Supplemental Text 2:
Bibliographic Discussion for Maize and Dietary Proxies Figures, Tables and Radiocarbon Models

For: "Spatiotemporal Structure of the Agricultural Demographic Transition in Mesoamerica and Southwestern North America,"

by Richard G. Lesure, R. J. Sinensky, Gregson Schachner, Thomas Wake, and Katelyn J. Bishop

The following materials are included in this supplement:

1) A detailed discussion of the attributes of Figure 6, including KDE modeled and non-modeled events.
2) An annotated version of Table 1.
3) An annotated version of Table 2.
4) References cited for the above and Supplemental Table 3.

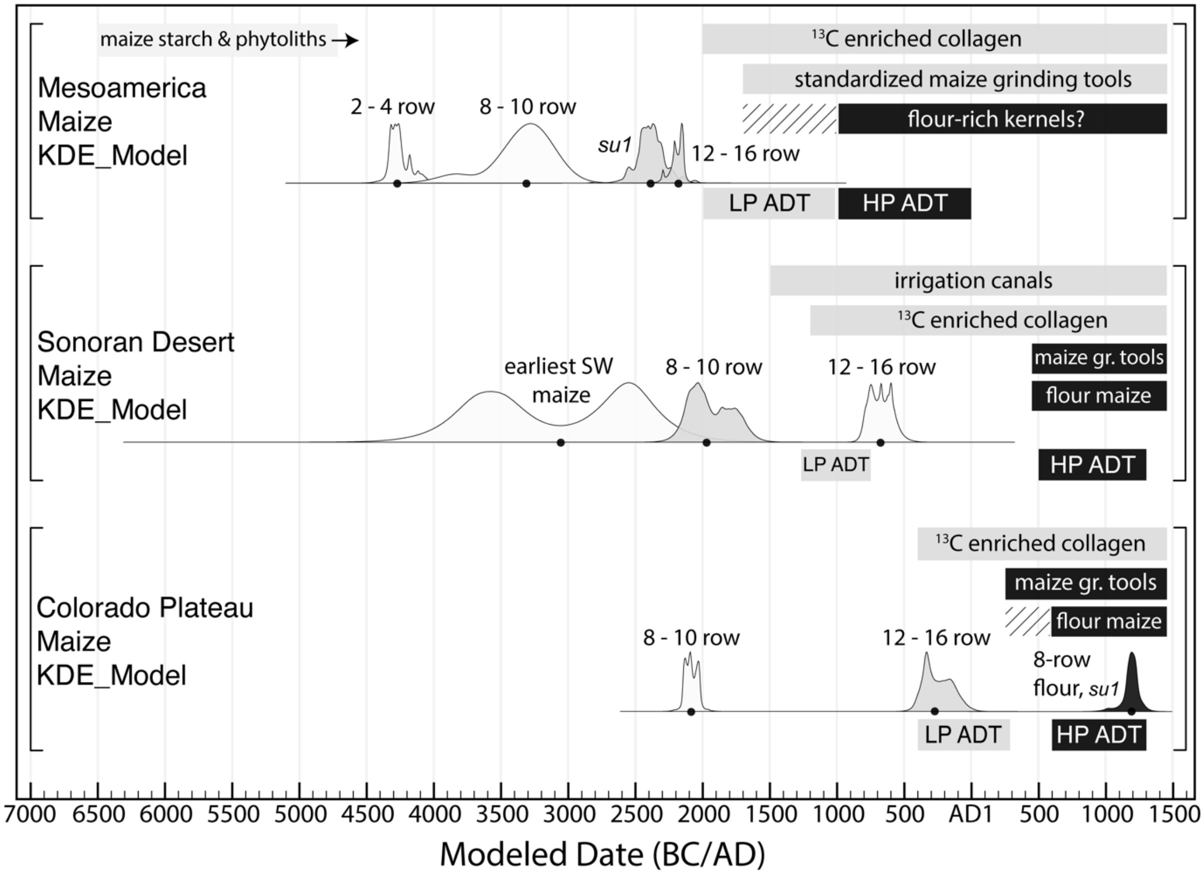

Figure S2.1. KDE_Model derived probability densities (Bronk Ramsey 2017) for the introduction and/or development of important genetic and phenotypic changes to maize in Mesoamerica, the Sonoran Desert and the Colorado Plateau. Black circles represent KDE modeled median dates and the shaded rectangles display the proposed start dates for non-modeled events.

Discussion:

Descriptive information for individual radiocarbon measurements, calibrated unmodeled date ranges, modeled date ranges, and the code used to generate models are provided in Supplemental Table 3. We ran individual models for each grouping of dates, meaning that there is no assumed relationship between groupings. Note that we chose to focus on kernel row counts for the current study since incomplete, charred and uncharred cobs can be included as long as cob diameter remains intact, and complete uncharred cobs are rare. Moreover, kernel row counts are less heavily influenced by variable environmental conditions compared to other cob attributes (K. Adams 1999, 2015).

All ^{14}C measurements included in our models are derived from one of the following high-quality material types:

(1) Carbonized and uncarbonized maize (*Zea mays* L.) cob and kernel fragments, and in one instance, vegetative plant parts (a date derived from an aDNA sequenced basal stalk and nodal roots from San Marcos Cave, see Vallebueno-Estrada et al. [2016]).

(2) Measurements derived from human bone collagen with stable carbon isotope values indicative of a maize-heavy diet. Such dates were only included when a clear association between these individuals and well-preserved maize specimens could be made (see description of the 12-16 row model in the Colorado Plateau section for additional details).

Figure 6 was created in OxCal v.4.4.2 and then was modified in Adobe Illustrator to add the date ranges for the high productivity and low productivity portions of the ADT (black and gray rectangles), and additional indicators for increasing reliance on maize and agricultural intensification. The discussions below present evidence for the proposed date ranges of dietary indicators (stable isotope signatures), maize processing strategies (ground stone tools), agricultural strategies (irrigation infrastructure), and individual KDE models from each region. We also present figures for each individual model that display summed probability, KDE_Model derived probability, a 1000 iteration mean ± 1SD, and the calibrated unmodeled and modeled medians of each radiocarbon measurement included in a model. For additional information about the implementation of kernel density estimation models in OxCal see Bronk Ramsey (2017), and for implementations with radiocarbon data more broadly see McLaughlin (2019).

