

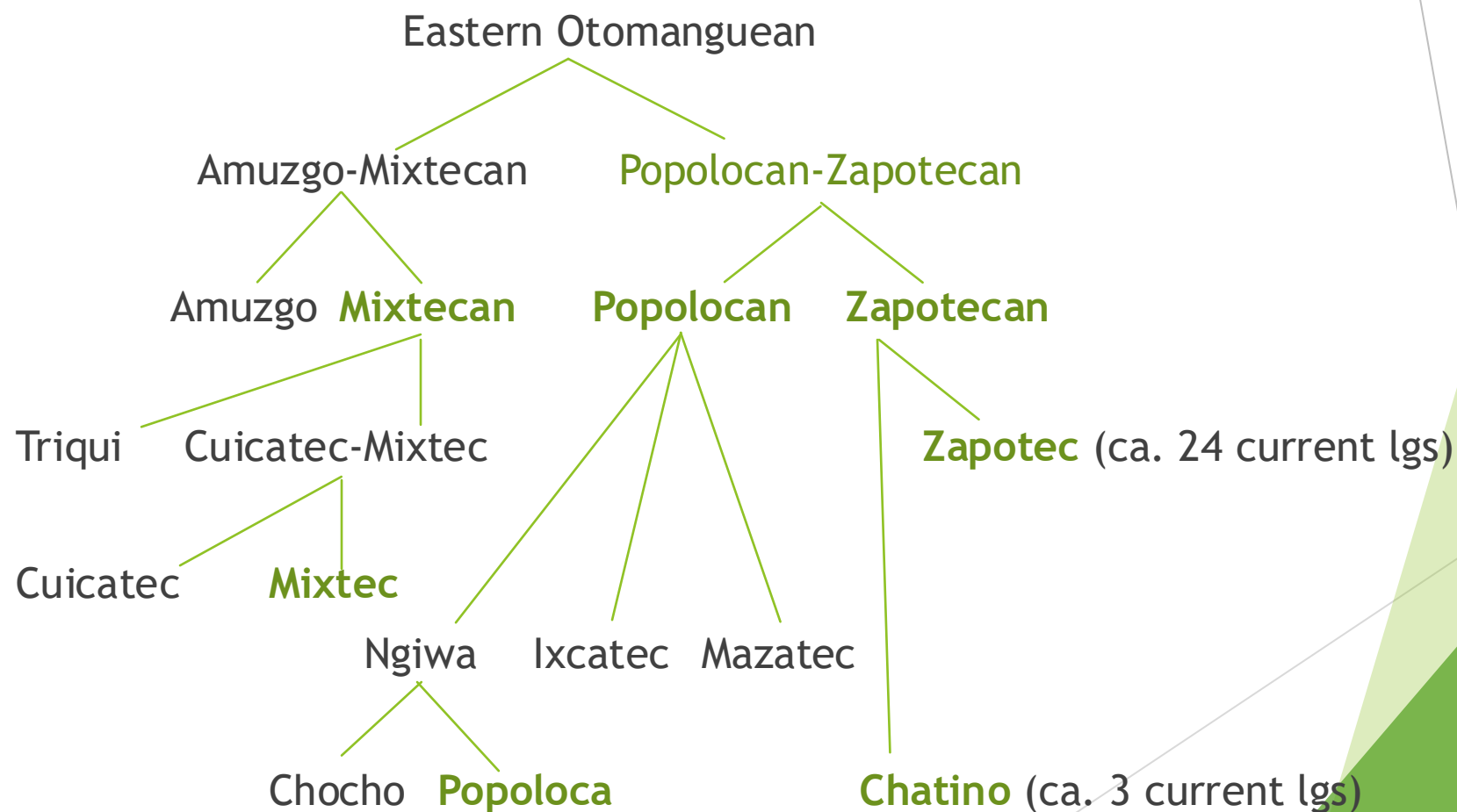
Prominence, syllable weight and contact in Eastern Otomanguean

Princeton Phonology Forum, April 18-19, 2025

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Posgrado en Lingüística, Escuela Nacional de
Antropología e Historia

One hypothesis of Eastern Otomanguean diversification





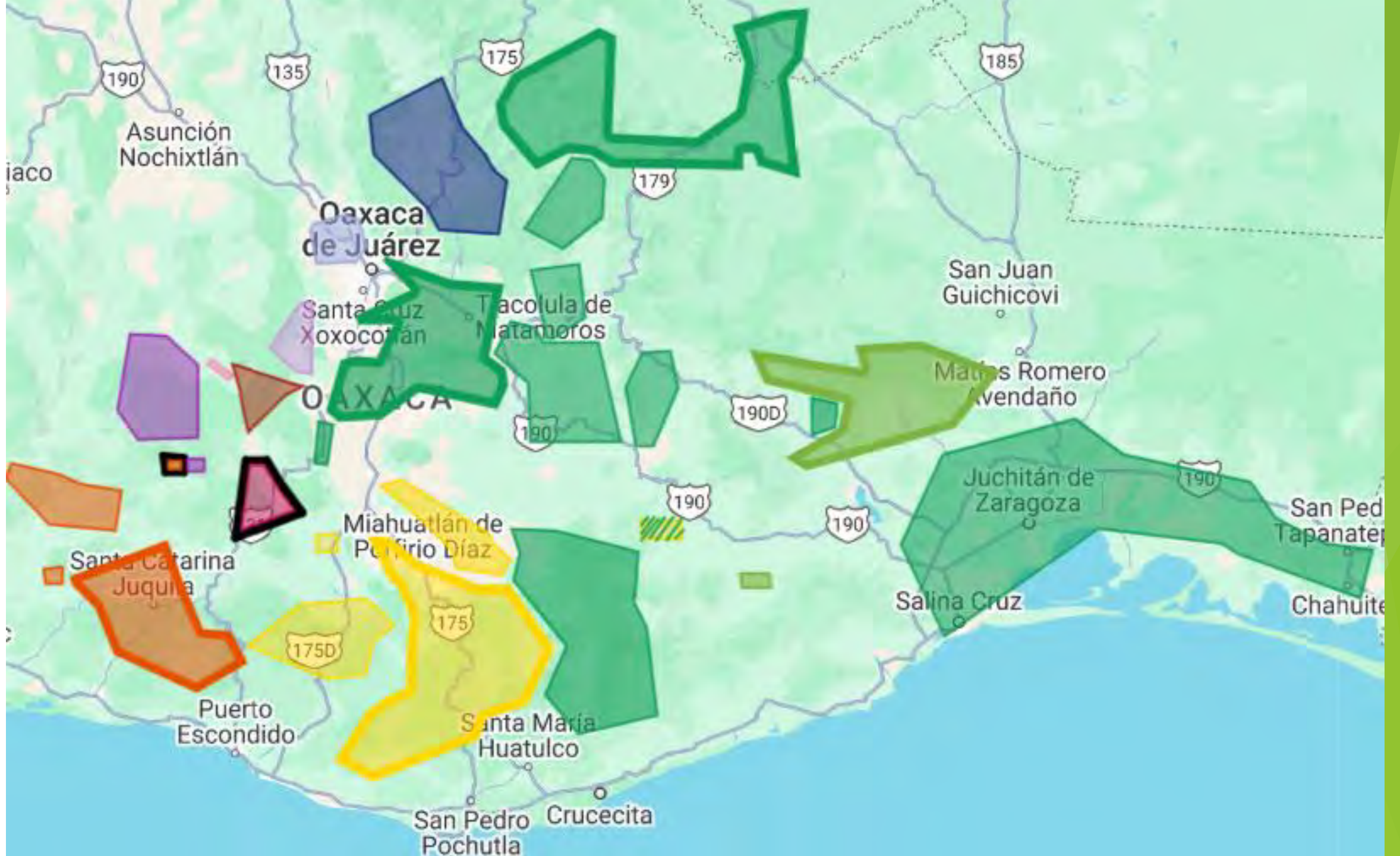
Topics for today's talk

- ▶ Reconstructed stress patterns of Proto-Zapotecan
- ▶ Common patterns of metrical prominence in modern Zapotecan
- ▶ Substrate effects in genetically unexpected stress systems

Social changes ca. 500 BCE in the Valley of Oaxaca

- Urbanization
- Economic specialization
- Increasing inequality
- Hereditary class distinctions
- Religious innovations
- 260-day ritual calendar
- Human sacrifice
- Logosyllabic writing
- Mesoamerican ballgame
- Tribute/taxation
- Political centralization
- Larger families
- Warfare



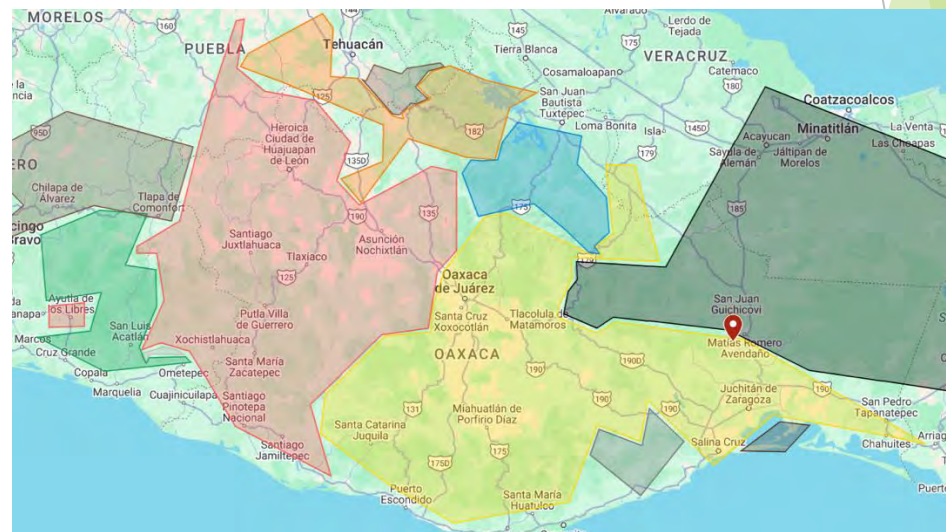
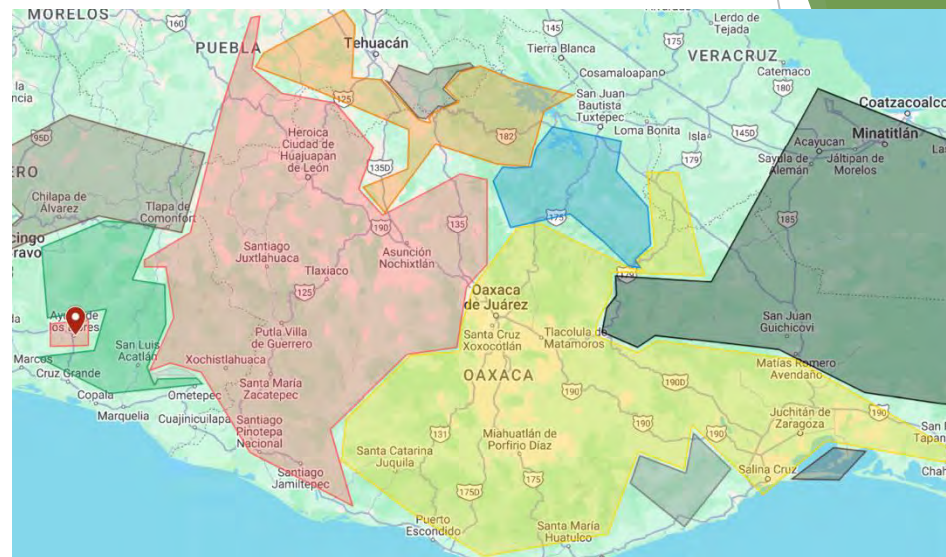


Canonical roots are disyllables in Eastern Otomanguean (EOM)

- ▶ Proto Eastern Otomanguean had only *CVCV roots
- ▶ Today's EOM languages have 10-20% CVV roots resulting from loss of root-medial back consonants *k, *ʔ, *h in different languages
 - ▶ *k
 - ▶ 'tree' Proto-Zapotecan *jaka > San Bartolomé Loxicha [jà:]
 - ▶ *ʔ
 - ▶ 'straw mat' Proto-Zapotecan *θaʔa > Santa María Coatlán [ðà:]

In Eastern Otomanguean, prefixes are extrametrical

- ▶ Ayutla Mixtec
 - ▶ ‘nephew’ [ˈsáʃi̯]
 - ▶ ‘small animal’ [ti-ˈlúlˈú]
- ▶ Petapa Zapotec
 - ▶ ‘mute’ [ˈŋ-gùpːà]
 - ▶ ‘guava’ [mbe-ˈwiːh]
 - ▶ ‘lizard’ [ŋgu-ˈrãǵú]



Prominence in Eastern Otomanguean and Zapotecan

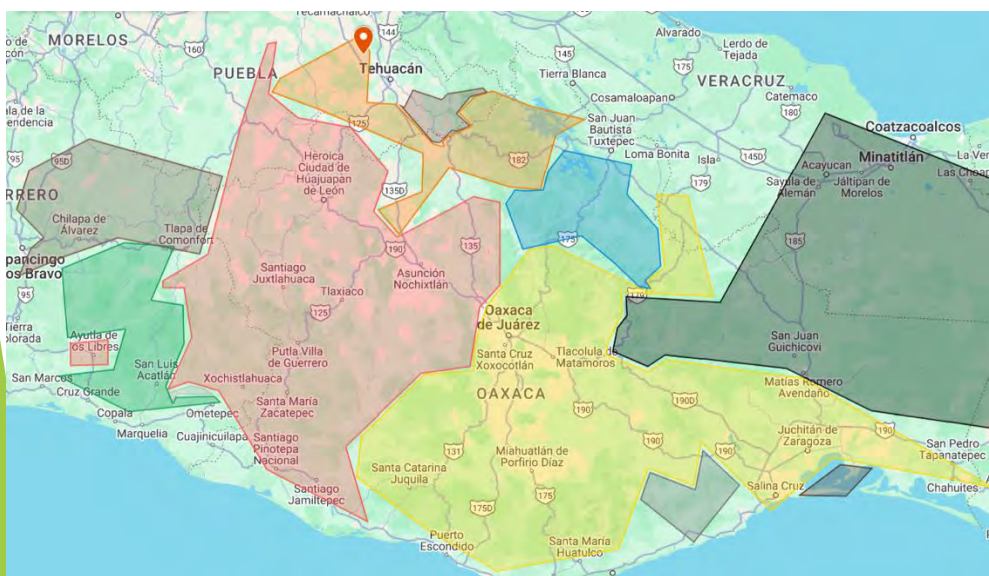
- ▶ Stressed syllables are heavy in Eastern Otomanguean languages
 - ▶ Vowel length
 - ▶ Presence of coda
 - ▶ Consonant length
 - ▶ Gemination
 - ▶ Pre-aspiration
 - ▶ Post-aspiration

Stress in EOM can be fixed or quantity-sensitive

- ▶ Stress fixed to a particular position
 - ▶ Root-initial syllable
 - ▶ Mixtec
 - ▶ Zapotec
 - ▶ Root-final syllable
 - ▶ Chatino
- ▶ Quantity-sensitive stress (with phonetic lengthening in a default position in the absence of a heavy σ)
 - ▶ Based on vowel length
 - ▶ Temalacayuca Popoloca
 - ▶ Based on coda consonants
 - ▶ Proto-Zapotecan, pre-Soltec

