

Natural History Collections Development at TACC

AIM-UP!

Fairbanks, Alaska

February 20th, 2012


TACC's Collaborations with TNSC


- Entomology
- Non-vertebrate Paleontology
- Botany (PRC)
- Ichthyology

A Couple of Examples

- Odonates
 - Hosting and Migration of OdonataCentral.org
 - Development of MigratoryDragonflyPartnership.org
- Non-vertebrate Paleontology
 - Hosting of PaleoCentral.org
 - Development of a Paleogeographic Mapping Service





OdonataCentral.org





Home
My OC
Checklists
Maps
Photos/ID
Records
Resources
Publications
Societies

Submit Record |
 Browse Submitted Records |
 Dot Map Project Records |
 My Records |
 UT Collection |
 Stats

Photo	Species	Collected	Submitted	Vetted	Actions
	<p>Scientific Name: <i>Enallagma signatum</i></p> <p>Common Name: Orange Bluet</p>	<p>Collected On: 2011-Oct-07</p> <p>Collected By: Skyler McLean</p> <p>Jurisdiction: Drew County, Arkansas, United States at 33.59157° N 91.81091° W</p> <p>Favorite: UAM Monticello Weevil Pond</p>	<p>Submitted On: 2012-Feb-16</p> <p>Submitted By: Skyler McLean</p> <p>OC#: 367296</p>	<p>Vetted On: Unknown Date</p> <p>Vetted By: N/A</p> <p>Decision: Pending</p>	
	<p>Scientific Name: <i>Ischnura ramburii</i></p> <p>Common Name: Rambur's Forktail</p>	<p>Collected On: 2011-Oct-13</p> <p>Collected By: Skyler McLean</p> <p>Jurisdiction: Drew County, Arkansas, United States at 33.59157° N 91.81091° W</p> <p>Favorite: UAM Monticello Weevil Pond</p>	<p>Submitted On: 2012-Feb-15</p> <p>Submitted By: Skyler McLean</p> <p>OC#: 367295</p>	<p>Vetted On: 2012-Feb-15</p> <p>Vetted By: Steve Krotzer</p> <p>Decision: Confirmed</p>	

OdonataCentral.org

- Collects data from the community of amateurs and odonate enthusiasts (i.e. the bird-watchers model)
- Moved backend from Oracle to MySQL
- Redesigned schema for normalization and data integrity
- Will be re-implementing and integrating with Migratory Dragonfly Partnership site

The Migratory Dragonfly Partnership

- New site seeking to gain insight into the migratory patterns of 5 North American species
- Like OdonataCentral, will seek to leverage “citizen scientist” involvement.

The Migratory Dragonfly Partnership



[Home](#)

[My Observations](#)

[MDP Observations](#)

[Localities](#)

[Resources](#)

[Administration](#)

To better understand and conserve North America's dragonfly migration, dragonfly experts, nongovernmental programs, academic institutions, and federal agencies from the United States, Mexico, and Canada have formed the collaborative **Migratory Dragonfly Partnership (MDP)**.

Regular monitoring and centralized reporting among participants across three nations will help us answer some of the many questions currently surrounding dragonfly migration and provide information needed to create cross-border conservation programs to protect and sustain the phenomenon. This site will allow you to submit dragonfly migration observations.



A tandem pair of Common Green Darners (*Anax junius*) laying eggs. © Dennis Paulson.

Status

You are logged in as:

Tomislav Urban

Administrator

[\(sign out\)](#)

Stats

Submissions:

Total: 10

[Enter New Observation](#)

The Migratory Dragonfly Partnership

Create a New Flight Observation

Step: Enter Observed Taxa

Taxon	Confidence	% of Flight
x Anax junius (Common Green Darner)	High	75
x Tramea lacerata (Black Saddlebags)	High	25
Total Percentage		<u>100</u>

? Taxon

? Identification Confidence

? Percentage

Add

The Migratory Dragonfly Partnership

Create a New Flight Observation

Step: Enter Point Counts

Point Counts

	Start Time	End Time	Individuals Counted	Notes	Individuals/min.
x	9:00	9:15	12		0.8
x	9:15	9:30	8		0.53
x	9:30	9:45	7		0.47
x	9:45	10:00	13		0.87

? Start Time :

? End Time :

