Spatial Analysis of Ancient Settlements in the Oaxaca Valley

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Where They Lived and Why

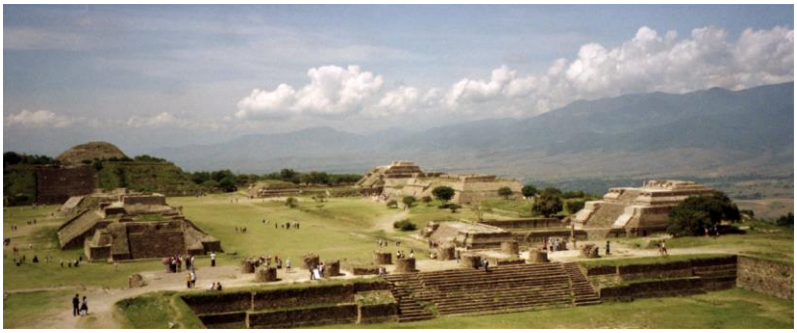
- Study done by Anne Kirkby in 1973 determined that settlement location was primarily based on the quality of the land for agriculture.
- Later studies proposed that agriculture was not the primary factor for where settlements were located.
- Our goal was to use spatial analysis techniques to attempt to find what the primary factor was for settlement location

Background Information

- Located in Southwest Mexico. Valley is made up of three arms; Etla, Valle Grande, and Tlacolula.

Archeological Importance

- Oaxaca Valley is an important Archeological Area as the valley has been inhabited for a long period of time
- Compared to many other long inhabited locations, artifacts and ruins are common and well preserved.

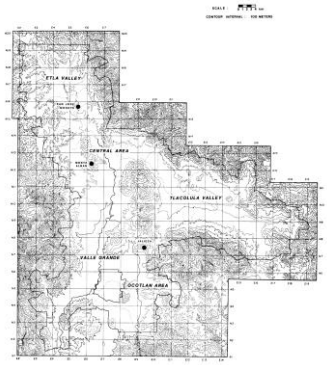


Settlement Periods

- Ages broken into various phases, starting with Tierra Largas, Guadalupe, then Monte Alban I-V
- Looked at Settlements from Tierra Largas Period to Monte Alban IV (1400 BCE-900 CE)

Data Collection

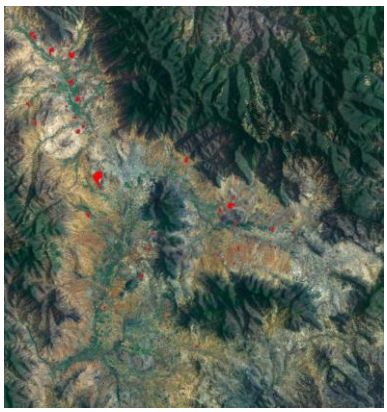
- We used a 30 meter DEM of the Oaxaca Valley.
- Data was digitized from maps, published in research articles focusing on populations in the Oaxaca Valley.