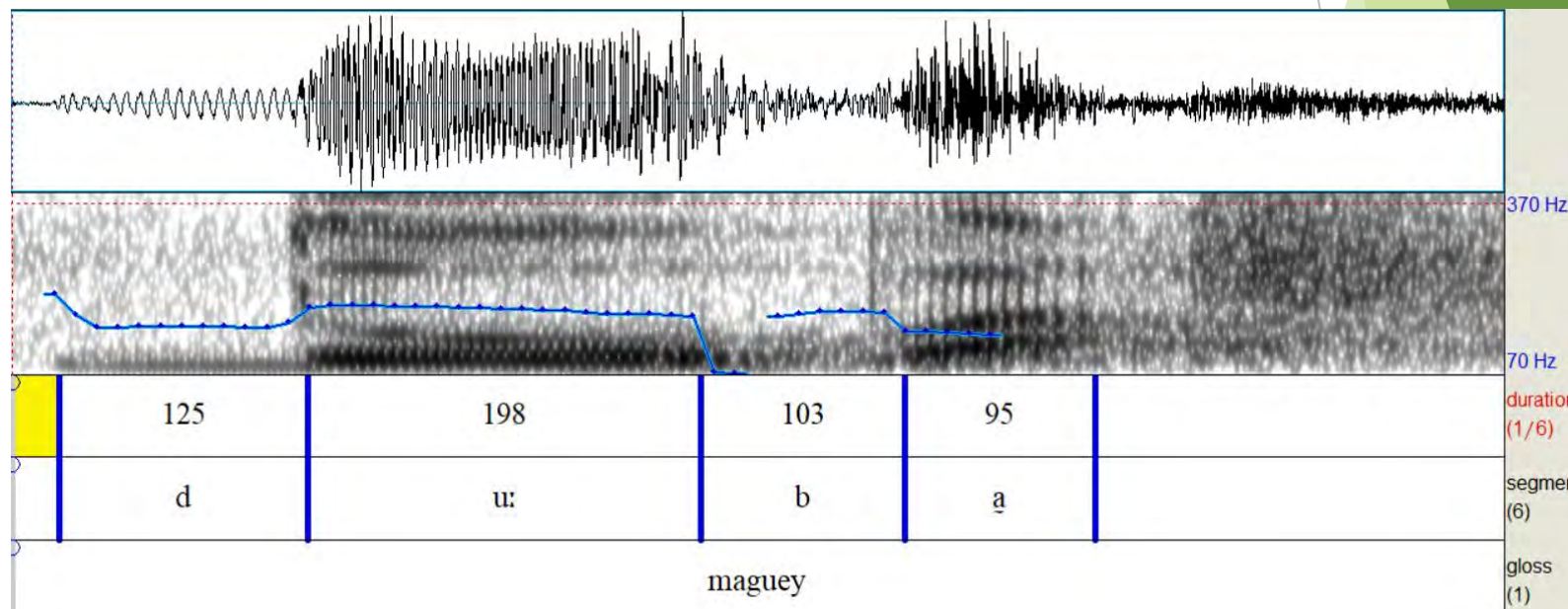
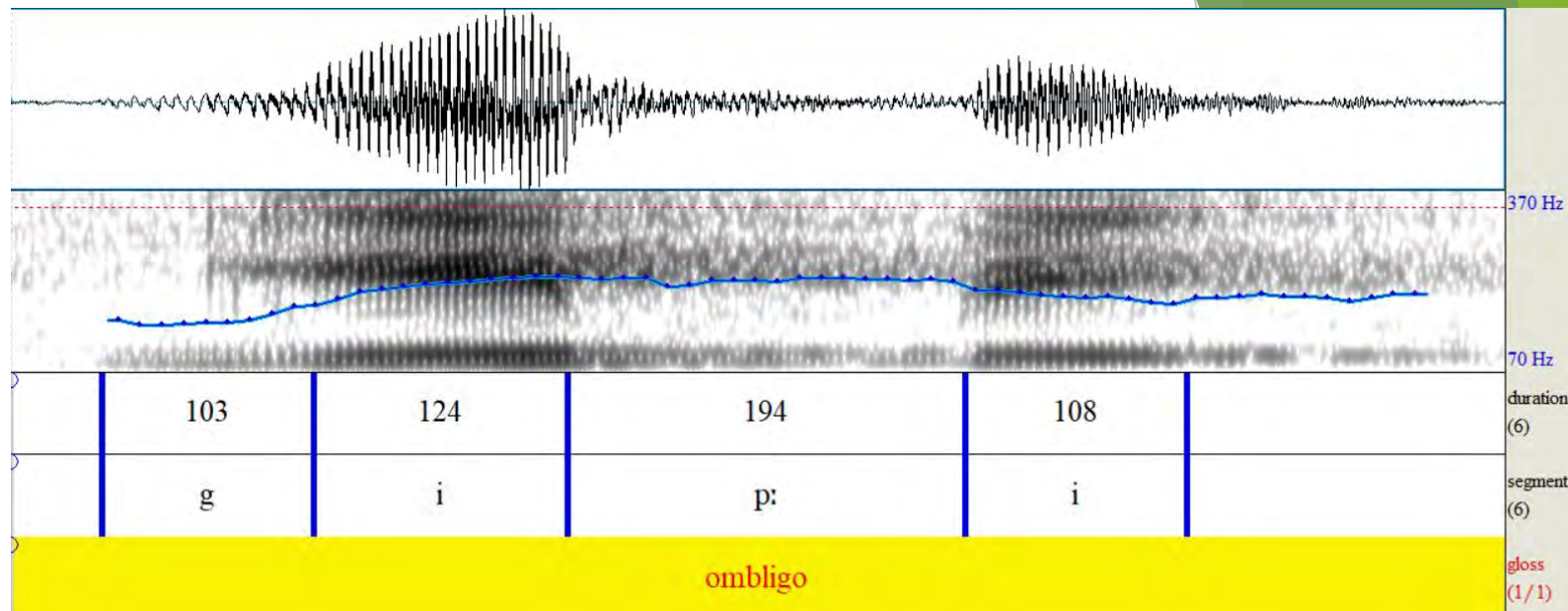
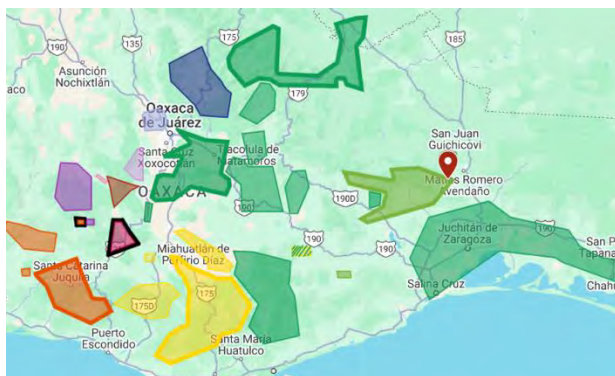
The quantity-sensitive system of Temalacayuca Popoloca (Nakamoto 2017)

- ▶ Vowel length is contrastive
- ▶ An ultima or penult with a long vowel attracts stress
 - ▶ CV'CVV#
 - ▶ 'CVV.CV#
- ▶ If neither the ultima nor the penult has a long vowel, the last intervocalic consonant is phonetically lengthened, rendering the penult as heavy on the surface
 - ▶ 'CV[C₁].C₁V#

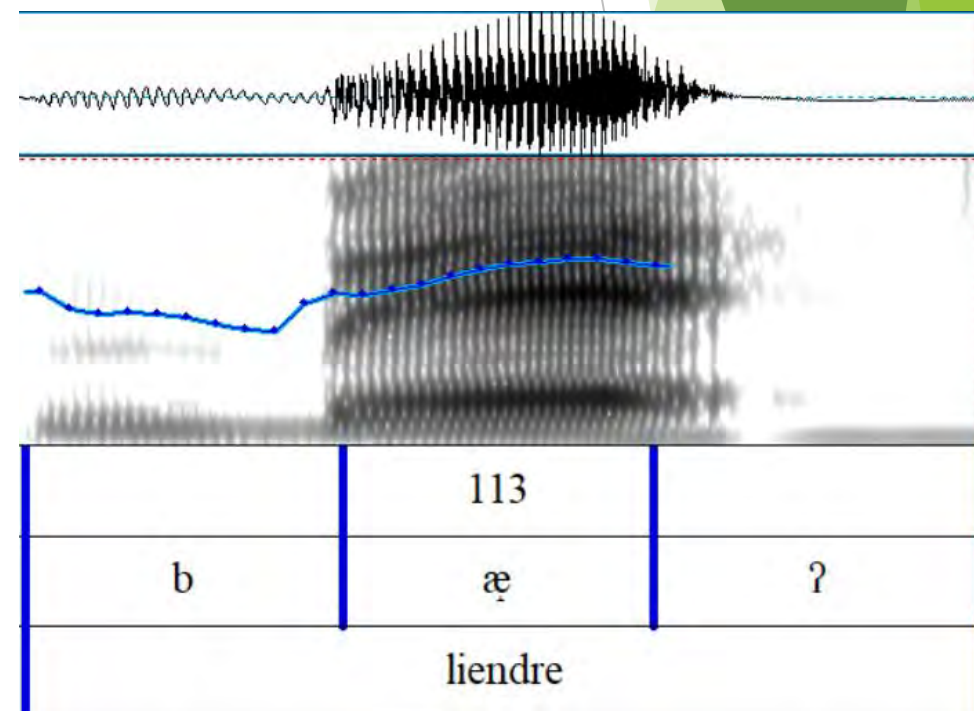
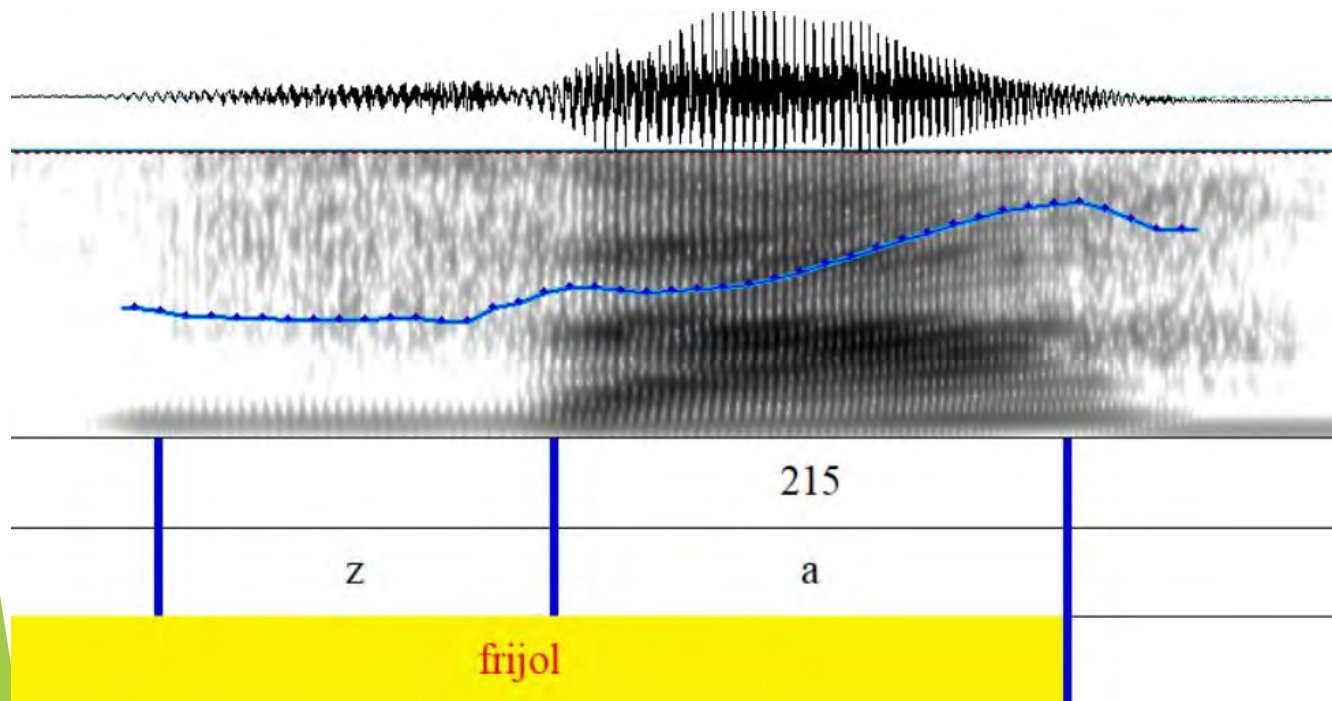
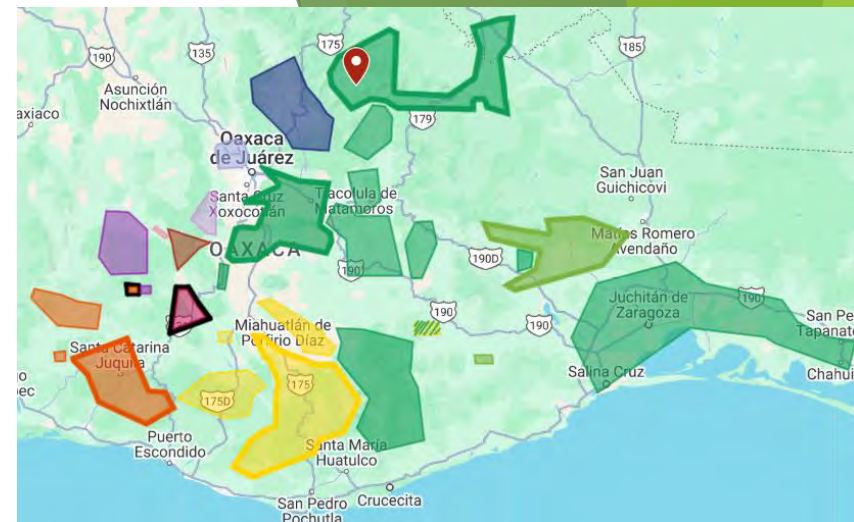


