Issues Involved with Incorporating Museum Collections into GIS Analytical Studies

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What this long-term project wants to illustrate and promote

- Spatial Data Mining of Museum Specimens
  - Location, Altitude/Depth, Environment
  - Collected over Time
  - Collected by Department
  - Spatial Biases in the Collections
  - Identify Where to Collect New Specimens
  - Long-term Species' Migrations/Displacements

The Smithsonian holds more than 128 million objects and artifacts in its natural history collections.

So far, we have georeferenced about 2 million objects.

BUT georeferencing is a slow process with editing of one record at a time.

Like most museums around the world, the vast majority of our records are recorded with descriptive locations, rather than coordinate locations.

Our collections, like many other museums manages these database records with EMu Software.

www.kesoftware.com/emu

KE Software

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We found KE Software happy to sit down with us and work through our issues in order to get a result that satisfied both parties.

User Syst
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KE EMu

KE EMu: the world's premier Collections Management System

Engineered to manage all types of collections, EMu is suited to:

- Cultural collections, Anthropology, Archaeology, Science and Technology.
- Paintings, Drawings, Prints, Sculpture and 3-dimensional objects, Decorative Art, Performing Art, Photography, Textiles and Digital Objects.
- Natural History collections, including Zoology, Earth Sciences, Palaeobiology, Botany, Horticulture and Physical Anthropology.
- Special collections, Digital Assets, Historical Societies and Archives

Read on...

Spect
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Shortcuts

EMu User Confer

Case Studies

- 11th Australasi Conference, Sy September 201
- 8th North Ameri Conference, Wi October, 2013
- 10th European Conference, Ne April 2013
- 7th North Ameri Conference, Ne October 2012

EMu News

2013 North American EMu User Conference
Tuesday, 11 June 2013

10th European EMu User Conference
Tuesday, 07 May 2013

If the records have been recorded using coordinate locations from GPS, those records can be mapped in EMu or exported to SHP or KMZ.