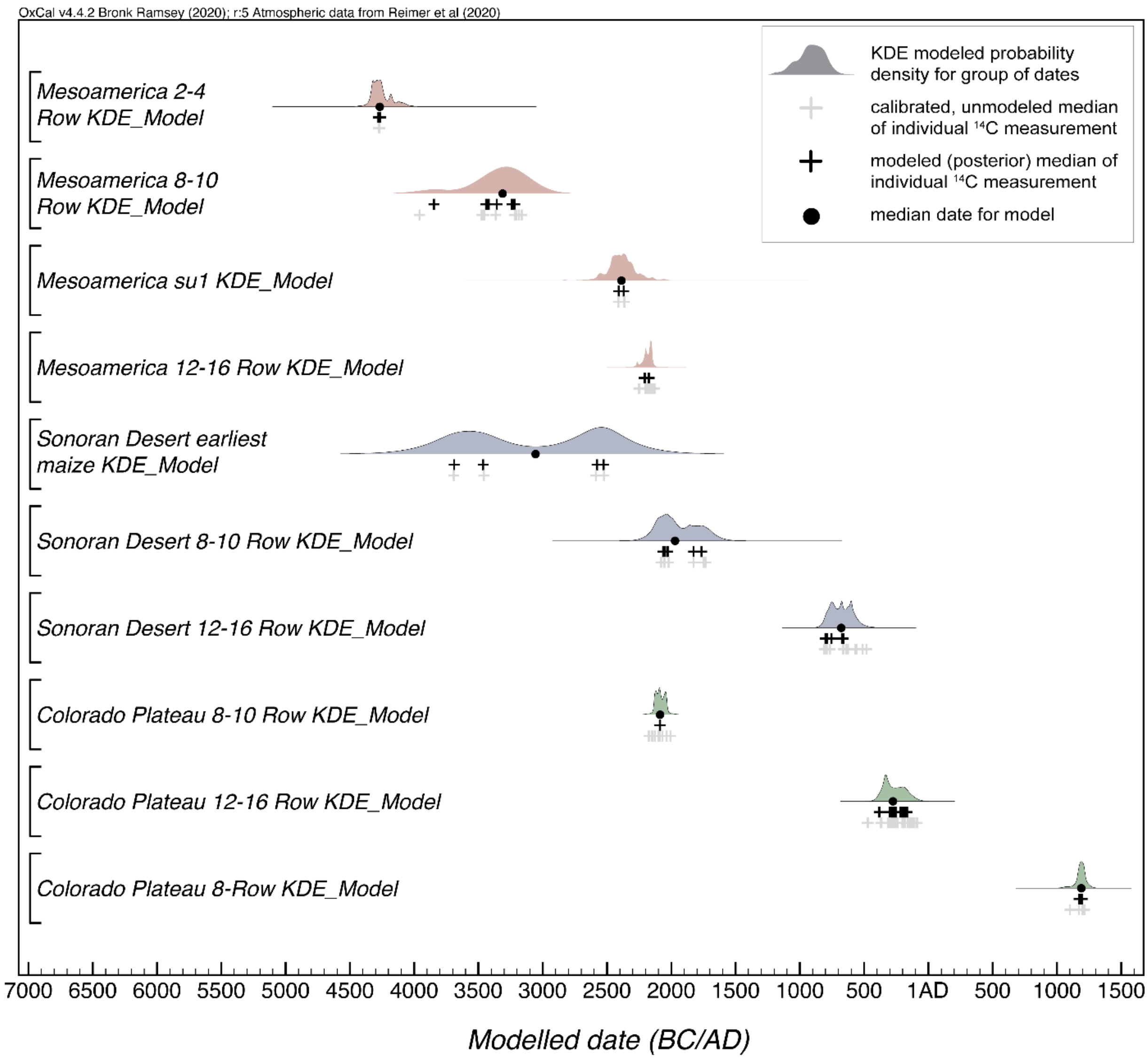

Figure S2.2. A simplified view of the kernel density estimation models included in Figures 6.

Mesoamerica

Stable Isotope Data Indicative of a C_4 Enriched Diet

Stable isotope values derived from archaeological human bone collagen and/or apatite indicative of moderate (~30-50%) to high (50% or greater) levels of maize consumption are first evident in Mesoamerica 2900-2000 BC (Kennett et al. 2020; Lesure et al. 2020). Kennett et al. (2020) present a compelling case for maize achieving its status as a dietary staple in the Maya region by 2000 BC based on a large data set derived from directly dated individuals, while Lesure et al. (2020) note a trajectory of increasing maize consumption in the Soconusco 1700-600 BC, with 1400 BC serving a hinge point during which foodways largely fell in-line with those present in the Soconusco during the Middle Formative. Hepp et al. (2017) also recently presented isotopic evidence for moderate levels of maize consumption in coastal Oaxaca during the Early Formative derived from the directly dated bone collagen of two individuals (1700-1400 BC). Four directly dated individuals dating to the Early Formative - Middle Formative transition (1100-825 BC) in the Basin of Mexico undoubtedly consumed maize as a dietary staple (Storey et al. 2019). Thus, isotopic evidence supports the steadily increasing dietary importance of maize 2000-1000 BC and consumption of maize as a dietary staple by 1000 BC across Mesoamerica.

Ground Stone and Flour-Rich Maize Varieties

Evidence for the manufacture and use of standardized maize grinding tools (formal and well-maintained flat/concave metates and manos) used with a reciprocal stoke is evident in the Soconusco 1700-1400 BC (Sinensky 2020) and elsewhere in the same timeframe (Lesure et al. 2020: Figure 26.6). Functional and stylistic attributes of Early Formative tools from the Soconusco compare favorably to those manufactured and used at La Libertad, Chiapas, during the Middle Formative (see Clark 1988), although tools became larger, more durable, more efficient and increasingly standardized throughout the Early and Middle Formative. Note that grinding stone assemblages of the second millennium BC tend, as assemblages, to be more expedient than those of the first millennium BC, as pointed out by Arnold (2009), Clark et al. (2007), Rosenswig (2010), and Rosenswig et al. (2015). It is important, however, to recognize that assemblages of the Early Formative are composed of two traditions: expedient tools similar to Archaic types and a new tradition of larger manos used with a reciprocal stroke on slab metates. When the latter are segregated (from contemporaneous mortars and pestles and other, expedient tools), they are readily recognized as part of the same technological tradition for maize grinding equipment that would continue through the Postclassic. Bérubé et al. (2020) recently identified maize starch and phytoliths adhering to Early Formative ground stone tools in coastal Oaxaca, and McClung de Tapia et al. (2019) also recently identified maize starch adhering to numerous mano and metate fragments of the types described above at a site spanning the Early Formative to Middle Formative transition (1100-825 BC) in the Basin of Mexico.

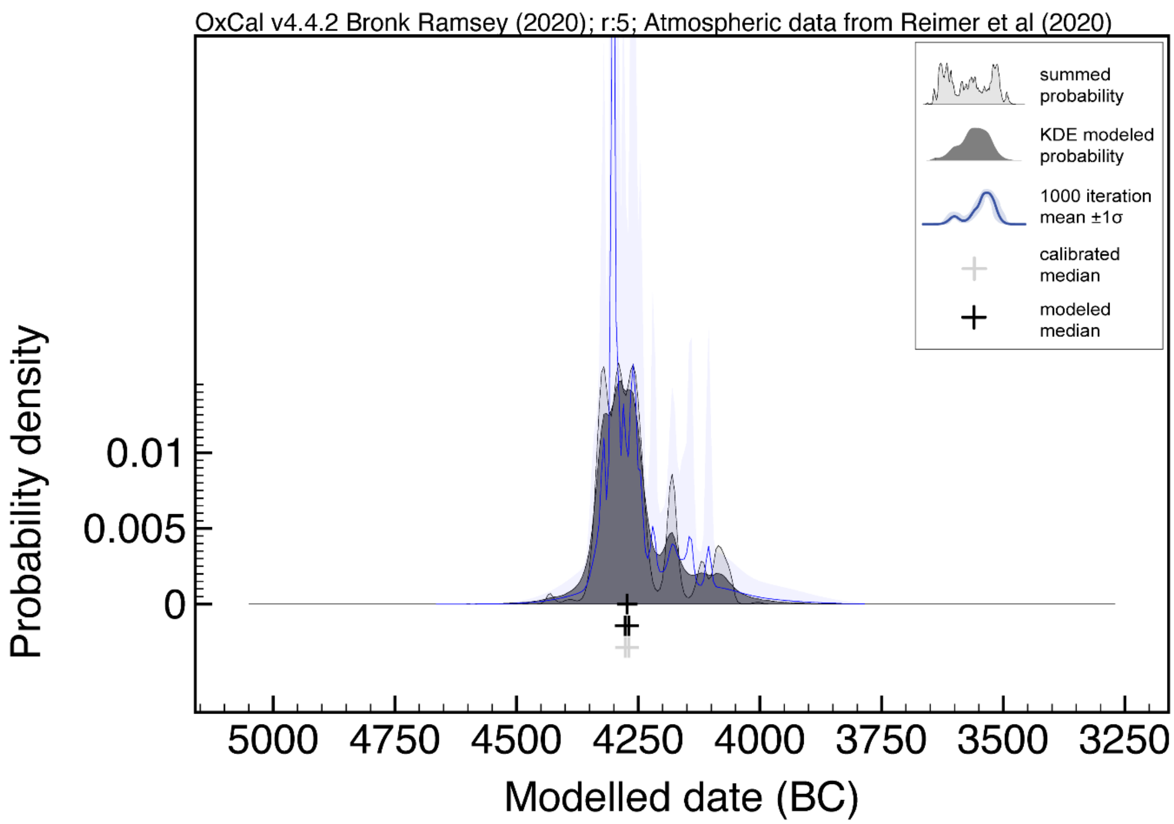

Figure 2.3. Detailed view of KDE_Model derived probability density for the appearance of maize that produced ears with 2 to 4 kernel rows in Mesoamerica.

Discussion:

This model includes the two dates reported by Piperno and Flannery (2001) from Guilá Naquitz - still the earliest direct dates derived from maize macroremains in the Americas. However, microbotanical and genetic evidence strongly suggest that maize was domesticated by 6500 BC in the Balsas River Valley of Guerrero, Mexico (Matsuoka et al. 2002; Piperno et al. 2009; Piperno 2011; van Heerwaarden et al. 2011).