Santo Domingo Petapa

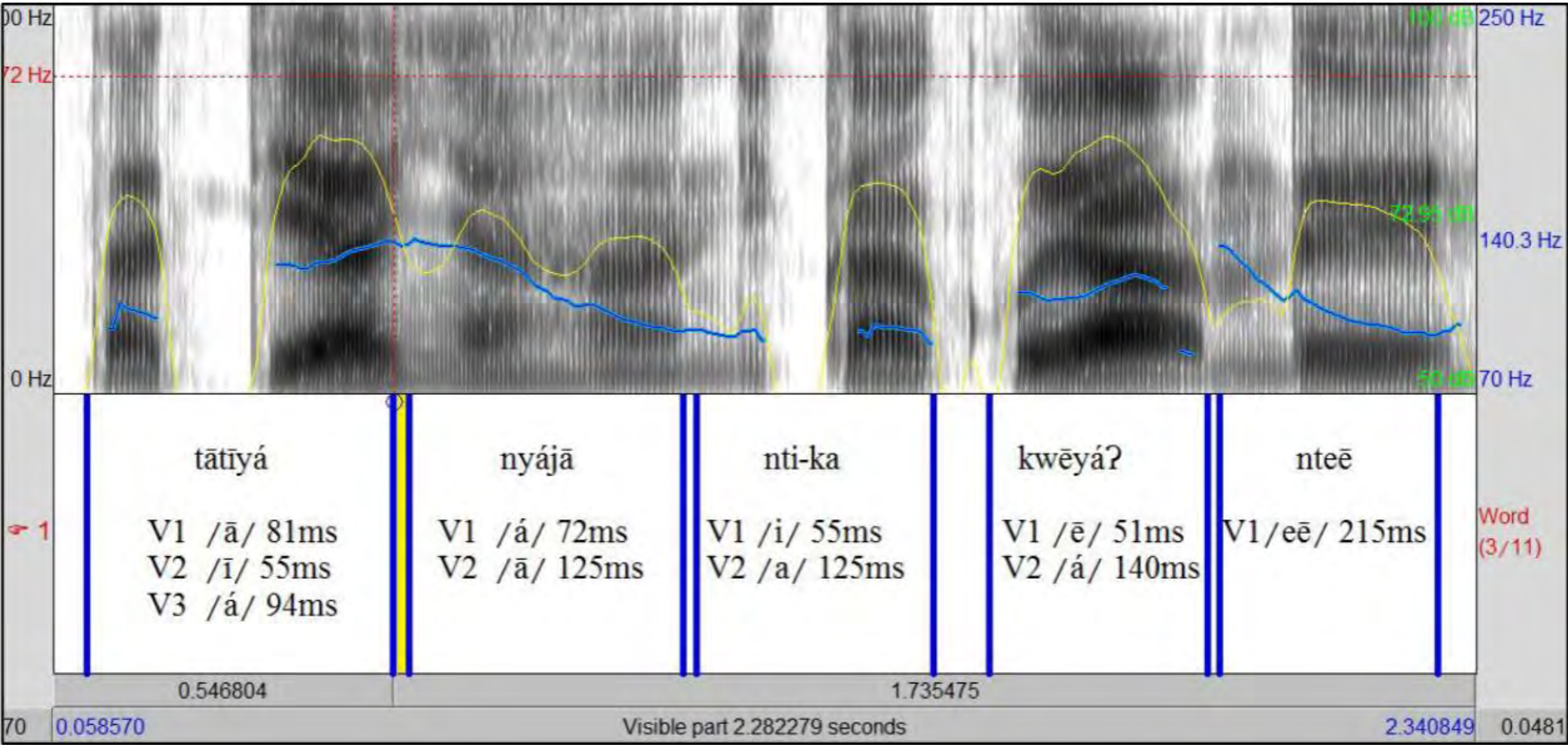
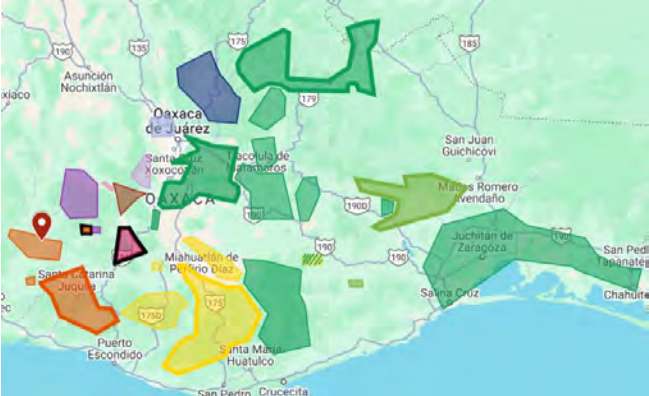
/ 'CVC:V/
['CV:CV]



Minimality requirement for lexical roots (San Juan Yaeé courtesy of Armando Doroteo)



Zenzontepec Chatino (Campbell 2014: 171)



Many modern Zapotecan languages have lost unstressed vowels, as in ‘tortilla’ (Proto-Zapotecan *kekθa)

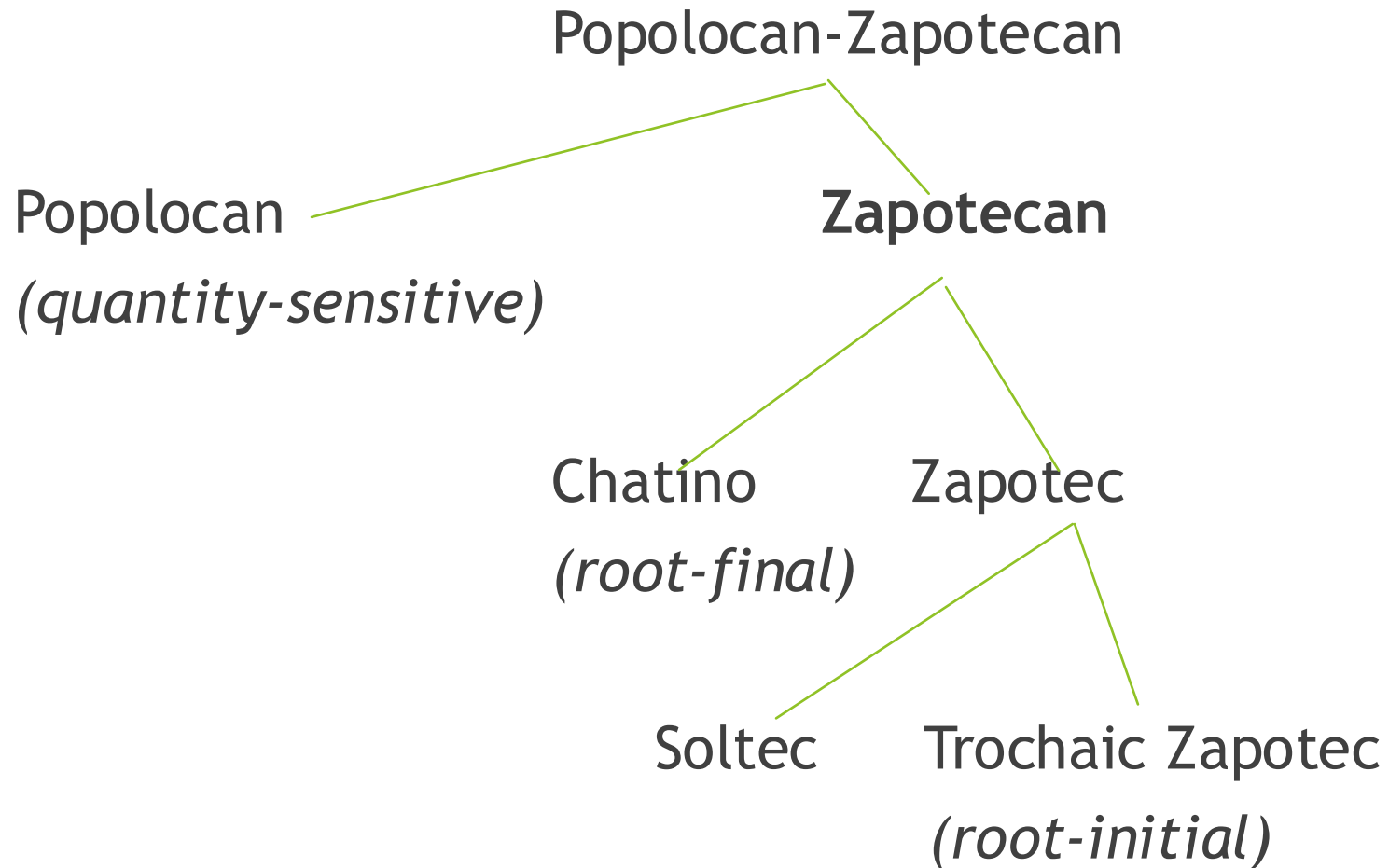
Proto-Chatino *kjaħa

- ▶ Zenzontepec /tʃaha/ (Campbell 2019)
- ▶ Tataltepec /tjha/ (Sullivan 2015)
- ▶ San Juan Quiahije /kjhà/ (Cruz 2011)

Proto-Zapotec *kekθa

- ▶ Lachixío [ét:à] (Sicoli 2020)
- ▶ Santa María Petapa [gæ^htæ]
- ▶ San Baltazar Loxiha /jæ^hθ/
- ▶ Zaniza /git/ (Operstein 2012)
- ▶ Tlacolulita [cià^ht]

Reconstruction of Zapotecan stress



Proto-Zapotec(an) syllable structure and prosodic weight

- ▶ $[(N)(k)C]_{\text{ONSET}} [V(N)(\text{?})(k)]_{\text{RIME}}$
- ▶ Bimoraic syllables
 - ▶ Closed: CV?, CVk, CV?k
 - ▶ Lexical roots comprised of open monosyllables: CV:
- ▶ Monomoraic syllables
 - ▶ Open syllables in disyllabic roots: **CV'CV**, **'CVC.CV**, **CV'CVC**
 - ▶ Unstressed grammatical morphemes: CV-, CV=, =CV

My reconstruction of Proto-Zapotec(an) stress

- Quantity-sensitive
- Lexical roots had stress on the following syllables:

'σ
μ μ

Only σ

σ 'σ
μ μ μ

Heaviest σ

'σ σ
μ μ μ

σ 'σ
μ μ μ μ

σ 'σ
μ μ

Last σ

Antonio Peñafiel mailed a lexical questionnaire to San Miguel Sola, which was filled out by Ramón Elorza on September 17th, 1886.

DE LA *Villa de San Miguel Sola*
REPÚBLICA MEXICANA

INSTRUCCIONES SOBRE LA ETNOLOGÍA Y FILOLOGÍA NACIONALES

Nombre del Estado *de Oaxaca*
Id. del Municipio *San Miguel Sola* Ayuntamiento
Id. del Pueblo *San Miguel Sola*
Id. del idioma *Castellano Solteco*
Id. genitico en que se habla *id.*

Nombre de la persona que escriba las palabras que corresponden á las castellanas escritas por orden numérico *Ramon Elorza*

Fecha y lugar en que se escribe la traduccion de este vocabulario *Septiembre 17 del 1886*

Solteco
VOCABULARIO COMPARATIVO.

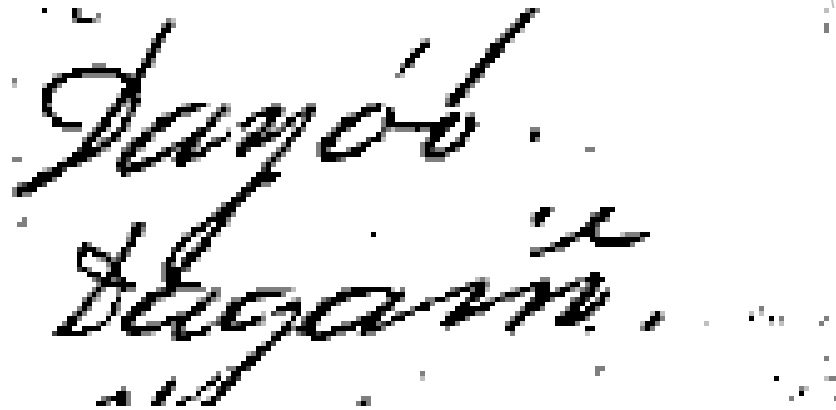
1. Dios.	<i>Juan Dios</i>
2. Sacerdote.	<i>Uana</i>
3. Templo.	<i>el elorza</i>
4. Hombre.	<i>huni</i>
5. Mujer.	<i>elorza</i>
6. Muchacho.	<i>ataite</i>
7. Muchacha.	<i>cha'orra</i>

*Segundo el idioma expresado
el que se halla en el lugar
en donde se escriben las palabras del
presente vocabulario pero
en el Barrio de San Miguel Sola
en el idioma de Oaxaca que
se halla en el idioma que
se halla en el idioma que*

Siendo el idioma español el que se habla en el lugar, se contesta con las mismas palabras del presente vocabulario; pero en el Barrio de San Yldefonso se encontró una señora de 92 años que dijo que se hablaba el siguiente idioma.

Siendo el idioma español el que se habla en el lugar, se contesta con las mismas palabras del presente vocabulario; pero en el Barrio de San Yldefonso se encontró una señora de 92 años que dijo que se hablaba el siguiente idioma.

Interpretation of Elorza's written accent



Jagob.
Hagarin.

- Elorza wrote an accent in some words and not others
- After comparing forms with cognates and reconstructions
 - I ruled out the possibility that the accent represented glottalization
 - I ruled out the possibility that it represented tone
 - I hypothesize that the accent represents prominence, as in Spanish

The Elorza data used for studying prominence

- ▶ Not all of the 250 prompts have a unique Zapotec equivalent
- ▶ Repeated forms counted only once
- ▶ Hispanisms excluded
- ▶ Unprefixed monosyllables are excluded
- ▶ Complicated compounds excluded
- ▶ Forms that have lost entire syllables are excluded
- ▶ Cliticized forms are excluded
- ▶ Non-cognates or non-reflexes of reconstructed forms are excluded
- ▶ **59 remaining forms**

In Spanish orthography, an accent marks iambic (e.g. *comí*) but not trochaic (e.g. *como*) stress.

Gloss	Proto-Zapotecan	Soltec	Zenzontepec Chatino	Zapotec of Santa María Petapa
‘day’	*PRON nĩ=ku-i-. 'tsa:	<i>Luché</i>	kwi'tsaā	gu-'bidza
‘night’	*'tj-eʔ.n[d]a	<i>Bela</i>	te'lā	'dja'ala
‘six’	*'k-suʔk.kwa	<i>Xoco</i>	sú'kwa	'ʃop:a
‘seven’	*k-a.'tʃi	<i>Gaché</i>	ká'tī	'gaʰtʃi

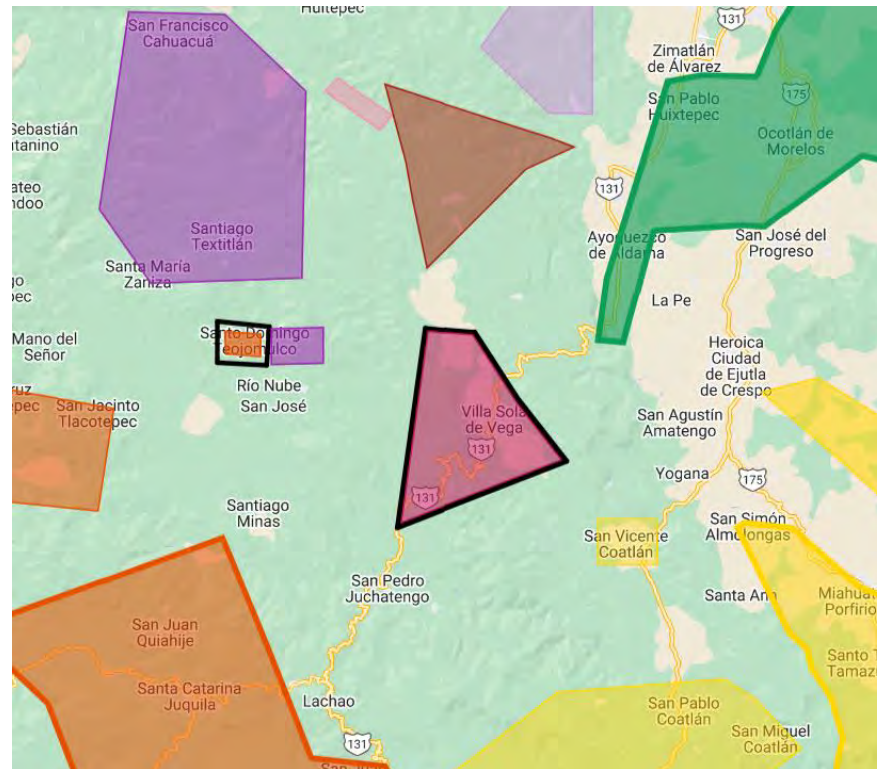
73.	Dia.				<i>Luché</i>
74.	Noche.				<i>Bela</i>
195.	Seis.				<i>Xoco</i>
196.	Siete.				<i>Gaché</i>