? Individuals Counted

? Notes

Add

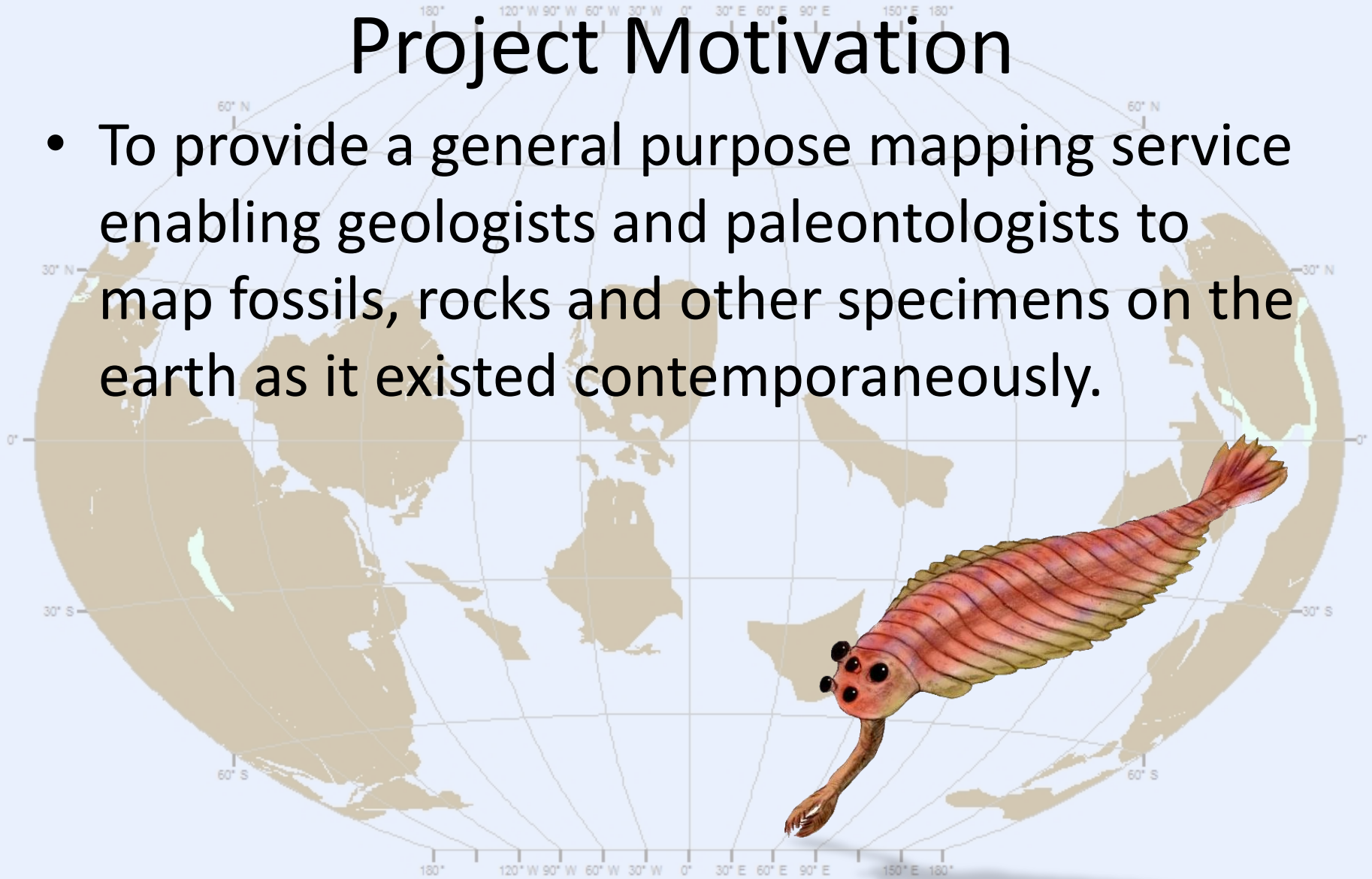
The Migratory Dragonfly Partnership





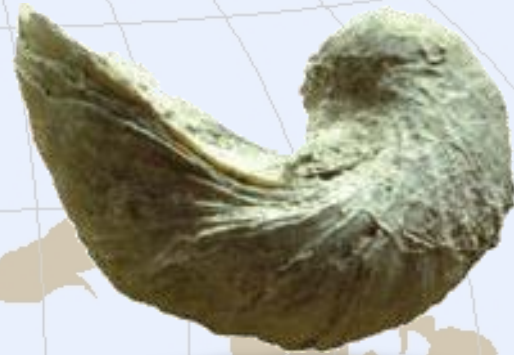
Project Motivation

- To provide a general purpose mapping service enabling geologists and paleontologists to map fossils, rocks and other specimens on the earth as it existed contemporaneously.



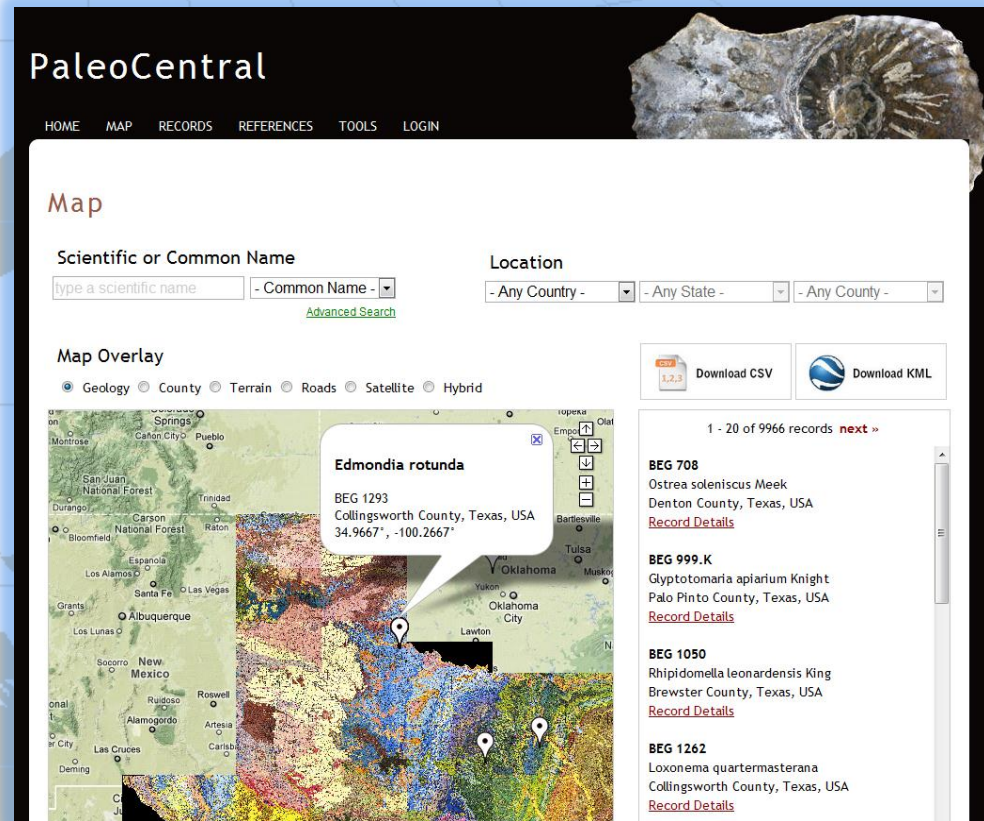
Outline

- Project Genesis
- Data Sources
- Implementation
 - Approach
 - Architecture
 - Interface
- Future Work



Project Genesis

- The Non-vertebrate Paleontology Lab (NPL) at the University of Texas had the need to plot specimens in deep geologic time on their web site.



The screenshot displays the PaleoCentral website interface. At the top, there is a navigation menu with links for HOME, MAP, RECORDS, REFERENCES, TOOLS, and LOGIN. Below the menu is a search bar with the text "Scientific or Common Name" and a dropdown menu for "Location". The search bar contains the text "type a scientific name" and a dropdown menu for "Common Name". A "Map Overlay" section is visible, showing a map of Texas with a data overlay. The overlay is a colorful, textured map showing the distribution of specimens. A callout box for "Edmondia rotunda" is visible, providing the following information: "BEG 1293", "Collingsworth County, Texas, USA", and "34.9667°, -100.2667°". To the right of the map, there are buttons for "Download CSV" and "Download KML". Below the map, there is a list of records, including "BEG 708", "BEG 999.K", "BEG 1050", and "BEG 1262", each with a "Record Details" link.



