

# Re-examining Mogollon Pithouse Chronology - A Bayesian Approach

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## OBJECTIVE

Test the traditional Mimbres Mogollon chronology and determine when major cultural changes occurred during the Mogollon Pithouse period.

## SIGNIFICANCE

Under the traditional Mimbres chronology, the shift from the Early Pithouse period (AD 200-550) to the Georgetown phase of the Late Pithouse period (AD 550-660) is often associated with a further commitment to agriculture and sedentism, especially in the Mimbres Valley.

## METHODS

Bayesian Chronological Modeling

## DATA

Excavated Mogollon pithouse sites, Site landform designations, Pithouse chronometric dates

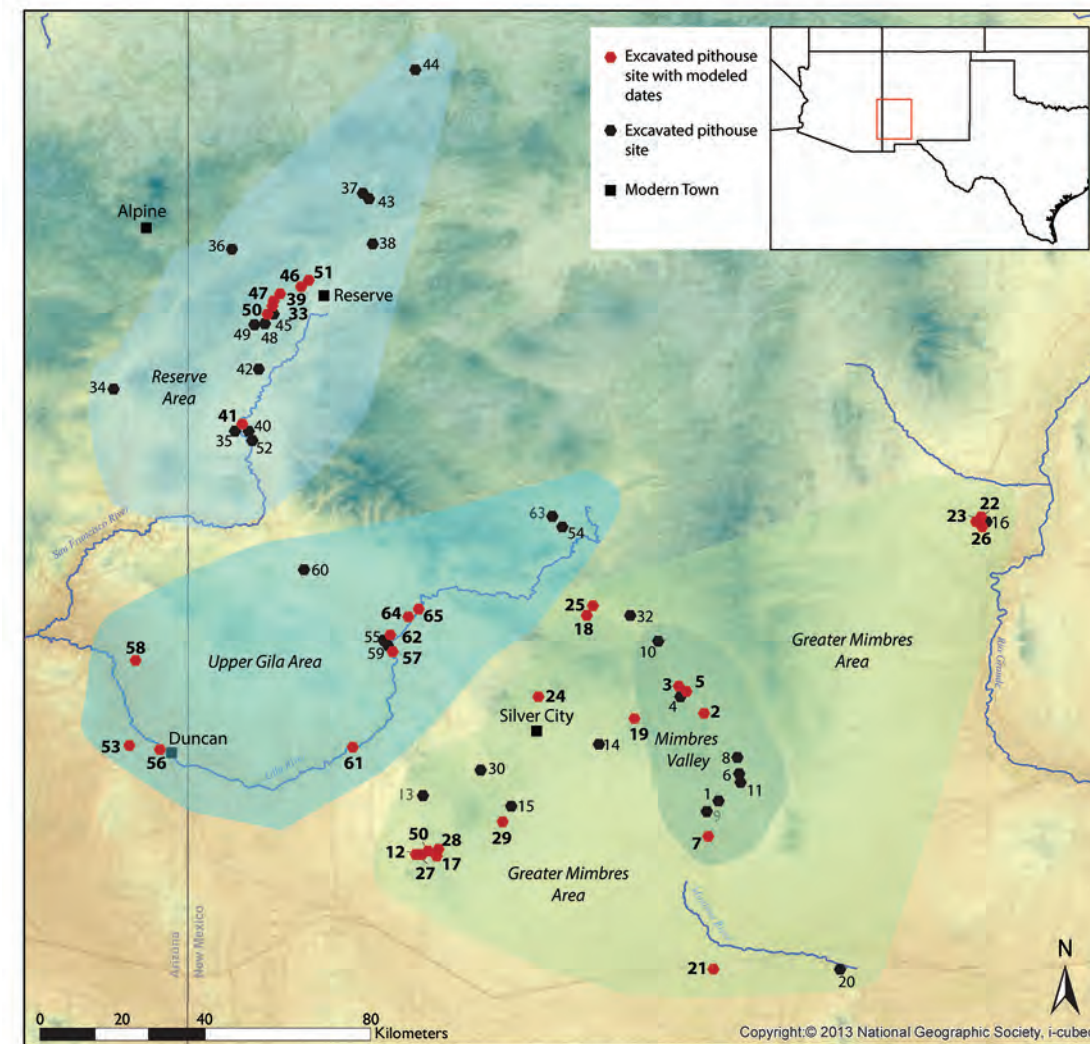
## ANALYSES

- 1). Examine the timing and duration of Mogollon circular pithouses with Plain Brown ceramics only, circular pithouses with Red-slipped ceramics, rectangular pithouses, communal pithouses;
- 2). Compare Bayesian model with generally accepted pithouse dates with model using stringent data hygiene;
- 3). Determine landform use for circular and rectangular pithouses in the Mimbres Valley, General Mimbres, Upper Gila, and Reserve areas;
- 4). Examine the timing of circular and rectangular pithouses by landform type

