐ Sr isotope records
- ☐ c14resultsversion8
- ☐ 8000
- ☒ 7000
- ☒ Topographic



ArcGIS Carolinas

NEW MAP

John

Details

Add

Basemap

Save

Share

Print

Measure

Bookmarks

Find address or place



Contents

☐ thin section list dec 2012

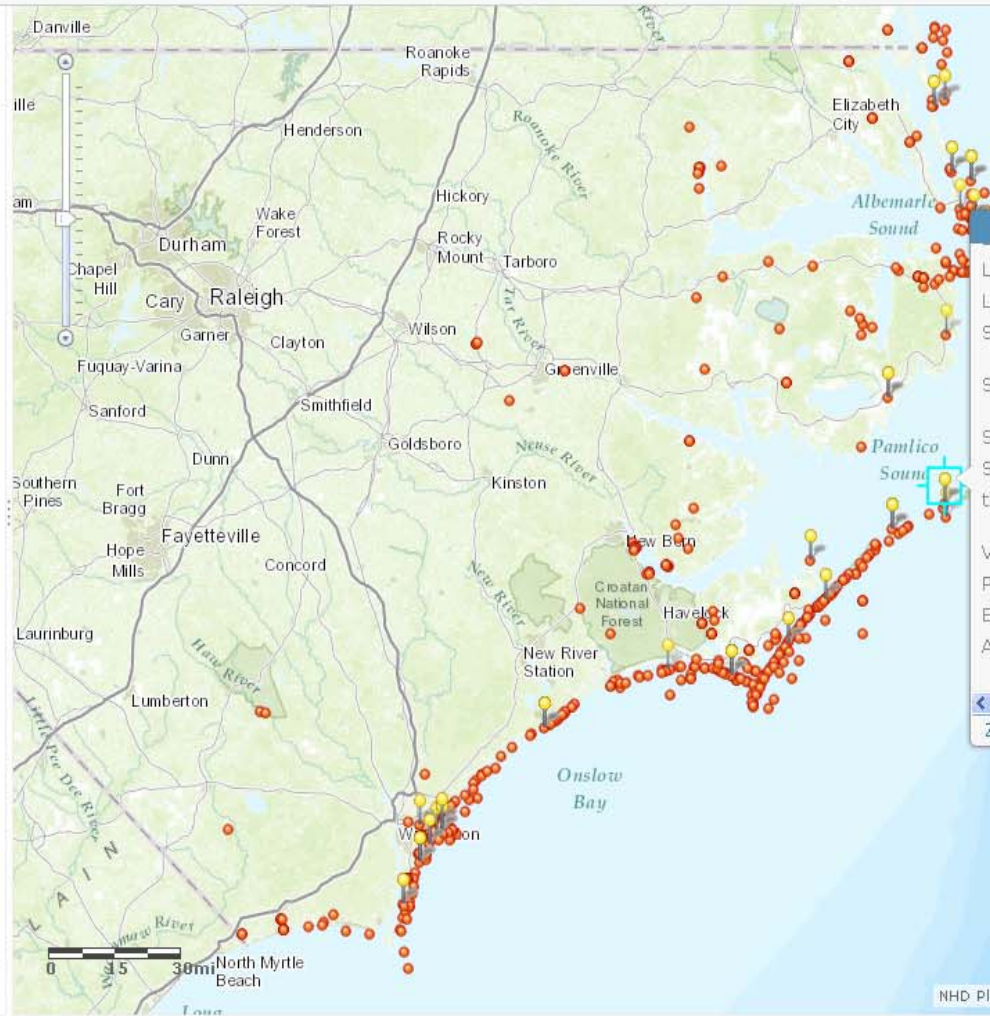
☐ Sr isotope records

☒ c14resultsversion8

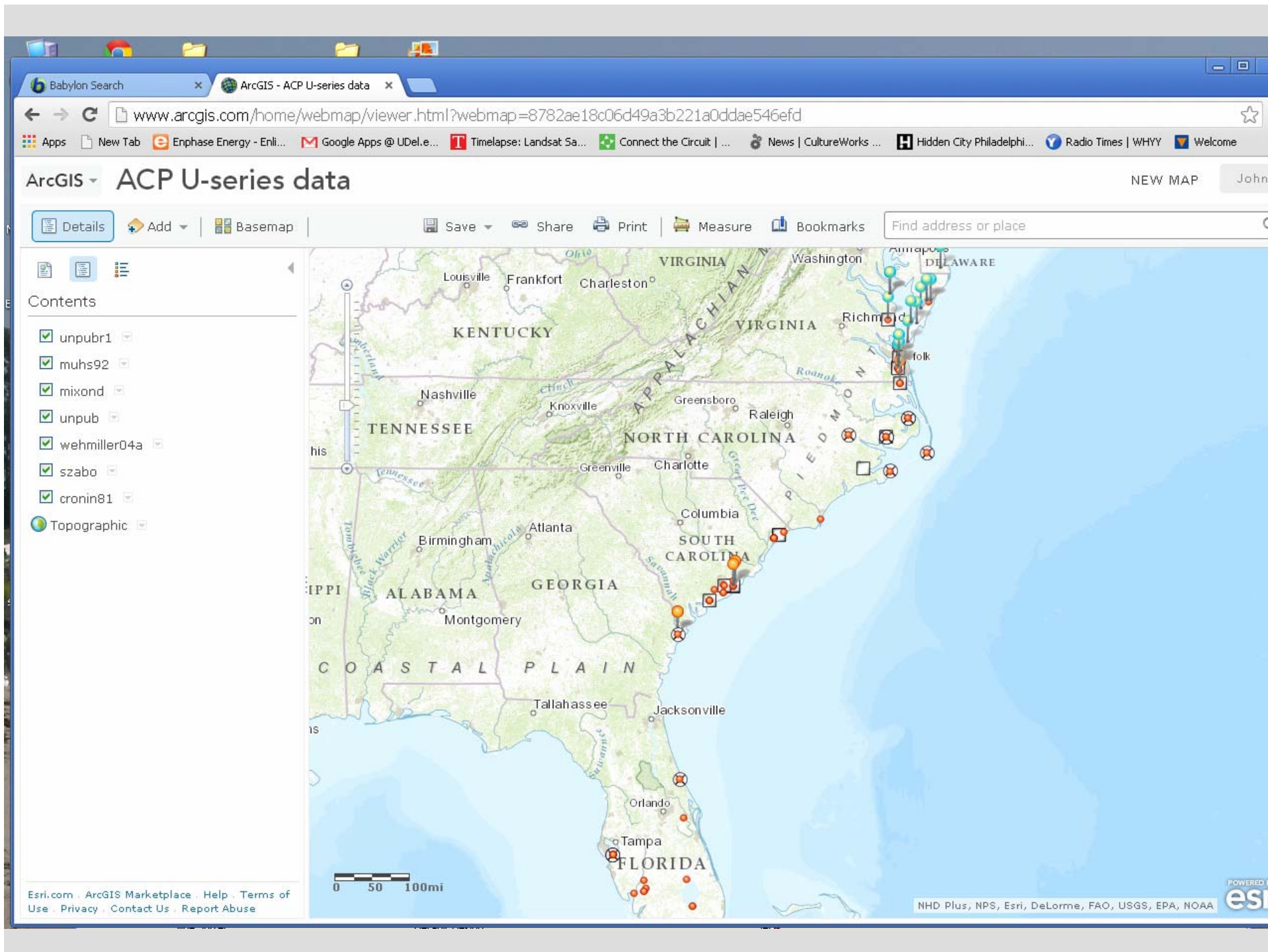
☐ 8000

☒ 7000

Topographic



Lat	35.19
Long	-75.78
SamplingType	Inland Core
Sample ID	jw2004-063
Sample Type	Chione
SubsampleID	
tblOtherResult.SubSampleID	OS-45333
Value	6,900
Prefix	EqualTo
Error	35
AnalysisProcedureID	C14 AMS
Zoom to	



Babylon Search x ArcGIS - East Coast South A...

www.arcgis.com/home/webmap/viewer.html?webmap=3a0bda95e0cf4d4696006ced6f55584f

Apps New Tab Enphase Energy - Enli... Google Apps @ UDel.e... Timelapse: Landsat Sa... Connect the Circuit | ... News | CultureWorks ... Hidden City Philadelphi... Radio Times | WHYY Welcome