In geographic
Context



Cretaceous New Mexico



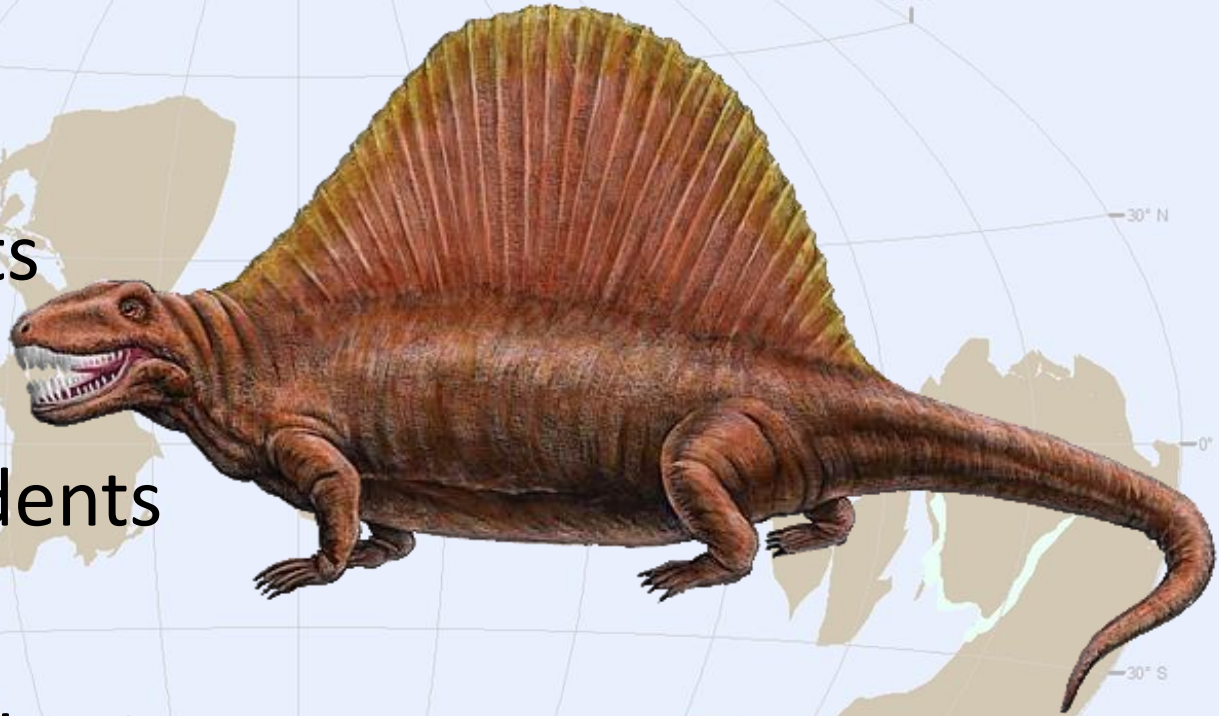
Fossil Find
Location



Modern New Mexico

Audience

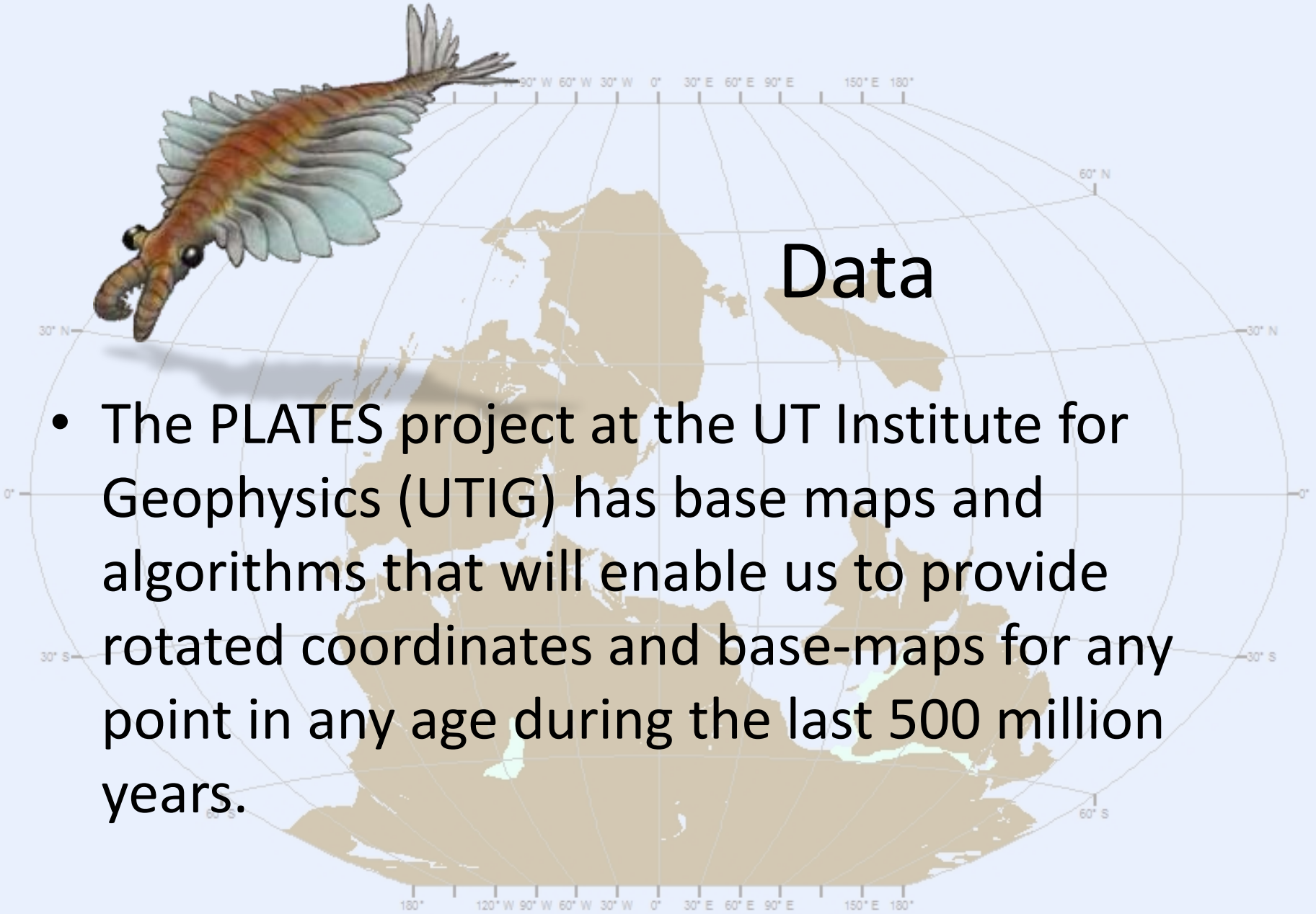
- Geologists
- Paleontologists
- Undergrads
- Graduate Students
- Researchers
- Amateurs/Enthusiasts



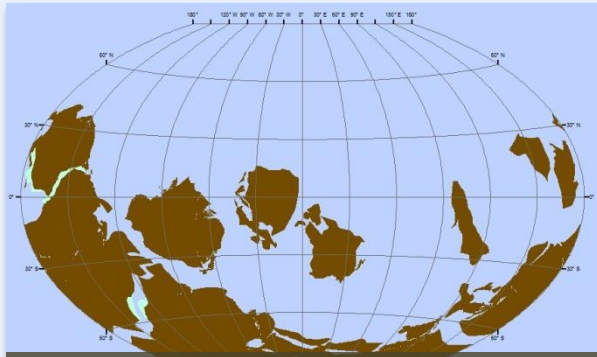


Data

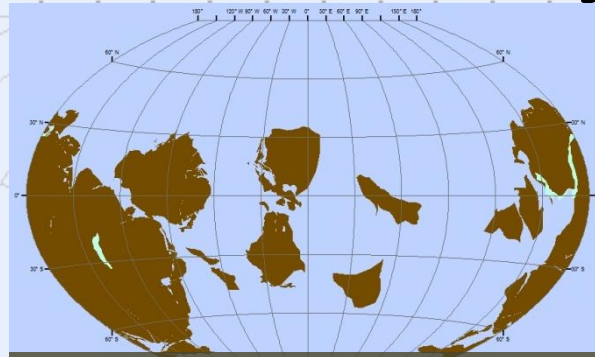
- The PLATES project at the UT Institute for Geophysics (UTIG) has base maps and algorithms that will enable us to provide rotated coordinates and base-maps for any point in any age during the last 500 million years.



