

Supporting Information for

Mesoamerican Urbanism Revisited: Environmental Change, Adaptation, Resilience, Persistence, and Collapse

Diane Z. Chase, José Lobo, Gary M. Feinman, David M. Carballo, Arlen F. Chase, Adrian S.Z. Chase, Scott R. Hutson, Alanna Ossa, Marcello Canuto, Travis W. Stanton, L.J. Gorenflo, Christopher A. Pool, Barbara Arroyo, Rodrigo Liendo Stuardo, Deborah L. Nichols

Corresponding Author: Diane Z. Chase

dzchase@central.uh.edu

This PDF file includes:

Figures S1 to S3
Table S1
SI References

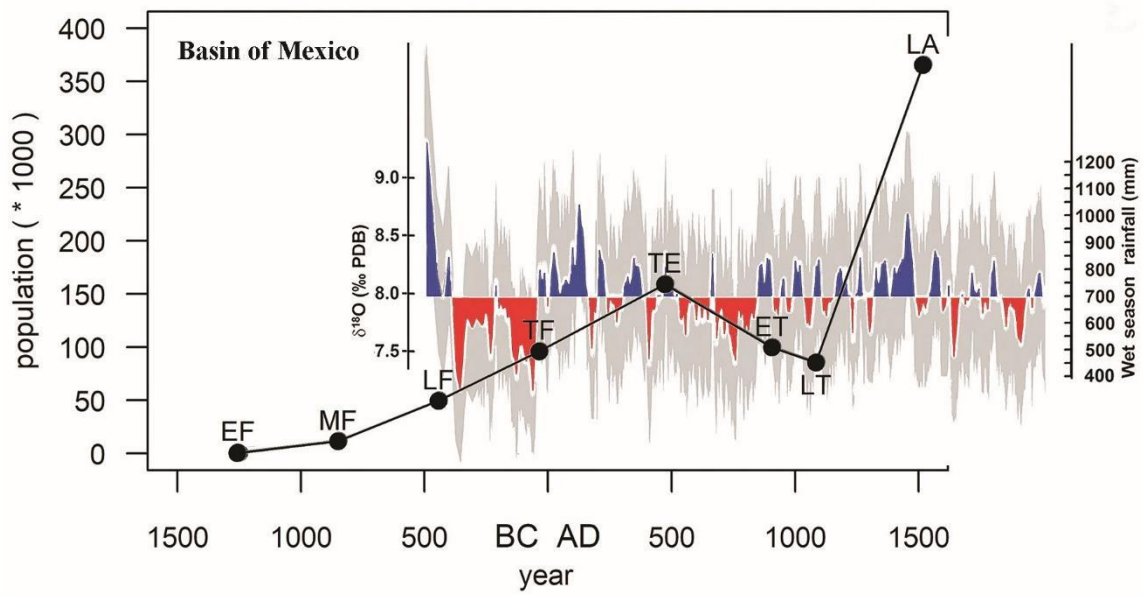


Fig. S1. Comparison of population trajectory for the Basin of Mexico with its potential rainfall history (climate after [1] and population after [2]) (EF=Early Formative; LF=Late Formative; TF=Terminal Formative; TE=Teotihuacan period; ET=Early Toltec; LT=Late Toltec; LA=Late Aztec).