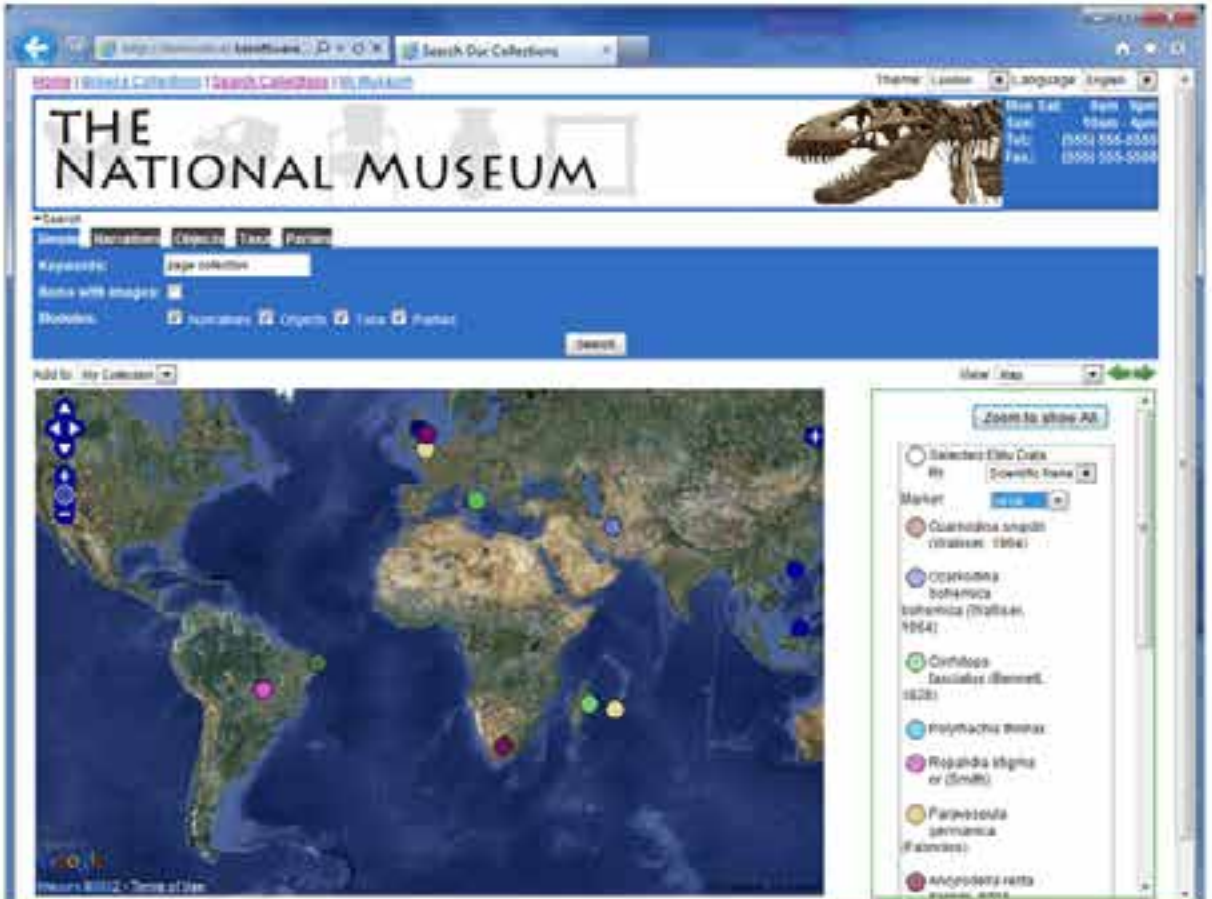
Geo-referencing and Mapping

EMu supports geo-referencing of your collection. Comprehensive geo-referencing details can be stored in EMu and used to map objects and specimens in mapping tools such as IMu Web Maps. Geo-referencing information is designed to contain all locality co-ordinate information and associated error values.

IMu Web Maps is a web browser utility that can be accessed from within EMu or directly from a website and which plots the location and distribution of data (typically specimens) on maps. IMu Web Maps is interactive and dynamic, with data sourced directly out of EMu or from other suitable web service data providers.

IMu Web Maps comprises discrete components that can be used to incorporate maps of varying sophistication or features in other web pages. It can be implemented and accessed as part of a website or can be generated as a web page directly out of the EMu client

It is possible to map the collection locality of a series of specimens by plotting details on to a map of the world. With a large enough set of specimens, this can provide a distribution map for various species that have been collected.