## RESULTS/CONCLUSIONS

- The chronometric data and landform use does not support the traditional Early Pithouse period and Georgetown phase chronology.
- The lack of chronometric dates, "old wood," and other date issues hamper and skew our understanding of Mogollon Pithouse chronology.
- The results suggest that caution should be used when assigning sites/structures to a time period or cultural phase based on pithouse shape, presence of red-slipped pottery, or site location.
- There does not appear to be a major settlement shift from high to low landforms around AD 550 in the Mogollon region.
- Both circular and rectangular pithouses can be found on high and low landforms throughout the Pithouse period in the Mogollon region.
- There are no dated circular pithouses on low landforms nor dated rectangular pithouses on high landforms in the Mimbres Valley.
- Given the lack of data, the settlement patterns in the Mimbres Valley cannot be compared to other areas in the Mogollon region.
- More chronometric dates (multiple dates per structure) are needed for the Mogollon Pithouse period.
- We need to move beyond just trying to place a site in some cultural phase and provide more precise date estimates for individual structures. In doing so, we are giving agency to those who lived there, and we have the potential to gain greater insight into the past.

### Mogollon Pithouse Sites Used in This Study



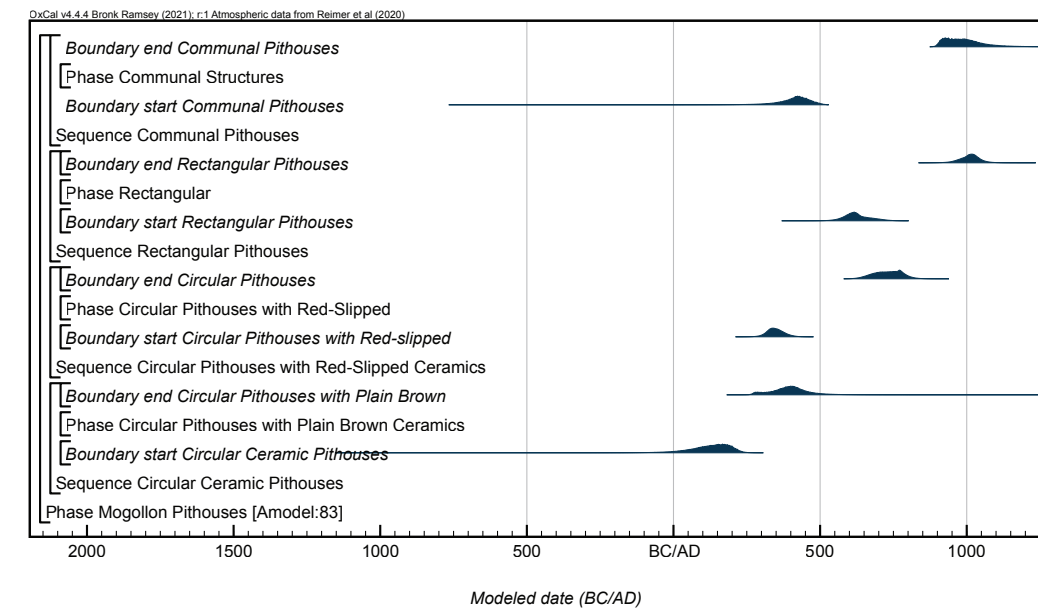
Mogollon Pithouse Sites with Excavated Pithouse Type		
<b>Mimbres Valley</b>	16. Cuchillo	49. Turkey Foot Ridge
1. Baca Ruin	17. Forest Home	50. Twin Bridges
2. Galaz	18. Hooker	51. Wheatley Ridge
3. Harris	19. Jackson Fraction	52. WS Ranch
4. Mattocks	20. Kipp	53. Clark
5. McAnally	21. LA 129562	54. Diablo Village
6. NAN Ranch	22. LA 50547	55. Dinwiddle
7. Old Town	23. LA 53480	56. Duncan
8. Swartz	24. La Gila Encantada	57. Lee Village
9. Thompson	25. Lake Roberts Vista	58. Mesa Top
10. Three Circle	26. Ocotillo	59. Ormand
11. Y-Bar	27. Peterson Canyon	60. Pine Creek
<b>Greater Mimbres Area</b>	28. Power	61. Red Rock #1
12. Beargrass	29. White Signal	62. Saige-McFarland
13. Burro Springs #2	30. Wind Mountain	63. West Fork
14. Cameron Creek	31. Wood Canyon	64. Winn Canyon
15. Cherry Creek	32. Y4:7	65. Woodrow
	33. Fence Corner	
	34. Harlequin	
	35. HO Bar	
	36. Humming Wire	
	37. LA 5936	
	38. Largo Canyon	
	39. Lazy Meadows	
	40. McKeen Ranch	
	41. Mogollon Village	
	42. Promontory	
	43. Pueblo Lillie	
	44. Quemado Alegre	
	45. South Leggett	
	46. Starkweather	
	47. SU	
	48. Three Pines Pueblo	

