Obsidian Source

Process Data | Plot Spectrum | Plot

Choose Spectra

Browse...

You can choose data input here, either spectra, net counts, or an excel spreadsheet

- (•) Spectra
- ( ) Net
- ( ) Spreadsheet

Project Name

ObsidianSourcing

Element:

(Fe) Iron

Load Cal File

Browse...

- [ ] Use Cal File
- [ ] Import Other Data

127.0.0.1

Obsidian Source

Obsidian Source

Spectrum

Process Data | Plot Spectrum

Choose Spectra

Browse...

- (•) Spectra
- ( ) Net
- ( ) Spreadsheet

Project Name

ObsidianSourcing

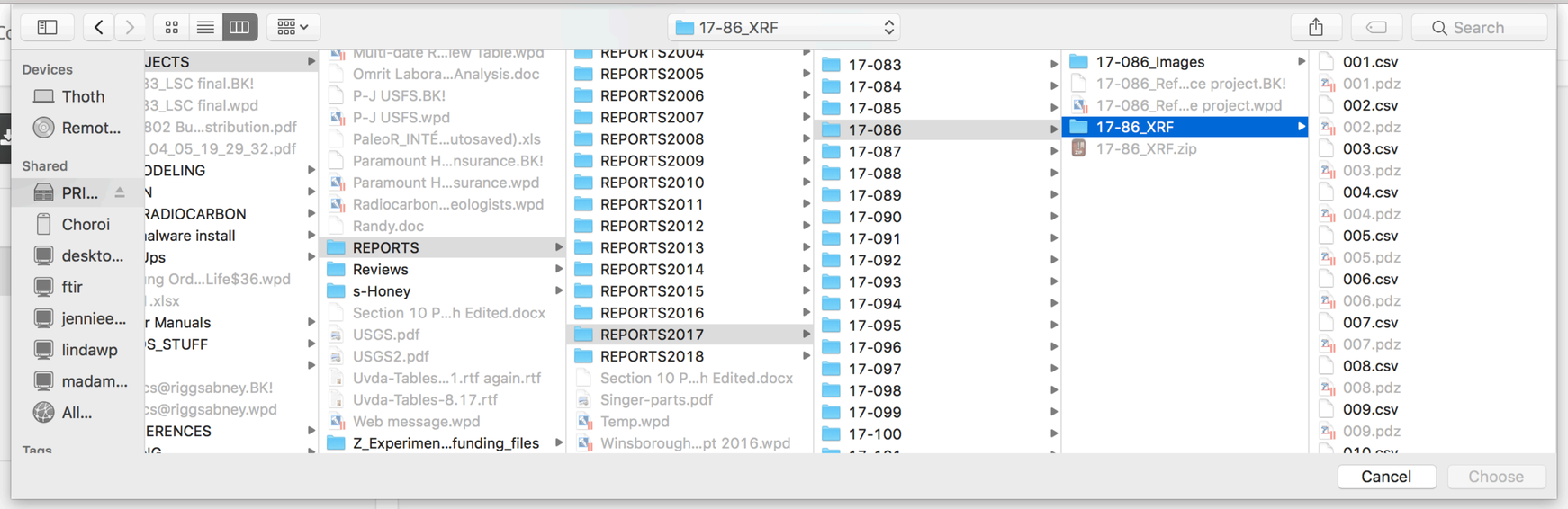
Element:

(Fe) Iron

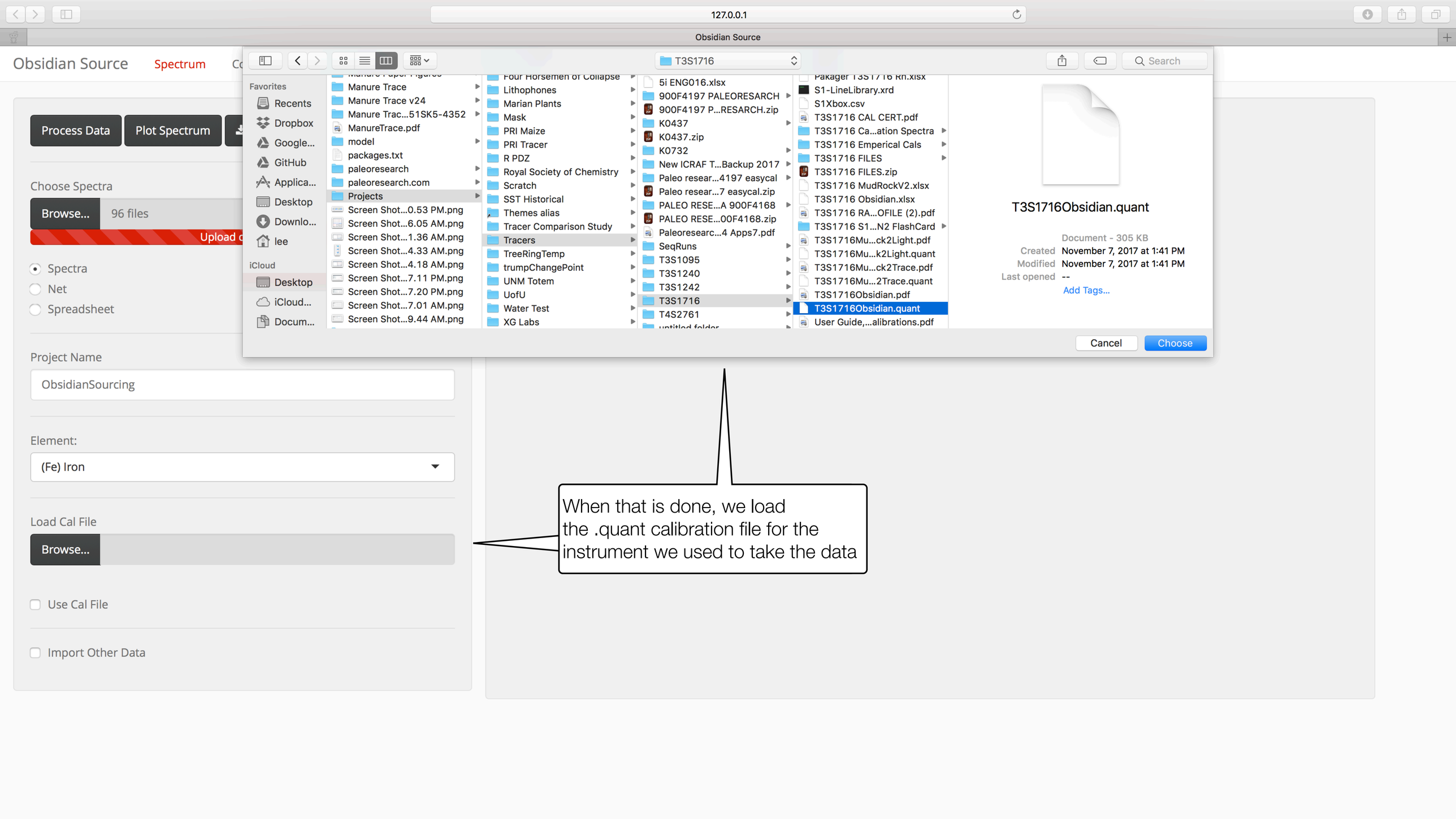
Load Cal File

Browse...

- [ ] Use Cal File
- [ ] Import Other Data



In this case, we are going to use spectra csv files. We navigate and select the ones we want to use