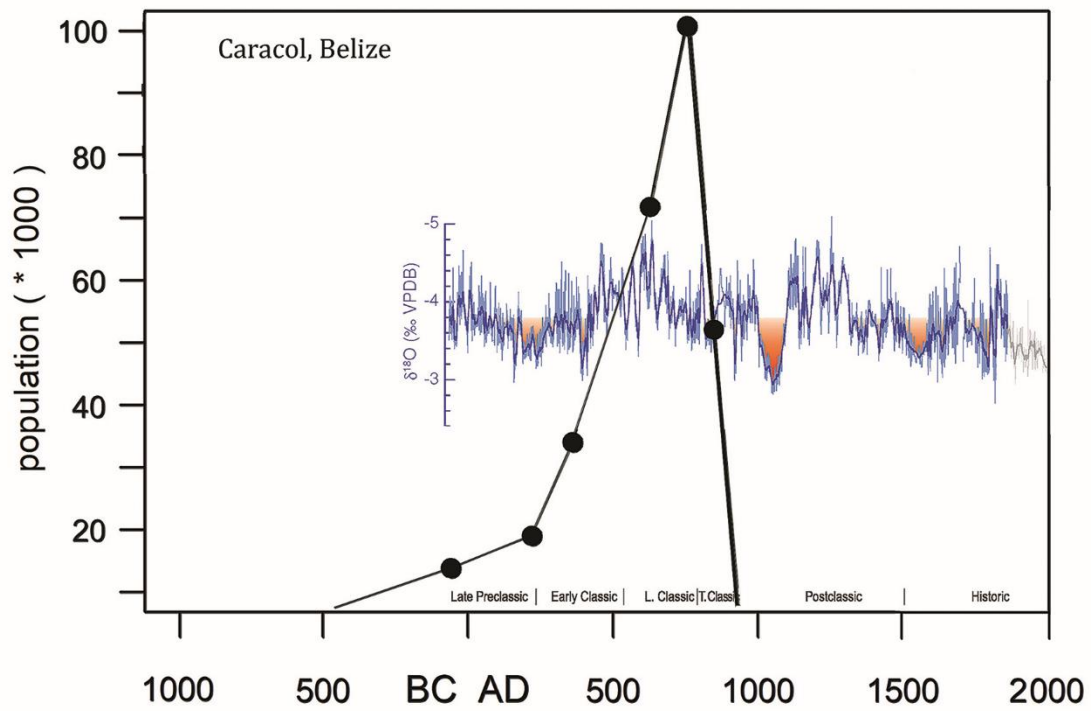


Fig. S2. Comparison of population trajectory for Caracol, Belize with its potential rainfall history (climate after [3] and population after [4]).

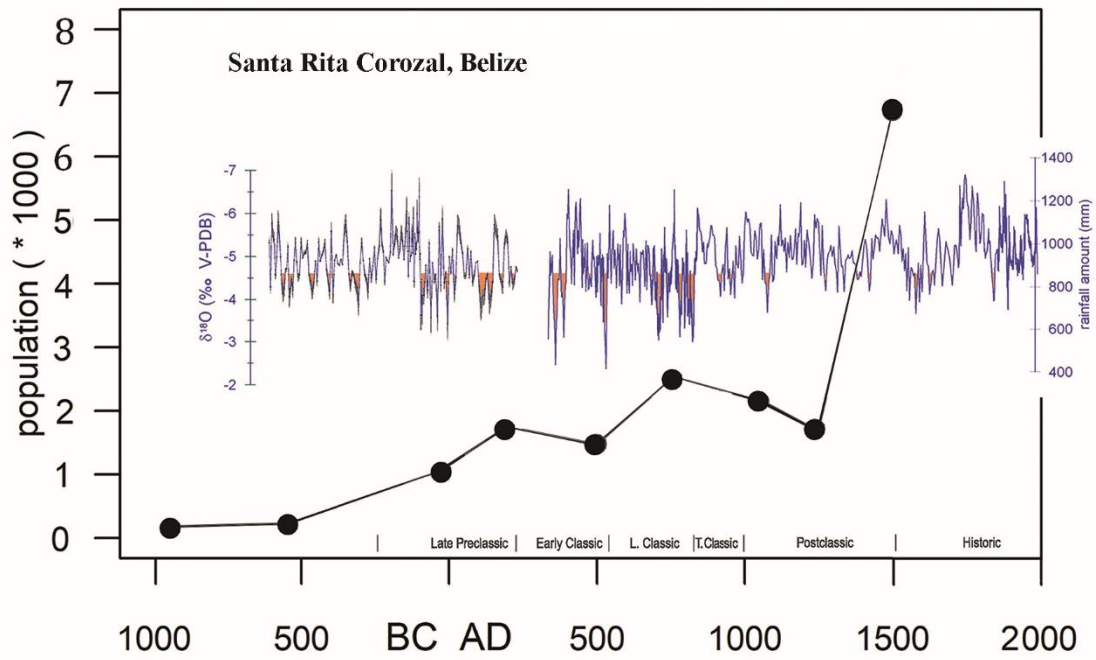


Fig. S3. Comparison of population trajectory for Santa Rita Corozal, Belize with potential rainfall history as reflected in the northern Yucatan [left trajectory is after [5] and right trajectory is after [6]; settlement data is from [7]).