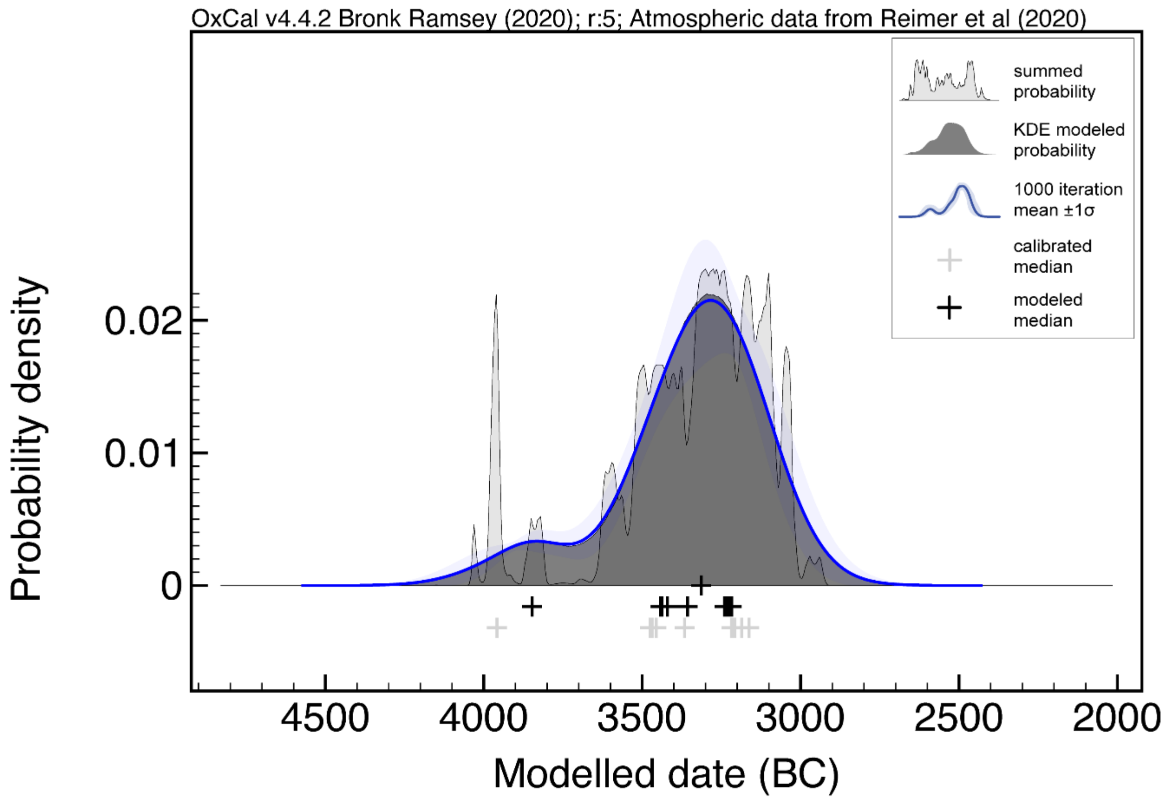

Figure S2.4. Detailed view of KDE_Model derived probability density for the appearance of maize varieties that typically produce ears with 8 to 10 rows of kernels.

Discussion:

Our model for the development or introduction of maize varieties that typically produce ears with 8 to 10 kernel rows in Mesoamerica is derived from eleven radiocarbon measurements derived from maize from the Tehuacan Caves reported in Long et al. (1989), da Fonseca et al. (2015), Vallebueno-Estrada et al. (2016) and Torres-Rodriguez et al. (2018) that form a strong early cluster, but post-date the 2 to 4 row cobs from Gila Naquitz. This model includes several dates derived from aDNA sequenced cobs reported in da Fonseca et al. (2015), Vallebueno-Estrada et al. (2016), and Ramos-Madrigal et al. (2016). These directly dated and aDNA sequenced specimens also provided data included in Tables 1 and 2 (see Tables S2.1 and S2.2 below for annotated versions).

This model includes a single date with measurement error greater than ±100 ^{14}C years from San Marcos Cave (AA-3311). We include this date since it exhibits complete temporal overlap with seven other dates from San Marcos Cave at the 95.4% confidence level (calibrated and unmodeled) that are also included in the model. We recognize that it has become fairly common to only include dates with measurement errors less than ±100 ^{14}C years, but as noted by Hamilton and Kruse (2018:191) Bayesian methods can "…handle these data effectively…" and "…dates with large standard errors can be informative data for Bayesian models". Given the contextual and chronometric agreement between this date and the others included in our model we see no convincing justification to exclude this measurement due exclusively to measurement error exceeding a ±100 ^{14}C year threshold.

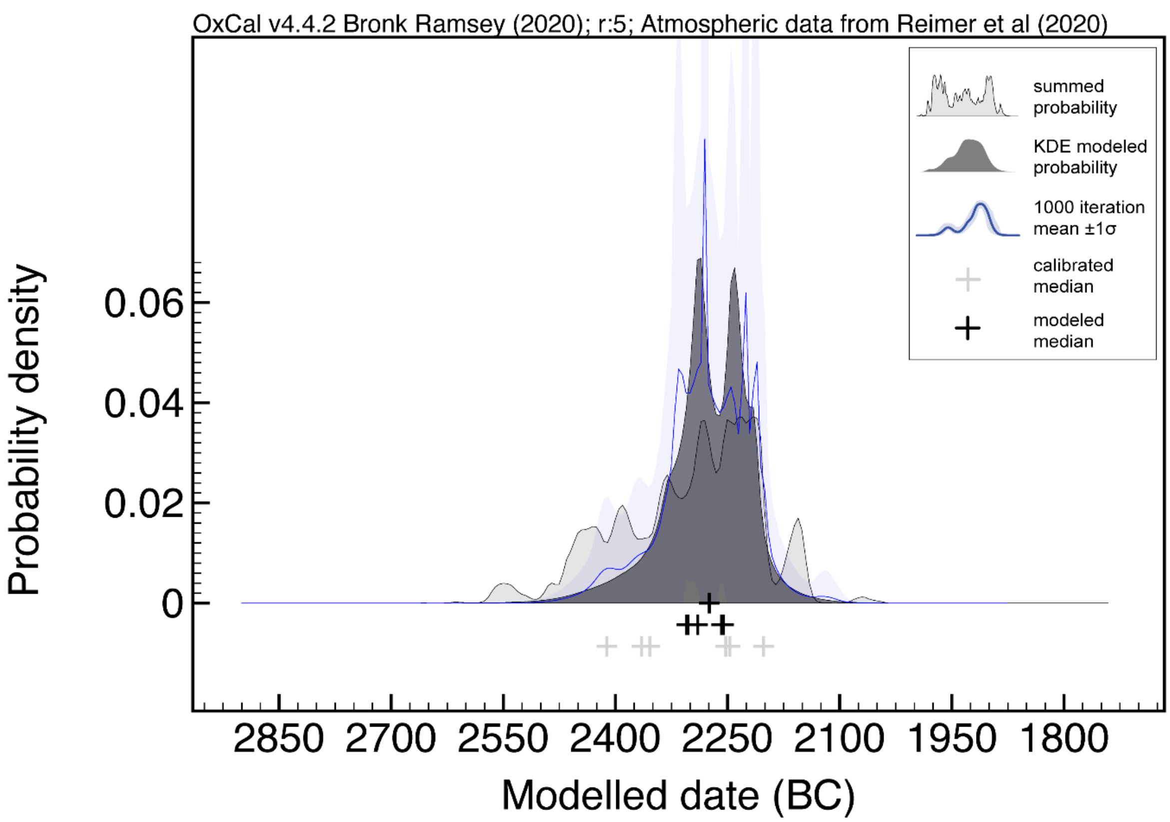

Figure S2.5. Detailed view of the KDE_Model derived probability density for the appearance of maize varieties that typically produce ears with 12 to 16 kernel rows in Mesoamerica.

Discussion:

Our model for the introduction or development of maize that typically produced 12 to 16 kernel rows per ear is derived from directly dated and well-described cobs from El Gigante rockshelter (Kennett et al. 2017). Of the 11 dated Marcela phase cobs from El Gigante we include 10 in our model since the agreement index of the earliest date (UCI-128441) fell below the 60% threshold for good fit when included.

Maize varieties with 12 to 16 kernel rows appear to have fueled the low productivity ADT during the Early Formative (1900-1000 BC) period in Mesoamerica. Few specimens intact enough to document cob attributes have been recovered from Early Formative sites, but the small sample available exhibit 12 to 16 rows as well (see Tables 2 and S2.2). Well-preserved mineralized cobs and cob impressions from Salinas La Blanca described by Mangelsdorf (1967) provide some of the only detailed measurements for Early Formative 12 to 16 row cob morphology aside from the detailed documentation presented by Kennet et al (2017) and two carbonized cob fragments reported by Feddema (1993).