127.0.0.1
Obsidian Source
Obsidian Source
Spectrum
Process Data
Plot Spectrum
Choose Spectra
Browse...
96 files
Upload c
Spectra
Net
Spreadsheet
Project Name
ObsidianSourcing
Element:
(Fe) Iron
Load Cal File
Browse...
Use Cal File
Import Other Data
T3S1716
Search
Favorites
Recents
Dropbox
Google...
GitHub
Applica...
Desktop
Downlo...
lee
iCloud
Desktop
iCloud...
Docum...
Manure Trace
Manure Trace v24
Manure Trac...51SK5-4352
ManureTrace.pdf
model
packages.txt
paleoresearch
paleoresearch.com
Projects
Screen Shot...0.53 PM.png
Screen Shot...6.05 AM.png
Screen Shot...1.36 AM.png
Screen Shot...4.33 AM.png
Screen Shot...4.18 AM.png
Screen Shot...7.11 PM.png
Screen Shot...7.20 PM.png
Screen Shot...7.01 AM.png
Screen Shot...9.44 AM.png
Four Horsemen of Collapse
Lithophones
Marian Plants
Mask
PRI Maize
PRI Tracer
R PDZ
Royal Society of Chemistry
Scratch
SST Historical
Themes alias
Tracer Comparison Study
Tracers
TreeRingTemp
trumpChangePoint
UNM Totem
UofU
Water Test
XG Labs
5i ENG016.xlsx
900F4197 PALEORESARCH
900F4197 P...RESARCH.zip
K0437
K0437.zip
K0732
New ICRAF T...Backup 2017
Paleo resear...4197 easycal
Paleo resear...7 easycal.zip
PALEO RESE...A 900F4168
PALEO RESE...00F4168.zip
Paleoresearc...4 Apps7.pdf
SeqRuns
T3S1095
T3S1240
T3S1242
T3S1716
T4S2761
S1-LineLibrary.xrd
S1Xbox.csv
T3S1716 CAL CERT.pdf
T3S1716 Ca...ation Spectra
T3S1716 Emperical Cals
T3S1716 FILES
T3S1716 FILES.zip
T3S1716 MudRockV2.xlsx
T3S1716 Obsidian.xlsx
T3S1716 RA...OFILE (2).pdf
T3S1716 S1...N2 FlashCard
T3S1716Mu...ck2Light.pdf
T3S1716Mu...k2Light.quant
T3S1716Mu...ck2Trace.pdf
T3S1716Mu...2Trace.quant
T3S1716Obsidian.pdf
T3S1716Obsidian.quant
User Guide,...alibrations.pdf
T3S1716Obsidian.quant
Document - 305 KB
Created November 7, 2017 at 1:41 PM
Modified November 7, 2017 at 1:41 PM
Last opened --
Add Tags...
Cancel
Choose
When that is done, we load the .quant calibration file for the instrument we used to take the data

Obsidian Source

Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Process Data | Plot Spectrum | Plot

Choose Spectra

Browse... 96 files

Upload complete

- Spectra
- Net
- Spreadshe

With those loaded, we can now ‘Process Data’ and ‘Plot Spectrum’

Project Name

ObsidianSourcing

Element:

(Zr) Zirconium

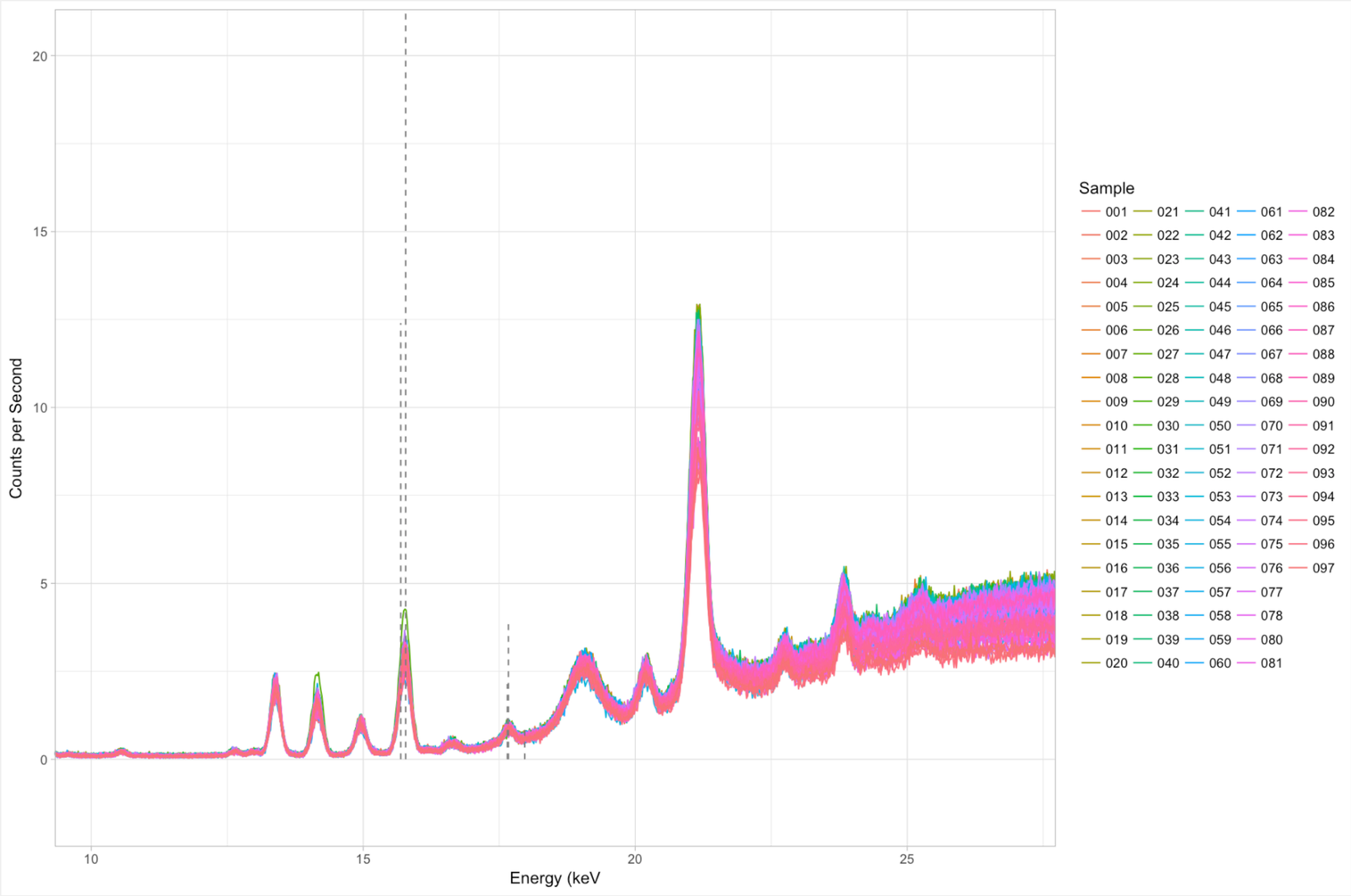
Load Cal File

Browse... T3S1716Obsidian.quant

Upload complete

- [x] Use Cal File

- [ ] Import Other Data



Obsidian Source | Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Enter Values | Table

Elemental lines to show:

- [ ] As
- [ ] Ba
- [ ] Ca
- [ ] Co
- [ ] Cu
- [ ] Fe
- [ ] Ga
- [ ] K
- [ ] Mn
- [ ] Nb
- [x] Rb
- [x] Sr
- [ ] Th
- [ ] Ti
- [ ] U
- [x] Y
- [ ] Zn
- [x] Zr

Navigate to ‘Counts’ then select the elements to use. Rb, Sr, Y, and Zr are best for Obsidian