ArcGIS East Coast South America AAR studies

NEW MAP John

Details Add Basemap Save Share Print Measure Bookmarks Find address or place

Contents

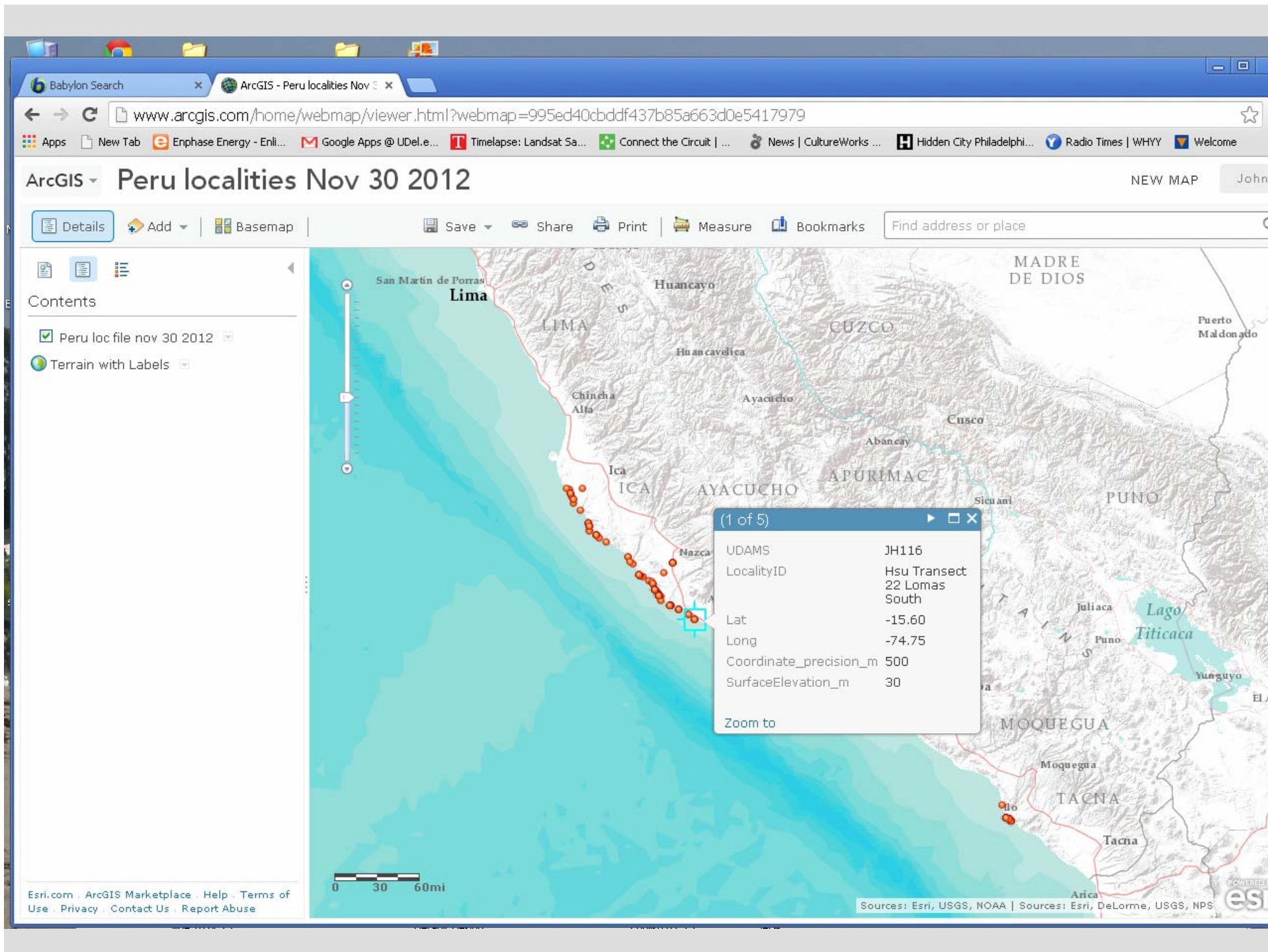
- ☒ East coast S
- ☐ Topographic

Lat -47.75
Lon -65.89
Description Figure 18 Rutter et al 1989 QSR
Weblink [More info](#)
Zoom to

