Sam Noble Museum of Natural History Paleobotany, Micropaleontology & Mineralogy Collection
Georeferencing Localities Procedures

According to iDigBio, "[a]s applied to natural history collections data, georeferencing is the process of determining geographic coordinates (typically latitude and longitude) from a textually described locality description."

This document describes our Collection's procedures for georeferencing localities in our collection. We utilize a multi-tiered (*e.g.*, "County Level", TRS) approach. This approach provides georeferences at various resolutions, allows quicker higher-level georeferences to be used for both collection management and data sharing and allows time for the more precise georeferencing to occur.

Some fossil localities (and some other localities) are considered sensitive, private in nature or confidential. Therefore, providing online precise georeferences might place the specimens, the localities where the specimens were collected, our Collection and/or our Museum at risk. It is our Collection policy to only share online localities and georeferences to county-level. The described procedures implement this policy. (For more information see our "Collection Information & Data Access/Sharing" document.)

For All Tiers of Georeferencing

1. Open MS Excel file of specimens needing georeferenced.
   1.1. Click on the header row of the table (usually the top row, has darker fill, and white text).
   1.2. Find the "Sort & Filter" Button on "Home" Tab and click on it.

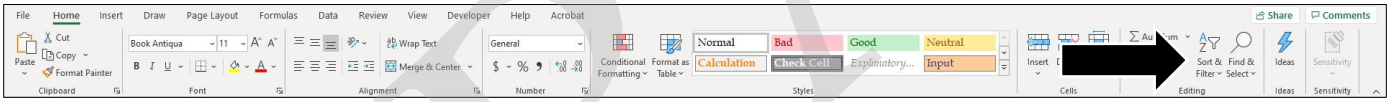


Figure Description: SNOMNH Screenshot of Home Tab showing "Sort & Filter" Button location.

   1.3. Select "Custom Sort" from the "Sort & Filter" drop-down picklist.

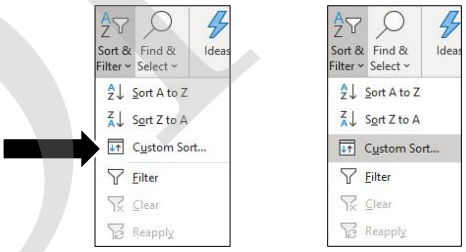


Figure Description: SNOMNH screenshots of "Sort & Filter" drop-down picklist showing & selecting "Custom Sort".

   1.4. Add the columns of: "OPC_Loc_No" ⇒ "Continent" ⇒ "Country" ⇒ "StateProvince" ⇒ "County" ⇒ "Nearest_City" ⇒ "City" ⇒ "Loc_Name" ⇒ "Loc_Descrip" ⇒ "Verbatium_Loc" to the "Sort by"field clicking the "Add Level" button as needed.