Museum Collections: Problems

- Fuzzy Locations
- Incomplete Distributions

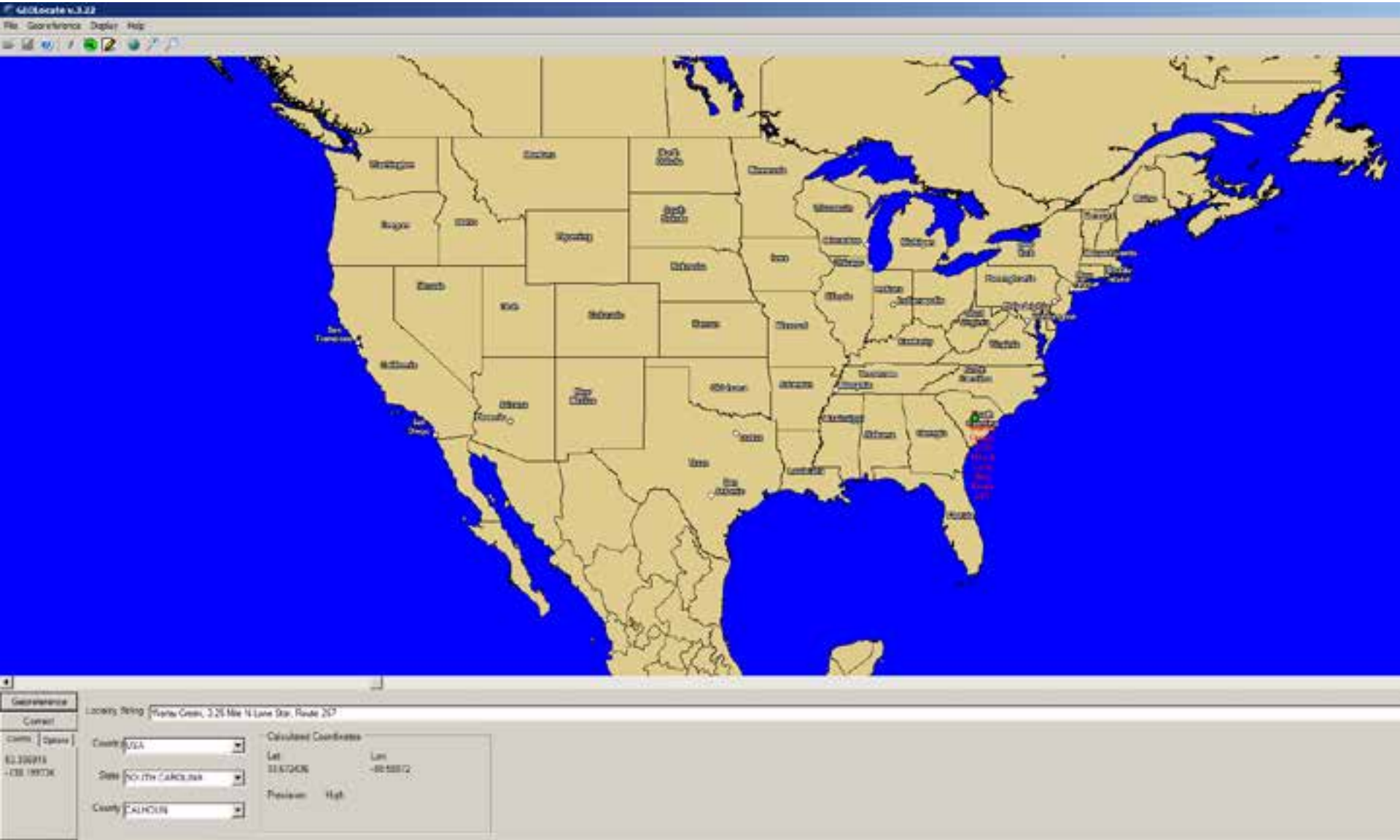
Museum Collections: Advantages

- Where species can be/were found
- Subsequent analyses of
  archaeological and geological data
  and evaluations of
  biogeographic/ecological models

Georeferencing

- **BioGeomancer Workbench (Sept. ’06):**
  - **BioGeomancer Classic (Yale, UC-Berkeley, U of Kansas, Centro de Referência em Informação Ambiental-Brazil)**
  - **GeoLocate (Tulane)**
  - **Diva-GIS**
- **Commercial Geographic Text Search:**
  - **MetaCarta**

GeoLocate with an example site georeferenced in Calhoun County, South Carolina



When georeferenced by humans, Collection localities may have the following problems:

- **Reversal of latitude and longitude**
- **Forgetting to use a negative sign with decimal degrees in western and southern hemispheres**
- **Mistaking a 4 and a 9, 6 and a 0, or an 8 and a 3 from handwritten records**
- **Simply typing the wrong number**
- **Or any combination of the above!**

So we must always rely of the descriptive locations included in the database:

- **Country**
- **Province/State**
- **County**
- **Ocean**
- **Sea/Gulf**
- **Archipelago**
- **Island**
- **Precise Location**