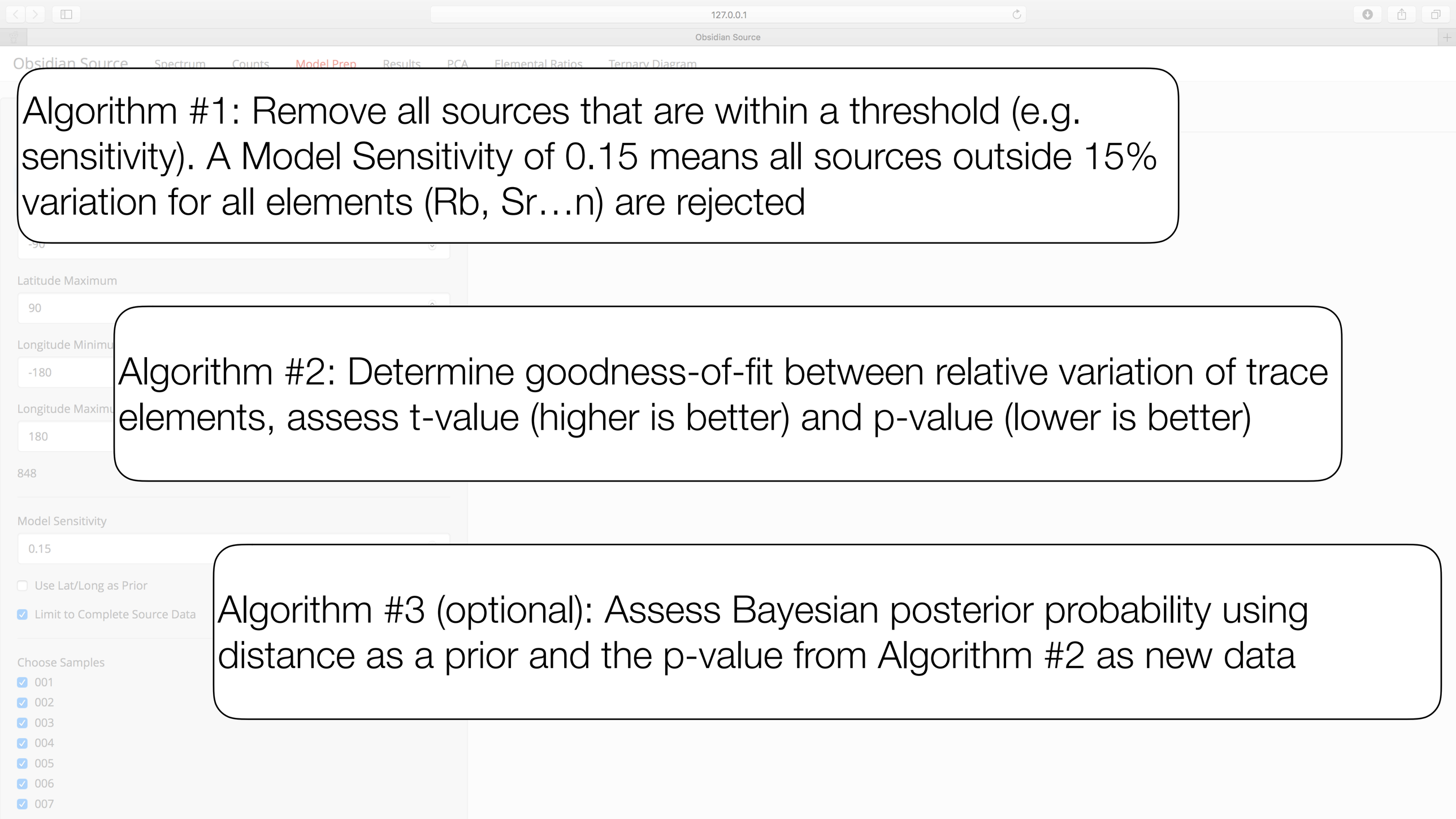
All Data | Add Categories

Show 10 entries Search:

	Sample	Rb	Sr	Y	Zr
	001	100	58	22	96
	002	107	49	24	91
	003	96	65	23	101
4	004	95	64	22	98
5	005	93	61	20	96
6	006	91	58	21	96
7	007	99	57	22	96
8	008	103	63	24	102
9	009	87	60	23	92
10	010	104	64	20	103

Showing 1 to 10 of 96 entries

Previous 1 2 3 4 5 ... 10 Next


127.0.0.1
Obsidian Source
Obsidian Source
Spectrum
Counts
Model Prep
Results
PCA
Elemental Ratios
Ternary Diagram
Latitude Maximum
90
Longitude Minimu
-180
Longitude Maximu
180
848
Model Sensitivity
0.15
Use Lat/Long as Prior
Limit to Complete Source Data
Choose Samples
001
002
003
004
005
006
007
Algorithm #1: Remove all sources that are within a threshold (e.g. sensitivity). A Model Sensitivity of 0.15 means all sources outside 15% variation for all elements (Rb, Sr…n) are rejected
Algorithm #2: Determine goodness-of-fit between relative variation of trace elements, assess t-value (higher is better) and p-value (lower is better)
Algorithm #3 (optional): Assess Bayesian posterior probability using distance as a prior and the p-value from Algorithm #2 as new data

Obsidian Source | Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Download

Define Region

Lat/Long

Latitude Minimum

-90

Latitude Maximum

90

Longitude Minimum

-180

Longitude Maximum

180

848

Model Sensitivity

0.15

Use Lat/Long as Prior

Limit to Complete Source Data

Choose Samples

- 001
- 002
- 003
- 004
- 005
- 006
- 007

Subsets | Data

Select HOLD | Select HOLD | Select HOLD | Select HOLD

In 'Model Prep', we choose:

a) The region to use for possible sources (lat/long or political boundaries)

b) Model Sensitivity - how sensitive to make the model? Higher means more selective fingerprinting, but a risk of missing important sources

c) Bayesian or standard - by using Lat/Longs as a prior, the model will assume closer sources are more likely

d) Limit to Complete Source Data - checking this box removes sources that don't have full elemental data (e.g. missing Sr, etc.)

e) Which data to use? You can exclude samples here if you want to

f) You can also subset by qualitative information you provide for the samples, such as site, level #, etc.

Obsidian Source

Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Download

Define Region

Political

- Lat/Long
- Continent
- Region
- Political

Nevada Oregon Utah Washington Wyoming South Dakota Texas

327

Model Sensitivity

0.15

Use Lat/Long as Prior

Limit to Complete Source Data

Choose Samples

- 001
- 002
- 003
- 004
- 005
- 006
- 007
- 008
- 009
- 010
- 011
- 012
- 013

Subsets | Data

Select	Select	Select	Select
HOLD	HOLD	HOLD	HOLD

In this case, we will use political boundaries to define the possible sources our artifacts have come from

Obsidian Source

Download

Define Region

Political

Choose Country

USA

Choose State/Provence

Arizona Colorado Idaho Montana New Mexico Nevada Oregon Utah Washington Wyoming South Dakota Texas

Alaska
California

Model Sensitivity

0.15

Use Lat/Long as Prior

Limit to Complete Source Data

Choose Samples

- [x] 001
- [x] 002
- [x] 003
- [x] 004
- [x] 005
- [x] 006
- [x] 007
- [x] 008
- [x] 009
- [x] 010
- [x] 011
- [x] 012
- [x] 013

Subsets Data

Select HOLD
Select HOLD
Select HOLD
Select HOLD

We can add/remove states and provinces here to further narrow the scope

Obsidian Source | Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Download

Define Region

Political

Choose Country

USA

Choose State/Provence

Alaska Arizona California Colorado Idaho Montana New Mexico Nevada Oregon Utah Washington Wyoming South Dakota Texas

510

Model Sensitivity

0.05

Use Lat/Long as Prior

Limit to Complete Source Data

Choose Samples

- [x] 001
- [x] 002
- [x] 003
- [x] 004
- [x] 005
- [x] 006
- [x] 007
- [x] 008
- [x] 009
- [x] 010
- [x] 011
- [x] 012
- [x] 013