### Summary of chronometric dates

	MODEL 1 (Generally Accepted Dates)				MODEL 2 (Stringent Data Hygiene)			
	# of Sites	# of Pithouses	Radiocarbon Dates	Tree-ring Cutting Dates	# of Sites	# of Pithouses	Radiocarbon Dates	Tree-ring Cutting Dates
Circular Pithouse (Plain Brown Ceramics)	5	7	10	0	Too few dates to model			
Circular Pithouses (Red-Slipped Ceramics)	16	29	60	2	6	10	18	2
Rectangular Pithouses	14	42	52	15	9	21	21	15
Communal Pithouses	6	8	13	1	4	5	10	1
Totals	41	86	135	18	19	36	49	18

Brief model construction overview: Individual Bayesian models were created for each site that had at least two radiocarbon dates. Each individual site model was constructed to capture date estimates for the beginnings and endings of the different pithouse types. For the synthetic models, the different pithouse types were modeled as independent sequences to allow for the possibility of overlap between the types. Both synthetic models incorporate the posterior density estimates from the individual site models as the standard likelihoods. All models were run in OxCal 4.4 (Bronk Ramsey 2009) with the IntCal20 calibration curve (Reimer et al. 2020) set at a resolution of on year.

### Overall structure of Model 1



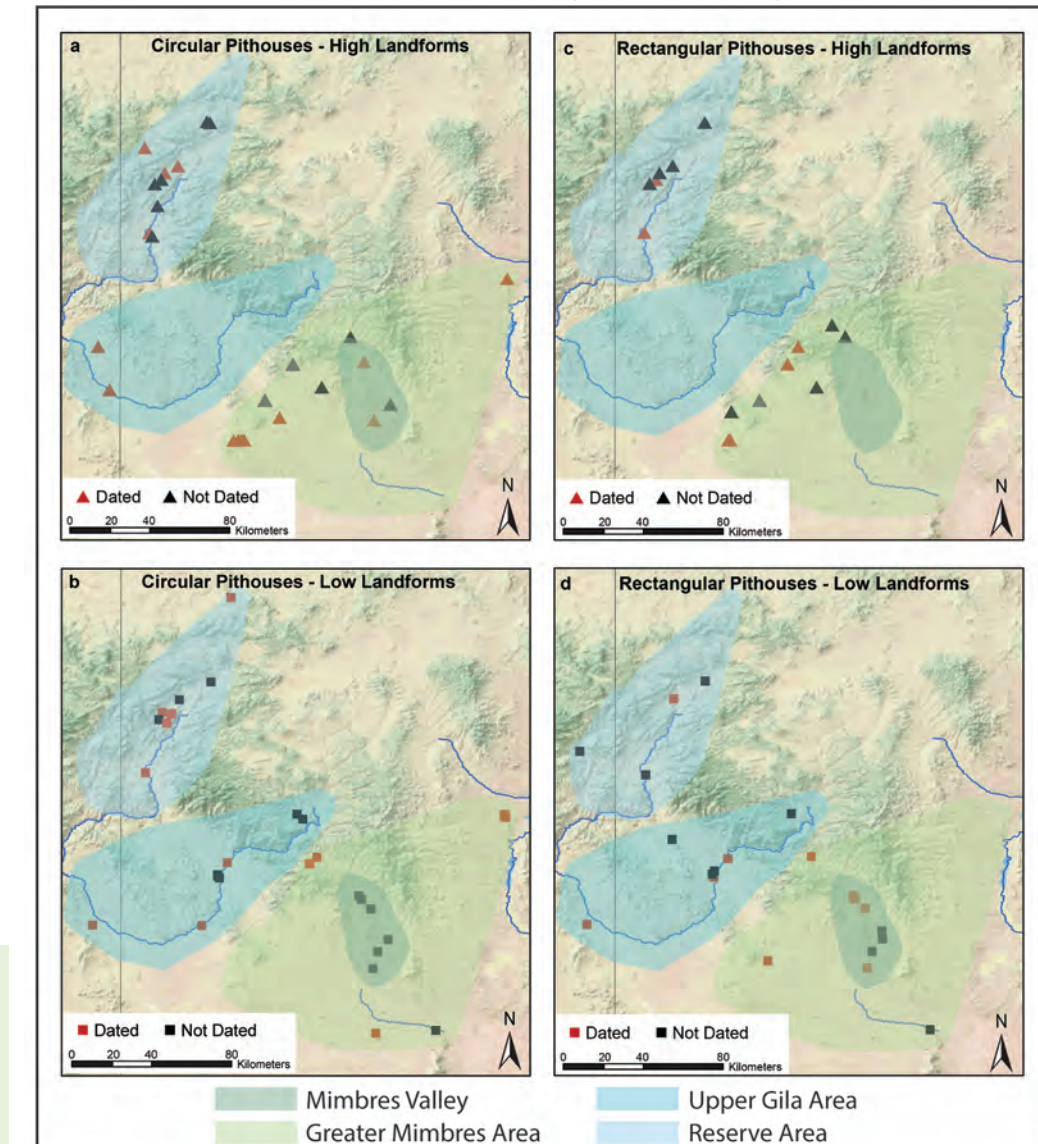
### Highest posterior density intervals for key parameters

	MODEL 1		MODEL 2	
	68% Probability	95% Probability	68% Probability	95% Probability
start Circular Ceramic Pithouses	80-210	35 cal BC-240		
end Circular Pithouses with Plain Brown	335-460	265-525		
Circular Pithouses with Plain Brown span	170-325 yrs	65-390 yrs		
start Circular Pithouses with Red-Slipped	315-375	290-415	290-365	225-400
end Circular Pithouses	685-790	635-820	610-730	575-815
Circular Pithouses with Red-slipped span	420-475 yrs	405-530 yrs	415-450 yrs	390-505 yrs
start Rectangular Pithouses	575-665	540-730	600-720	535-770
end Rectangular Pithouses	980-1045	935-1085	970-1050	925-1105
Rectangular Pithouses span	380-440 yrs	360-475 yrs	360-495 yrs	360-495 yrs
start Communal Pithouses	375-475	265-515	345-495	185-565
end Communal Pithouses	905-1025	890-1150	775-995	700-1095
Communal Pithouses span	430-535 yrs	390-580 yrs	405-460 yrs	370-465 yrs

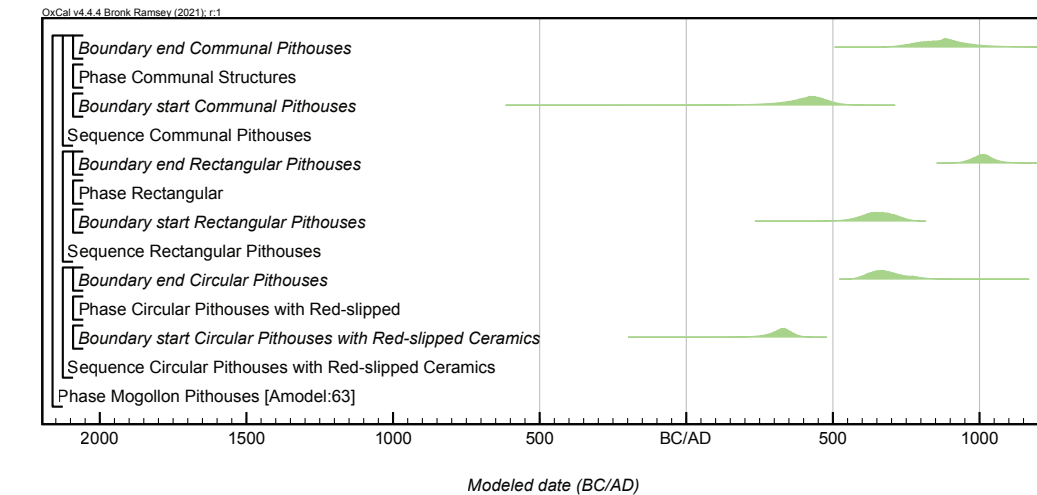
All dates cal AD, unless otherwise listed, with end points rounded to the nearest five years.