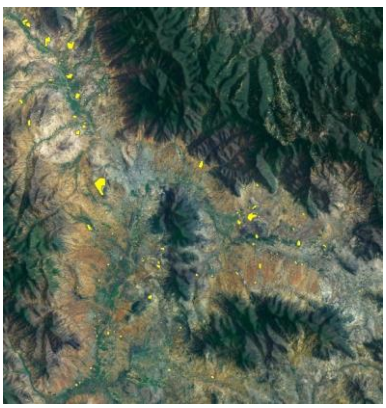
Settlement Phases

Tierra Largas 1400-1150 BCE

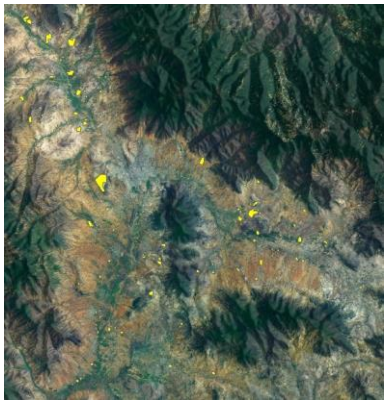
Guadalupe 1150-600 BCE



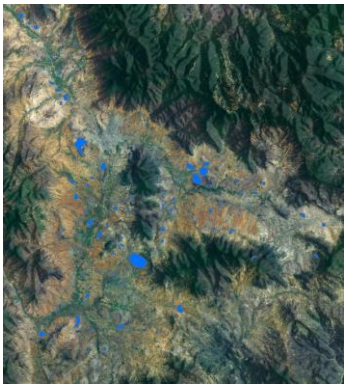
Monte Alban Early I 500-300 BCE



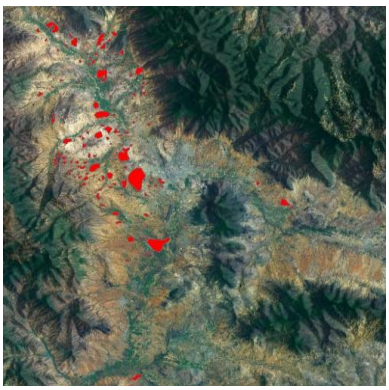
Monte Alban Late I 300-200 BCE



Monte Alban II 200 BCE-200 CE



Monte Alban IIIA 200-450 CE



Monte Alban IIIB 450-650 CE

Monte Alban IV 650-900 CE

Monte Alban V 900-Spanish Contact(1500's) CE

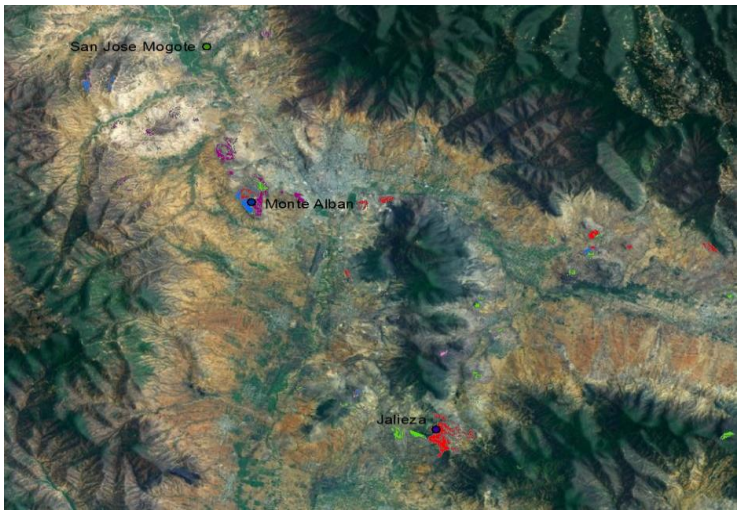
We did not include Monte Alban V in our analysis as at this time in Mesoamerica there was a great decline in the various civilizations. The reasons for this are still heavily debated today.

Looking at Slope

- Calculated percentage of settlements on slopes at 15 degrees or higher.

Stage	% of settlements >= 15	Notes
Alban Early I	16%	
Alban Late I	11%	
Alban II	16%	
Alban IIIA	15%	
Alban IIIB	18%	Monte Alban at peak
Alban IV	20%	Jalieza at peak

Slope Map



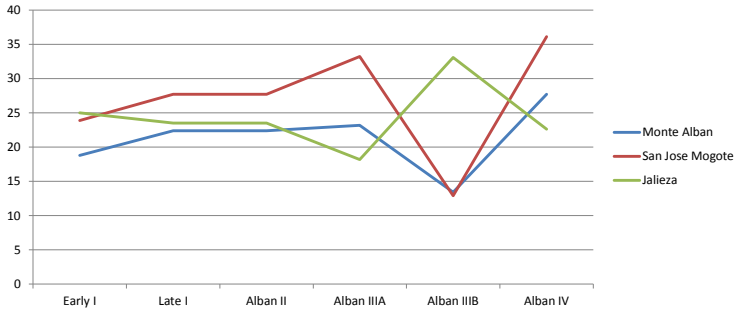
Settlement Height

Used zonal statistics to find the average height of settlements through the different phases.