Subsets | Data

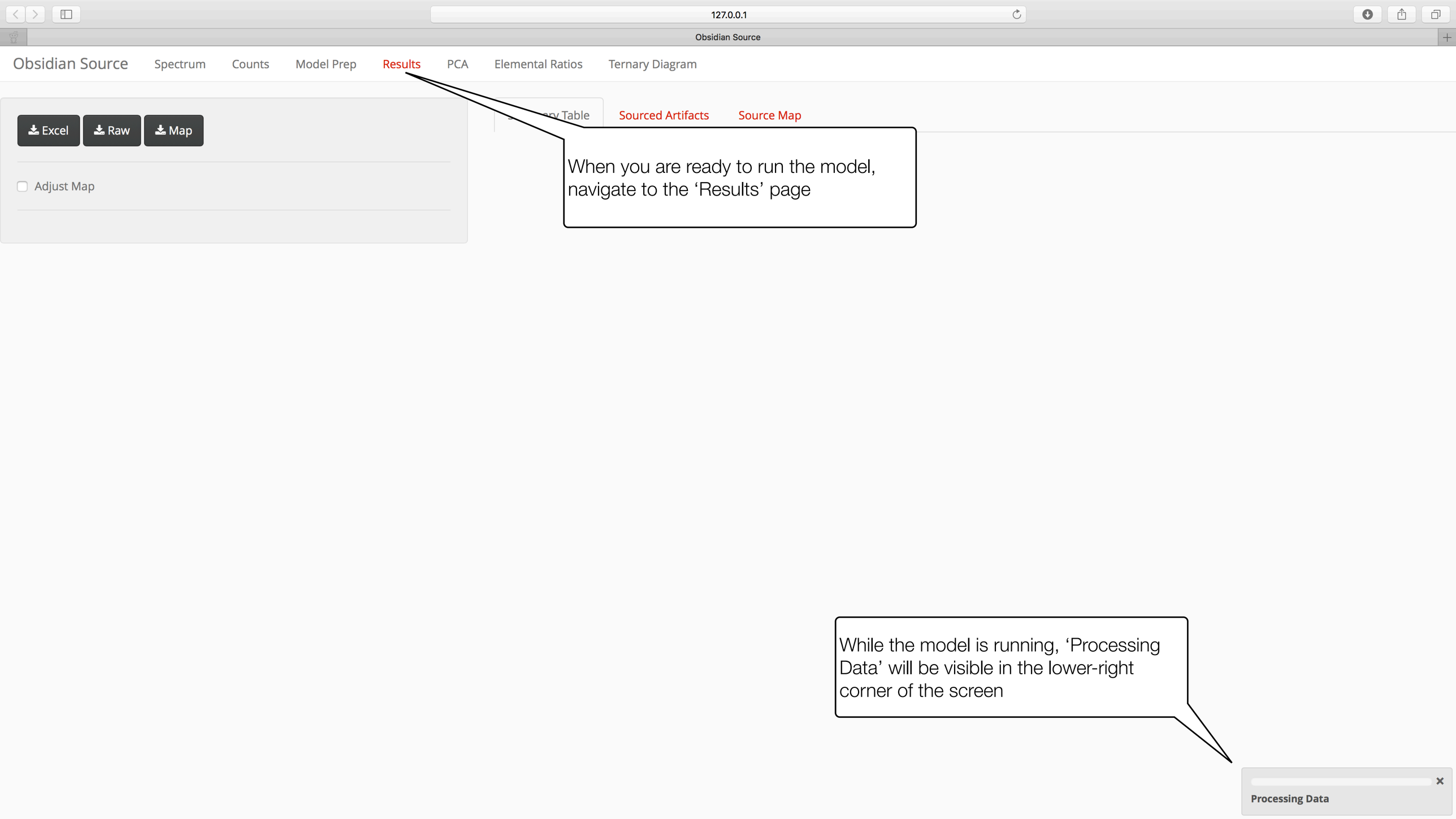
Select
- [x] HOLD

Select
- [x] HOLD

Select
- [x] HOLD

Select
- [x] HOLD

The Model Sensitivity is defaulted to 0.15, but for the Western US a model fit of 0.05 is best


127.0.0.1
Obsidian Source
Obsidian Source
Spectrum
Counts
Model Prep
Results
PCA
Elemental Ratios
Ternary Diagram
Excel
Raw
Map
Adjust Map
Sourced Artifacts
Source Map
When you are ready to run the model, navigate to the ‘Results’ page
While the model is running, ‘Processing Data’ will be visible in the lower-right corner of the screen
Processing Data

Excel Raw Map

Adjust Map

Summary Table Sourced Artifacts Source Map

Show 10 entries Search:

	Source	Total	Percent	Latitude	Longitude	Description
1	Coglan.Buttes	40	41.7%	42.669	-120.371	"Coglan Butte obsidian has a purple sheen to it, and is found to the west of Lake Albert, Oregon (Moore 2009)."
2	Obsidian.Butte.Variety.4	14	14.6%	37.327	-116.842	"The Obsidian Butte Volcanic Complex contains several well known subsources, including Crow Spring, Silver Peak, the Montezuma Range, Shoshone Mountain, and Tempiute Mountain, as well as Obsidian Butte. Obsidian Butte is a black-brown and slightly translucent obsidian featuring distinct banding, spherulites, and phenocrysts (Haarklau et al 2005)." "The Obsidian Butte Volcanic Center was commonly utilized for point manufacturing spanning the entire prehistory of the Great Basin and Mojave Desert (Haarklau et al 2005)."
3	Wolf.Creek	11	11.5%	44.16	-118.64	
4	Whitewater.Ridge	8	8.3%	44.313	-118.606	"High quality obsidian correlated with the Whitewater Ridge source group is known from many different widely distributed source localities found along the southern margins and hills immediately south of Bear Valley' (Skinner and Thatcher 2003)." "Prehistoric use of the Whitewater Ridge source was very extensive, perhaps more so than any other source in northeast Oregon' (Skinner and Thatcher 2003)."
5	Obsidian.Butte.Variety.3	6	6.2%	37.303	-116.846	"The Obsidian Butte Volcanic Complex contains several well known subsources, including Crow Spring, Silver Peak, the Montezuma Range, Shoshone Mountain, and Tempiute Mountain, as well as Obsidian Butte. Obsidian Butte is a black-brown and slightly translucent obsidian featuring distinct banding, spherulites, and phenocrysts (Haarklau et al 2005)." "The Obsidian Butte Volcanic Center was commonly utilized for point manufacturing spanning the entire prehistory of the Great Basin and Mojave Desert (Haarklau et al 2005)."
6	Badger.Creek	5	5.2%	41.753	-119.462	"Badger Creek obsidian is blue-grey, and sometimes green. It is found 2.5 miles southeast of Bitner Butte, Nevada (Moore 2009)."
7	China.Lake	3	3.1%	43.372	-119.689	
8	Coyote.Spring	2	2.1%	41.606	-119.513	"The source of Coyote Spring use was highly localized to the High Country of northwest Nevada. The material is not a true obsidian source, and it considered a fine-grained volcanic rock (LaValley 2013)."
9	Obsidian.Butte.Variety.5	2	2.1%	37.366	-116.866	"The Obsidian Butte Volcanic Complex contains several well known subsources, including Crow Spring, Silver Peak, the Montezuma Range, Shoshone Mountain, and Tempiute Mountain, as well as Obsidian Butte. Obsidian Butte is a black-brown and slightly translucent obsidian featuring distinct banding, spherulites, and phenocrysts

When the model is done, it will sort sources by what % of the data they match. The location of the source will be provided as well.

The database we've developed includes, when available, a brief summary of the source in both the geologic and ethnological literature. You can access the bibliographic information we used to compile the database in the downloadable Excel file

Excel Raw Map

Adjust Map

On the ‘Sourced Artifacts’ page, you can see the elemental data and most-likely source attribution for each artifact.

Summary Table | Sourced Artifacts | Source Map

Show 100 entries Search:

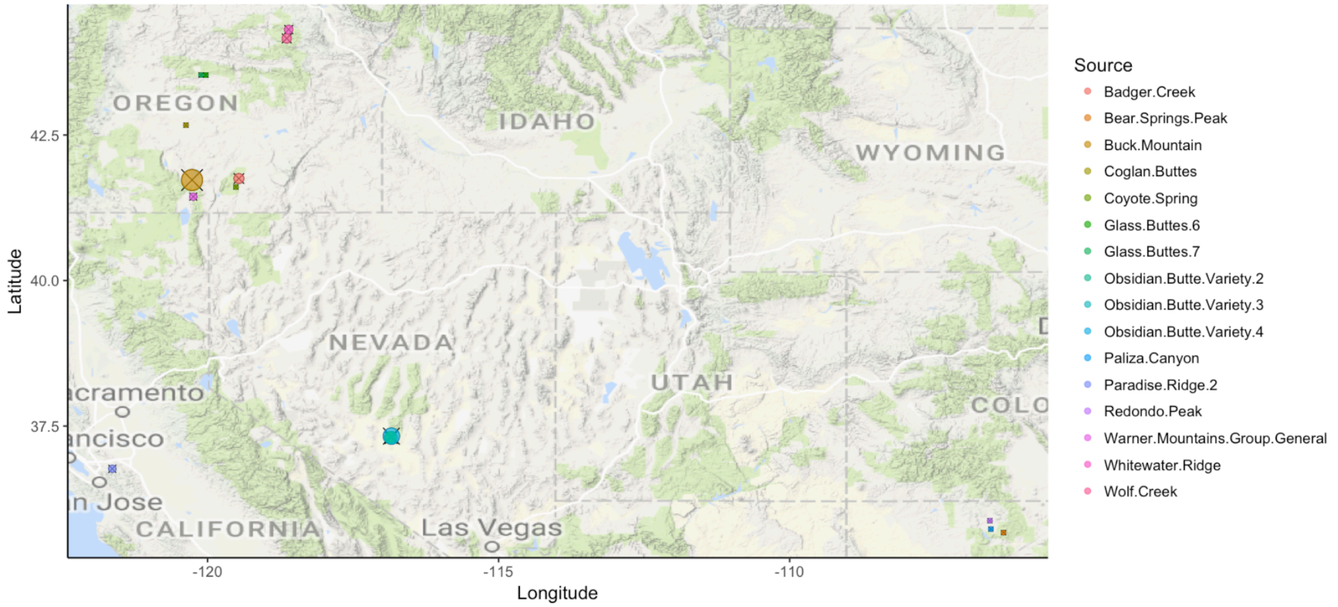
	Sample	Nb	Rb	Sr	Y	Zr	Source
1	001	8	100	58	22	96	Coglan.Buttes
2	002	8	107	49	24	91	Obsidian.Butte.Variety.3
3	003	8	96	65	23	101	Obsidian.Butte.Variety.4
4	004	9	95	64	22	98	Coglan.Buttes
5	005	9	93	61	20	96	Coglan.Buttes
6	006	9	91	58	21	96	Coglan.Buttes
7	007	9	99	57	22	96	Coglan.Buttes
8	008	8	103	63	24	102	Obsidian.Butte.Variety.4
9	009	8	87	60	23	92	Obsidian.Butte.Variety.4
10	010	8	104	64	20	103	China.Lake
11	011	9	86	60	23	99	Glass.Buttes.7
12	012	9	98	60	25	99	Whitewater.Ridge
13	013	8	110	50	25	90	Obsidian.Butte.Variety.3
14	014	8	99	60	23	95	Coglan.Buttes
15	015	8	99	60	22	96	Coglan.Buttes
16	016	8	108	47	27	92	Wolf.Creek
17	017	9	93	63	23	97	Obsidian.Butte.Variety.4
18	018	9	95	59	20	94	Coglan.Buttes
19	019	8	98	47	21	88	Wolf.Creek
20	020	8	95	63	20	96	Coglan.Buttes
21	021	8	95	61	19	95	Badger.Creek