A majority but not all of the forms considered conform to my hypothesis

Type	Items	Percentage
Heavier penult reconstructed, no accent marked	21	35.59%
Heavier ultima reconstructed, accent written on final vowel	11	18.64%
Syllables of equal weight reconstructed, accent written on ultima	10	16.94%
Forms that conform to the hypothesis	42	71.86%
Heavier penult reconstructed, but accent marked on ultima	3	5.08%
Heavier ultima reconstructed, but no written accent	7	11.86%
Syllables of equal weight reconstructed, but no written accent	7	11.86%
Forms not predicted by the hypothesis	17	28.8%

Possible explanations for exceptional words (28.8%)

- ▶ ***k was lost word-finally** in Soltec, but
*CVk ultimas retained prominence
 - ▶ ‘head’ PZn *kekkek > Soltec *yequí*
- ▶ Stress thus became unpredictable and
therefore **contrastive**.
- ▶ Loanwords from iambic Chatino
languages and Trochaic Zapotec
languages no longer had to adapt to a
rule and could retain the accentual
pattern of the source language



Soltec data supports default iambic rather than trochaic stress in *CVCV

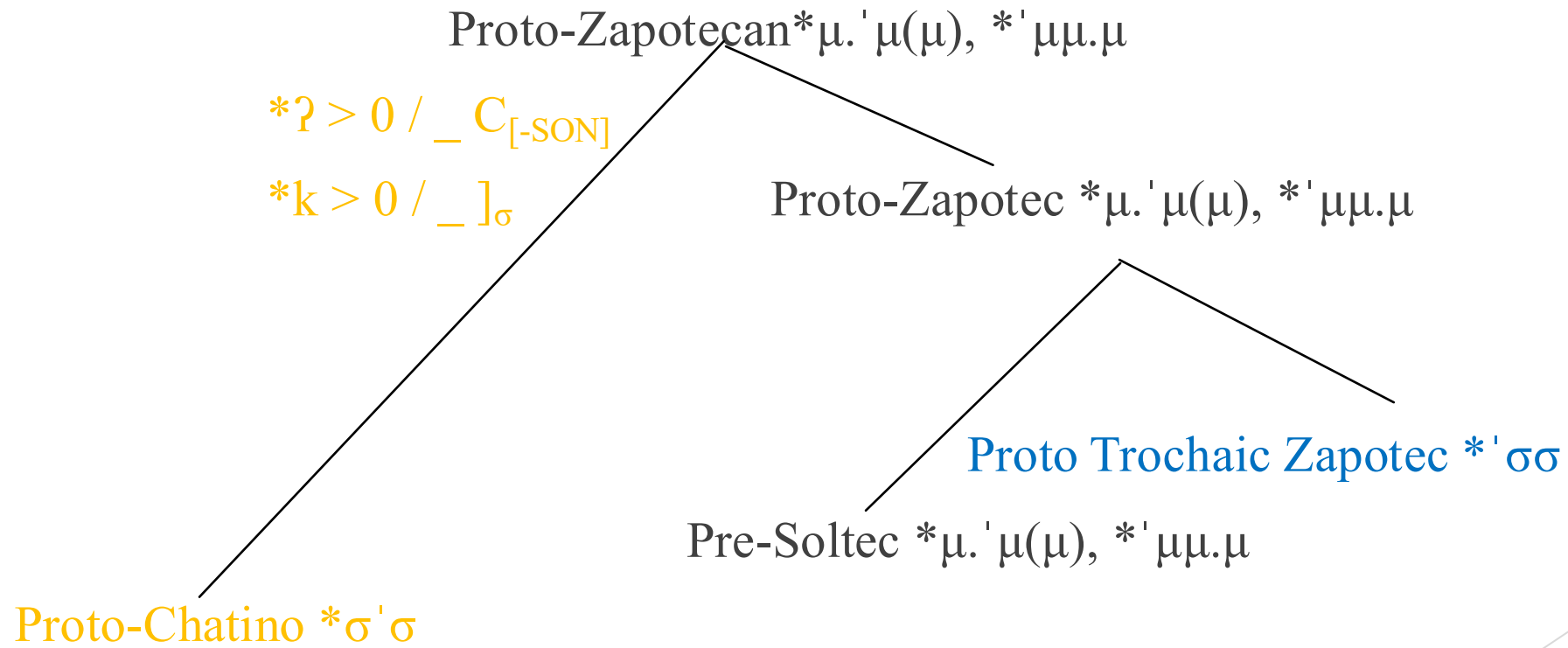
*CVCV Soltec CV'CV

dedo	*kkwenẽ	cuiní
cara	*ndawu	da=yóo
barba	*ndusu	dioxí
siete	*kati	gaché
pueblo	*kětse	yenchí
cuerpo	*nãθi	te=natí
sangre	*tjenẽ	reiníi
pasto	*kisi	yixé
hablar	*akwi	huicuí

*CVCV Soltec 'CVCV

huevo	*kuwe	guue
guajolote	*kwet'a	lete
uno	*kθukwi	tico
ocote	*jaka kět'e	yayenque

Divergence of Zapotecan stress patterns in disyllables



Stressed syllables are the locus of greater number of contrasts in Zapotecan

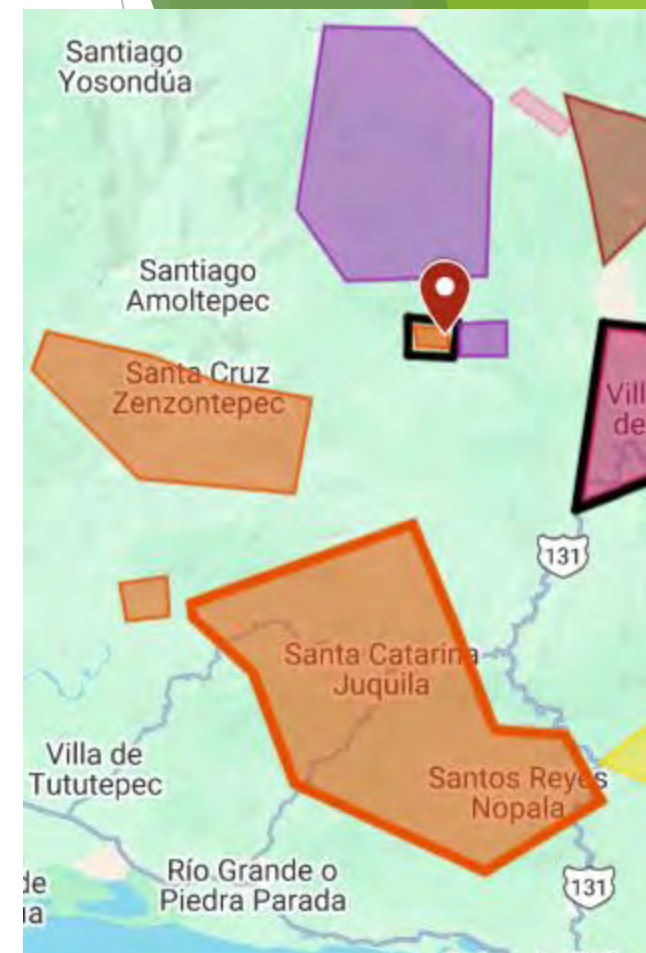
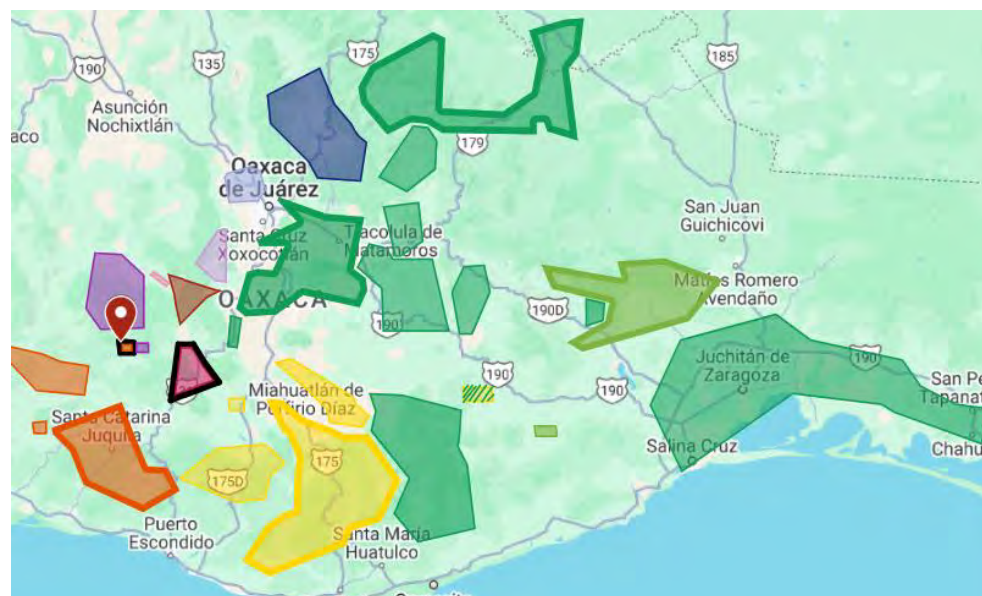
- ▶ Coda consonants
- ▶ Suprasegmental contrasts
 - ▶ Tone
 - ▶ Phonation
 - ▶ Nasalization

Stress and the locus of contrastive vowel nasalization

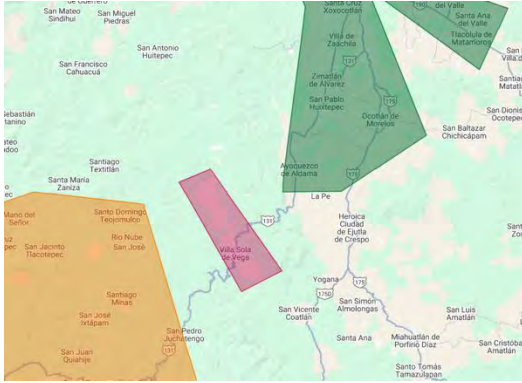
		‘mosquito’	‘hunchback’	‘town’
Chatino	Zenzontepec	kwi-na'tě	kwe'kõ	ki'tsě
	Zacatepec	hɲia'tě		
	Tataltepec	klja'tě	ɭja'kõ	ktfě
Modern Zapotec	S. A. Mixtepec	mblañtʃ	leŋgw	
	S.C. Amatlán	mlentʃ		
	S. M. Mixtepec		u'ʒuŋgu	
	Teotitlán		'peŋkwa	
Soltec				yenchí

Teojomulco Chatino (Sullivant 2016)

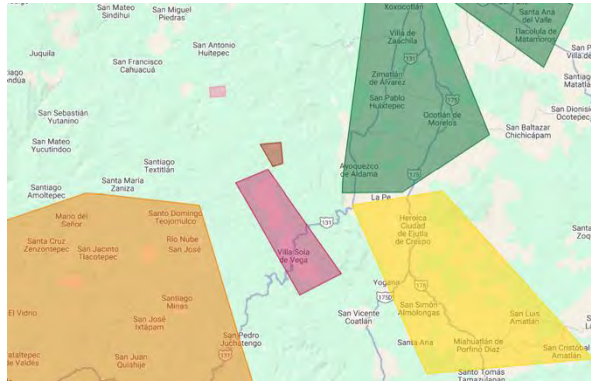
	Zenzontepec Chatino	Teojomulco Chatino	Texmelucan Zapotec
‘town’	kitsẽ	<i>quiénche</i>	gjedz
‘person’	njatẽ	<i>yeinte</i>	mbeki
‘ear’	njakã	<i>yanca</i>	gèdà:y
‘hair’	kitsã?	<i>quinche</i>	‘gɪfi



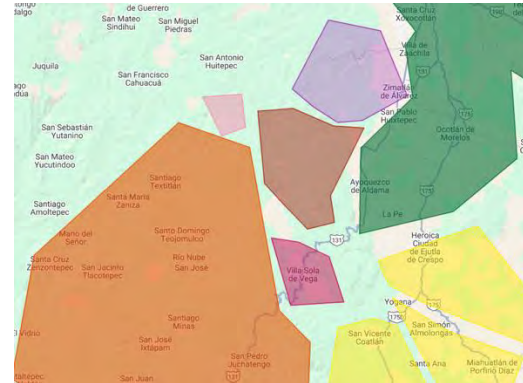
300 BCE



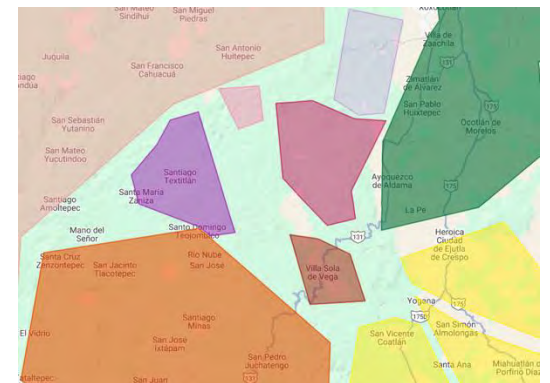
100 BCE



750 CE



1150 CE



Speculative linguistic geography

Buenos Aires Spanish (Colantoni & Gurlekian 2004; McMahon 2004; Benet et al. 2012; inter alia)

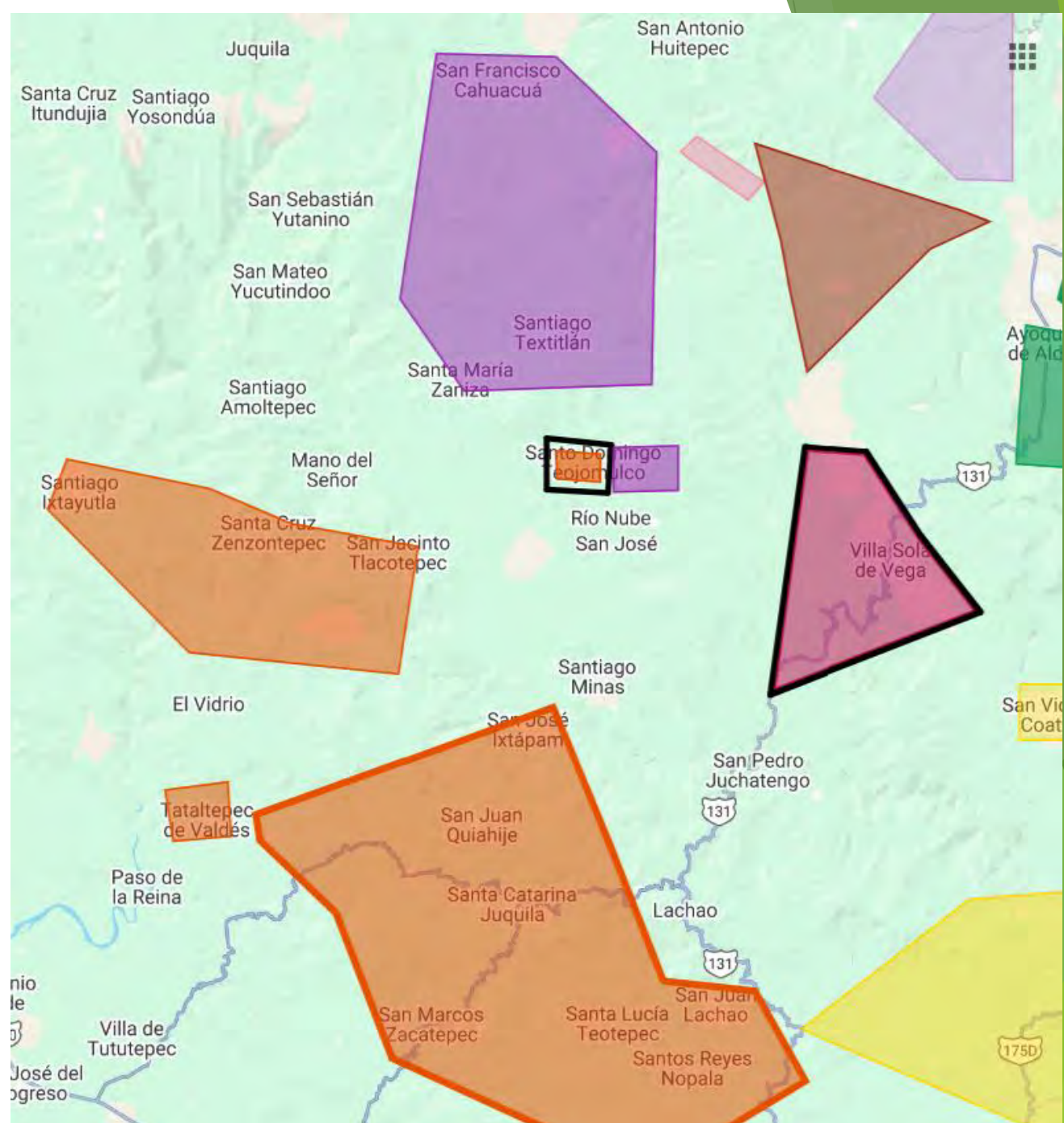
- ▶ 2.9 million Italian immigrants to Argentina between 1855 and 1946.
- ▶ Italian immigrants constituted 40% of some Buenos Aires neighborhoods.
- ▶ *Lunfardo* was a slang that originated in these neighborhoods and became popular in tango lyrics and popular literature.