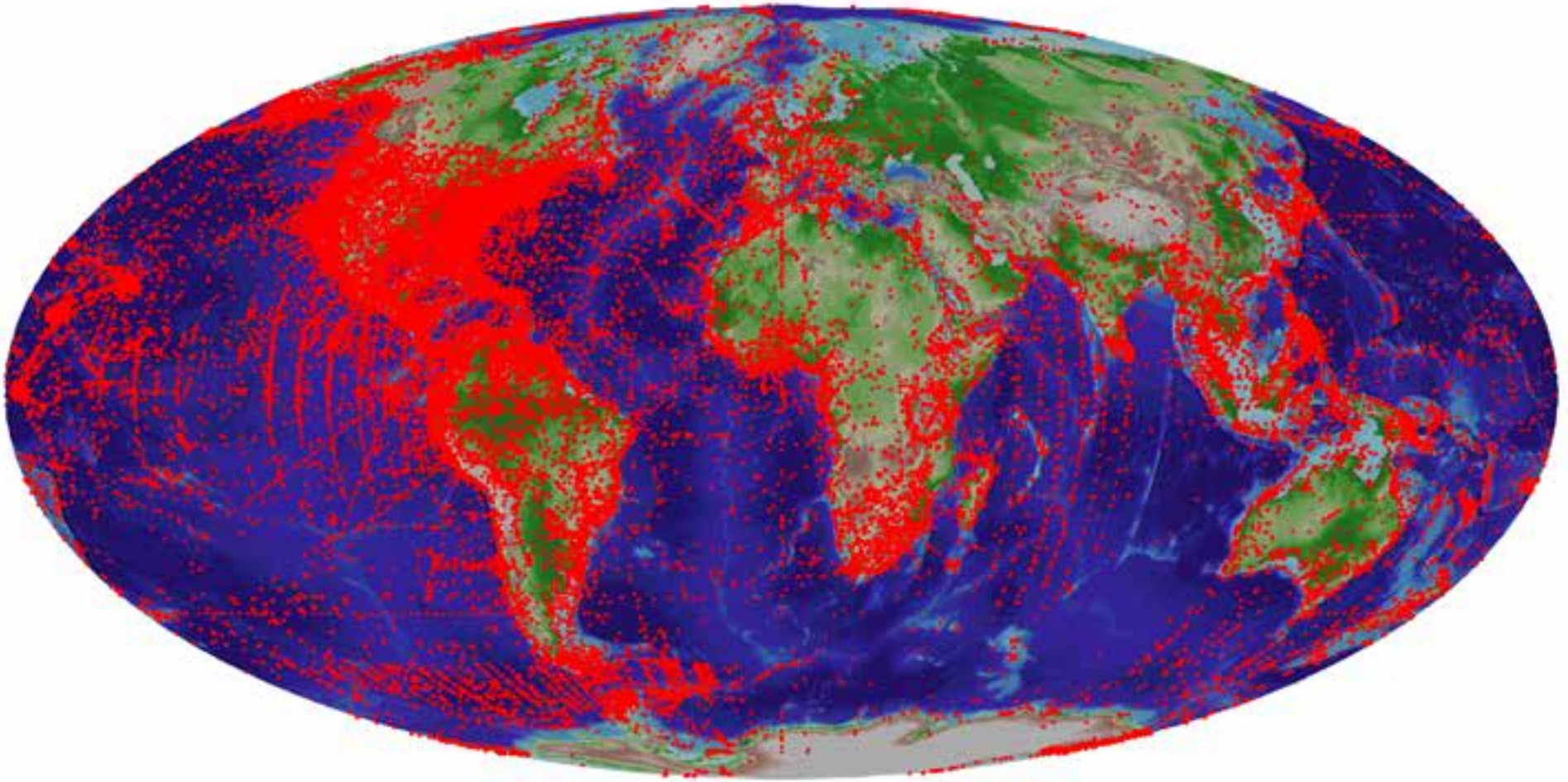
Interactive Curator/Map Reader

- **Wants the ability to manipulate the base map**
  - **Projection**
  - **Scale**
  - **Geographic Focus**
- **Wants the ability to manipulate the data**
  - **Classification**
  - **Symbolization**