Table S1. Comparative Data on Ancient Mesoamerican Cities. Sources for the information contained in Table 1 may be found in the references and are as follows: Caracol (4,8-13) ; Tikal (14-18); Santa Rita Corozal (7,19-22) ; Chunchucmil (23,24); Monte Alban (25-28); Teotihuacan (2,29,30) ; Tenochtitlan (17,30); Cantona (31,32) .

	Caracol, Belize	Tikal, Guatemala	Santa Rita Corozal, Belize	Chunchucmil, Mexico	Monte Alban, Mexico	Teotihuacan, Mexico	Tenochtitlan, Mexico	Cantona, Mexico
Occupation (dates)	BCE 600 - CE 950	BCE 600- CE 950	BCE 800 - contact/present	BCE700- 1100CE	BCE 500 - 1520 CE	BCE100- 600CE	CE 1325- 1521	600 BCE - CE 900
Length of occupation (yrs)	1550	1550	2300/2800	1800	2020	700	200	1500
Population Height	CE 550-800	CE 550-800	CE 1250-1530	CE 400 - 630	CE 400-850	CE 250-550	CE 1450- 1521	CE 300-900
Population at Peak	100,000	55,000	6,500	40,000	25,000	100,000	212,500	60,000
Population Density at Peak (Indiv/Km2)	500	500	4,333	2,667	3,333	5,330	13,281	4,285
Roads/Transport System at Peak	Urban: Dendritic	Urban: City Center	unknown	Neighborhood	Urban: Dendritic	Urban and Neighborhood	Urban and Regional	Neighborhood
Markets at Peak: Central or Distributed?	Central and Distributed Markets	Centralized Market	Locations Not Known, but Present	Centralized Market	Several Markets	Central and Distributed Markets	Central and Distributed Markets	Multiple Distributed Markets
Public Plazas: total area (m2)	192,170	117,626	unknown	42,000	45,000 +	82,760/132,110	4,400 downtown	multiple; largest -2,200
Agriculture at Peak; Sustainable within city limits?	Sustainable urban agricult. terracing; exported food	Some urban and bajo farming; imported food	Outside urban area; kitchen gardens; imported food	Outside urban area; kitchen gardens; imported food	Outside urban area; imported food	Fields north of San Lorenzo and SW of spring zone	Chinampa zones in metro area accessed by canoe	Dense occupation of malpais with no agriculture
Housing at Peak	Plazuelas - Regularly Spaced	Plazuelas - Regularly Spaced	Plazuelas - Concentrated	Plazuelas - Walled and Concentrated	Dense Small Multi-Room Residences	Apartment Compounds: Regularly Spaced	House Compounds: Agglutinated	Walled Plazas with Houselots - Concentrated
Governance Form at Peak	Collective	Autocratic	Collective	Collective	Collective	Collective	Mixed	Collective
Governance Final Form	Autocratic	Autocratic	unknown	Collective	More autocratic	Mixed	Mixed	Collective
Inequality at Peak based on GINI	0.34 (Area); 0.64 (Vol)	0.63	unknown; vacant terrain	0.6	0.37	0.41	0.35	0.43