Obsidian Source | Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Excel | Raw | Map

Adjust Map

Summary Table | Sourced Artifacts | Source Map



On the 'Source Map' page, you can see where the sources are located relative to each other. In this case, the majority of the artifacts come from south-central Oregon

Obsidian Source

Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Excel | Raw | Map

Adjust Map

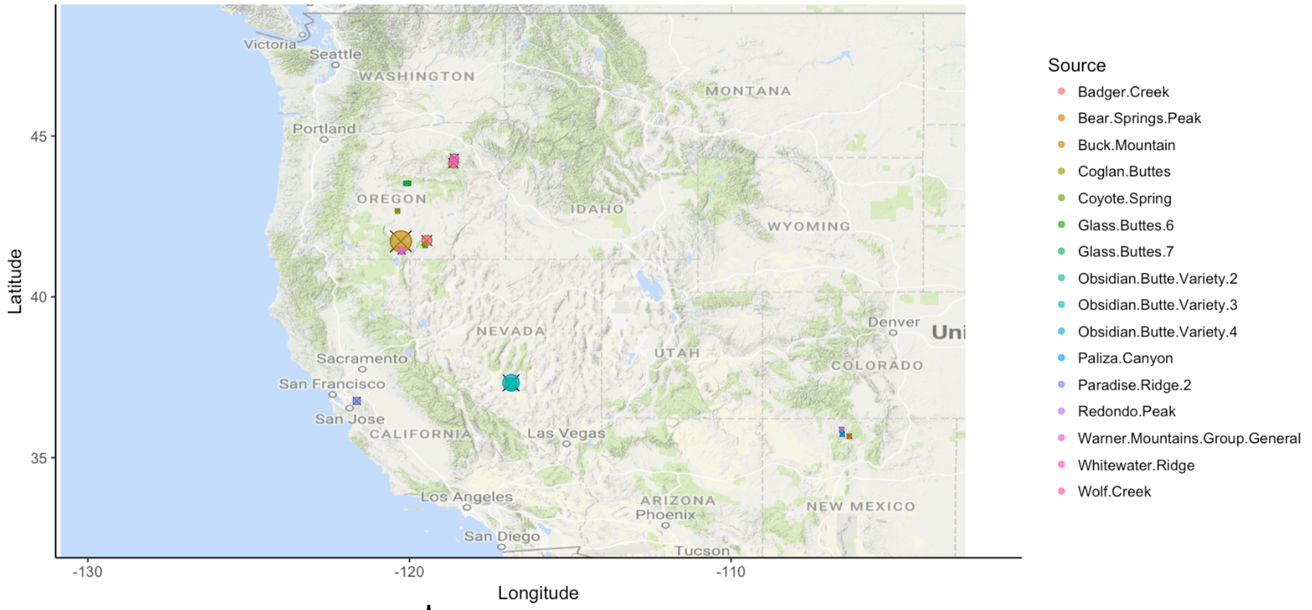
Latitude Minimum: 32.669

Latitude Maximum: 48.313

Longitude Minimum: -129.637

Longitude Maximum: -102.326

Summary Table | Sourced Artifacts | Source Map



You can also manually adjust the coordinates on the map itself to frame it as it is most useful to you

Obsidian Source

K-Means

3

Colour

Source

Point Size

2 15

2 4 6 8 10 12 14 15

Sources to Plot

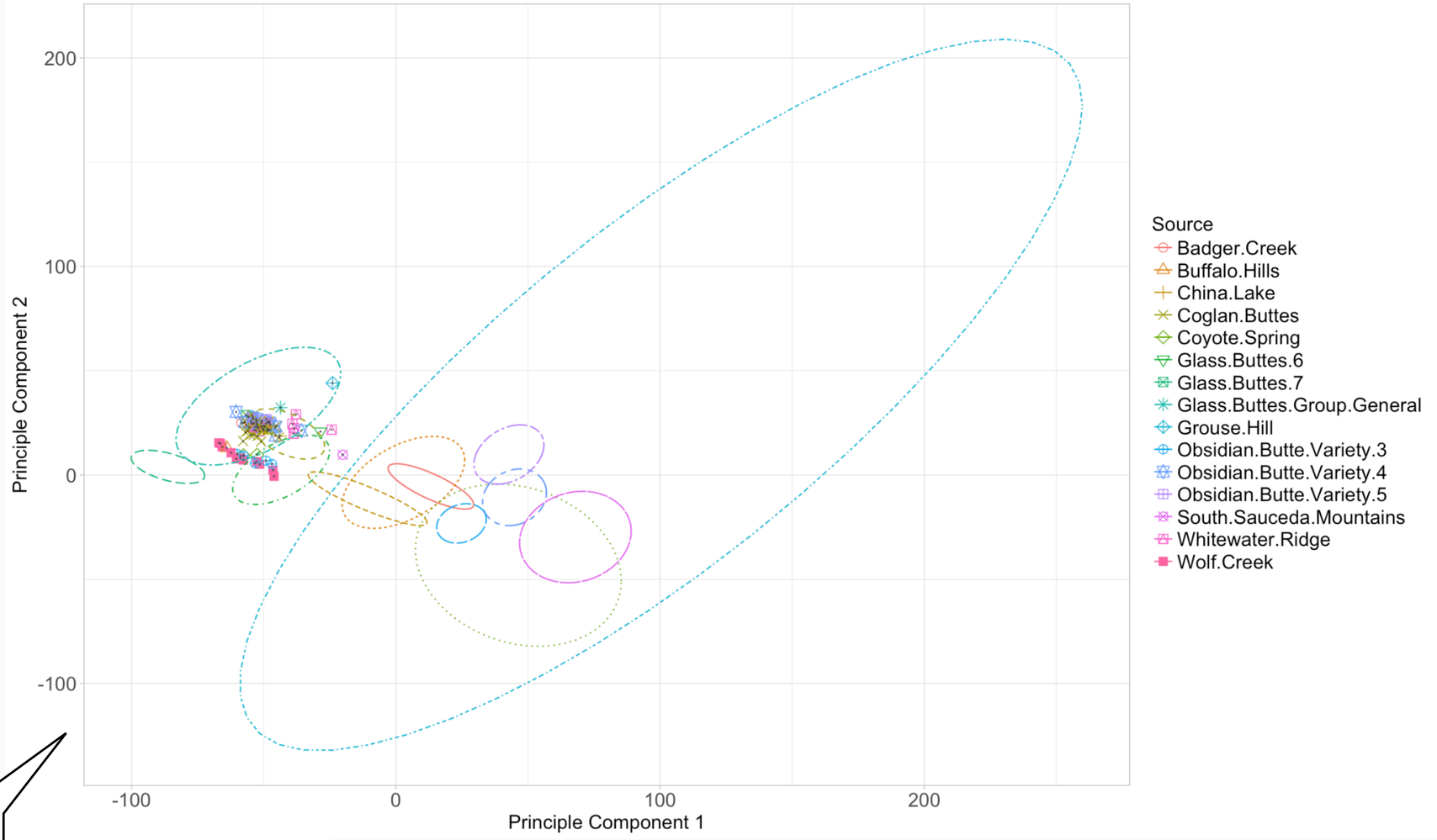
Badger.Creek Buffalo.Hills China.Lake Coglan.Buttes Coyote.Spring
Glass.Buttes.6 Glass.Buttes.7 Glass.Buttes.Group.General Grouse.Hill
Obsidian.Butte.Variety.3 Obsidian.Butte.Variety.4 Obsidian.Butte.Variety.5
South.Sauceda.Mountains Whitewater.Ridge Wolf.Creek

☑ Elipse

☐ Log Transform

Plot Results

PCA Plot | Table



On the 'PCA' page, you can do traditional PCA analysis - the possible sources are ellipses (optional) and the data can be colored by source, cluster analysis, or qualitative attributes (site, layer, etc.)