To determine landform use, the location information and landform category was recorded from the site records from NMCRI, Archaeological Records Management Section of the New Mexico Historic Preservation Division or AZSITE, Arizona State Museum. This information was collected not only on the sites used in the Bayesian analysis, but also known sites that had excavated pithouses with known shape in the Mogollon region. Based on the landform descriptions provided by NMCRI, the landforms were coded as "High" if the description refers to elevated or steep locations or "Low" if the description refers to level or gentle sloping locations.

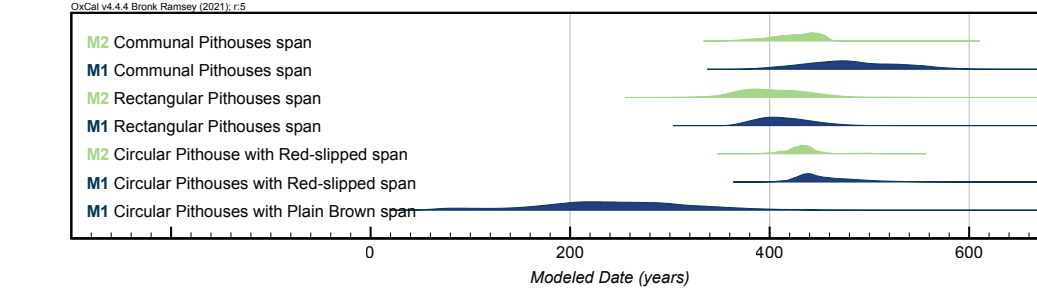
### Distribution of pithouse shape by landform type