SI References

1. M.S. Lachniet, J.P. Bernal, Y. Asmerom, V. Polyak, D. Piperno, A 2400 yr Mesoamerican rainfall reconstruction links climate and cultural change, *Geology* **40**(3), 259-262 (2012).
2. L.J. Gorenflo, I.G. Robertson, D.L. Nichols, “The Basin of Mexico: Revisiting Prehispanic Population” in *Ancient Mesoamerican Population History: Demography, Social Complexity, and Change*, A.S.Z. Chase, A.F. Chase, D.Z. Chase, Eds. (University of Arizona Press, in press 2024).
3. D.J. Kennett, S.F.M. Breitenbach, V.V. Aquino, Y. Asmerom, J. Awe, et al., Development and disintegration of Maya political systems in response to climate change. *Science* **338**, 788- 791 (2012).
4. A.S.Z. Chase, E.D.Z. Chase, D.Z. Chase, A.F. Chase, “Population History for Caracol, Belize: Numbers, Complexity, and Urbanism” in *Ancient Mesoamerican Population History: Demography, Social Complexity, and Change*, A.S.Z. Chase, A.F. Chase, D.Z. Chase, Eds. (University of Arizona Press, in press 2024)
5. M. Medina-Elizalde, S.J. Burns. J.M. Polanco-Martinez, T. Beach, F. Lasas-Hernandez, et al., High-resolution speleothem record of participation from the Yucatan Peninsula spanning the Maya Preclassic period. *Global Planet. Change* **138**, 93-102 (2016).
6. M. Medina-Elizalde, S.J. Burns, D.W. Lea, Y. Asmerom, L. von Gunten, et al., High resolution stalagmite climate record from the Yucatan Peninsula spanning the Maya Terminal Classic period. *Earth Planet. Sci. Letters* **298**, 255-262 (2010).
7. D.Z. Chase, “The Invisible Maya: Population History and Archaeology at Santa Rita Corozal” in *Prehispanic Population History in the Maya Lowlands*, T.P. Culbert, D.S. Rice, Eds. (University of New Mexico Press, 1990), pp. 199-213.
8. A.S.Z. Chase, Residential Inequality among the Ancient Maya: Operationalizing Household Architectural Volume at Caracol, Belize. *Res. Rep. Belizean Archaeol.* **14**, 31-39 (2017).
9. A.S.Z. Chase, *Urban Life at Caracol, Belize: Neighborhoods, Inequality, Infrastructure, and Governance*. Ph.D. dissertation (SHESC, Arizona State University, Tempe, 2021).
10. A.S.Z. Chase, J.F. Weishampel, Using LiDAR and GIS to investigate water and soil management in the agricultural terracing at Caracol, Belize. *Adv. Archaeol. Pract.* **4**, 357-370 (2016).
11. D.Z. Chase, A.F. Chase, Ancient Maya Markets and the Economic Integration of Caracol, Belize. *Ancient Mesoam.* **25**(1), 239-250 (2014).
12. D.Z. Chase, A.F. Chase, Caracol, Belize and changing perceptions of ancient Maya society. *J. Archaeol. Res.* **25**(2), 185-249 (2017).
13. L.M. Johnson, *Toward an Itinerary of Stone: Investigating the Movement, Crafting, and Use of Obsidian from Caracol, Belize*, Ph.D. dissertation. (Department of Anthropology, University of Florida, Gainesville, 2016).
14. A.F. Chase, D.Z. Chase, A.S.Z. Chase, Caracol, Belize, and Tikal, Guatemala: Ancient Maya Human-Nature Relationships in their Sociopolitical Context, in