Stage	Settlement Height Average	Notes
Alban Early I	1654 meters	
Alban Late I	1653 meters	
Alban II	1653 meters	
Alban IIIA	1614 meters	Jalieza secondary
Alban IIIB	1670 meters	Monte Alban at peak
Alban IV	1677 meters	Jalieza at peak

Center	Height
Monte Alban	1909 meters
Jalieza	1752 meters
San Jose Mogote	1636 meters (Base Level)

Distance to Main Settlements

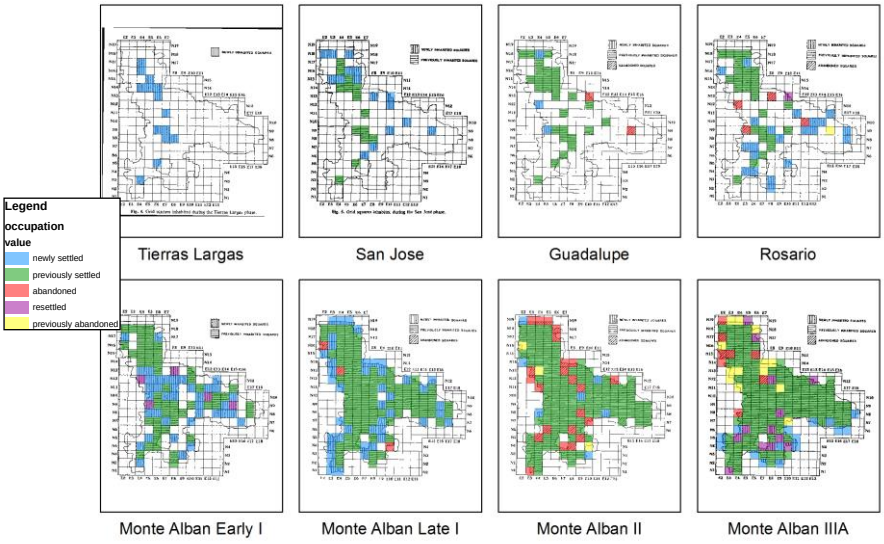


Stage	Monte Alban	San Jose Mogote	Jalieza
Early I	18.8	23.9	25
Late I	22.4	27.7	23.5
Alban II	22.4	27.7	23.5
Alban IIIA	23.2	33.2	18.2
Alban IIIB	13.4	12.9	33.1
Alban IV	27.7	36.1	22.6
Tierra Largas	18.9	17.1	31.7
Guadalupe	18	17.6	29.6