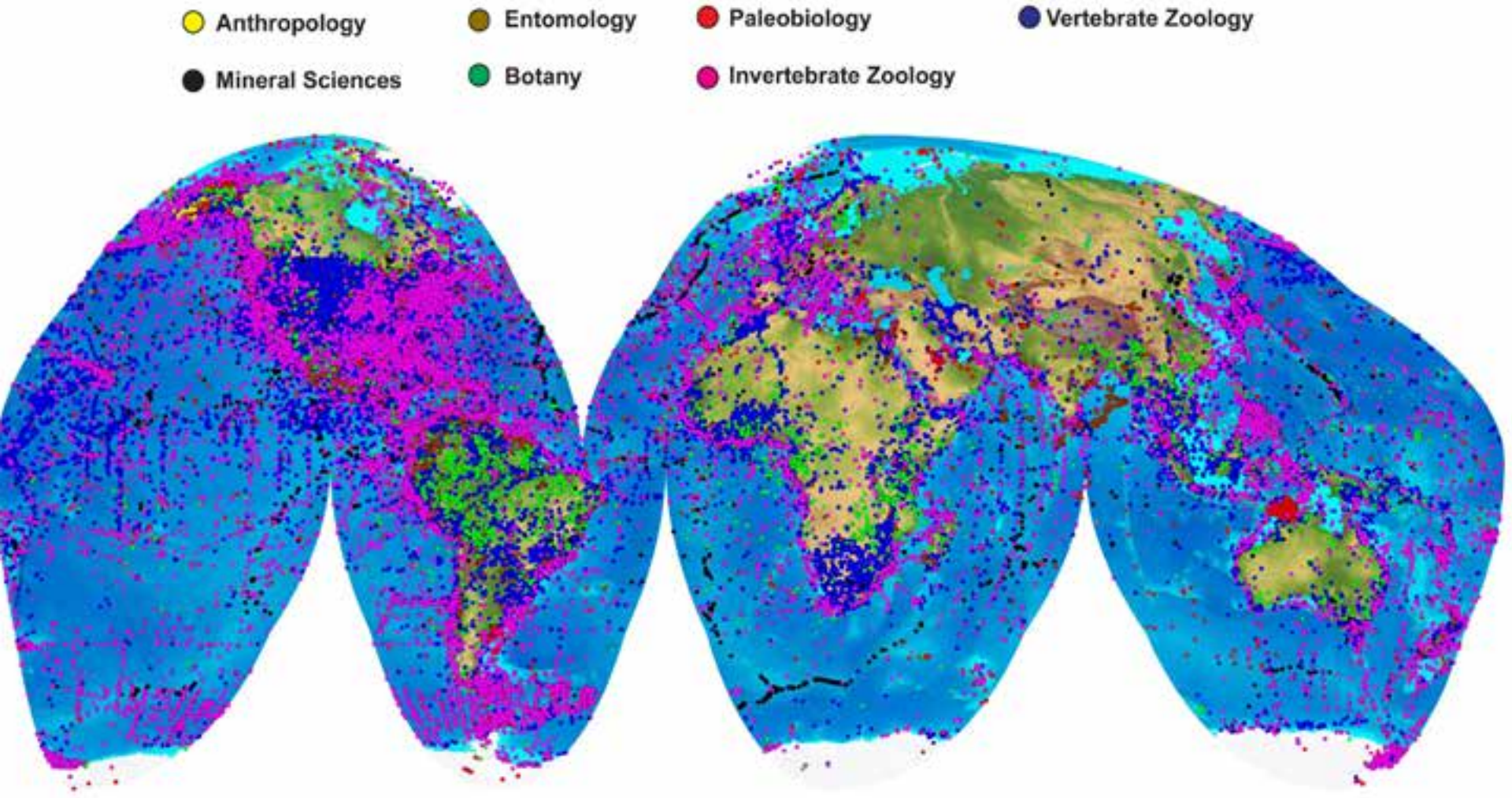
Pilot Project
A Temporal Mapping Study:
200 years of Collecting Specimens for Natural History