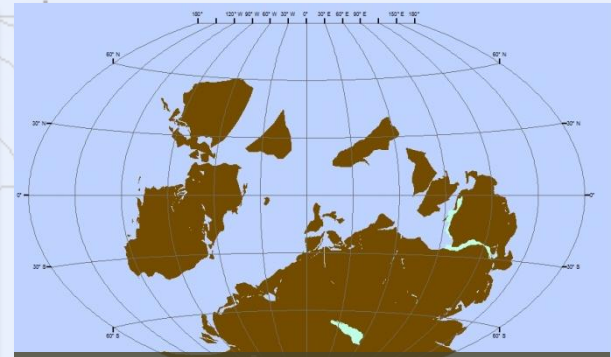
The PLATES Project



Cambrian ≈ 535 mya



Ordovician ≈ 461 mya



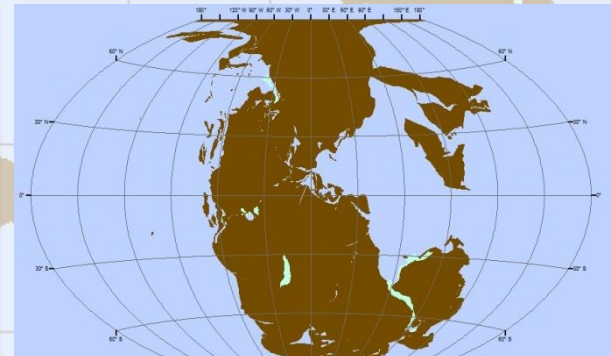
Devonian ≈ 416 mya



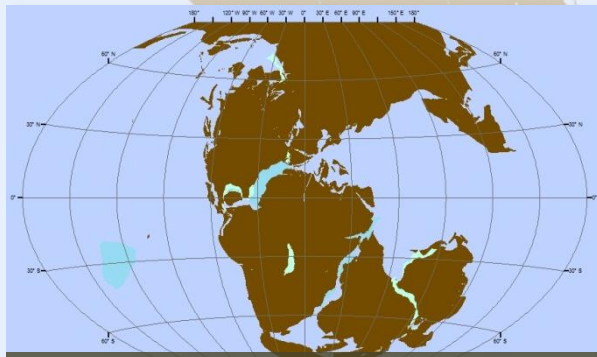