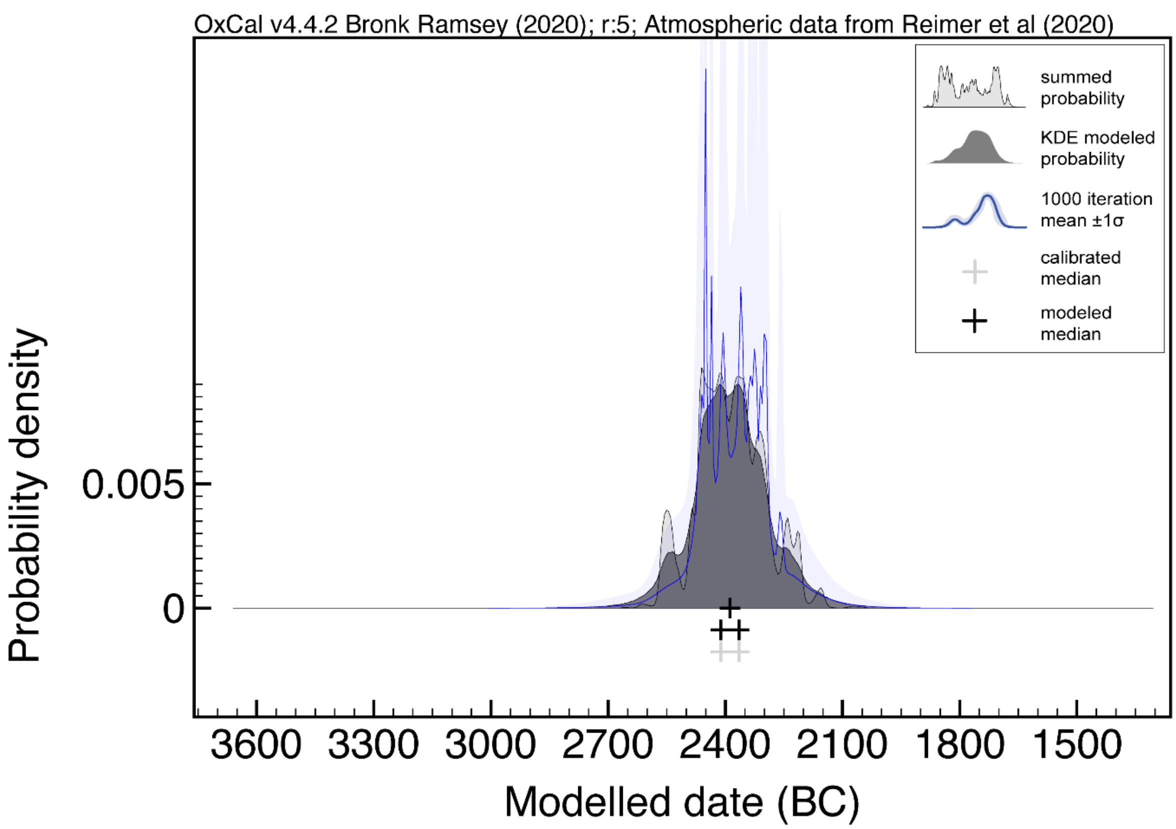

Figure S2.6. KDE_Model derived probability density for the the likely fixation of the *su*1 (*sugary*1) allele in Mesoamerica.

Discussion:

This model includes dates derived from two directly dated and aDNA sequenced cobs from the Ocampo Caves in Tamulipas reported by Jaenicke-Despres et al. (2003) and Jaenicke-Despres and Smith (2006). These specimens immediately predate or overlap with the earliest Marcella phase cobs from El Gigante, and display evidence for the *likely* fixation of *su*1, an allele associated with starch quality in kernels that is very rare in teosinte (*Z. mays* ssp. *parviglumis*) and was intermediate between teosinte and modern maize in the sequenced 8 to 10 row cobs included in our Mesoamerica 8-10 row model (see Vallebueno-Estrada et al. 2016; Ramos-Madrigal et al. 2016). We note, however, that Jaenicke-Despres et al. (2003), Jaenicke-Despres and Smith (2006) and Smith (1997) do not describe the morphology of these cobs (this was not the focus of their research) other than noting the length of a single complete specimen that is displayed in a photograph, and these cobs are therefore not included in our row-count data. As noted by Jaenicke-Despres and Smith (2006), with a sample size comprising of only two cobs, additional research is necessary to establish that the *su*1 allele was indeed fixed by this time.

Sonoran Desert

^{13}C Enriched Human and Domesticated Animal Bone Collagen

^{13}C enriched bone collagen indicative of the consumption of C_4 plants from roughly 1500 BC - AD 200 is evident from stable carbon isotope values derived from human bone collagen and domesticated dog bone collagen at the La Playa site, located in northern Sonora (Carpenter et al. 2015), several samples from Chihuahua (Hard and Roney 2020, [Chihuahuan Desert]), and a domesticated dog from the Tucson Basin (Ezzo and Stiner 2000). Unfortunately, a lack of ^{15}N values, C:N ratios or samples derived from non-human and non-domesticated archaeological or modern fauna complicate the interpretation of the directly dated La Playa samples, which have provided the overwhelming majority of the measurements. The interpretation of stable carbon isotope values as a proxy for maize consumption in the Sonoran Desert at this time is also complicated by the importance of wild and cultivated plants C_4 and CAM plants in the diets of early farmers (K. Adams and Hanselka 2020; Diehl 2015; Sinensky and Farahani 2018), and a lack of isotopic values derived from individuals dating to the Silverbell interval (2100-1200 BC) and earlier periods. However, the existing ^{13}C enriched bone collagen data coupled with high ubiquities and densities of maize in the archaeobotanical record onwards (K. Adams and Hanselka 2020; Diehl 2015; Sinensky and Farahani 2018), and substantial investment in irrigation infrastructure from 1220 BC forward (Nials 2008, 2015a, 2015b) all suggest that maize comprised a substantial portion of the diet.

Ground Stone and Flour-Rich Maize

Standardized, formal maize grinding tools (trough metates and manos) used exclusively with a reciprocal stroke came into widespread use in the Sonoran Desert with the onset of the high productivity ADT at around AD 450 (J. Adams 1999, 2003, 2014). This shift was likely related to the introduction or development of maize varieties with flour-rich kernels, which were ground dry in metates designed with deep troughs (see J. Adams 1999, 2003, 2015; J. Adams et al. 2015; K. Adams 2015). Grinding dried, flour-rich kernels on metates of similar design continues in the Sonoran Desert throughout the Hohokam era.

Irrigation Agriculture

The earliest known irrigation canals in the Tucson Basin date to ~1500 BC (Mabry 2005; Vint 2018). Substantial investment in irrigation infrastructure is evident 1220-1000 BC, and the size, complexity and degree of investment in the maintenance of canal systems increases 800-730 BC as evidenced by the well-documented irrigation system at Las Capas (Nials 2008, 2015a, 2015b). Construction of canals continues through the subsequent Cienega phase (800 BC - AD 50, see Schott 2017) and reaches its apex with the later and substantially larger Hohokam canal systems in the Phoenix Basin (Woodson 2016). These later irrigation systems fueled population growth during the high productivity ADT.