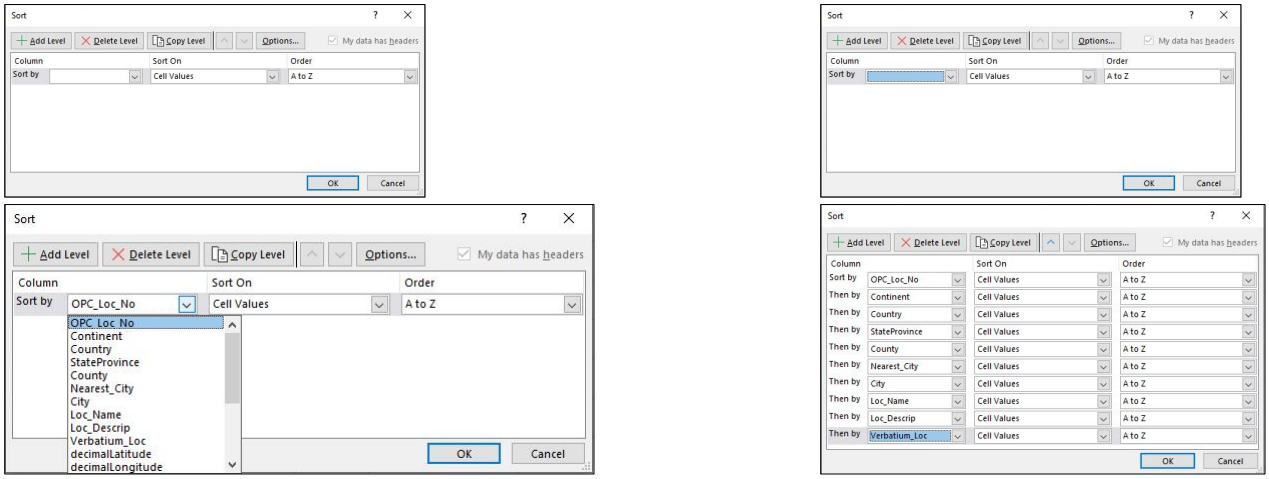


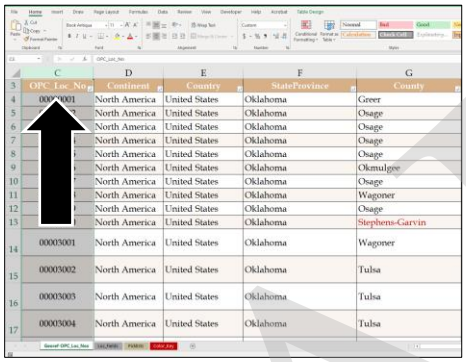
Figure Description: SNOMNH screenshots of "Sort" window showing setting sorting options.

1.5. Columns that need to be entered are the following columns:

Column Name	Definition	Helpful Tips	Some Example(s)
decimalLatitude	Latitude in decimal degrees	North = positive values South = negative values	40.793 -40.793
decimalLongitude	Longitude in decimal degrees	East = positive values West = negative values	77.860 -77.860
coordinateUncertaintyInMeters	Horizontal distance from georeferenced point	Radius of smallest circle containing entire locality	
geoDatum	Datum of georeference	Ours usually NAD83 so matches topographic and geology maps	NAD83
GeoRef_Level	Georeferenced tier used to obtain georeference value	Controlled vocabulary Levels	State/Province County TRS
LocDetail_Level	Detail Level of locality description	"Lowest"/Most-detailed column that has information	State/Province County TRS Nearest Feature
LocDetail_By	Who last categorized locality detail level	Your Initials (be sure to use all 3 initials, if appropriate add Jr./Sr./II/III)	MLL RAL II
Georef_By	Who last georeferenced locality	Your Initials (be sure to use all 3 initials, if appropriate add Jr./Sr./II/III)	MLL RAL II
Georef_Date	When last georeferenced	Date when georeference added to specimen	mm/dd/yyyy
GeorefProtocol	Description of how georeferenced or link to procedures	Our georeferencing procedures	SNOMNH: Paleobotany Georeferencing Procedures
GeoRefRemarks	Notes about georeferencing	Any changes from procedures, assumptions made in georeferencing, reason for flags	Historical atlas used Multiple counties
GeoRef_Flag	Status of georeferencing	Controlled flags	Unchecked 1st Pass Needs CM attention Matches OPC Loc No File
Info_withheld	Indicates if any specific level of data is withheld	Controlled statements	"Legacy Data" "Specific locality has been generalized to county centroid resolution. Detailed data might be available on request."
Withheld_Flag			Needs CM attention

"County Level" Georeferencing

2. Look at the row from the MS Excel file of specimens needing georeferenced to determine whether you have an OPC Locality Number listed.
3. If you record has an OPC Locality Number use the locality number to search/check the Collection's "OPC Locality Coordinates" file. Otherwise skip to step 4.
   3.1. Open MS Excel file of "OPC Locality Coordinates."
   3.2. Click on the Column Letter row of the table in the column labeled "OPC_Loc_No."



OPC_Loc_No	Continent	Country	State/Province	County
00003001	North America	United States	Oklahoma	Wagoner
00003002	North America	United States	Oklahoma	Tulsa
00003003	North America	United States	Oklahoma	Tulsa
00003004	North America	United States	Oklahoma	Tulsa

   3.3. Find the "Find & Select" Button on "Home" tab and click on it.

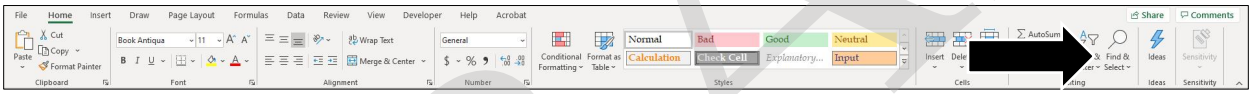


Figure Description: SNOMNH Screenshot of Home Tab showing "Find & Select" Button location.