0 150 300mi

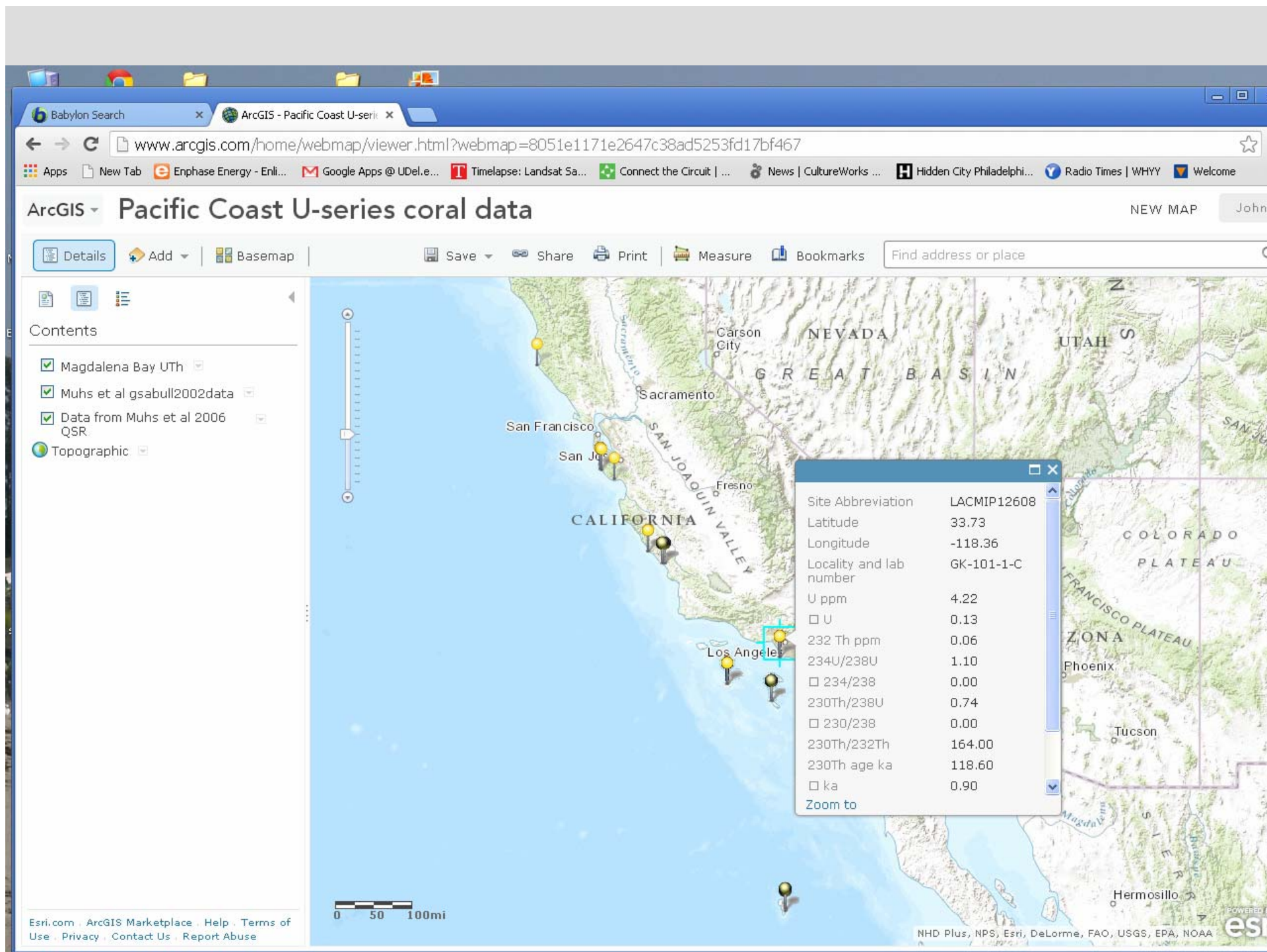
Esri.com ArcGIS Marketplace Help Terms of Use Privacy Contact Us Report Abuse