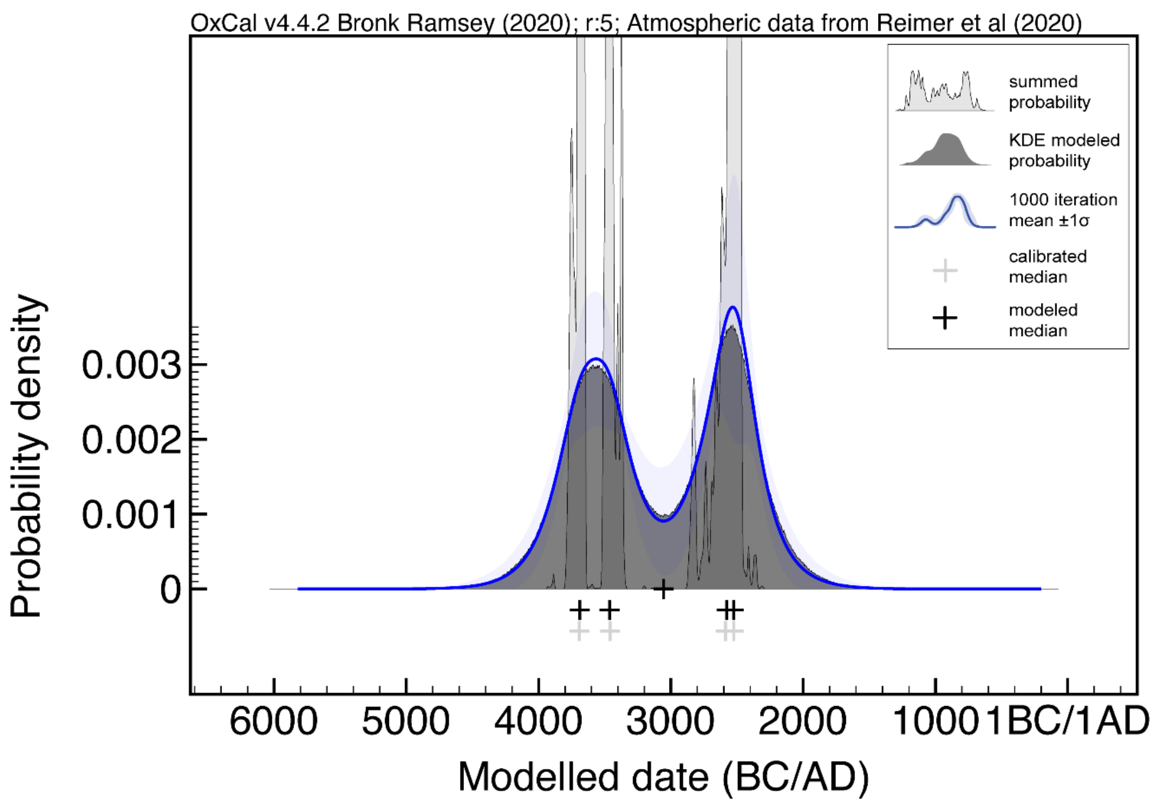

Figure S2.7. Detailed view of KDE_Model derived probability density for the introduction of maize into the Sonoran Desert.

Discussion:

This model includes four dates derived from carbonized maize cupules recovered from the Las Capas and Los Pozos sites, located in the Tucson Basin of southern Arizona. These dates all have calibrated, unmodeled 95.4% probability distributions falling between 3800-2450 BC (see Vint 2015, 2018), and strongly suggest maize was introduced into the Southwest earlier than previously thought (~2100 BC). The three dates from Las Capas all produced stable carbon isotope ratio values consistent with that of maize (see discussion of these four samples in Vint 2018:75). To our knowledge, complete or fairly complete maize cob fragments from this interval (~3800-2450 BC) have not been recovered, and it therefore currently remains unclear if the morphology of the earliest maize in the Southwest (pre-2100 BC) compares favorably to the better-studied maize from 2100-800 BC sites (see L. Huckell 2006a).

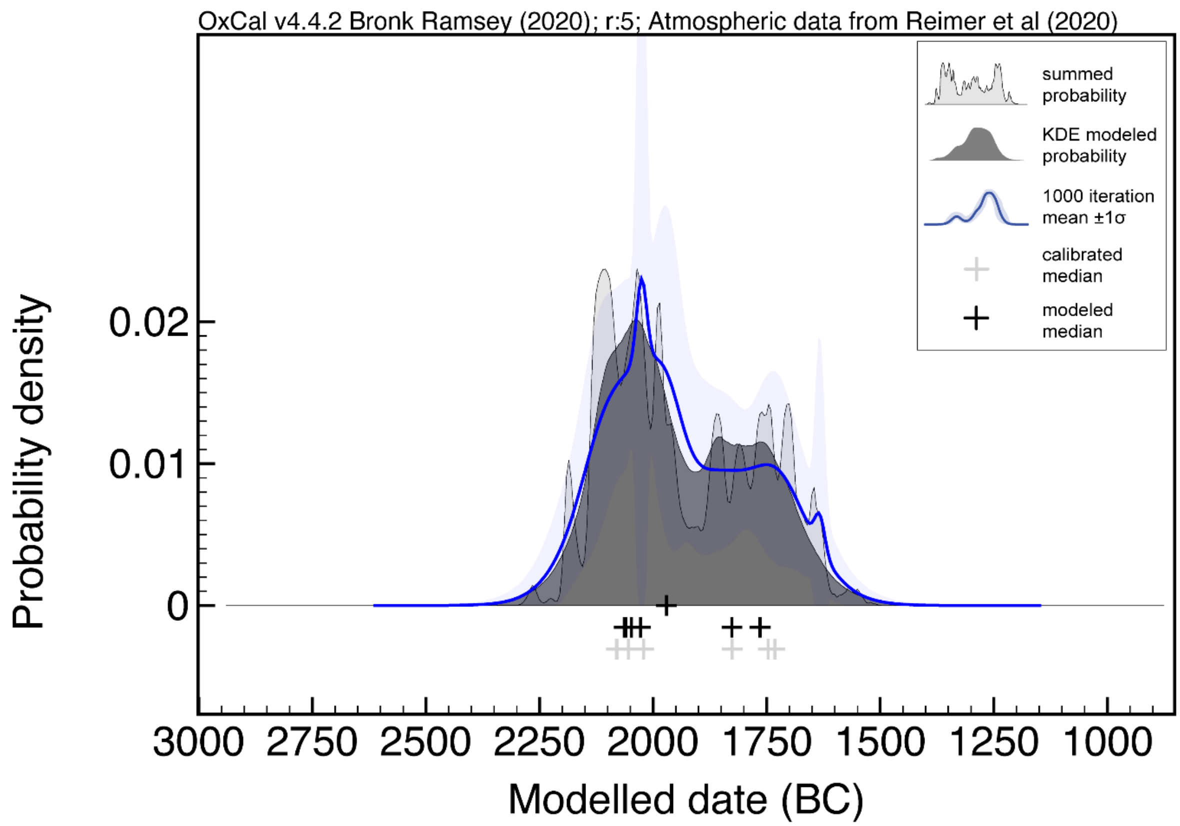

Figure 2.8. KDE_Model derived probability density for maize that typically produces ears with 8 to 10 kernel rows in the Sonoran Desert.

Discussion:

Our model for the appearance of maize varieties that typically produce ears with 8 to 10 kernel rows includes 7 dates derived from maize from 6 sites in the Sonoran Desert. Of these, McEuen Cave, Las Capas and Valley Farms have produced maize specimens included in Table 2 and Table S2.2. It is important to note that while most cobs dating between 2100-800 BC in the Sonoran Desert typically have 8 or 10 kernel rows, 12 and 14-row cobs are still present, albeit in lower relative proportions compared to sites dating to the Cienega phase (800 BC - AD 50, see Table S2.2 below). Strong selection pressure following increasing investment in irrigation infrastructure in the Sonoran Desert 1200-730 BC may have promoted higher kernel row counts (see Diehl 2005, 2015 and L. Huckell 2006a for similar arguments). However, cobs with 14 kernel rows are rare at this time and cobs with 16 kernel rows have not been recorded (L. Huckell 2006a). While these trends are similar to the 4000-1000 BC trajectory in Mesoamerica, to our knowledge, 12-row cobs are not currently known from 3500-2500 BC contexts in Mesoamerica. Moreover, it seems likely that early 8 to 10 row maize in the Southwest (2100-800 BC) was substantially more productive than the 3500-2500 BC 8 to 10 row maize in Mesoamerica. Few uncarbonized and complete specimens have been identified, but several directly dated and carbonized cobs dating to roughly 2100 BC from the Old Corn site documented by Huckell 2006b (see the Colorado Plateau 8 to 10 row discussion below) have broader diameters compared to 3500-2500 BC 8 to 10 row cobs and early 12 to 16 row cobs in Mesoamerica.