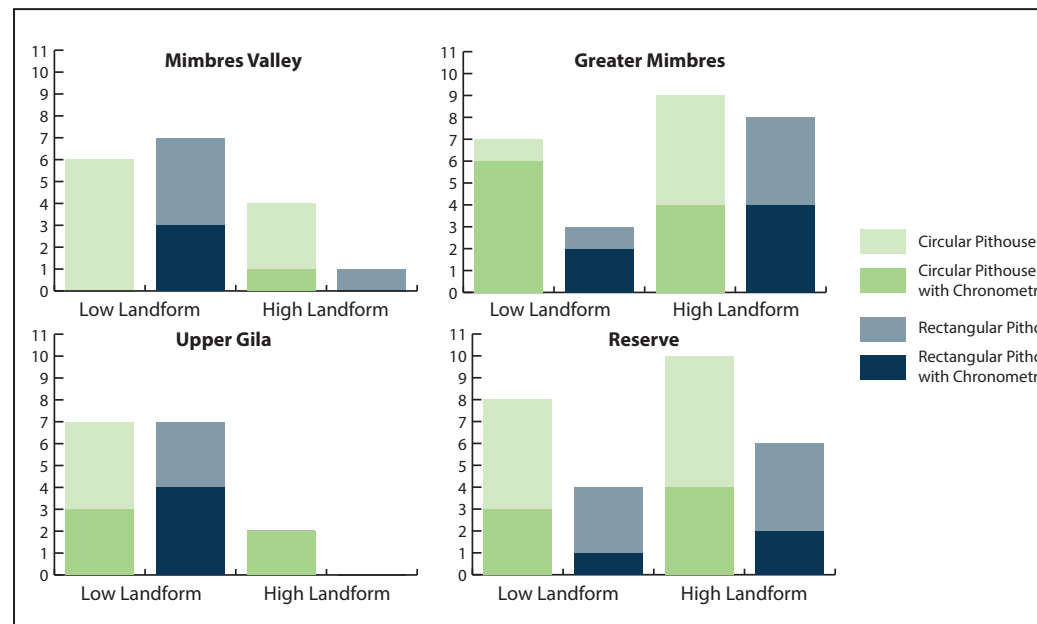
### Overall structure of Model 2



### Duration estimates for pithouse type phases

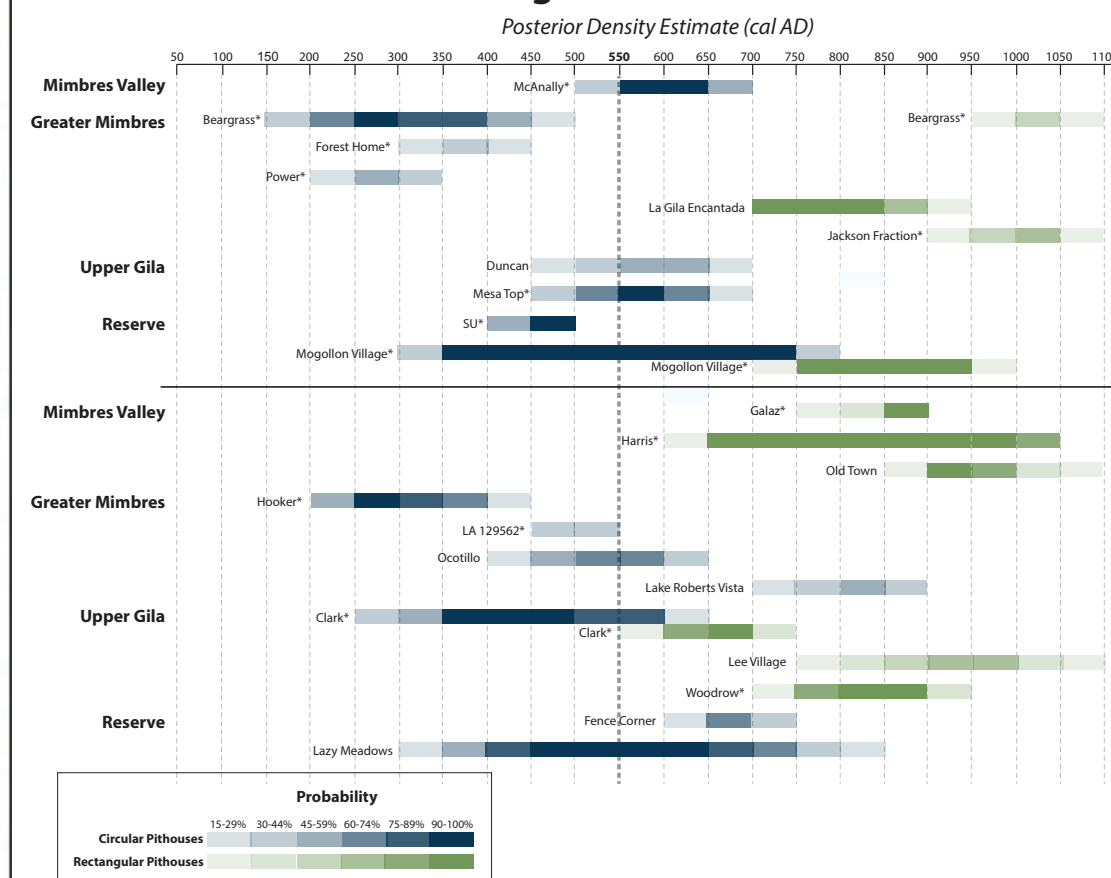


### Number of dated pithouse sites by shape, landform, and area



From the individual Bayesian site models, date estimates for periods of use were calculated for sites that had two or more radiocarbon dates associated with circular and/or rectangular pithouses. Note: Dates associated with undefined or extramural structures were not used in the calculations for periods of use. Below is a schematic diagram by landform type showing the probability that circular and/or rectangular pithouses were in use in any given 50-year period (the darker the shading, the higher the probability).

### Periods of use schematic diagram



A full (earlier) version of this study appears in my 2020 dissertation, "Challenging the Village Concept: Bayesian Analysis and Chemical Characterization in the Mogollon Early Pithouse Period of the US Southwest" from The University of Texas at San Antonio. This project was made possible by numerous individuals and institutions who provided site/date information, access to data, feedback and suggestions, and/or financial support. To all, THANK YOU. Questions or for more information, contact: lori.barkwill@utsa.edu.