   3.4. Select "Find" from the "Find & Select" drop-down picklist.

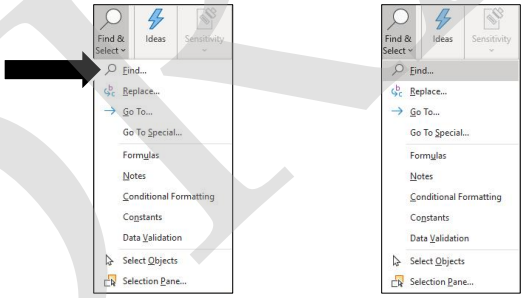


Figure Description: SNOMNH screenshots of "Find & Select" drop-down picklist showing & selecting "Find".

   3.5. Click on the "Options" Button in the "Find and Replace" window on the "Find" tab and select "By Columns" from the Search picklist.

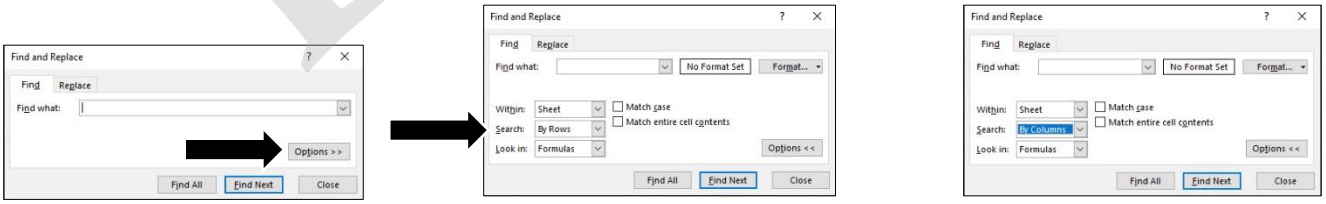


Figure Description: SNOMNH screenshots of "Find and Replace" window showing setting search by columns.

   3.6. Enter the OPC Locality Number of your record in the "Find What" box. Using the actual numbers in place of the ######## as seen in the figure below.

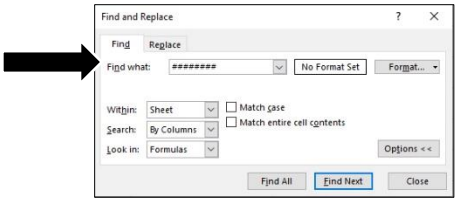


Figure Description: SNOMNH screenshot of "Find and Replace" window with entered number (use actual number, not ########).

3.7. Click the "Find Next" button.

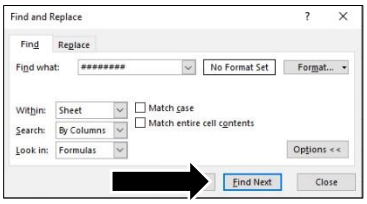


Figure Description: SNOMNH screenshot of "Find and Replace" indicating "Find Next" button.

3.8. If the OPC Locality Number is not found, a pop-up window will appear with the message "We couldn't find what you are looking for…". If this appears skip to step 4.

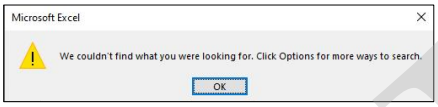


Figure Description: SNOMNH screenshot of "not found" pop-up window.

3.9. If the OPC Locality Number is found, the MS Excel cell containing the value of the OPC Locality Number will be highlighted. Check to make sure it is truly the value you are interested in and that it is a cell in the columns labeled "OPC_Loc_No" as occasionally the OPC Locality Number can be a portion of another number (e.g. if searching for "10" it will also find those values/fields that have "10" in it like: "101" "110"…"3010"….

3.10. Click in the cell of the OPC Locality Number of Interest and close the Find Window.

3.11. Use the right arrow key to move across the row of OPC Locality Number of Interest to the column labeled "decimalLatitude."

3.12. Select all columns needed (as listed in the table "For All Tiers of Georeferencing" step 1.5) in the "OPC Locality Coordinates" file to transfer into the MS Excel file of specimens needing georeferenced.