Obsidian Source

Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

K-Means

3

Colour

Focus

Choose Variable

Source

Choose Focus

Coglan.Buttes

Choose Label

None

Point Size

2 15

2 4 6 8 10 12 14 15

Sources to Plot

Badger.Creek Buffalo.Hills China.Lake Coglan.Buttes Coyote.Spring Glass.Buttes.6 Glass.Buttes.7 Glass.Buttes.Group.General Grouse.Hill Obsidian.Butte.Variety.3 Obsidian.Butte.Variety.4 Obsidian.Butte.Variety.5 South.Sauceda.Mountains Whitewater.Ridge Wolf.Creek

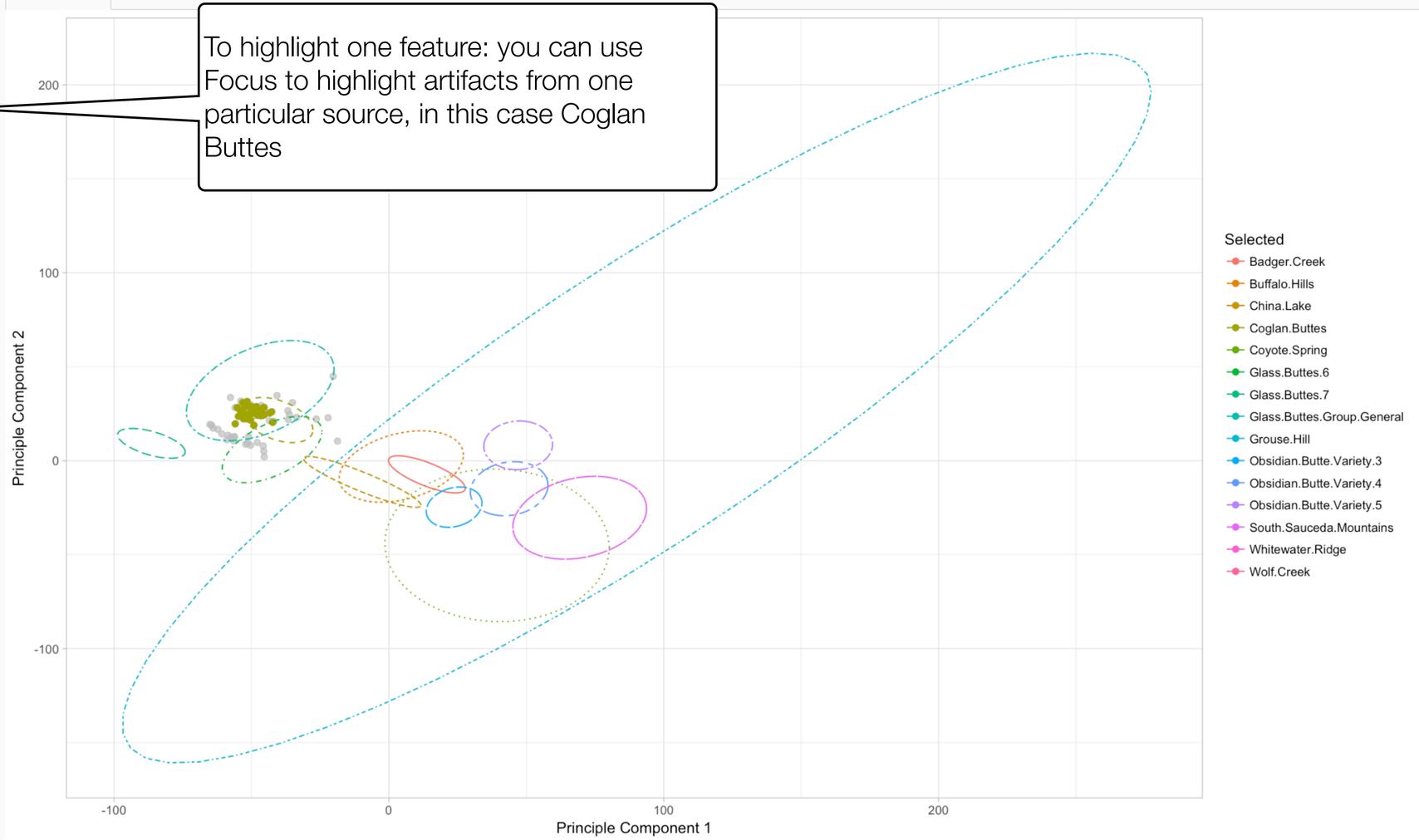
Elipse

Log Transform

Plot Results

PCA Plot | Table

To highlight one feature: you can use Focus to highlight artifacts from one particular source, in this case Coglan Buttes



Obsidian Source

Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

K-Means

3

Colour

Focus

Choose Variable

Source

Choose Focus

Coglan.Buttes

Choose Label

Sample

Point Size

2 15

2 4 6 8 10 12 14 15

Sources to Plot

Badger.Creek | Buffalo.Hills | China.Lake | Coglan.Buttes | Coyote.Spring | Glass.Buttes.6 | Glass.Buttes.7 | Glass.Buttes.Group.General | Grouse.Hill | Obsidian.Butte.Variety.3 | Obsidian.Butte.Variety.4 | Obsidian.Butte.Variety.5 | South.Sauceda.Mountains | Whitewater.Ridge | Wolf.Creek

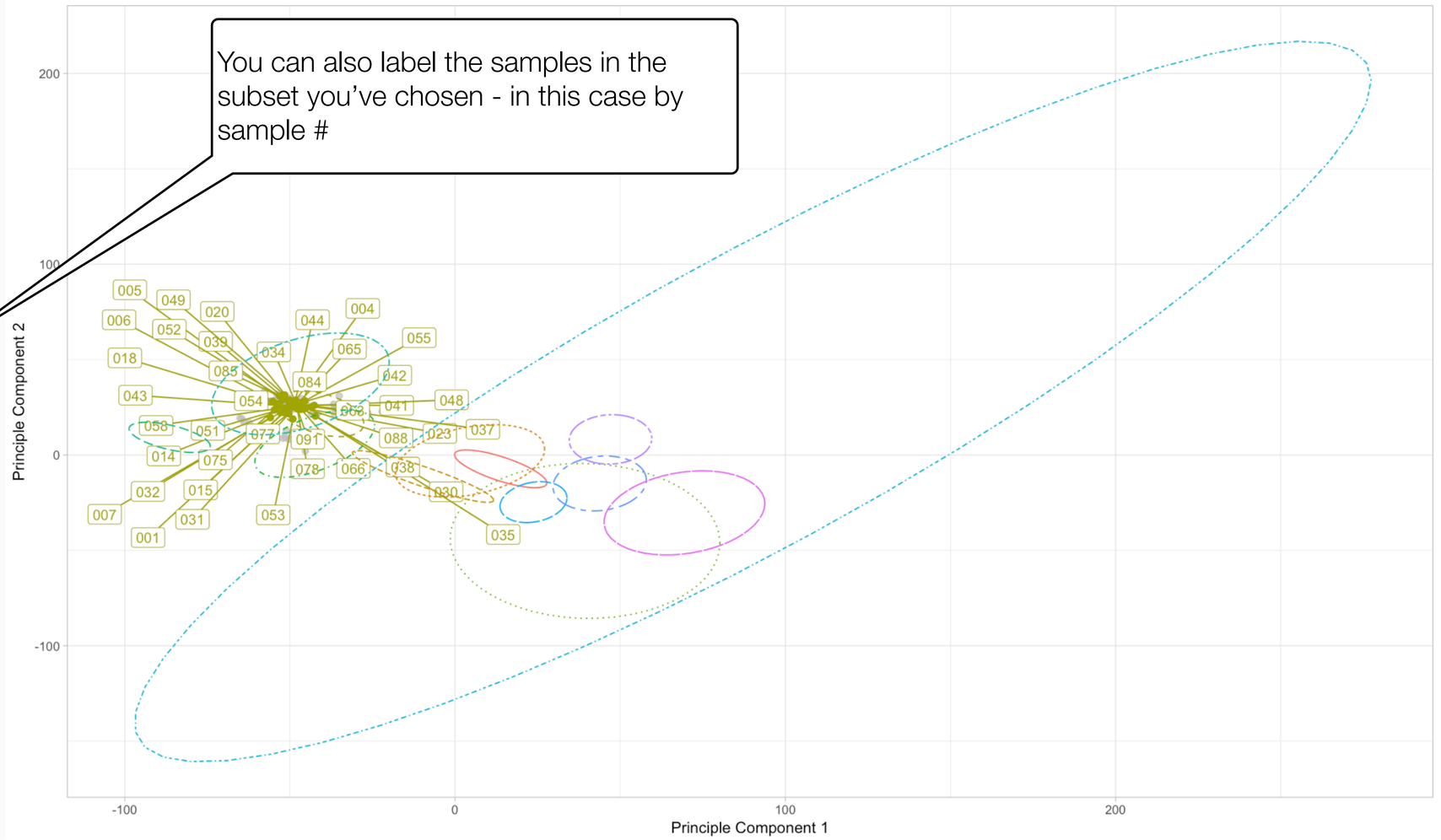
Elipse

Log Transform

Plot | Results

PCA Plot | Table

You can also label the samples in the subset you've chosen - in this case by sample #