Carboniferous ≈ 317 mya



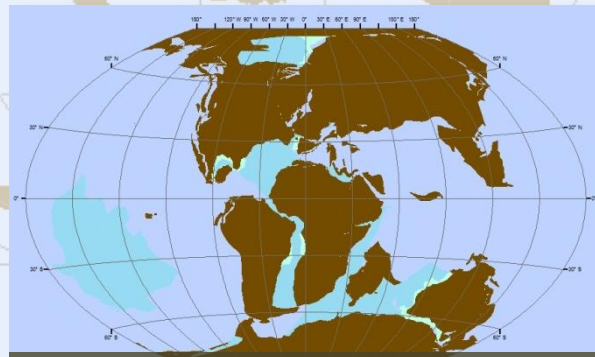
Permian ≈ 276 mya



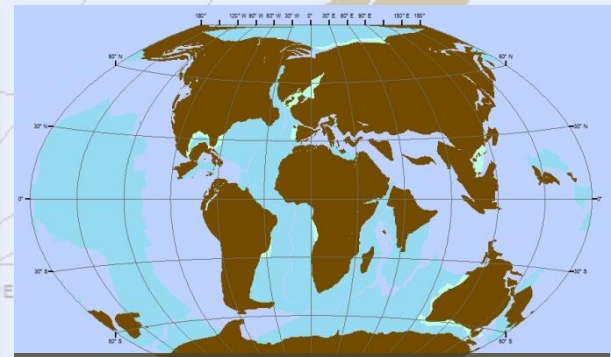
Triassic ≈ 222 mya



Jurassic ≈ 158 mya