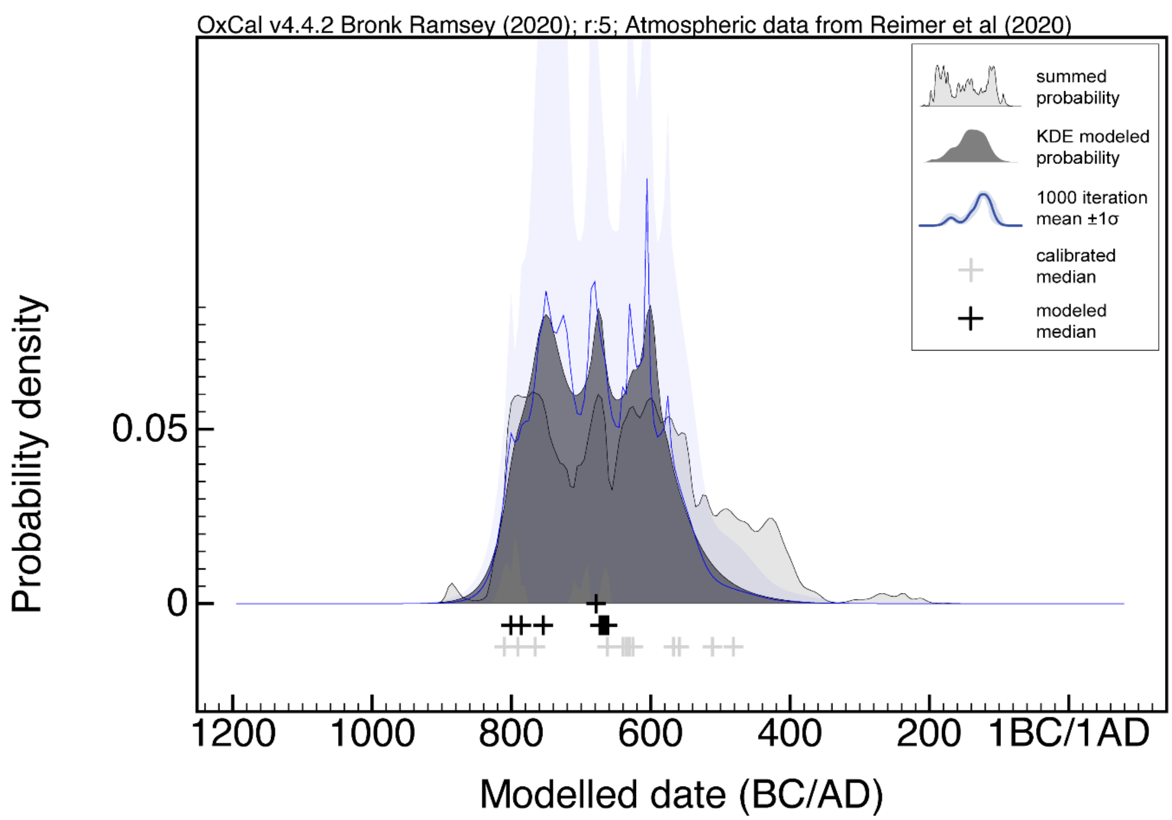

Figure S2.9. KDE_Model derived probability density for maize that typically produced ears with 12 to 16 kernel rows in the Sonoran Deserts.

Discussion:

Our model for the development or introduction of maize varieties that typically produce 12 to 16 kernel rows per ear includes 18 radiocarbon measurements derived from maize collected from four sites. Of these, three sites produced measurable cobs included in Table 2 and Table S2.2 (see Diehl 2015; L. Huckell 2006a, L. Huckell 2006b; B. Huckell 1990, 1995; Vint 2015). Note that we do not include the three earliest dates from Las Capas, Stratum 504 in the model (Beta-325654, Beta-339697, Beta 333931) since the remaining thirteen dates from Stratum 504 form a strong cluster that fit securely within the on-site stratigraphy (numerous high-quality dates were also run for the earlier and later strata, see Vint 2015). Researchers have previously noted that maize cobs from Cienega phase contexts (800 BC - AD 50) have higher kernel row counts compared to cobs from Silverbell Interval (2100-1200 BC) and San Pedro phase (1200-800 BC) contexts (Diehl 2005; L. Huckell 2006a). More recent research at the Las Capas site suggests that there was a general trajectory towards increasing kernel row counts between 1220-730 BC (see Diehl 2015:368) rather than a sharp break at 800 BC with an influx of new maize. It is, however, also possible that new maize varieties were introduced during the Cienega phase, and selection pressure for higher row counts and the introduction of new varieties should not be considered mutually exclusive. Temporal resolution for the early Cienega phase (800-400 BC) is notably poor due to a significant plateau in the radiocarbon curve. Note that we do not include all of the available Cienega phase dates in our model (see Supplemental Table 3) since we are interested in the timing of development or introduction of more productive maize varieties and not the date range of the Cienega phase.

Colorado Plateau

Stable Isotope Data Indicative of a C_4 Plant Consumption

Extensive evidence for ^{13}C enriched bone collagen indicating heavy reliance on C_4 plants, during the Basketmaker II period (~400 BC - AD 400) has been documented by Chisholm and Matson (1991), Coltrain et al. (2007) and Coltrain and Janetski (2013, 2019). This research has included direct radiocarbon dating of individuals from many of the "classic" Basketmaker II sites excavated by A.V. Kidder and Samuel Guernsey (Guernsey and Kidder 1921; Kidder and Guernsey 1919). The reader is urged to consult these works for further details.

Ground Stone

Standardized maize grinding tools (3/4 trough metates and manos) used with reciprocal strokes are present in some areas of the Colorado Plateau beginning around AD 250, but became widespread across the Colorado Plateau in the late 6th century (J. Adams 1999, 2015). The consistent adoption of similar tools across such a broad area was likely related to the introduction or development of flour-rich maize varieties that were ground dry to produce flour (J. Adams 2015). This dry grinding tradition remained the dominant maize processing strategy through the time of Spanish and Euro-American contact, and remains a common way to produce maize flour modern Pueblo communities.

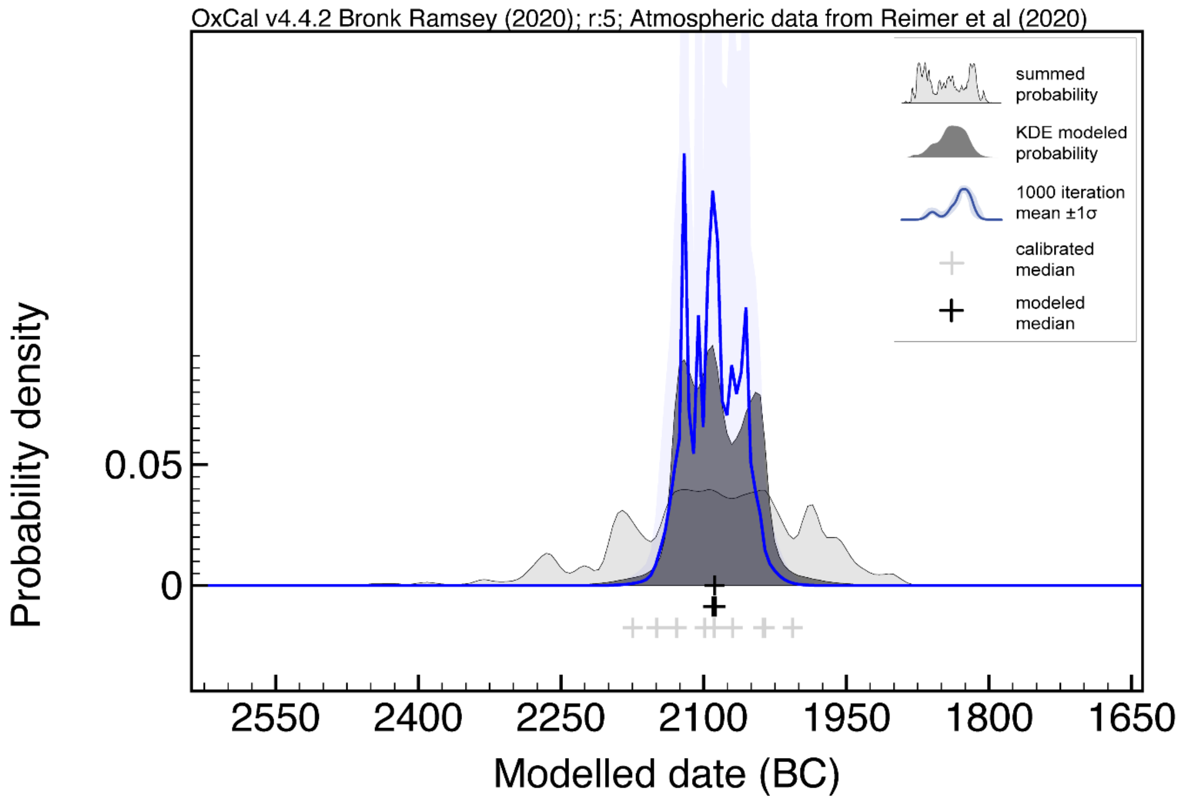

Figure S2.10. KDE_Model derived probability density for the appearance of maize varieties that typically produce cobs with 8 to 10 kernel rows on the Colorado Plateau.