3.13. Copy the selected cells in the "OPC Locality Coordinates" file.

3.14. Go to the MS Excel file of specimens needing georeferenced and click in the cell in the row you are working on in the column labeled "decimalLatitude."

3.15. Paste the cells into the appropriate row in the into the MS Excel file of specimens needing georeferenced.

3.16. Verify that the data pasted correctly into the MS Excel file of specimens needing georeferenced.

3.17. Be sure to add your initials to the "georefBy" column for the record and today's date in the "Georef_Date" column.

3.18. Be sure to transfer any notes that were in the "GeoRefRemarks" column and/or add anything you did different.

3.19. Update the GeoRef_Flag in the MS Excel file of specimens needing georeferenced record to "Matches OPC Loc No File."

3.20. Be sure to save the MS Excel file of specimens needing georeferenced every so often (at least every 30 minutes), before you walk away from the computer and/or at the end of your shift using collection file naming procedures.

3.21. Return to step 2 of any remaining records in your file.

4. If your record does not currently have an OPC Locality Number recorded look to see if it has a county listed. If it does check the Collection's "OPC County Coordinates" file.

4.1. Open MS Excel file of "OPC County Coordinates."

4.2. The OPC County Coordinates file is presorted to "Country" ⇒ "StateProvince" ⇒ "County". This is because multiple countries and/or states/provinces may have counties/subdivisions that have the same name. Therefore, look the country and/or states/provinces columns in the MS Excel file of specimens needing georeferenced so that the correct values get recorded as the georeference.

4.3. Filters are available. There should be picklist like drop down arrows in the right side of the column headings.

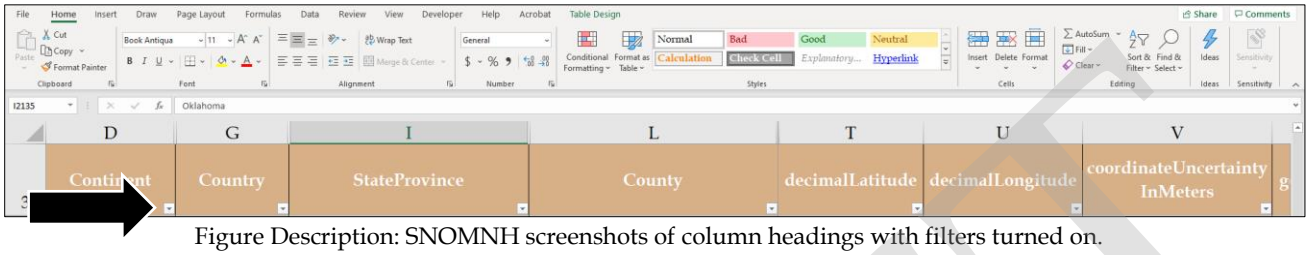


Figure Description: SNOMNH screenshots of column headings with filters turned on.

4.4. Select arrow in the column labeled "country" click on the check mark next to select all to deselect it. Then click the box next to the country listed in the MS Excel file of specimens needing georeferenced.

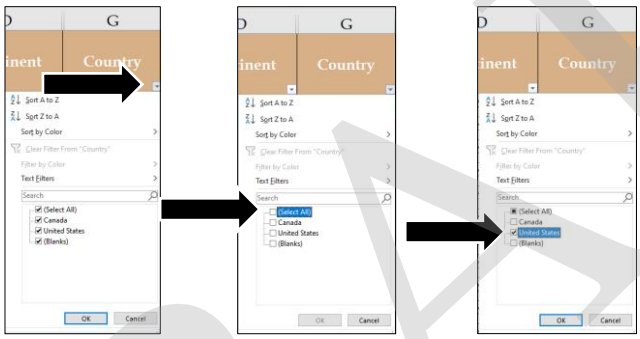


Figure Description: SNOMNH screenshots of Filtering to country.

4.5. Select arrow in the column labeled "StatesProvince" and limit it to the states/provinces listed in the MS Excel file of specimens needing georeferenced.