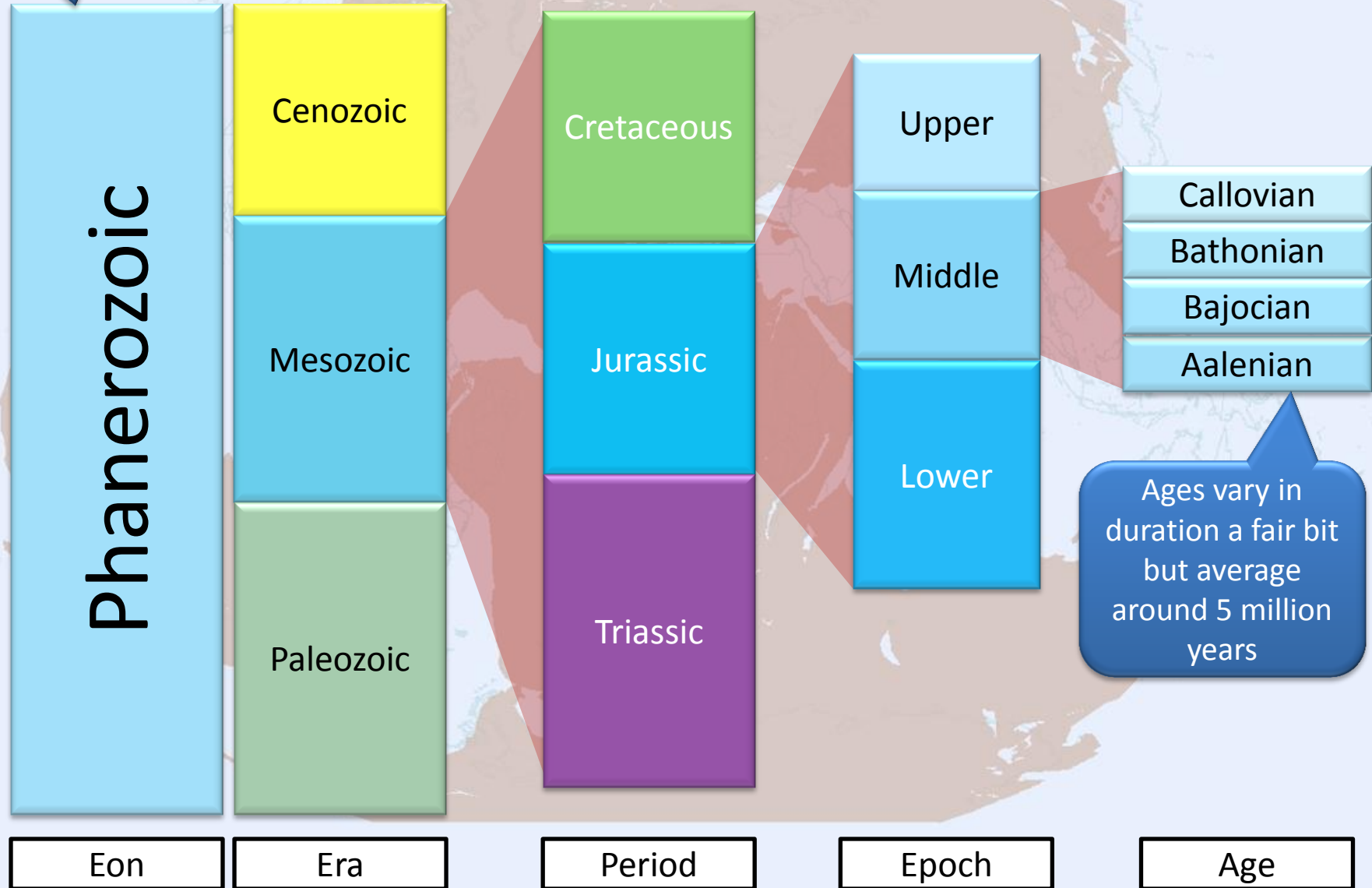
Cretaceous ≈ 112 mya



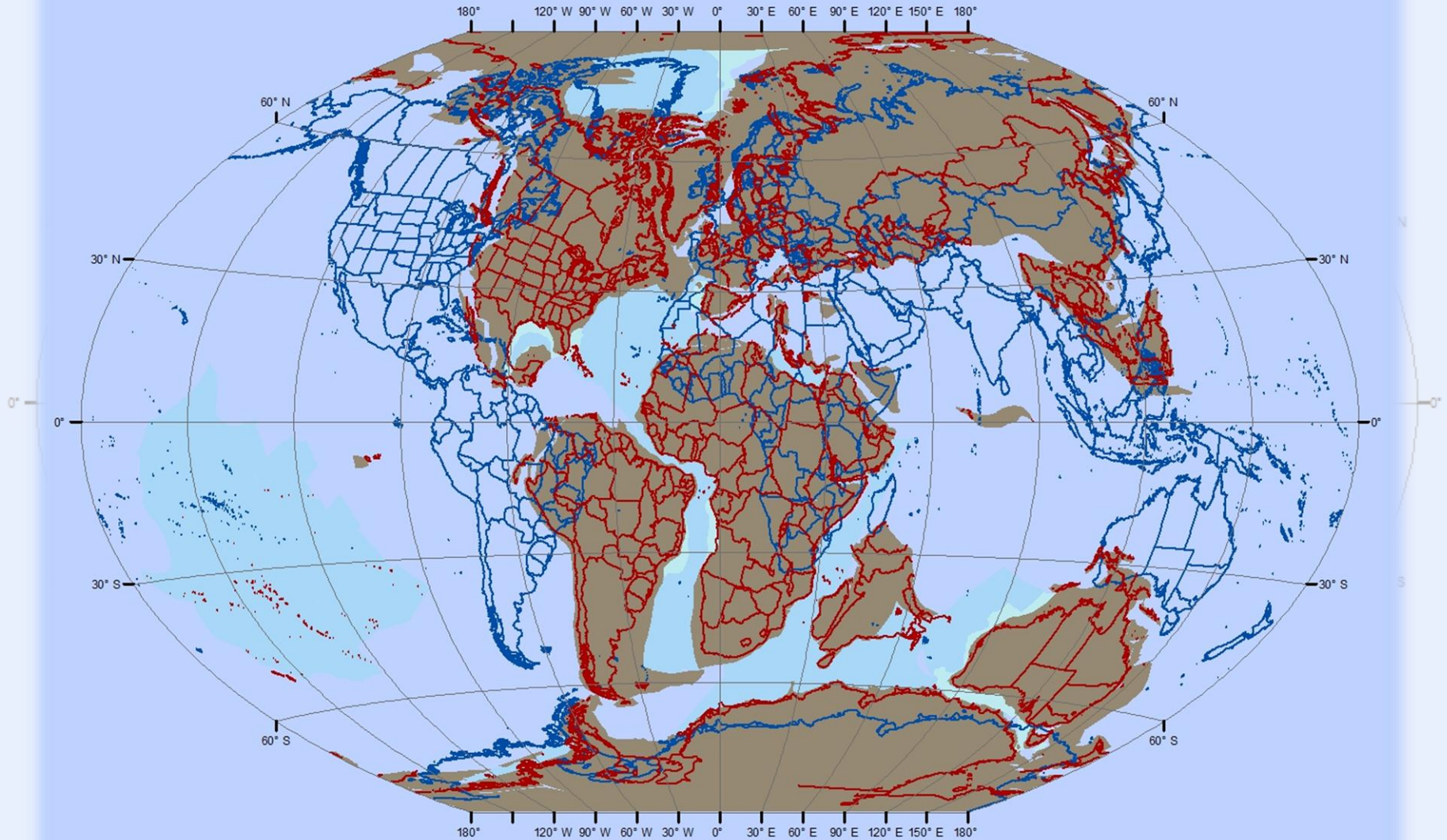
Paleogene ≈ 57 mya

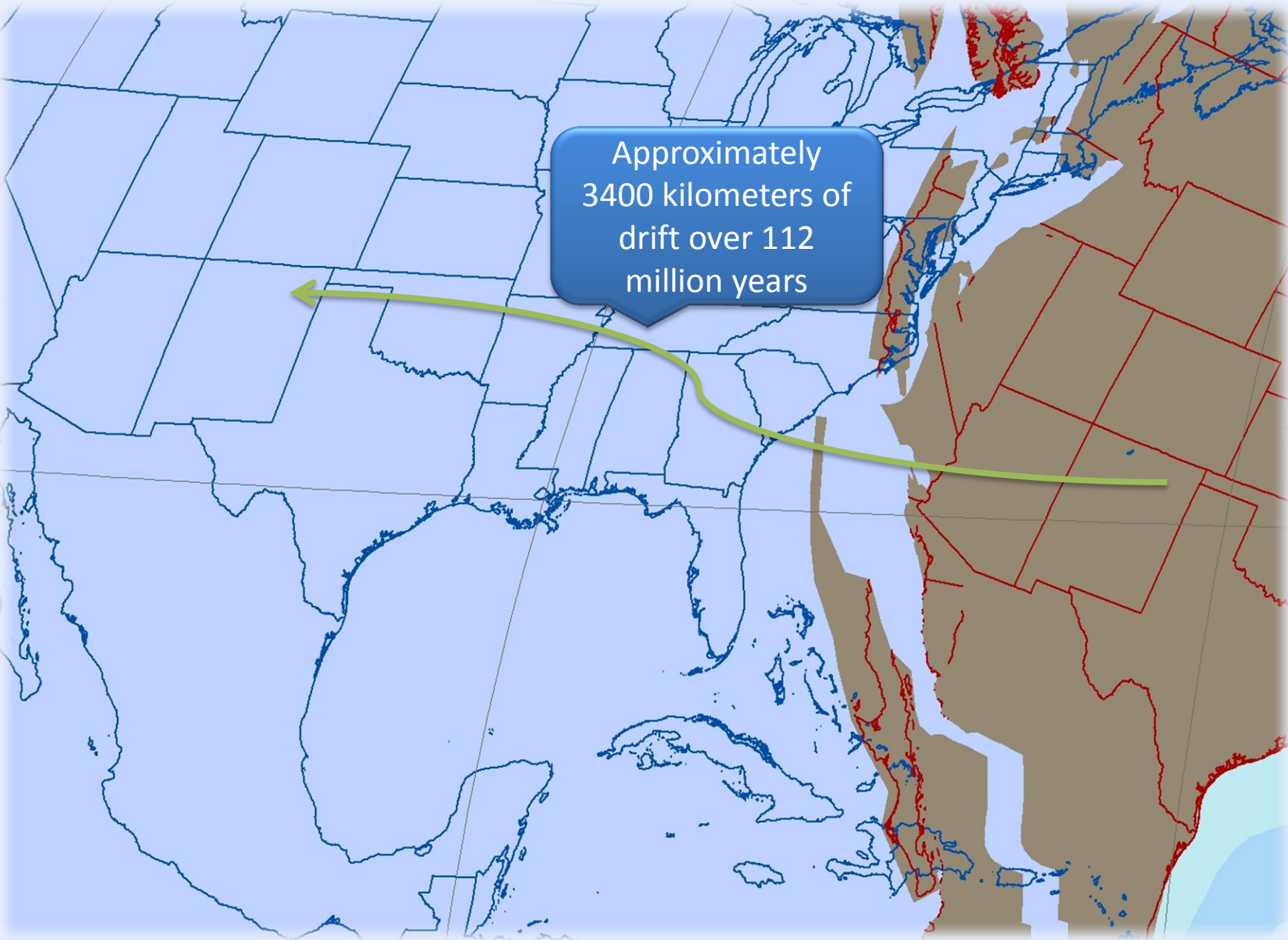
The Phanerozoic eon covers the last 540 million years