Obsidian Source

Spectrum | Counts | Model Prep | Results | PCA | Elemental Ratios | Ternary Diagram

Ratio Plot Type

Source

Element A

Zr

Element B

None

Element C

Sr

Element D

None

Point Size

2 15

2 4 6 8 10 12 14 15

Sources to Plot

Coglan.Buttes | Obsidian.Butte.Variety.3 | Obsidian.Butte.Variety.4 | China.Lake | Glass.Buttes.7 | Whitewater.Ridge | Wolf.Creek | Badger.Creek | Grouse.Hill | Glass.Buttes.Group.General | Coyote.Spring | Buffalo.Hills | Obsidian.Butte.Variety.5 | South.Sauceda.Mountains | Glass.Buttes.6

X axis

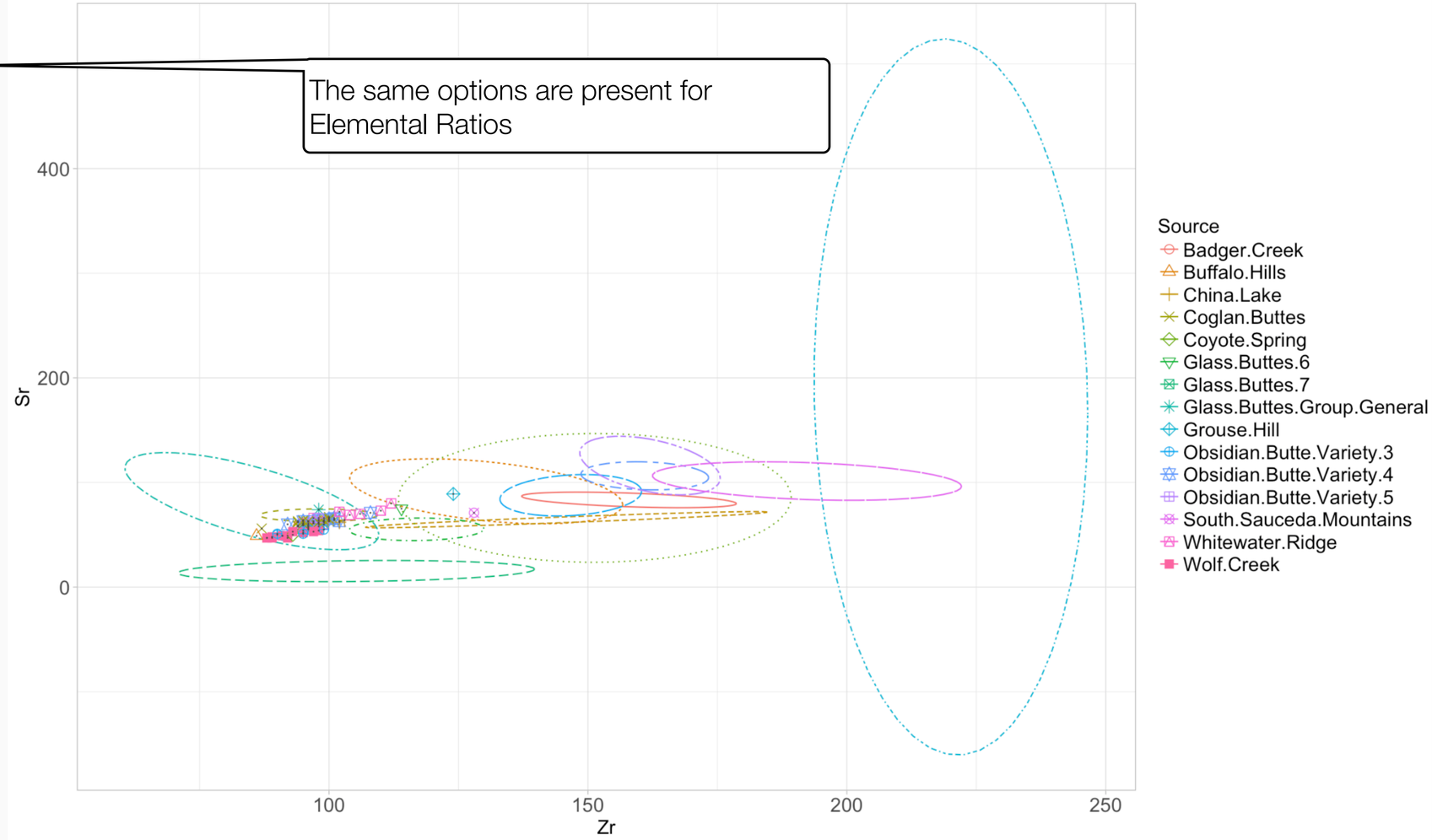
86 128

86 91 96 101 106 111 116 121 126

Y axis

47 89

The same options are present for Elemental Ratios



Obsidian Source

Ratio Plot Type
Focus

Choose Variable
Source

Choose Focus
Coglan.Buttes

Choose Label
None

Element A
Zr

Element B
None

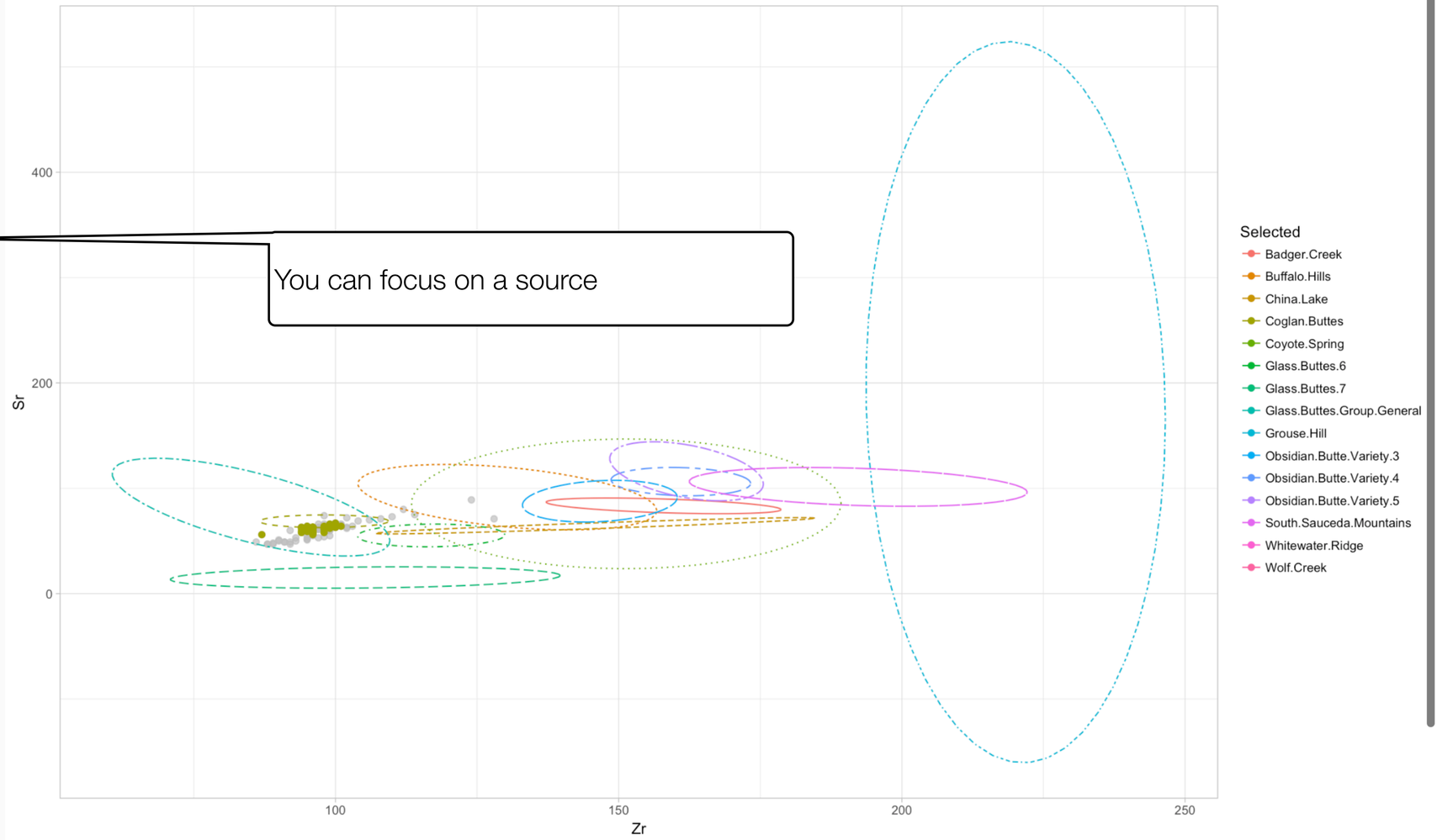
Element C
Sr

Element D
None

Point Size
2 15
2 4 6 8 10 12 14 15

Sources to Plot
Coglan.Buttes Obsidian.Butte.Variety.3 Obsidian.Butte.Variety.4
China.Lake Glass.Buttes.7 Whitewater.Ridge Wolf.Creek Badger.Creek
Grouse.Hill Glass.Buttes.Group.General Coyote.Spring Buffalo.Hills

You can focus on a source



Obsidian Source

Ratio Plot Type
Focus

Choose Variable
Source

Choose Focus
Coglan.Buttes

Choose Label
Sample

Element A
Zr

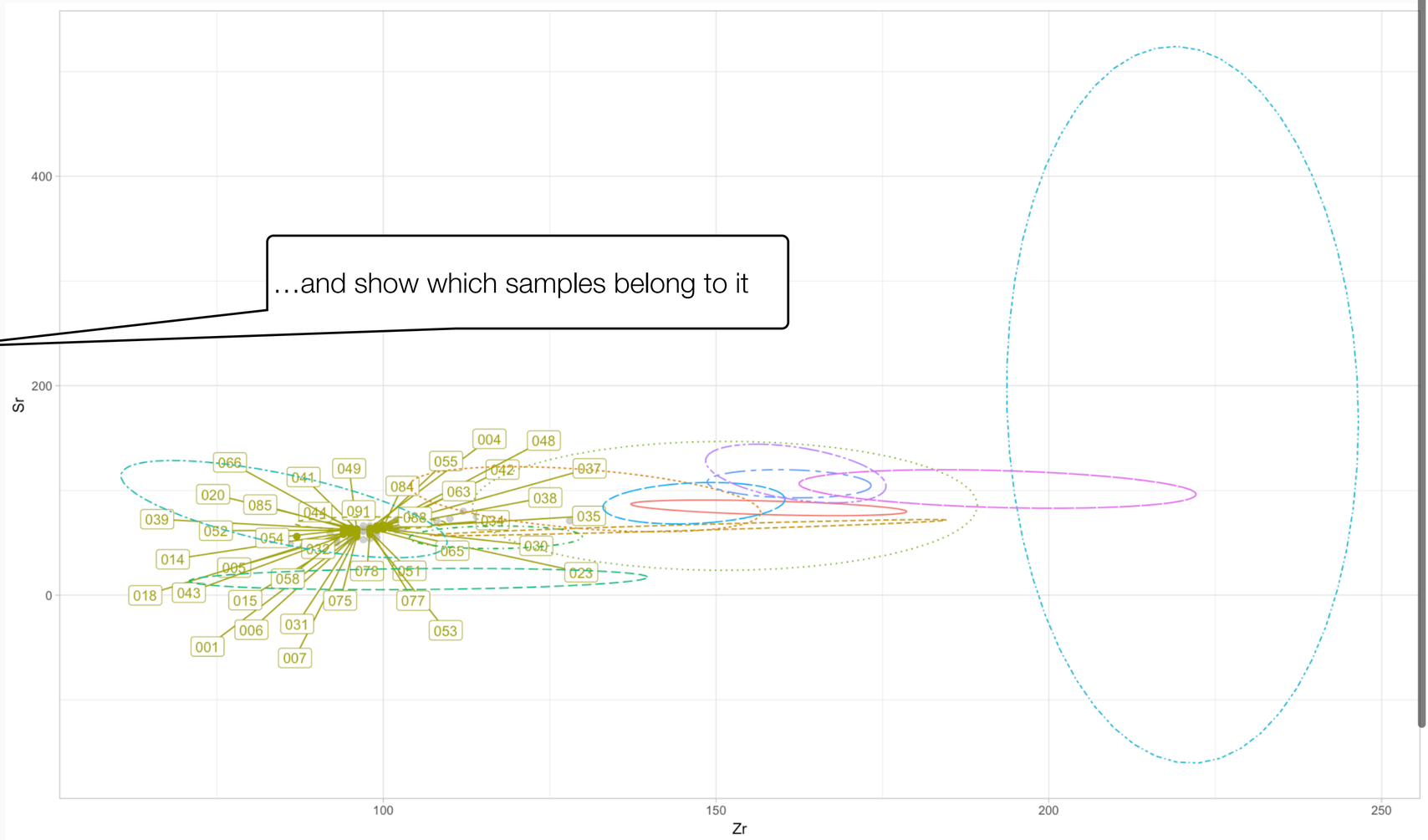
Element B
None

Element C
Sr

Element D
None

Point Size
2 15
2 4 6 8 10 12 14 15

Sources to Plot
Coglan.Buttes Obsidian.Butte.Variety.3 Obsidian.Butte.Variety.4
China.Lake Glass.Buttes.7 Whitewater.Ridge Wolf.Creek Badger.Creek
Grouse.Hill Glass.Buttes.Group.General Coyote.Spring Buffalo.Hills



File Home Insert Page Layout Formulas Data Review View Add-Ins Team

A1 Specimen

	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ
1	Clayton.Ridge	Cleetwood	Cleman.Mountain.Tachylyte	Cloudcap	Cloverdale.Canyon.A	Cloverdale.Canyon.B	Coal.Bank.Spring	Cochetopa.Dome	Coglan.Buttes	Cold.Point	Conant.Creek	Conant.Pass	Copper.Ridge.A	Copper.Ridge.B	Copper.Ridge.C	Copper.Ridge.D	Cougar.Creek