Social scenarios for transfer of Zapotec prosody to Teojomulco Chatino

Chatino predated Papabuco in the region by perhaps 1,000 years.

Zapotec (Papabuco) immigrants may have learned Chatino as L2.

Zapotecan communities are patrilocal.



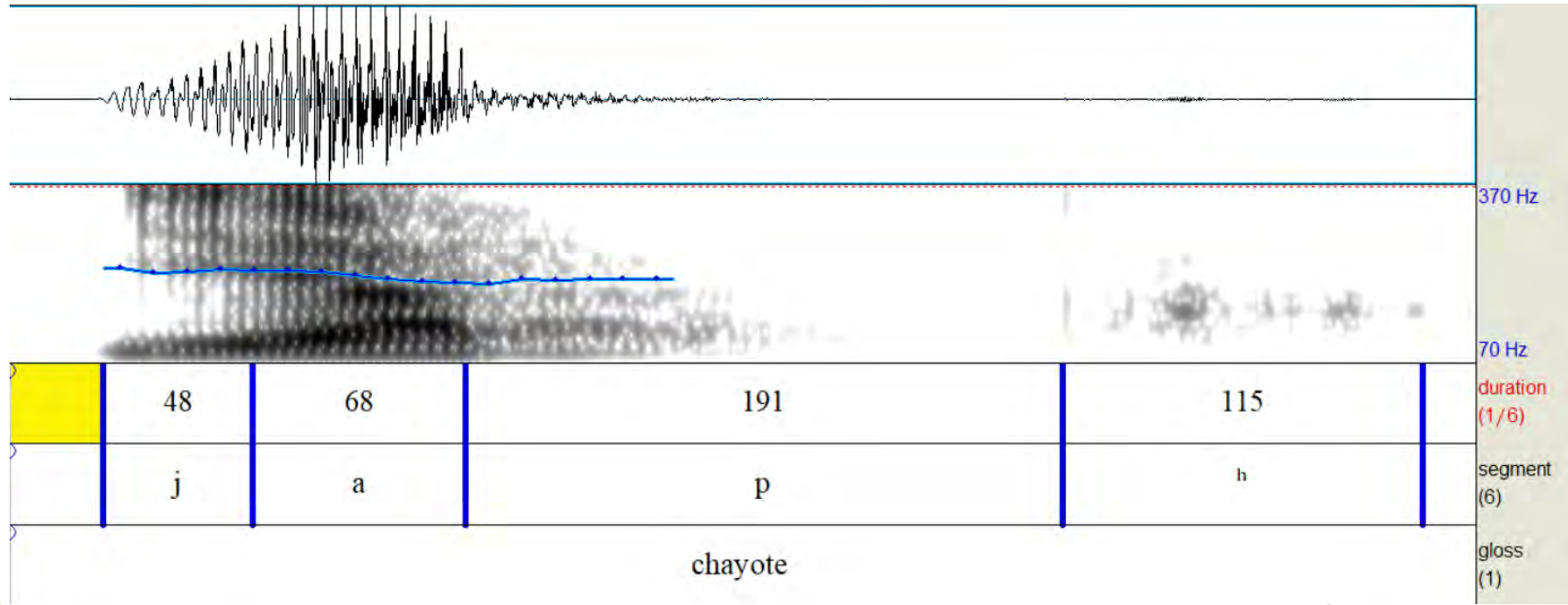
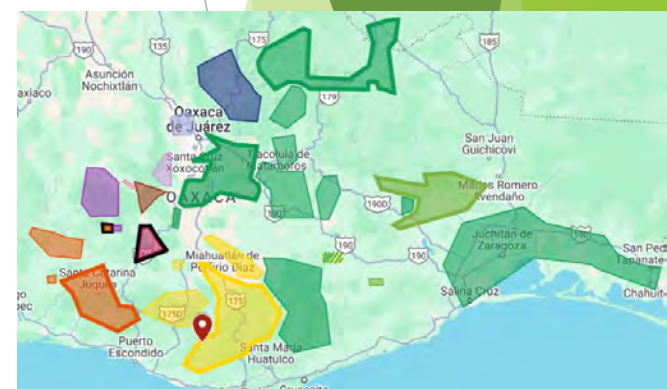
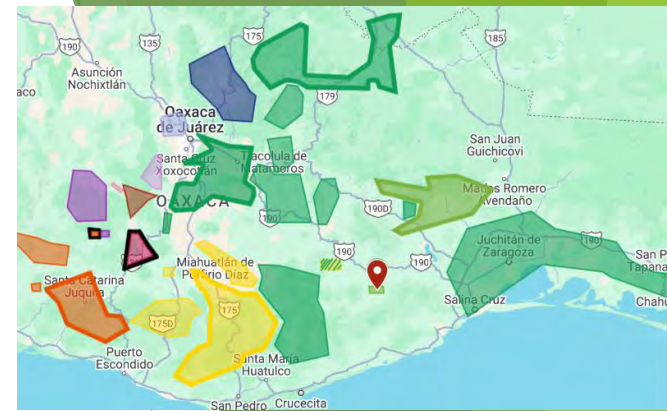
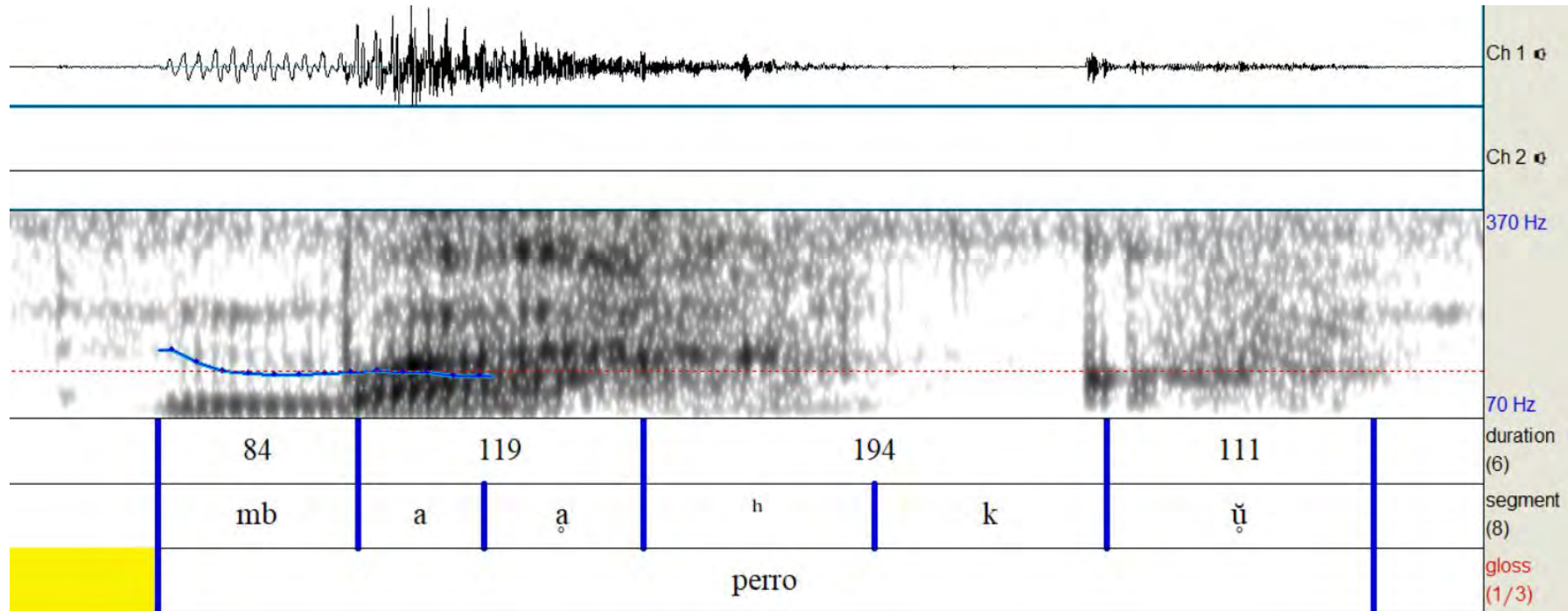
Proto-Zapotecan codas in modern Zapotec

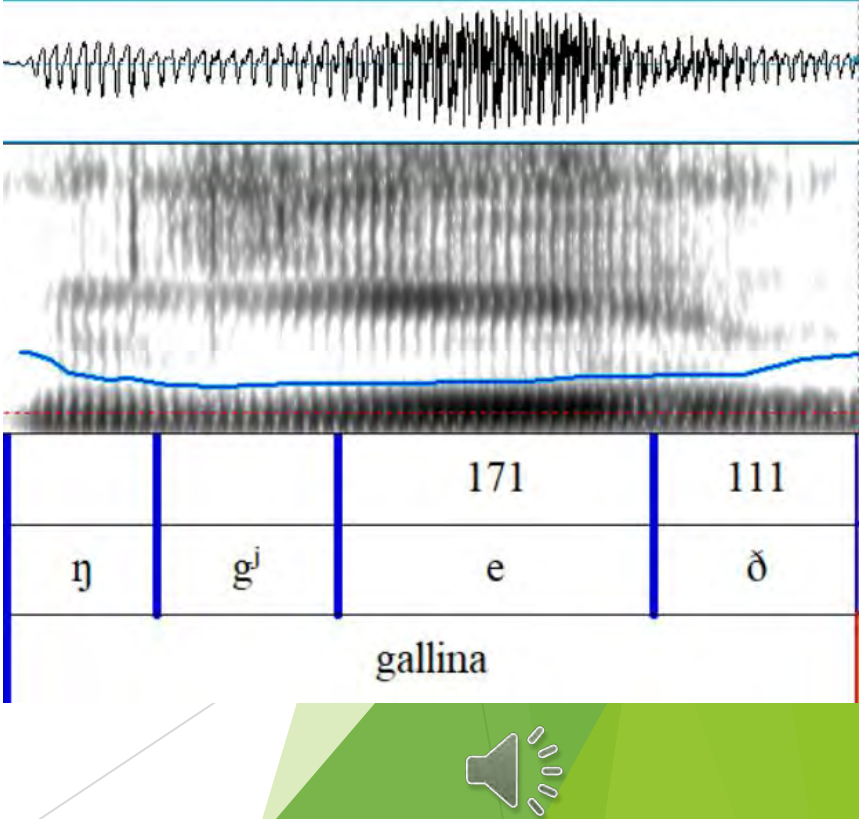
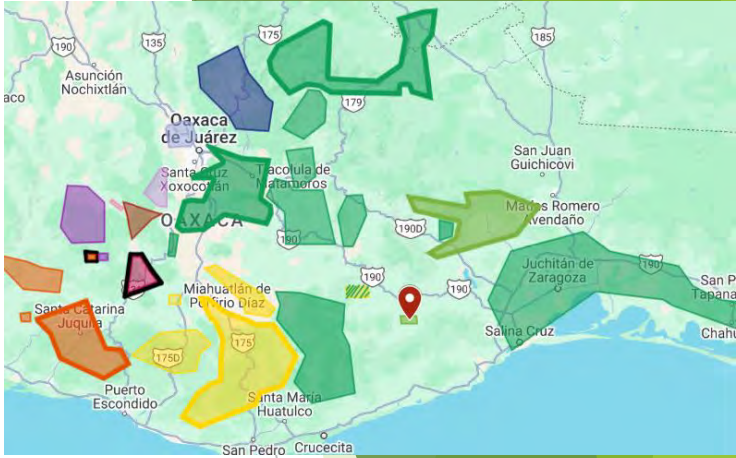
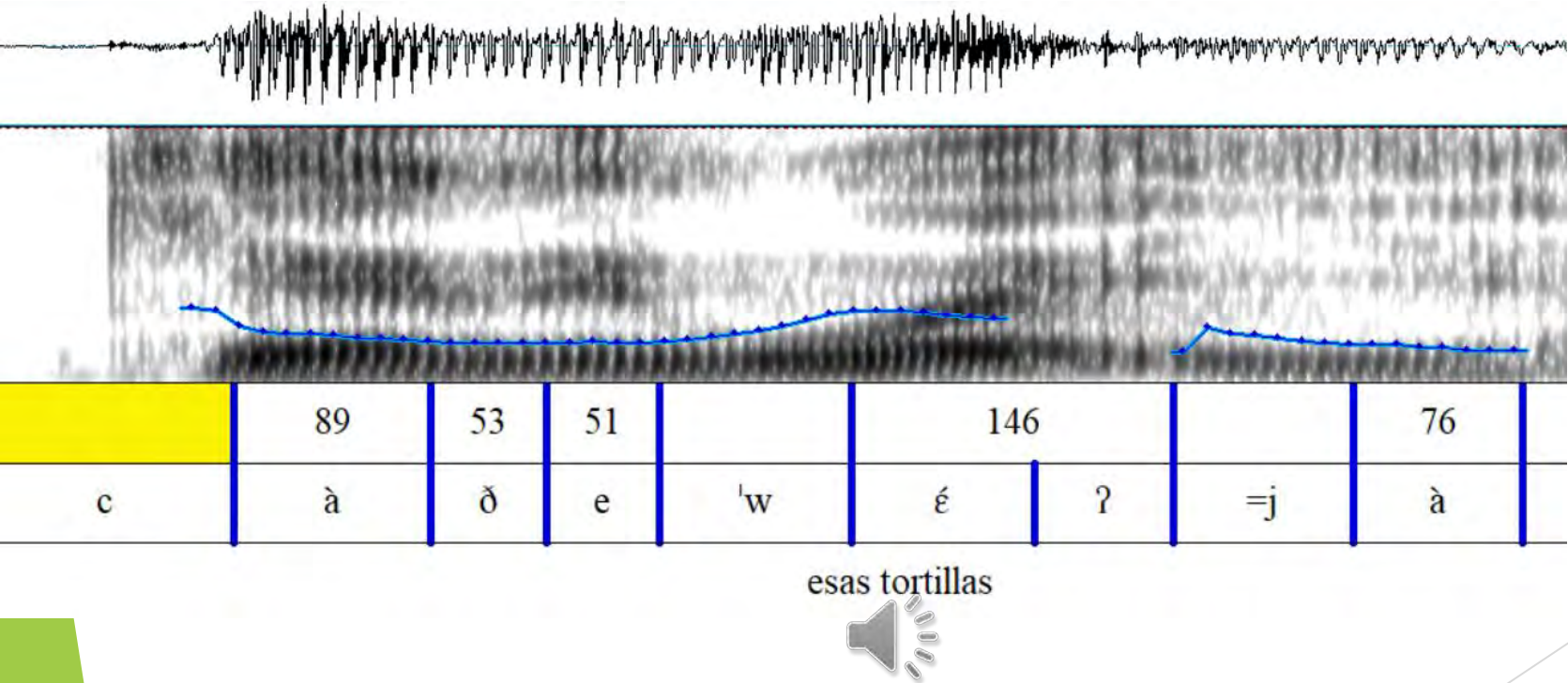
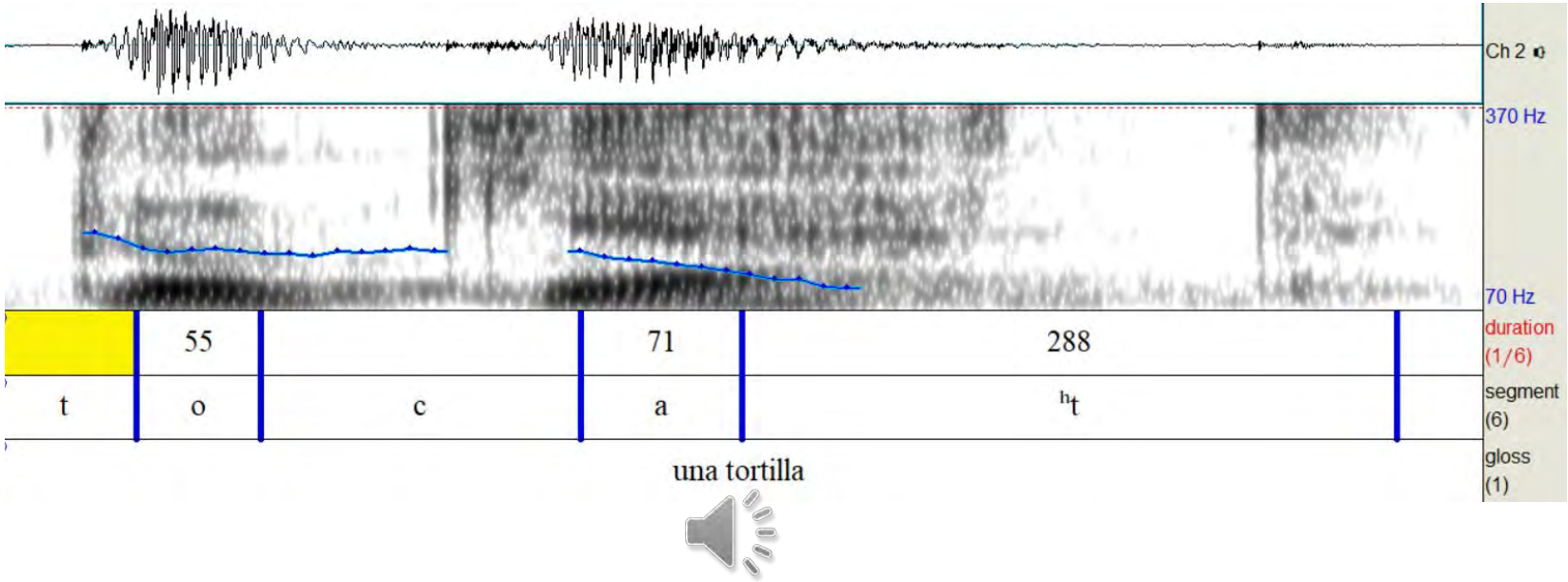
*k