The Geologic Timescale

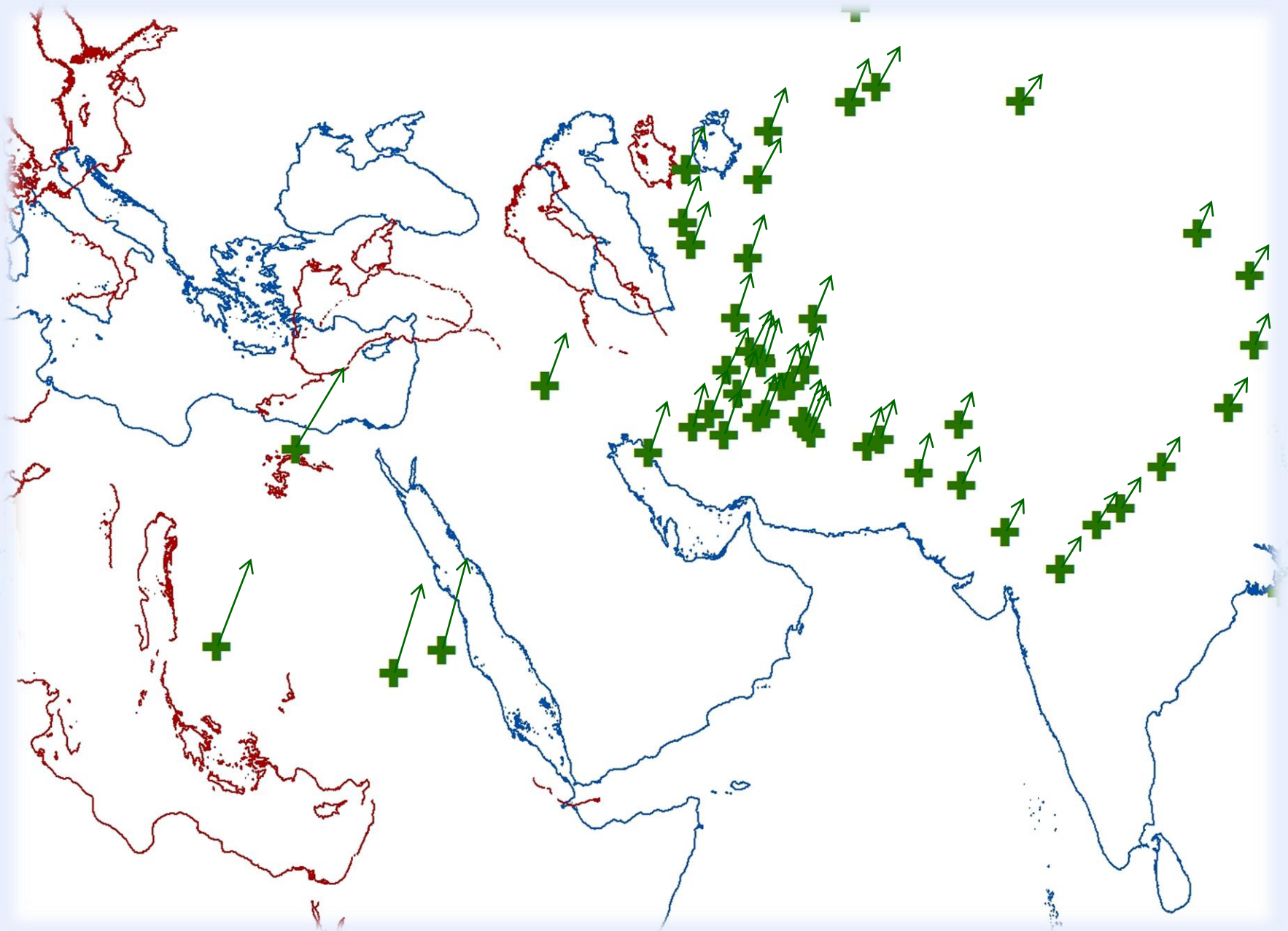


Albian Age \approx 112 Million Years Ago with Modern Overlay



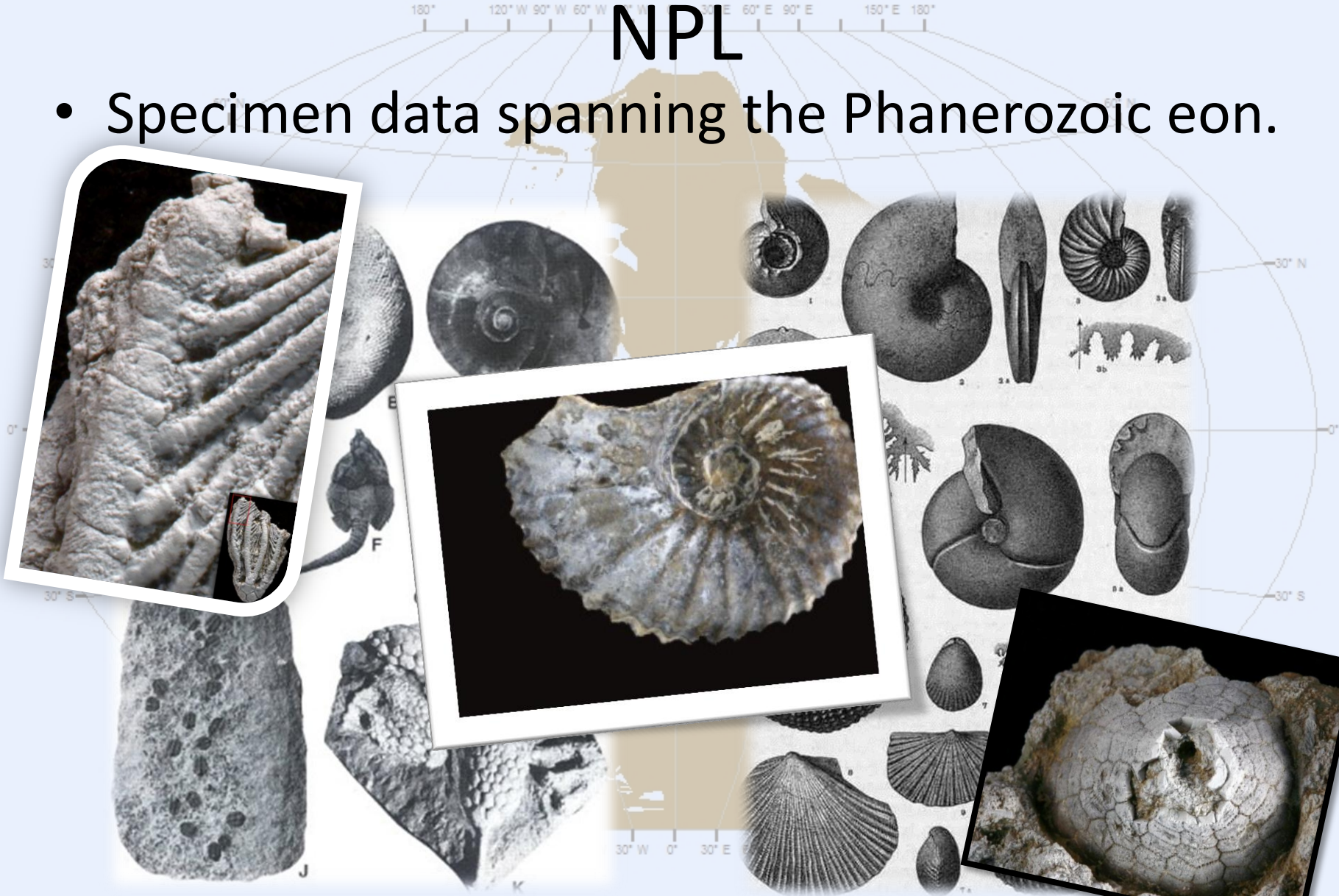
A map of North America showing the continental drift of the continent. The landmass is shaded in brown, and the surrounding oceans are light blue. A green arrow points from the eastern coast of North America towards the west, indicating the direction of drift. A blue callout box with white text is positioned in the upper central part of the map.

Approximately
3400 kilometers of
drift over 112
million years



NPL

- Specimen data spanning the Phanerozoic eon.



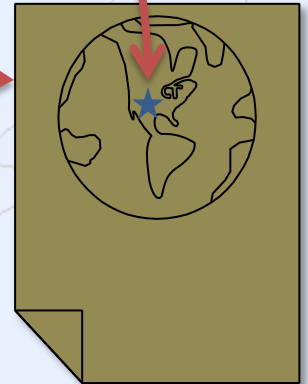
Approach

- Create a web service that will accept geographic coordinates and rock age in order to plot any given point in its correct geologic context.