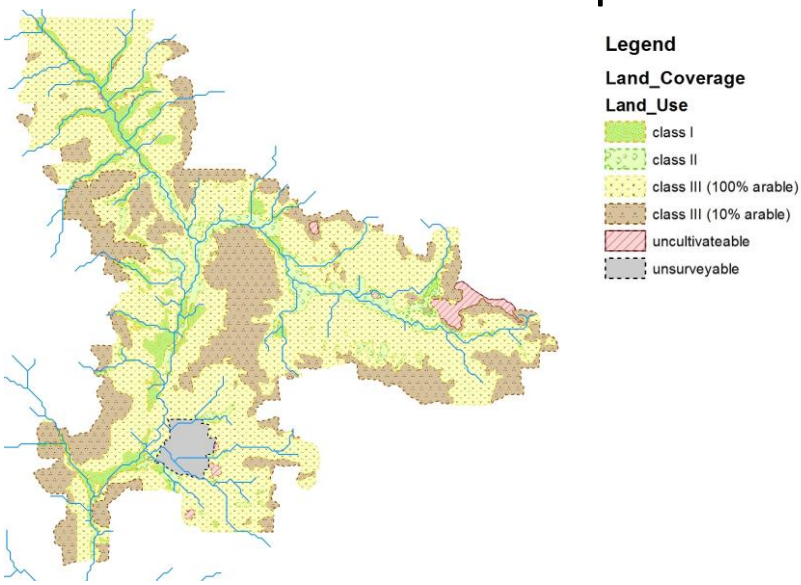
Distance in Kilometers

Looking at the distance between settlement centroids and town points

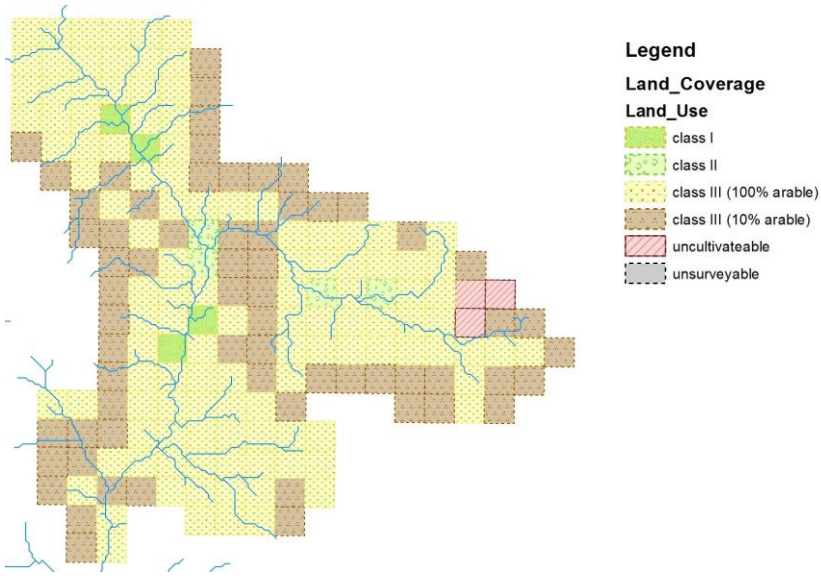
Settlement Patterns



Land Class Map



Land Class Grid



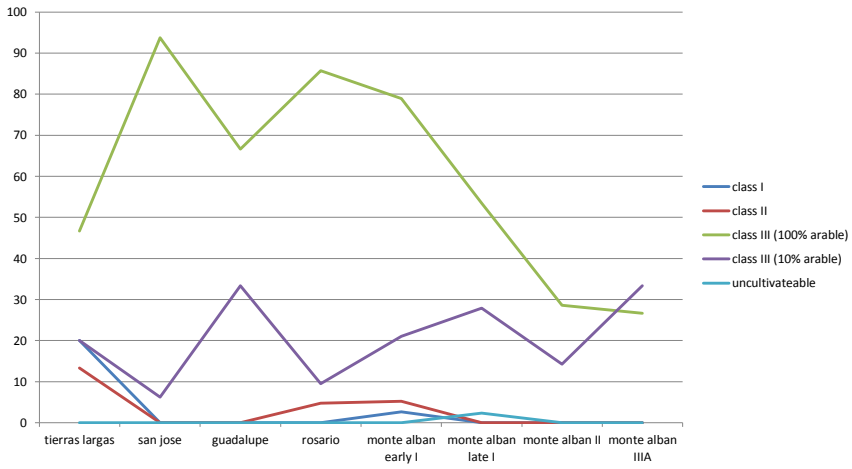
Settlements on Land Classes

	Class 1	Class 2	Class 3	Class 4	Class 5
Tierra Largas	27.60%	0%	65.50%	6.90%	0%
Guadalupe	20.50%	2.60%	74.40%	2.60%	0%
Early I	14%	6.60%	58.70%	21%	0%
Late I	10.30%	8.80%	64.40%	15.30%	1.30%
Alban II	10.30%	8.80%	64.40%	15.30%	1.30%
Alban IIIA	7.30%	6%	73%	12.90%	0.07%
Alban IIIB	13.60%	2.20%	55.70%	28.10%	0.05%
Alban IV	1.50%	12.80%	61.40%	23.90%	0.03%

We looked at the percentage of settlement land that was on each land class through the different phases.