- ▶ In coda of Zapotec tonic σ
 - ▶ *CVkCV > CVC:(V), CV^hC(V), CVC^h
 - ▶ Voiceless obstruents
 - ▶ Long sonorants
 - ▶ *CVCV >
 - ▶ Voiced obstruents, often fricatives
 - ▶ Short sonorants
- ▶ In coda of post-tonic σ
 - ▶ Lost from most languages
 - ▶ Survives as [x] in two languages
 - ▶ Reflected as vowel quality differences, *ek > o

*ʔ

- ▶ In coda of Zapotec tonic σ
 - ▶ Usually reflected as phonation contrasts V^ʔ, V_~, V^ʔV, V^h, V_{..}
- ▶ In coda of post-tonic σ
 - ▶ Lost in many languages





Zapotec

Soltec

Trochaic Zapotec

Totomachapam

Macro-Zapotec

Coyachilla

Core Zapotec

Southern Zapotec

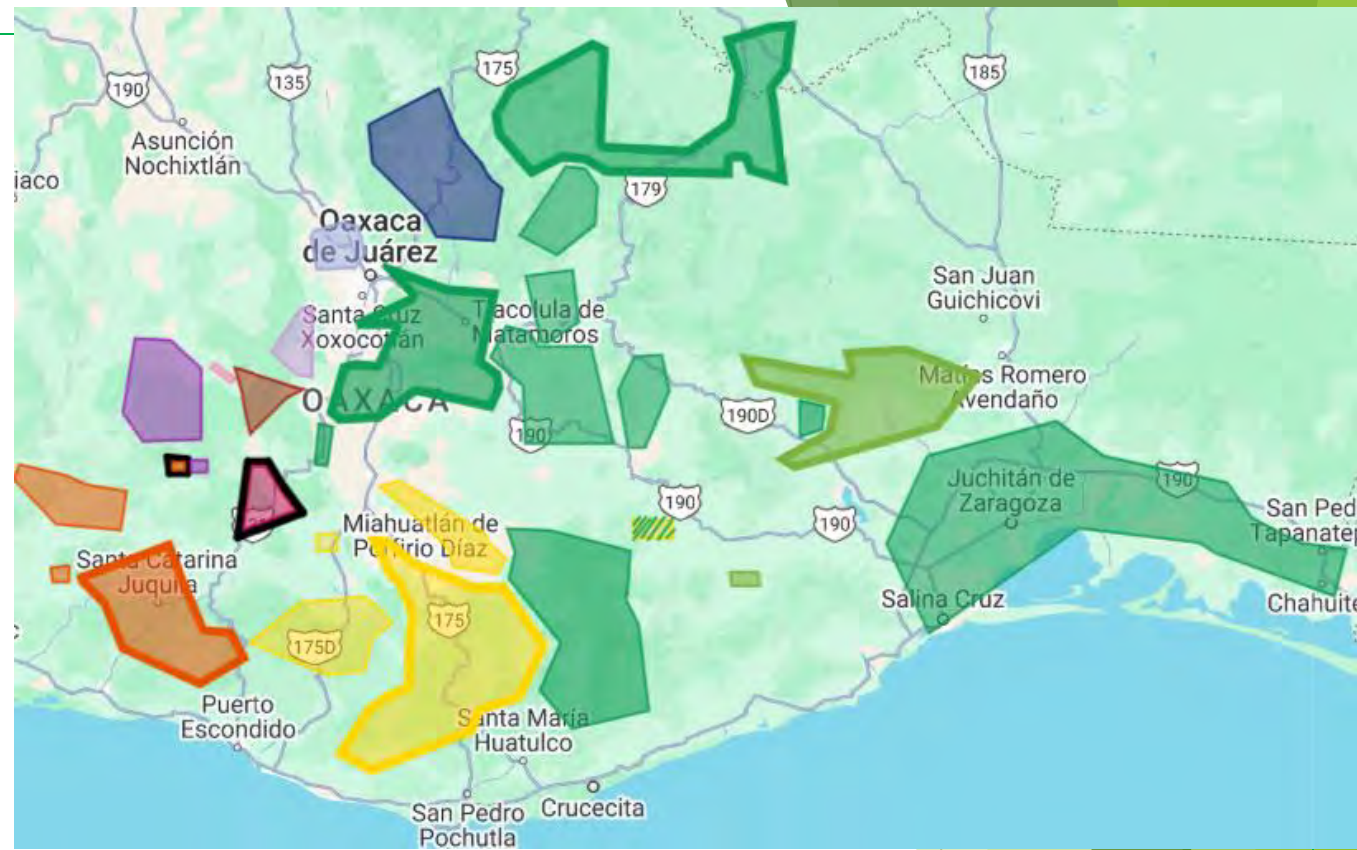
Monte Albán Zapotec

Papabuco

Nuclear Zapotec

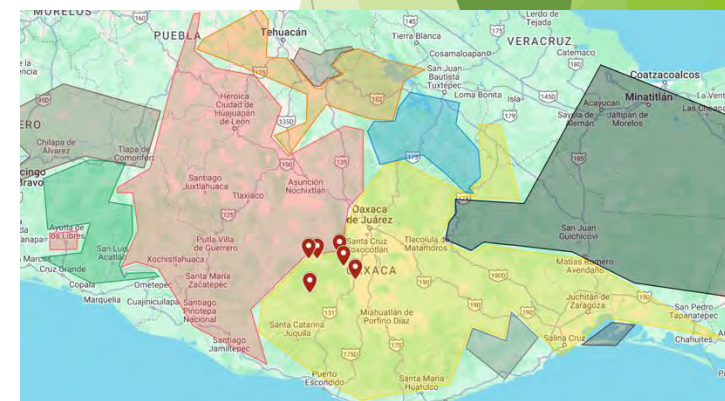
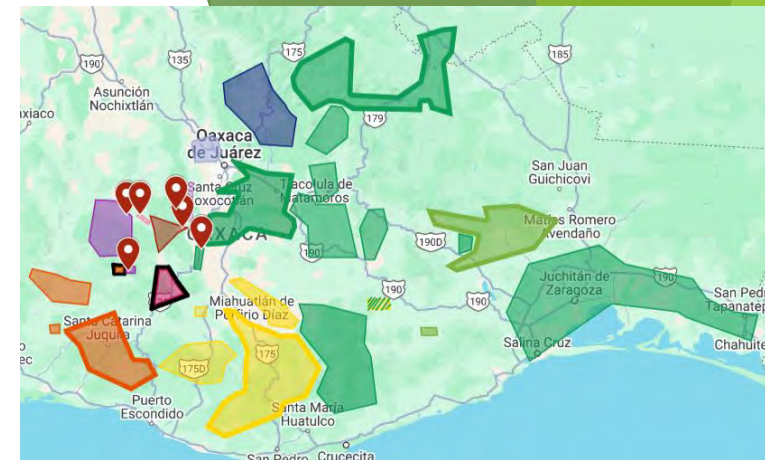
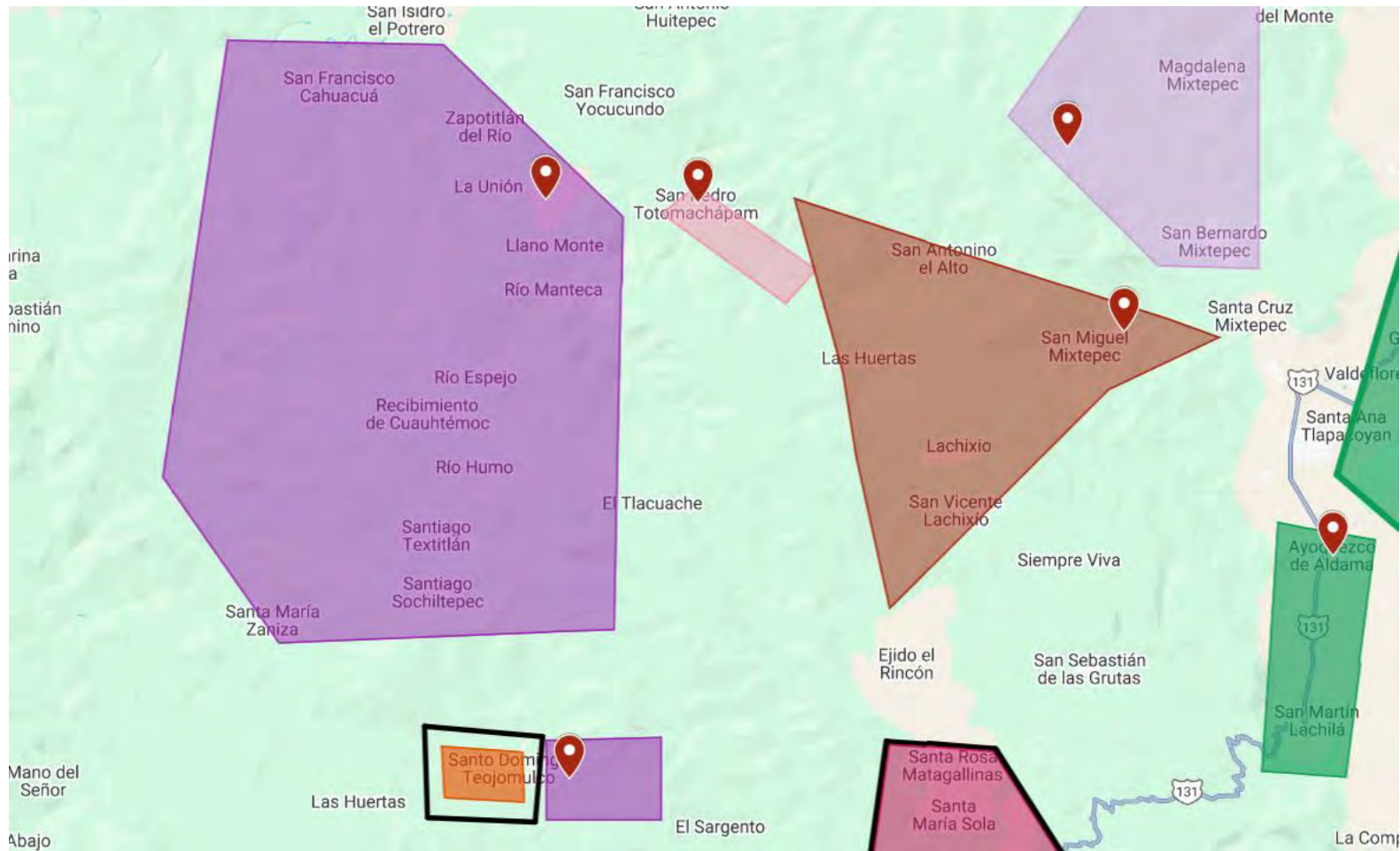
Serrano

Eastern Zapotec





PRONAI-2024-67 “Recopilación del conocimiento ambiental en lenguas zapotecas con poca documentación y en peligro del desplazamiento”