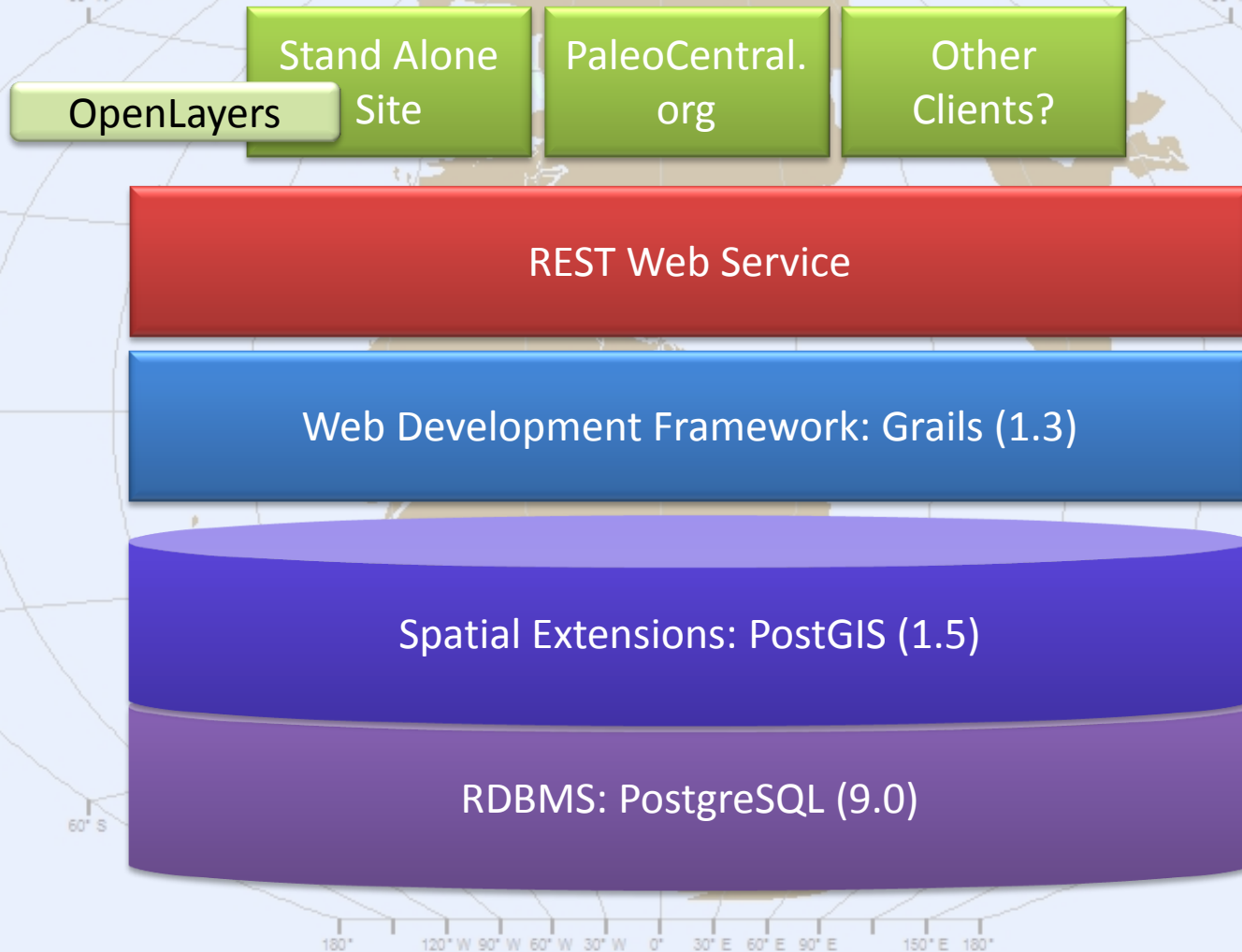
Double lat
Double lon
Integer age

REST

Double rotatedLat
Double rotatedLon
String baseMapURL



Architecture



Interface

- In addition to providing a web service and integrating it into the PaleoCentral web site, we will provide a standalone web site to frontend the service:

Paleogeographic Mapping Service [?]

Latitude Longitude 196 Ma ...

Map

[deg/min/sec](#)

Triassic	Lower	Adriatic	175.6
		Toarcian	183.0
		Pliensbachian	189.6
		Sinemurian	196.5
		Hettangian	199.6
Triassic	Triassic	Rhaetian	203.6

Paleogeographic Mapping Service [?]

8 -67 196 Ma

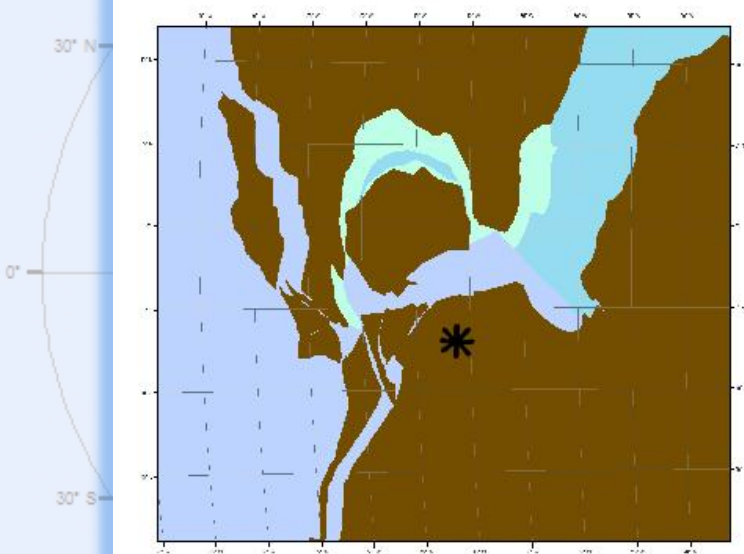
Map

[deg/min/sec](#)

Paleogeographic Location

Contemporary Location

Temporal Location



Eon	Phanerozoic
Era	Mesozoic
Period	Jurassic
Epoch	Lower
Age	Sinemurian
MA	196.5

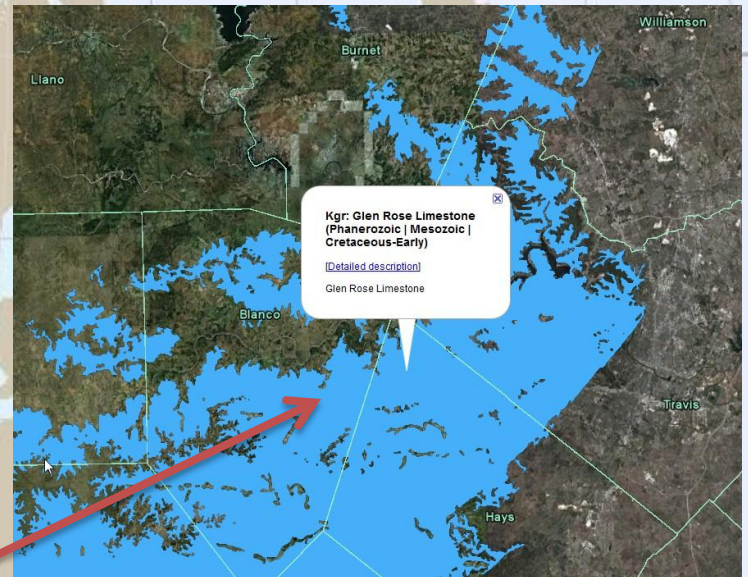


Future Work

- The PLATES data is strictly a tectonic plate reconstruction. Other layers could be added to the output maps:
 - Paleogeography (speculative)
 - Paleoclimate Data
 - Paleobiology including NPL specimen distributions

- **Input Map**

- Use a map to indicate the location of a find
- Provide Stratigraphy layer to aid users in dating their rocks



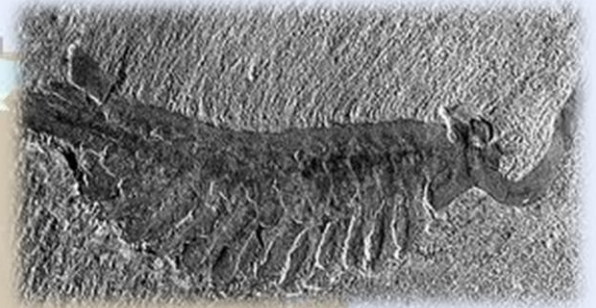
Future Work

- Batch uploads

- Allow multiple queries to be uploaded as a text file and processed in batch mode.

- Allow Third-party Contributions

- Allow properly vetted amateur and professional specimen contributions to be added as additional layers to the system



Conclusion

- According to the geologists and paleontologists involved in the project there would appear to be a substantial demand for such a service.
- We have one known client, we will build the service and find out how much reach it may have beyond that.