- Sustainability and Water Management in the Maya World and Beyond*, J. Larmon, L. Lucero, F. Valdez, Eds. (University Press of Colorado, 2022), pp. 143-170.
15. T.P. Culbert, L.J. Kosakowsky, R.E. Fry, W.A. Haviland, The Population of Tikal, Guatemala, in *Precolumbian Population History in the Maya Lowlands*, T.P. Culbert, D.S. Rice, Eds. (University of New Mexico Press, 1990), pp. 103-127.
 16. T. Inomata, Plazas, Performers, and Spectators: Political Theaters of the Classic Maya. *Cur. Anthropol.* **47**(5), 805-842 (2006).
 17. T.A. Kohler, M.E. Smith, A. Bogaard, G.M. Feinman, C.E. Peterson, et al., Greater Post-Neolithic Wealth Disparities in Eurasia than in North America and Mesoamerica. *Nature* **551**: 619 (2017).
 18. D.L. Lentz, N.P. Dunning, V.L. Scarborough, Eds., *Tikal: Paleoecology of an Ancient Maya City* (Cambridge University Press, 2015).
 19. M.M. Badillo, *Investigating Ancient Maya Late Postclassic Period Households and the Associated Function of Buildings at Santa Rita Corozal, Belize*, Ph.D. dissertation, (Department of Anthropology, University of Nevada, Las Vegas, 2021).
 20. D.Z. Chase, A.F. Chase, *A Postclassic Perspective: Excavations at the Maya Site of Santa Rita Corozal, Belize*, Monograph 4, (Pre-Columbian Art Research Institute, San Francisco, 1988).
 21. M.D. Marino, L.F. Fargher, N.J. Meissner, L.R. Martindale Johnson, R.E. Blanton, et al., Exchange Systems in Late Postclassic Mesoamerica: Comparing Open and Restricted Markets at Tlaxcallan, Mexico, and Santa Rita Corozal, Belize. *Lat. Am. Antiq.* **31**(4), 780-799 (2020).
 22. M.A. Seidita, *Chetumal's Dragonglass: Postclassic Obsidian Production and Exchange at Santa Rita Corozal, Belize*, M.A. thesis, (Department of Anthropology, University of Central Florida, Orlando, 2015).
 23. S.R. Hutson, *Ancient Urban Maya: Neighborhoods, Inequality, and Built Form* (University Press of Florida, 2016).
 24. S.R. Hutson, Ed. *Ancient Maya Commerce: Multidisciplinary Research at Chunchucmil*, (University Press of Colorado, 2017).
 25. R.E. Blanton, *Monte Albán: Settlement Patterns at the Ancient Zapotec Capital*, (Academic Press, 1978).
 26. R.E. Blanton, G.M. Feinman, S.A. Kowalewski, L.M. Nicholas, *Ancient Oaxaca: The Monte Albán State*, 2nd Edition, (Cambridge University Press, 2022).
 27. G.M. Feinman, R.K. Faulseit, and L.M. Nicholas, "Assessing Wealth Inequality in the Pre- Hispanic Valley of Oaxaca: Comparative Implications" in *Ten Thousand Years of Inequality: The Archaeology of Wealth Differences*, T.A. Kohler, M.E. Smith, Eds., (University of Arizona Press, 2018), pp. 262-288.
 28. G.M. Feinman, L.M. Nicholase, After Monte Albán in the Central Valleys of Oaxaca, in *Beyond Collapse: Archaeological Perspectives on Resilience, Revitalization, and Transformation in Complex Societies*, R.K. Faulseit, Ed. (Southern Illinois University Press, 2016), pp. 43-69.
 29. T. Murakami, Power Relations, Social Identities, and Urban Transformations:

- Politics of Plaza Construction at Teotihuacan, in *Mesoamerican Plazas; Arenas of Community and Power*, K. Tsukamoto, T. Inomata, Eds. (University of Arizona Press, 2014), pp. 34-49.
30. M.E. Smith, T. Dennehy, A. Kamp-Whittaker, E. Colon, R. Harkness, Quantitative Measures of Wealth Inequality in Ancient Central Mexican Communities. *Advan. Archaeol. Pract.* **2**(4), 311- 323 (2014).
 31. M.E. Smith, City size in Late Postclassic Mesoamerica. *J. Urban Hist.* **31**, 403-434 (2005).
 32. L. Gonzalez Gonzalez, *Unidades habitacionales al sur de Cantona con un enfoque bioarqueológico*. M.A. thesis, (Escuela Nacional de Antropología e Historia, México, 2016).
 33. C.M. Servin Rosas, *Braseros de piedra: elementos de culto en la ciudad arqueológica de Cantona, Puebla*. M.A. thesis, (Universidad Nacional Autónoma de México, 2021).