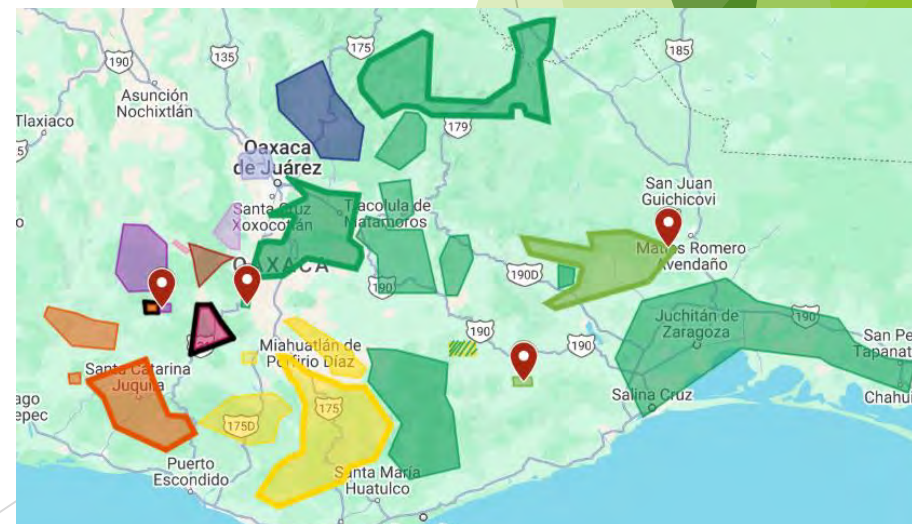
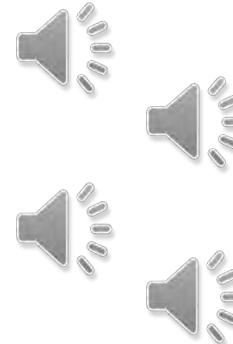


‘agave’ */θukua?/ *[θu'kwa?] with stereotypical vowel lengthening

- ▶ *kw > p > b in most Zapotec languages
- ▶ Retained as /kw/ or /k/ + round vowel in relic zone
- ▶ Recall the Zapotec stereotype of vowel lengthening before short consonants like /b/

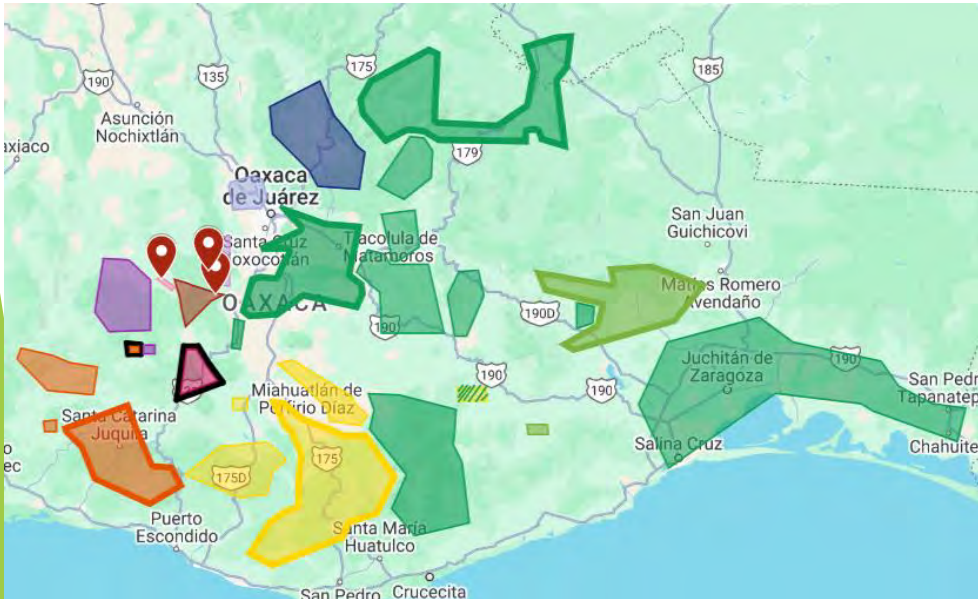
Better documented Zapotec languages:

- ▶ Santo Domingo Petapa
- ▶ Asunción Tlacolulita
- ▶ San Andrés Zabache
- ▶ San Lorenzo Texmelucan



Non-stereotypical Zapotec languages

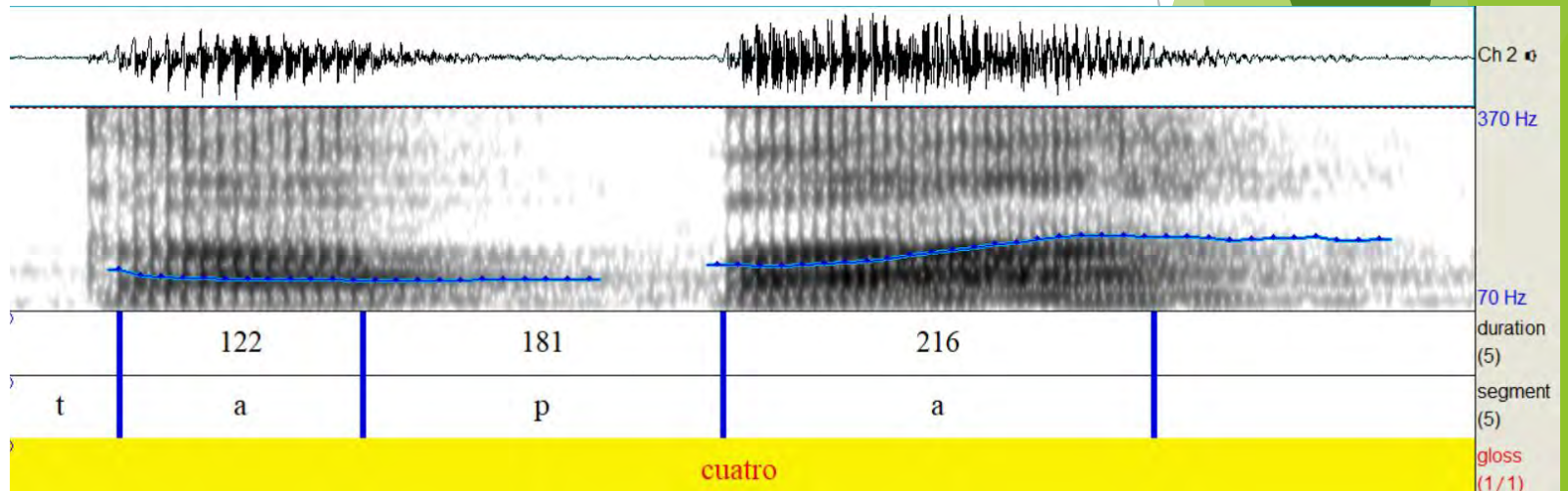
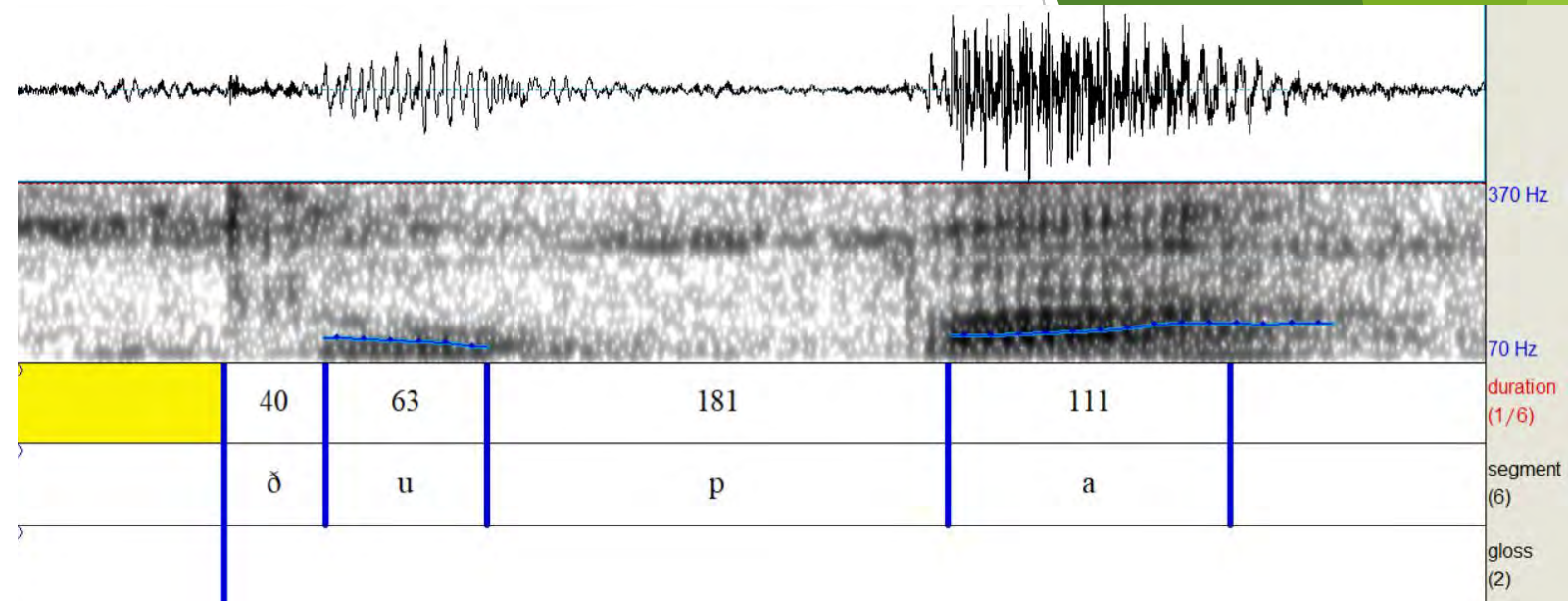
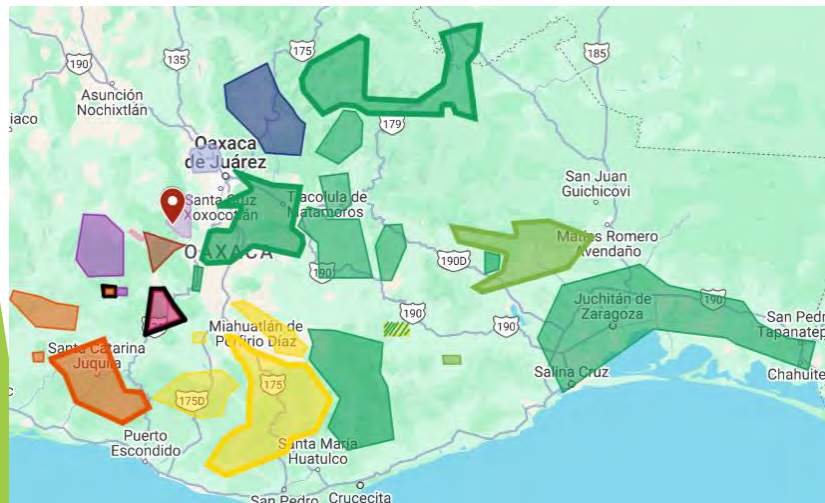
Lengthening on consonant, not vowel, in Relic Area / Contact Zone

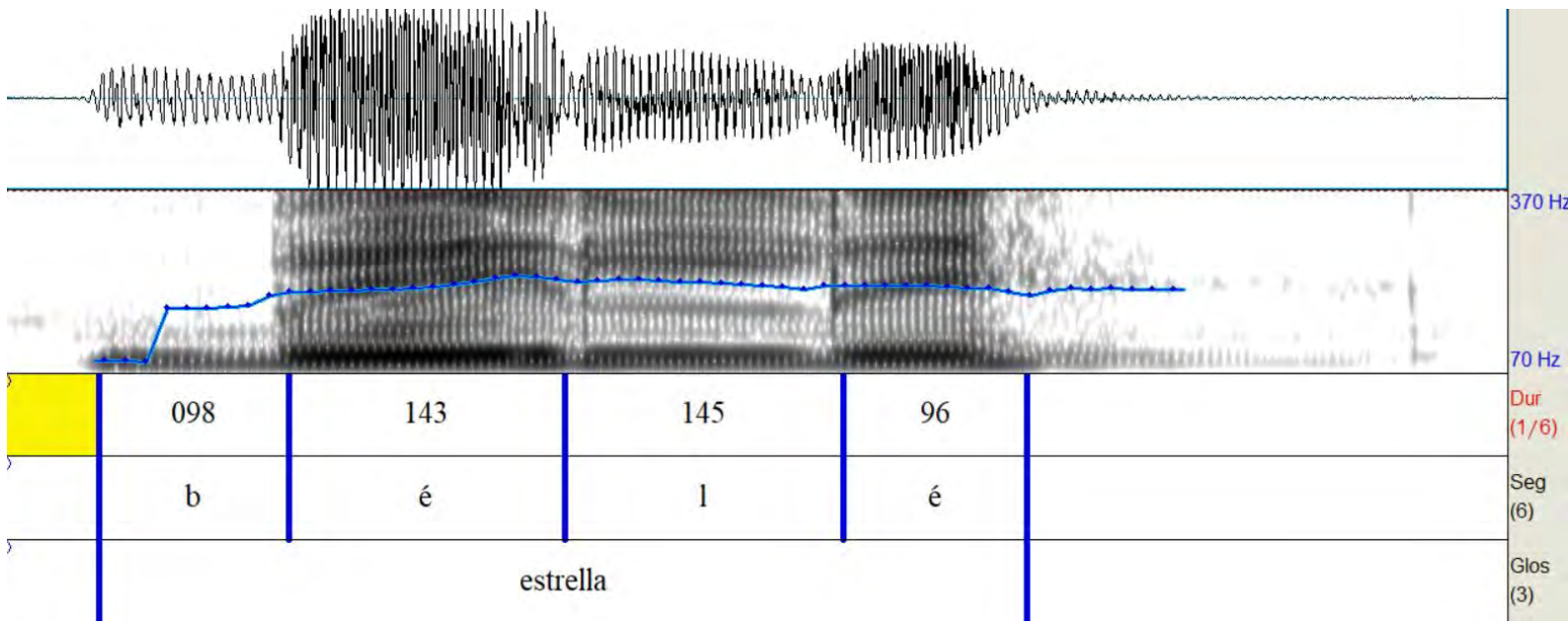


- ▶ Asunción Mixtepec
- ▶ San Mateo Mixtepec
- ▶ San Pedro Totomachapam

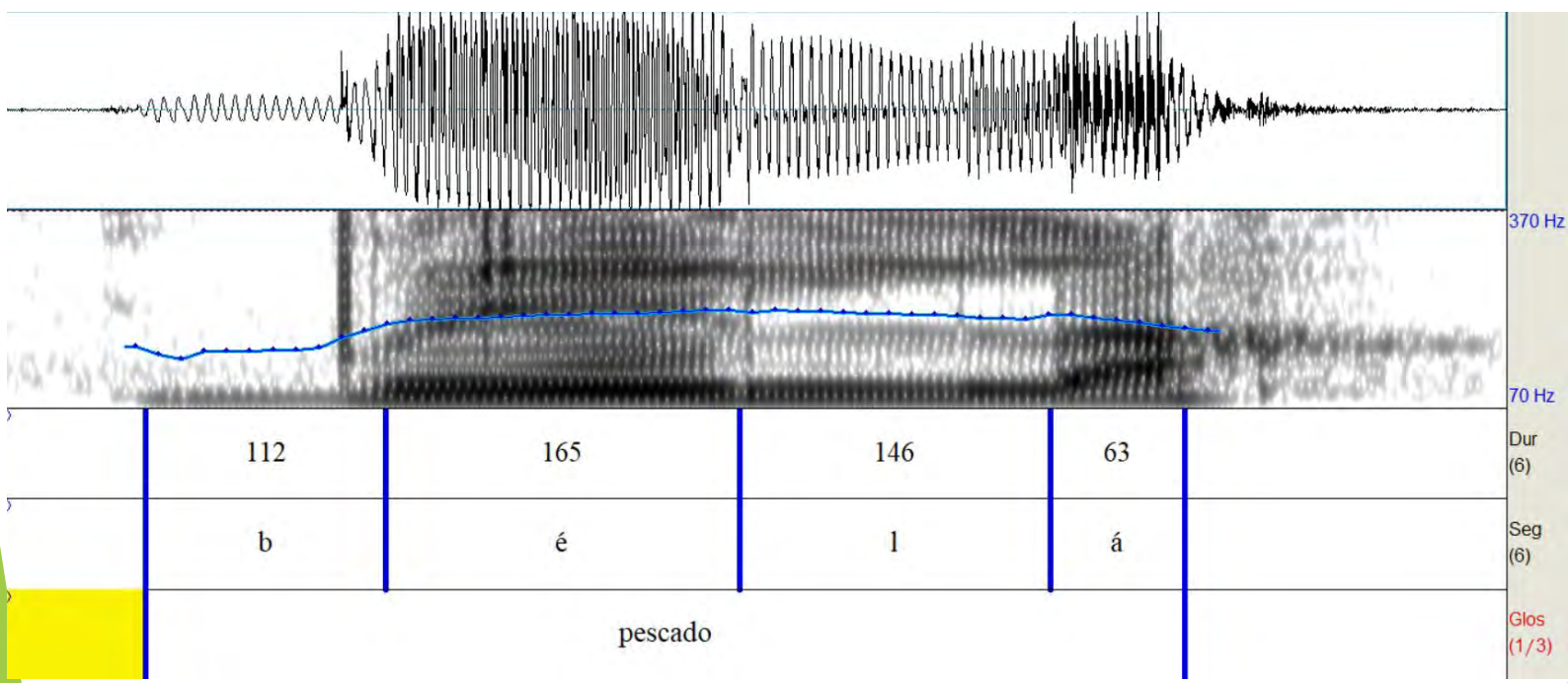


Asunción Mixtepec has
neutralized the
distinction between *C
and *kC root-medially:
cf. ‘agave’ *θukwaʔ vs.
‘four’ *kθakkwa