2	0.7507								0				0.5947				
3		0.8628						0.5166	0.0041								
4	0.7842	0.8349							0.0044				0.5017				
5	0.7841								0.0006				0.5086				
6	0.7807								0.002				0.5198				
7	0.7813								0.0003				0.3838				
8	0.7446								0.0001				0.5589				
9	0.7761	0.8528						0.6937									
10		0.8287							0.0092				0.5069				
11	0.8019																
12	0.5727	0.5752							0.5206				0.5455				
13	0.7311	0.7892						0.6671	0.0166				0.5637				
14		0.8771						0.502	0.0029								
15	0.7353	0.806							0				0.6038				
16	0.7341								0				0.5723				
17				0.8173					0.0691								
18	0.7774	0.8286							0.0053				0.5221				
19									0.0002				0.5967				
20													0.6071				
21	0.7815								0.0006				0.5649				
22	0.7337								0.0074				0.5801				
23		0.8027						0.7478					0.4279				
24	0.78								0.0002				0.5404				
25	0.7064								0.058				0.5447				
26	0.7787	0.8366							0.0052				0.4829				
27	0.7638	0.8222							0.0036				0.5248				
28		0.8834											0.6094				
29								0.7482									
30									0.0563				0.563				
31	0.7852								0.0001				0.5669				
32	0.7177	0.8							0				0.5978				
33				0.8231				0.6167	0.0001								
34	0.7302	0.7685		0.7249					0.0258				0.5444				
35	0.7694	0.8325		0.7875					0.0006				0.4631				
36	0.7165	0.7935							0				0.5835				
37	0.7891								0.0028				0.3537				
38	0.7713								0				0.572				
39	0.7731												0.5734				
40													0.6157				
41	0.7259												0.5939				
42	0.7445												0.5856				
43	0.7941												0.4846				
44	0.7611	0.8314		0.7994									0.578				
45	0.7379												0.5831				
46				0.8147													
47	0.7182	0.7674											0.6031				
48	0.7747	0.8365						0.7007	0.0019				0.5453				

To see other possible sources, you can use the downloadable spreadsheet, which in the —values tab shows the significance of each source attribution within the model's sensitivity

Summary Parameters T-Value r-Value **p-Value** Overlap

Ready 100%

EN 12:09 PM 3/7/18