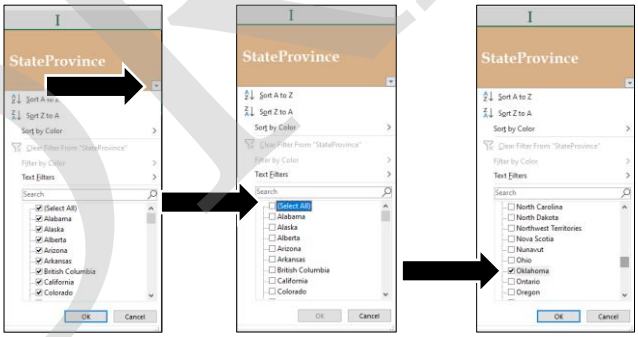


Figure Description: SNOMNH screenshots of "Sort & Filter" drop-down picklist showing & selecting "Filter".

4.6. Look for the county of your record by either filtering on the county or looking through the list. If the spelling of the county is correct filtering will be faster. However, if the spell is incorrect scrolling through the list will make it easier to determine the appropriate county name spelling.

4.6.1. If you find a misspelled county add a note of the MS Excel file of specimens needing georeferenced in the "GeoRefRemarks" column of: County misspelled as "XXX" should be "ZZZ." Replacing XXX in the phrase with the spelling from the MS Excel file of specimens needing georeferenced and the "ZZZ" with the correct spelling.

4.6.2. Update the County column in the MS Excel file of specimens needing georeferenced to the correct spelling.

4.7. Click in the County of Interest.

4.8. Use the right arrow key to move across the row of County of Interest to the column labeled "decimalLatitude."

4.9. Select all columns needed (as listed in the table "For All Tiers of Georeferencing" step 1.5) in the "OPC Locality Coordinates" file to transfer into the MS Excel file of specimens needing georeferenced.

4.10. Copy the selected cells in the "OPC County Coordinates" file.

4.11. Go to the MS Excel file of specimens needing georeferenced and click in the cell in the row you are working on in the column labeled "decimalLatitude."

4.12. Paste the cells into the appropriate row in the into the MS Excel file of specimens needing georeferenced.

4.13. Verify that the data pasted correctly into the MS Excel file of specimens needing georeferenced.

4.14. Be sure to add your initials to the "georefBy" column for the record and today's date in the "Georef_Date" column.

4.15. Be sure to transfer any notes that were in the "GeoRefRemarks" column and/or add anything you did different.

4.16. Update the GeoRef_Flag in the MS Excel file of specimens needing georeferenced record to "County."

4.17. Are additional details for the locality available?

4.17.1. If additional details are not available add "Legacy Data" to "Info_withheld" column and "Needs CM attention" to Withheld_Flag column.

4.17.2. If additional details are available add "Specific locality has been generalized to county centroid resolution. Detailed data might be available on request." to "Info_withheld" column.

4.18. Be sure to save the MS Excel file of specimens needing georeferenced every so often (at least every 30 minutes), before you walk away from the computer and/or at the end of your shift using collection file naming procedures.

4.19. Return to step 2 of any remaining records in your file.

References Consulted When Devising our Georeferencing Procedures

Chapman Arthur D. and Wieczorek, John R. eds, 2006. Guide to Best Practices for Georeferencing. Copenhagen: Global Biodiversity Information Facility (GBIF) Secretariat. (https://doi.org/10.15468/doc-2zpf-zf42).

Biodiversity Information Standards (TDWG). Darwin Core quick reference guide. Biodiversity Information Standards (TDWG). (https://dwc.tdwg.org/terms/).

iDigBio, ?. Georeferncing. (https://www.idigbio.org/wiki/index.php/Georeferencing).

Wieczorek, John R., Bloom, David A., Constable, Heather, Fang, Janet, Koo, Michelle, Spencer, Carol and Yamamoto, Kristina, 2012. Georeferencing quick reference guide, 2012. Version: 2012-10-08. (https://www.idigbio.org/sites/default/files/workshop-presentations/geotrain/GeoreferencingQuickReferenceGuide20121008.pdf).

Zermoglio, Paula F., Chapman, Arthur D., Wieczorek, John R., Luna, Maria Celeste, Bloom, David A., Sganga, Daniela E. and Cossi, Paula F. 2019. Draft Georeferencing quick reference guide, December 2019. (http://georeferencing.org/georefcalculator/docs/GeoreferencingQuickReferenceGuide.pdf).