POWERED BY Esri, DeLorme, FAO, USGS, NOAA



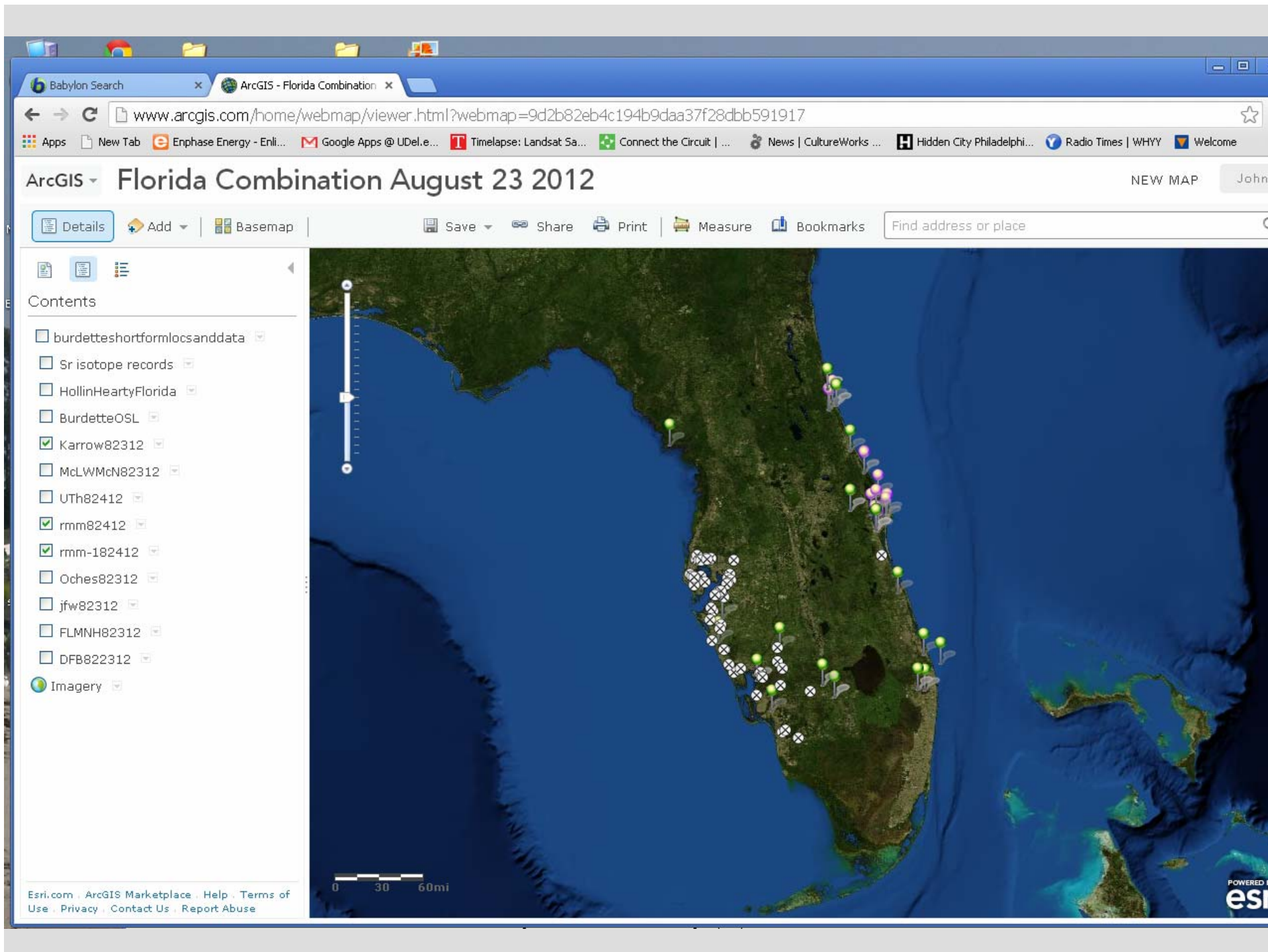
Coastal Peru





Data management: Florida project

- Very first publications on AAR used samples from Florida; numerous collections and analyses done since late 1960's; very few publications; current effort to compile history of work using ArcGis site



ArcGIS - Florida Combination August 23 2012 - Windows Internet Explorer

http://www.arcgis.com/home/webmap/viewer.html?webmap=9d2b82eb4c194b9daa37f28dbb591917&extent=-86.8759,26.4289,-75.6918,31.389

File Edit View Favorites Tools Help

bing

Search >> Translate > (3) New Driver Updates >

Google

Search > Share More >>

Facebook Smooch

Search > Go > Play VIDS > f > ... Califo... > -6°C

Favorites Suggested Sites Free Hotmail Get more Add-ons >

ArcGIS - My Content ArcGIS - Florida Combinat... >

ArcGIS Florida Combination August 23 2012

New Map My Content > Help > Sign I

Details Add > Basemap

Save > Share > Print > Measure > Bookmarks >

Contents

- ☐ burdettesshortformlocsanddata
- ☐ Sr isotope records
- ☐ HollinHeartyFlorida
- ☐ BurdetteOSL
- ☒ Karrow82312
- ☐ McLWMCN82312
- ☐ UTh82412
- ☐ rmm82412
- ☐ rmm-182412
- ☐ Oches82312
- ☐ jfw82312
- ☐ FLMNH82312
- ☐ DFB822312
- ☒ Imagery

Esri.com Terms of Use Privacy Contact Us Report Abuse

0 30 60mi

Source Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, Aero...

POWERED BY esri

Internet 100%

Source	pk
analysis	usf/um
Pref	1
UDAMS	10,139
LocalityID	FK-42 Charles Lassett Pit
Map100k	Fort Myers
Lat	26.75
Long	-81.45
Coordinate_precision_m	300
SurfaceElevation_m	
Notes and/or Reference	karrow notes portell reviewed locality info
Zoom to	

Data management: Summary

- Compilation of AAR, ^{14}C , U-Th, OSL, and other analytical data for US Pacific and Atlantic sites – see Wehmiller 2013 *Quat. Geochron.* review paper
- South American sites are in progress; European, Arctic & Australian sites remain
- Ultimately hope to coordinate with locality databases from various museums (Los Angeles County Museum, Florida Museum of Natural History, Paleontological Research Institute)