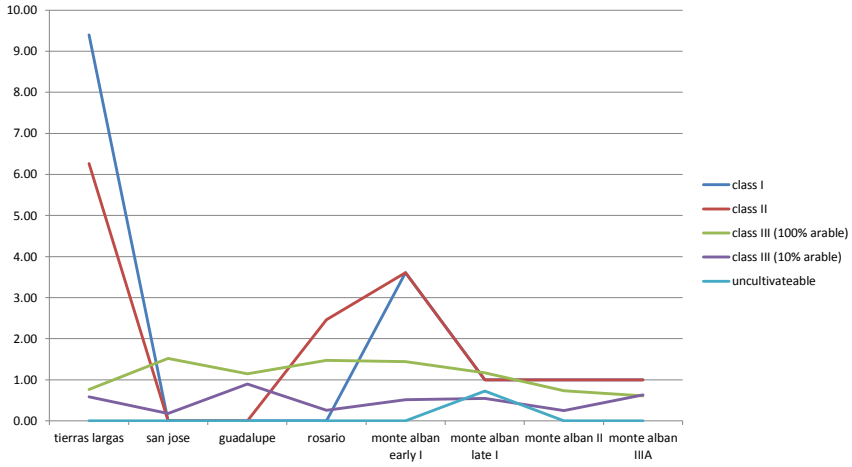
Initial Settlement:

% of settled squares by land quality



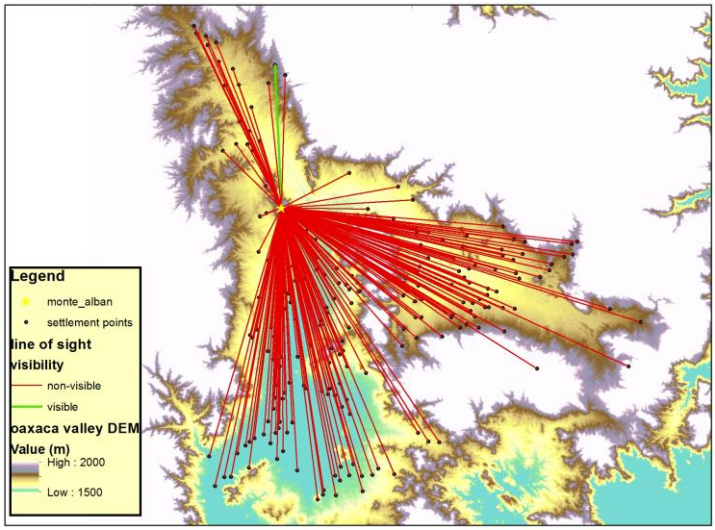
Initial Settlement

normalized by available squares of each land class



Line of Sight

visibility tool

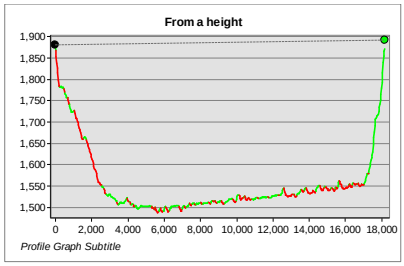


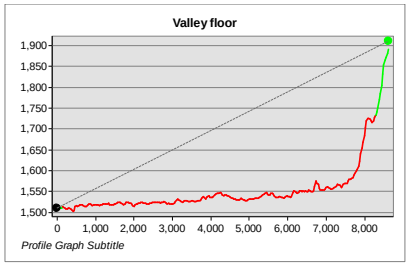
Line of Sight

3D analyst

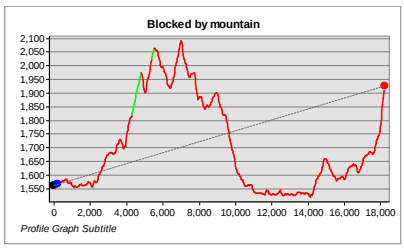
All with:
observer height 1.5m
target height 20m

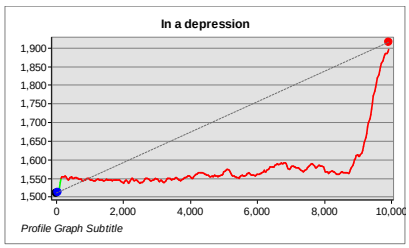
visible





non-visible





Conclusions