One Million Collection Records:

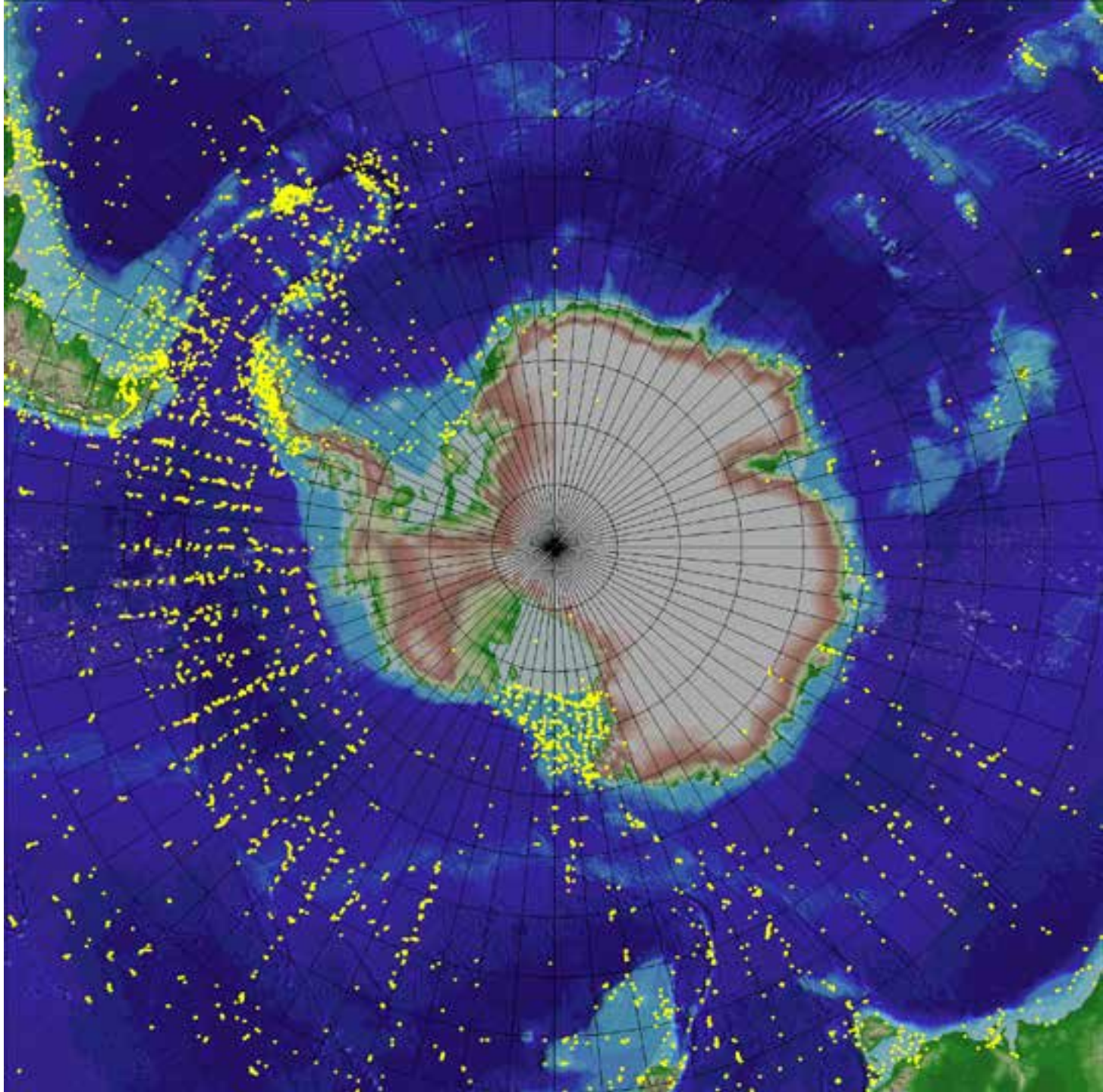
- Archaeology
- Botany
- Entomology
- Invertebrate Zoology
- Mineral Sciences
- Paleobiology
- Vertebrate Zoology