Discussion:

Our model for the introduction of maize that typically produces ears with 8 to 10 kernel rows onto the Colorado Plateau includes 9 dates from two sites. Only one of these sites furnished measurable cobs documented in a fashion that allows them to be incorporated into our row-count data, the Old Corn site (Huber 2006; L. Huckell 2006a, 2006b). The maize from Old Corn represents one of the only examples of fairly intact and directly dated maize predating 1500 BC with detailed morphometric analyses reported for *individual cobs* in the Southwest. Morphometric analyses have been reported on collections from Three Fir Shelter (assemblage means), but the relationship between the three earliest maize dates reported by Smiley (1994 [Beta-26275, Beta-26271, Beta-15937]) and the cobs measured by Wicker (1997) remains unclear. Like the Sonoran Desert, 12-row cobs are also fairly common in the region at this time, but are present in lower relative proportions than assemblages post-dating 400 BC. Current evidence suggests less productive maize with lower kernel row counts remained common until the start of the Basketmaker II era circa 400 BC. For example, McBride and Toll (2014:491) reported on maize cobs fragments from LA 32964, a preceramic site in northwestern New Mexico that produced radiocarbon dates falling primarily between 1000-400 BC, stating: "Average row number was nine, but the majority were eight rowed. Cupules were u-shaped and more closely resembled Archaic corn." Maize during the Basketmaker II era, however, is remarkably homogenous as a new more productive 12 to 16 row maize variety rapidly replaced less productive Archaic types.

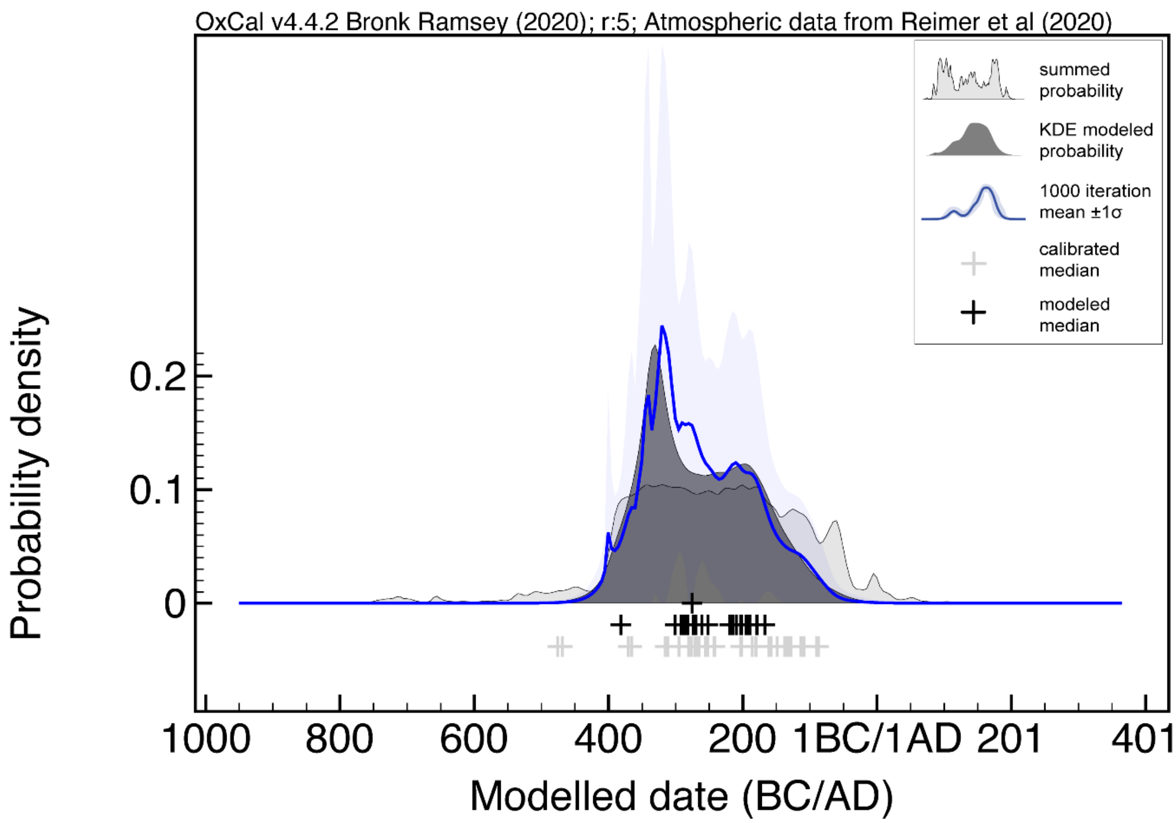

Figure S2.11. KDE_Model derived probability density for the introduction of maize varieties that typically produce ears with 12 to 16 kernel rows onto the Colorado Plateau.

Discussion:

Our model includes 35 dates derived from uncharred maize specimens and human bone collagen from 10 cave and rockshelter sites, including several sites that produced a large number of recorded cobs included in Table 2 and table S2.2. (K. Adams and Patersen 2011; Smiley and Robins 1997, Wicker 1997). Substantial population increase at this time follows the introduction or development of 12 to 16 row varieties of maize on the Colorado Plateau (see Coltrain and

Janetski 2019). Well preserved maize from this era recovered from cave and rockshelters across the Colorado Plateau have been described by K. Adams (2015), K. Adams and Paterson (2011), Hurst and Anderson (1949), Wicker (1997) and others. Maize assemblages at these sites are remarkably consistent, which has led researchers to believe that only a single land-race was cultivated. This land race produced relatively small ears with narrow shanks, cobs that taper towards both the shank and apex, with 12 to 16 rows of hard, corneous, pop/flint kernels with a globular, isodiametric shap. Researchers have long compared this maize to the modern land race of Chapalote (Nickerson 1953; Wellhausen et al. 1953).

The caves and rockshelters that have produced well-preserved maize ears, cobs, and kernels, were also common locations for human internments, and individuals were often buried with bags of seed corn, and on occasion, well-preserved maize ears (Kidder and Guernsey 1919; Guernsey and Kidder 1921; Morris and Burgh 1942). Maize cobs are also frequently found in the fill of burial cists (K. Adams and Paterson 2011). Given the close association between this new more productive 12 to 16 row variety of maize, and directly dated human remains with stable carbon isotope signatures indicative of a maize-heavy diet (see Coltrain and Janetski 2013; Coltrain et al. 2007), we believe that the best model for the appearance of 12-16 row maize on the Colorado Plateau *currently* includes directly dated maize specimens and dates derived from human bone collagen. Note that we do not use all of the dates derived from bone dates bone presented by Coltrain and Janetski or all of the Basketmaker II maize dates available since we are interested in the initial introduction or development of more productive maize varieties and the associated demographic consequences. If, for example we included the numerous Basketmaker II maize dates from Turkey Pen Shelter or Grand Gulch bone dates we would end up with a bimodal distribution since these sites were primarily occupied 400-600 years after the initial appearance of more productive maize to the Plateau.

In addition to not including more recent Basketmaker II dates in the model we also do not include six early maize dates from Three Fir Shelter (Beta-15940, Beta 26729, Beta-31984, Beta-26275, Beta 26271, Beta-15937) since they predate all other well-provenienced maize dates from Basketmaker II caves and rockshelters, and all of the bone collagen dates run by Coltrain et al. (2007) and Coltrain and Janetski (2013) by hundreds of years. We do, however, include two maize dates from Three Fir Shelter (Beta-97790, Beta-97789) that exhibit considerable overlap with the remaining maize and bone collagen dates in our model.