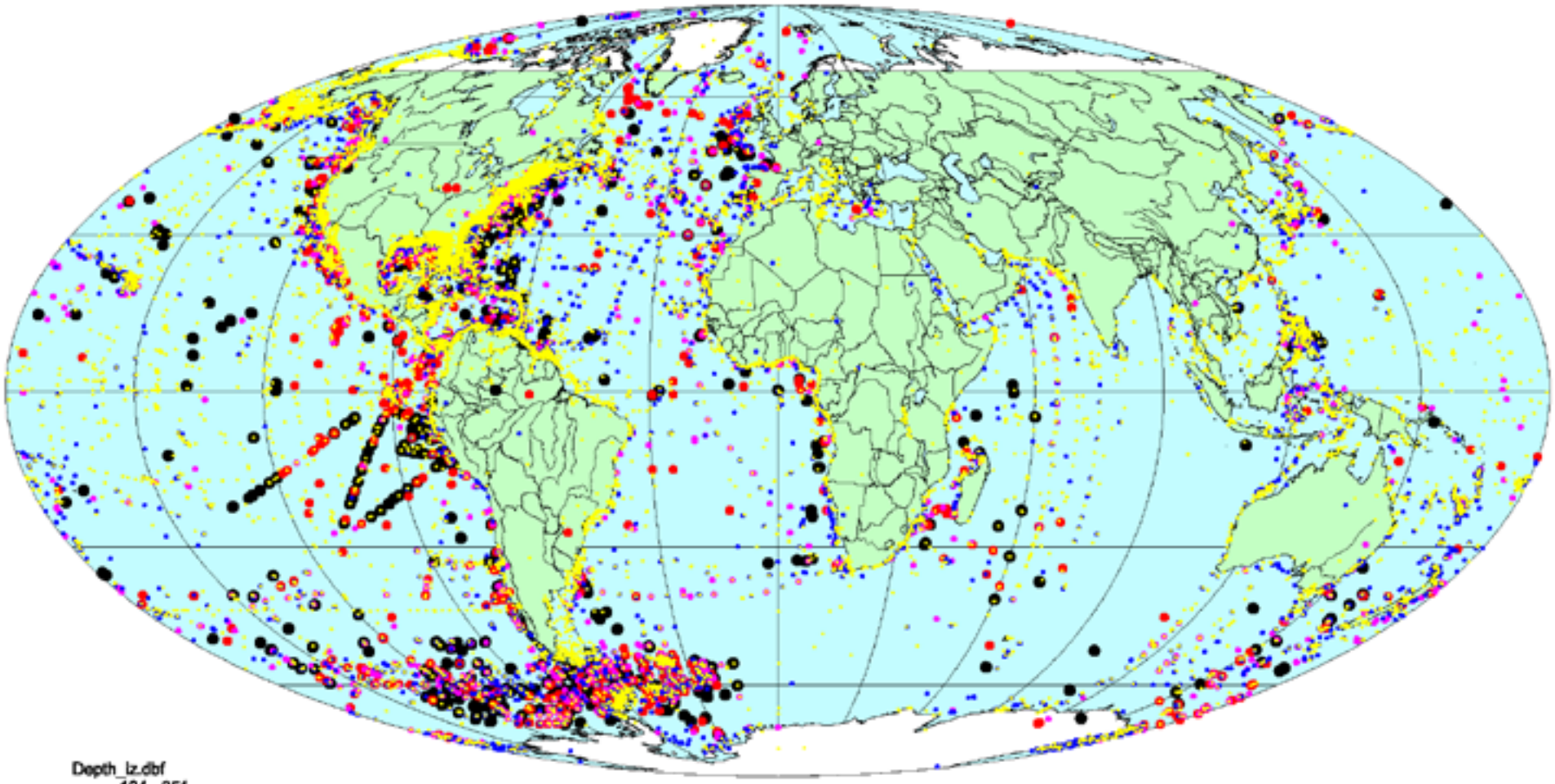
Georeferenced EMu Collections



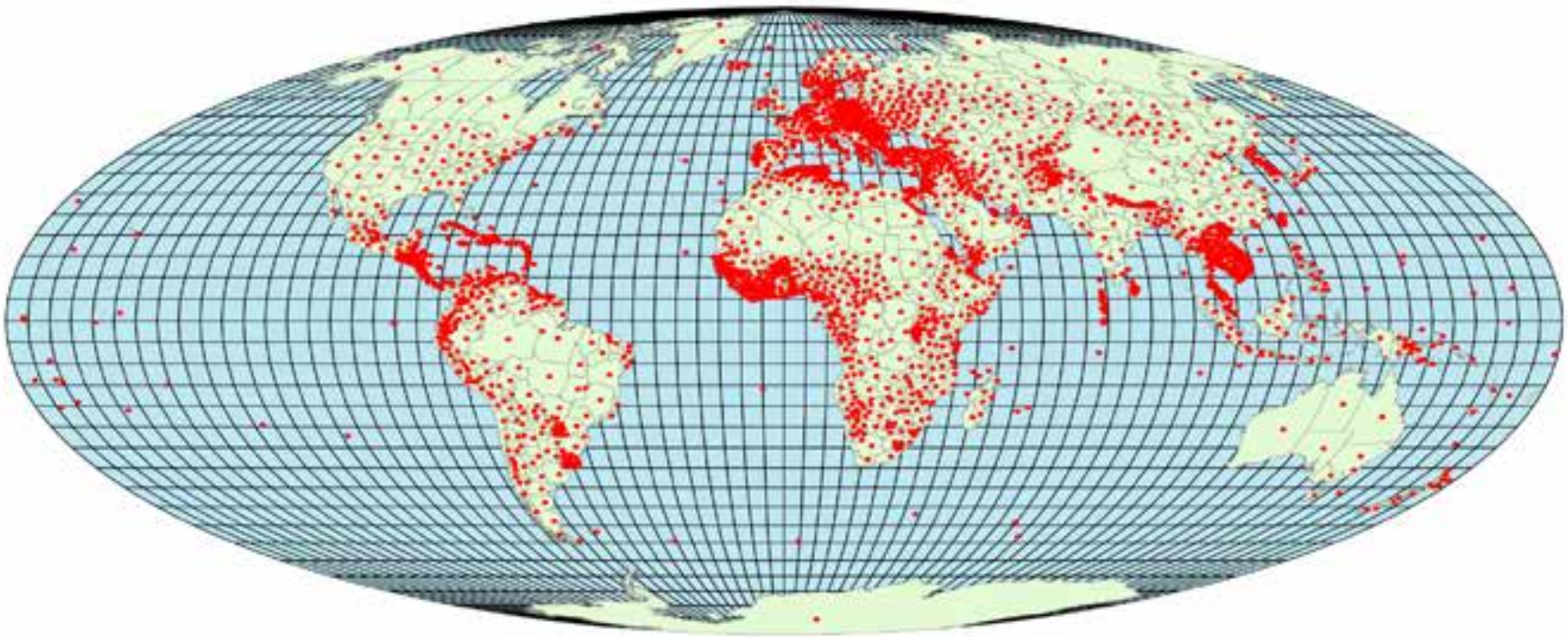
Invertebrate Zoology: Collections around Antarctica



Invertebrate Zoology
Depth of Collections



Next Five Million Records: Locations by Political Centroids



Thank you

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