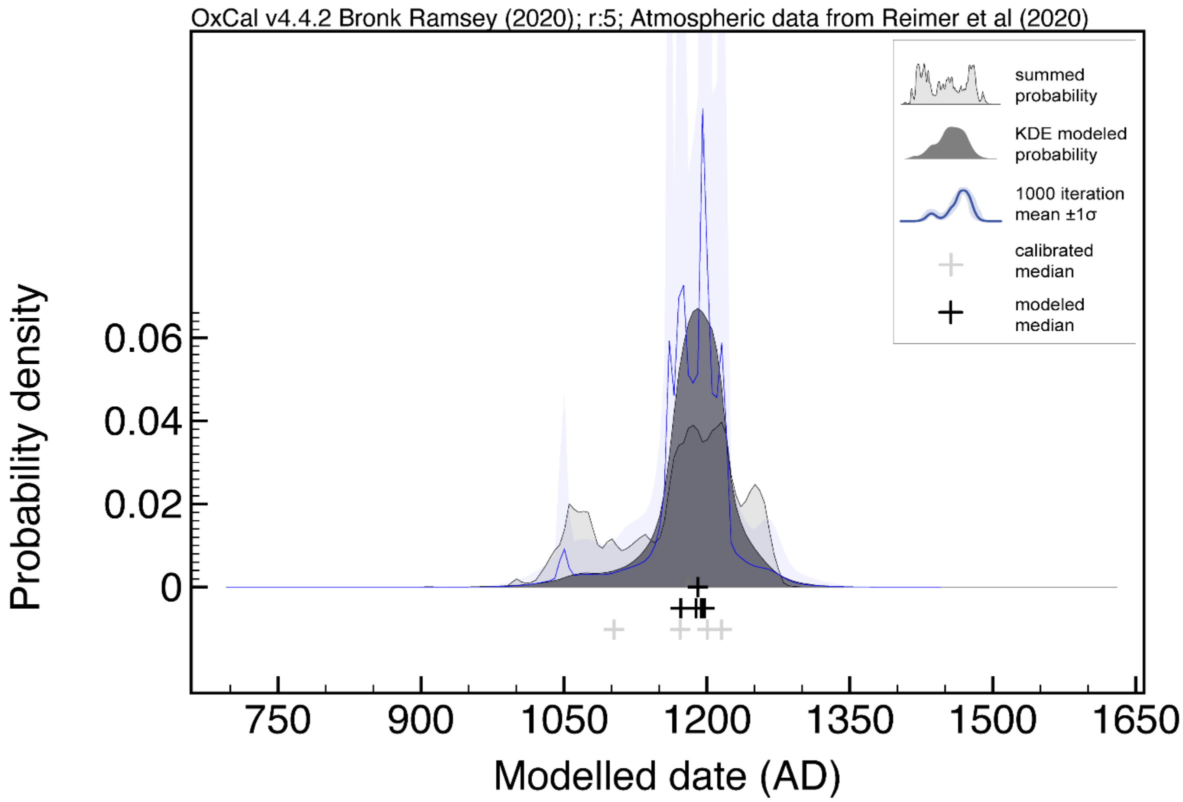

Figure S2.12. KDE_Model derived probability density for the appearance of 8-row flour rich maize with the modern *su*1 allele.

Discussion:

The dates included in this model are derived exclusively from the directly dated and aDNA sequenced maize cobs from Tularosa Cave reported by da Fonseca et al. (2015) that exhibited the modern *su1* allele (note that Tularosa Cave is technically in the transition zone between the southern basin and range province and the Colorado Plateau). We do not include the most recent date in our model (Beta-162533) since the agreement index for the earliest date (Beta-160185) falls below the 60% threshold when the most recent date is included, and we are interested in the timing of changes to maize productivity. While we recognize that the timing of the application of strong selective pressure to the *su*1 locus is important for our understanding the changing culinary preferences of prehispanic farmers, for a variety of reasons we are extremely skeptical that the dates derived from these 7 genetically sequenced Tularosa Cave cobs present an accurate date for the initial introduction or development of maize varieties with flour-rich kernels in the northern Southwest.

Dates for the initial introduction or development of flour-rich maize varieties remain equivocal due to a lack of direct AMS ^{14}C dates on well-preserved, uncharred specimens, and the qualitative recording techniques favored by archaeobotanists in the early 1900s (see K. Adams 2015 for further discussion). However, K. Adams (1994); Cutler (1952); Martin and Plog (1973:277) and Geib (2011) suggest that more productive, and perhaps flour-rich maize varieties were introduced at some point between AD 400 and 900. Moreover, as mentioned in the ground stone discussion above, it is very likely that flour rich maize varieties were present on the Colorado Plateau far earlier in time since there is a widespread shift towards the manufacture and use of tools optimal for grinding dried flour-rich kernels that is also roughly concomitant with explosive population growth at the onset of the Basketmaker III period (~AD 550). To date, published aDNA research on ancient maize in the northern Southwest has focused exclusively on cobs from preceramic and post-AD 1000 contexts. Direct dating, genetic sequencing and rigorous quantitative documentation of the morphological characteristics of well-preserved maize ears from AD 250-900 contexts is necessary to refine our understanding of the timing of the introduction or development of flour-rich maize varieties into the Colorado Plateau.

Table S2.1. Genes Associated with Maize Domestication and Improvement.

Region	**4000 - 2500 BC**	**2500 - 2000 BC**	**1000 - 400 BC**	**400 BC - AD 200**	**AD 1000 – 1300**
Mesoamerica[b]	*tb1*[a], *bt2*[a], *tga1*[b], *su1*[b]	*tb1*[a], *pbf*[a], *su1*[a]	*tb1*[a], *pbf*[a], *su1*[a]	-	-
Colorado Plateau	-	-	-	*tb1*[a], *bt2*[a], *tga1*[a], *pbf*[a], *su1*[b]	*tb1*[a], *bt2*[a], *tga1*[a], *pbf*[a], *su1*[a]

Note: Data are derived from the following sources: da Fonseca et al. (2015); Jaenicke-Despres et al. (2003); Jaenicke-Despres and Smith (2006); Ramos-Madrigal et al. (2016); Swarts et al. (2017); Vallebueno-Estrada et al. (2016).

tb1 = teosinte branched1 (regulates plant architecture).
bt2 = brittle endosperm2 (regulates glycogen biosynthesis).
tga1 = teosinte glume architecture1 (hardness and morphology of glumes, which encase kernels).
pbf = *prolamin box binding* - (regulates protein storage in kernels)
su1 = sugary1 - (encodes a starch debranching enzyme in kernels)

[a] Nucleotide variability similar to modern maize land races.

[b] Nucleotide variability intermediate between modern maize and teosinte (*Zea mays* ssp. *parviglumis*).

Table 2. Long-Term Trajectories of Maize Kernel Row Counts in Mesoamerica and the Southwest.

Region	Row Count	3500-2500 BC	2500-2000 BC	2000-1000 BC	1000 BC-AD 200	AD 200-700	AD 700-900
Mesoamerica[a]	8-10	100%	14.3%	6.3%	15.7%	28.1%	-
Mesoamerica[a]	12-16	0%	85.7%	90.6%	76.0%	70.2%	-
Southern SW[b]	8-10	-	-	70.8% [d]	24.3% [f]	28.3% [h]	-
Southern SW[b]	12-16	-	-	29.2% [d]	74.3% [f]	72.7% [h]	-
Northern SW[c]	8-10	-	-	80.0% [e]	21.8% [g]	30.0% [h]	47.4%
Northern SW[c]	12-16	-	-	20.0% [e]	78.2% [g]	70.0% [h]	52.2%

Note: Table S2.2. is an annotated version of Table 2 presented in Lesure et al. Data include charred and uncharred specimens with cob diameter intact. Row count data are provided in Supplemental Table 3.

[a] Mesoamerica sample includes row counts from a total of 244 cobs documented by Feddema (1993), Ford (1976), da Fonseca et al. (2015), Houston (1981), Lesure et al. (2006), Kennett et al. (2017), Mangelsdorf (1967), Mangelsdorf et al. (1967:188), McClung de Tapia (1979), Smith (1979, 1981), Smith and Tolstoy (1981), Torres Rodriguez et al. (2018), Ramos-Madrigal et al. (2016), and Vallebueno-Estrada et al. (2016).

[b] Southern Southwest sample includes row counts from a total of 366 cobs documented by K. Adams and Hanselka (2020), Cutler and Blake (1976), Diehl (2015), Ezzo and Deaver (1995), and L. Huckell (2006a).

[c] Colorado Plateau sample includes row counts from a total of 1725 cobs documented by K. Adams (1994), K. Adams and Paterson (2011), Brandt (1994, 1999), Cutler and Meyer (1965, *Step House Pit Structure I*, *level IV only*), Gish et al. (1993), L. Huckell (2006a, 2006b), Hurst and Anderson (1949), Morris (1980), Miksicek (1978), Toll (1985, 1993), Toll and McBride (1998); McBride and Toll (2014), and Wicker (1997).

[d] 2100 - 800 BC

[e] 2100 - 400 BC

[f] 800 BC - AD 50

[g] 400 BC - AD 200

[h] AD 400-700

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