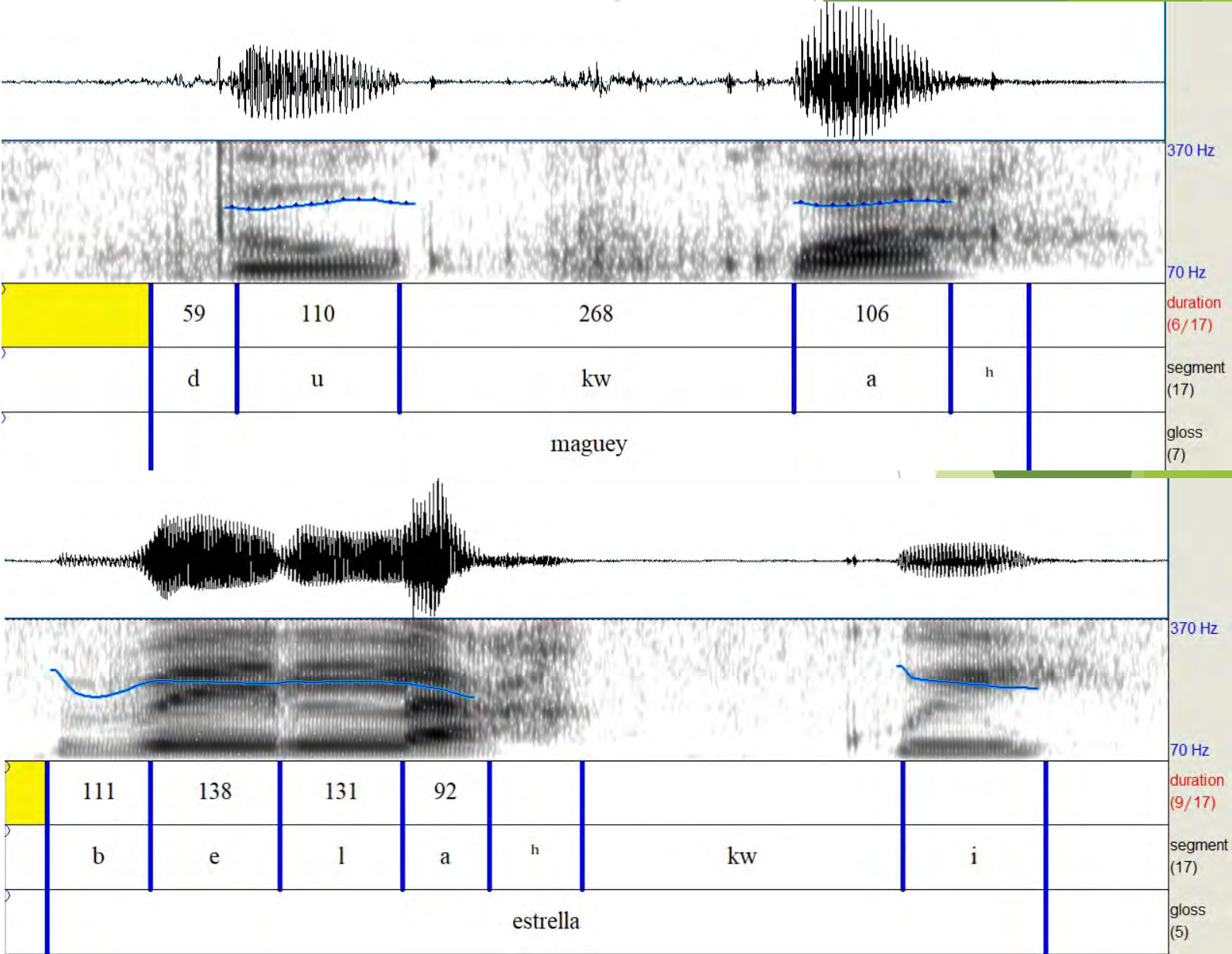
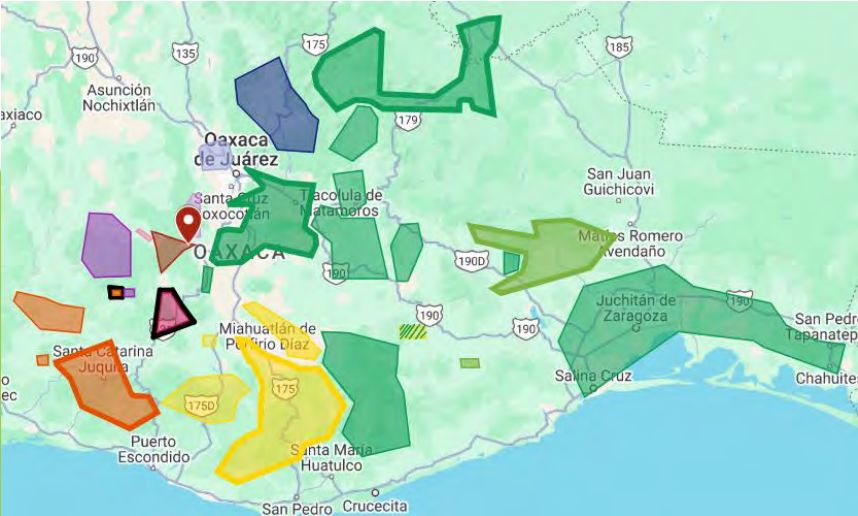




Asunción
Mixtepec has
neutralized
distinction
between *C
and *kC root-
medially: cf.
‘star’
*kwen[d]ak
vs. ‘fish’
*kwekn[d]a

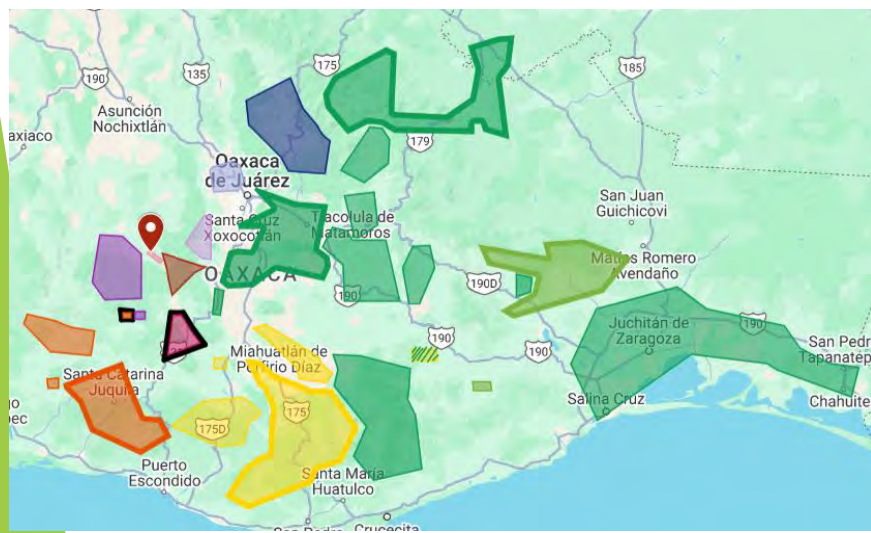
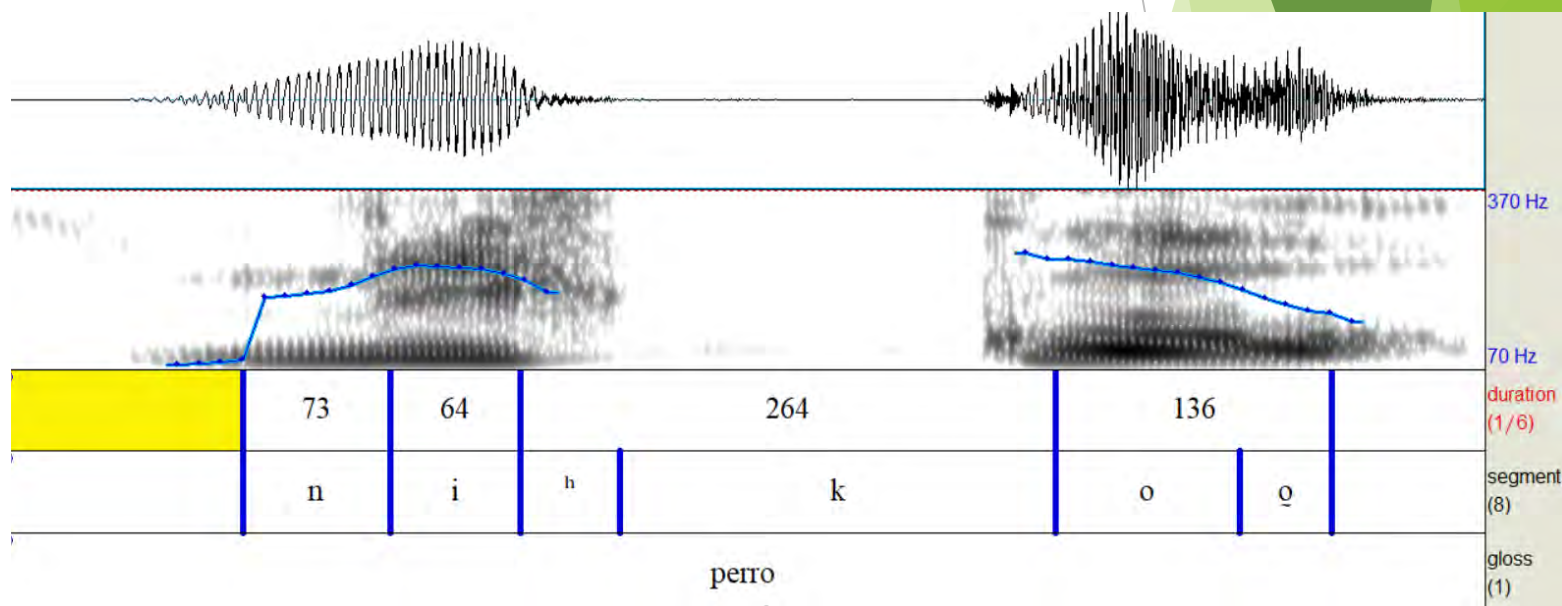
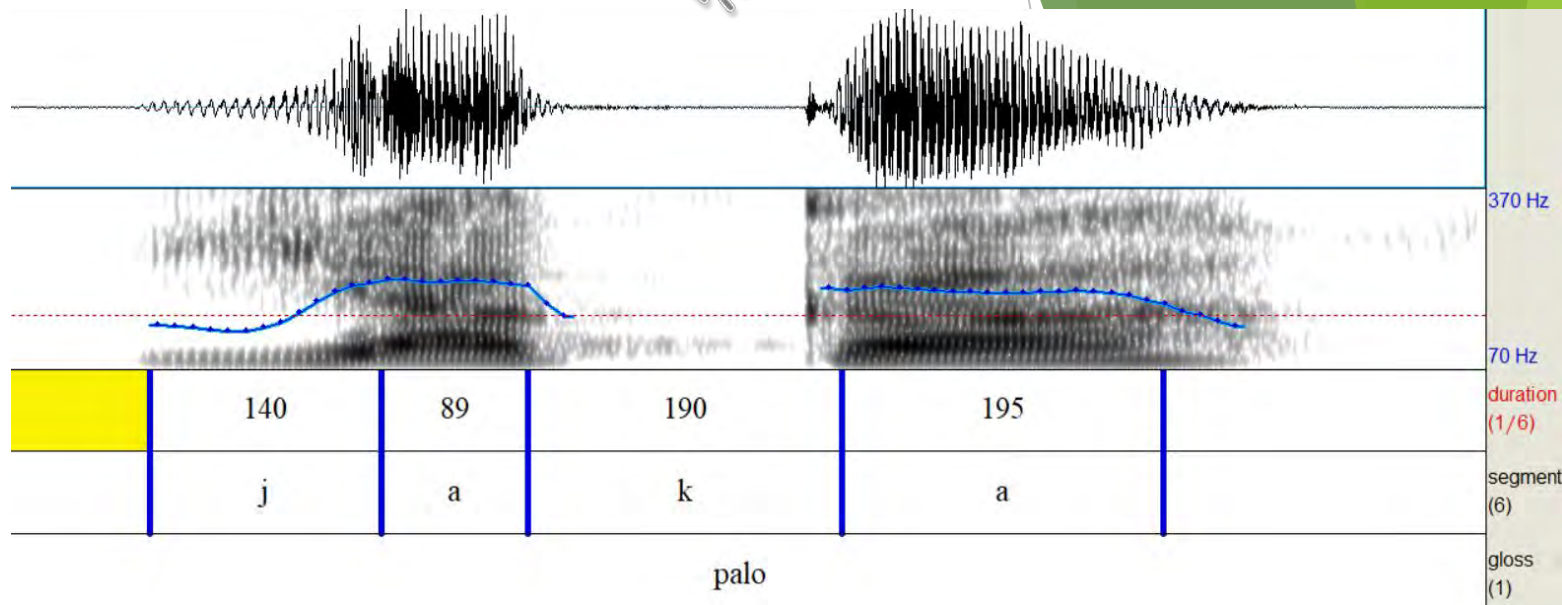


Similar patterns
found in the
neighboring
language of San
Mateo Mixtepec, cf.
'agave' *θukwa? vs.
'star' *kwendak

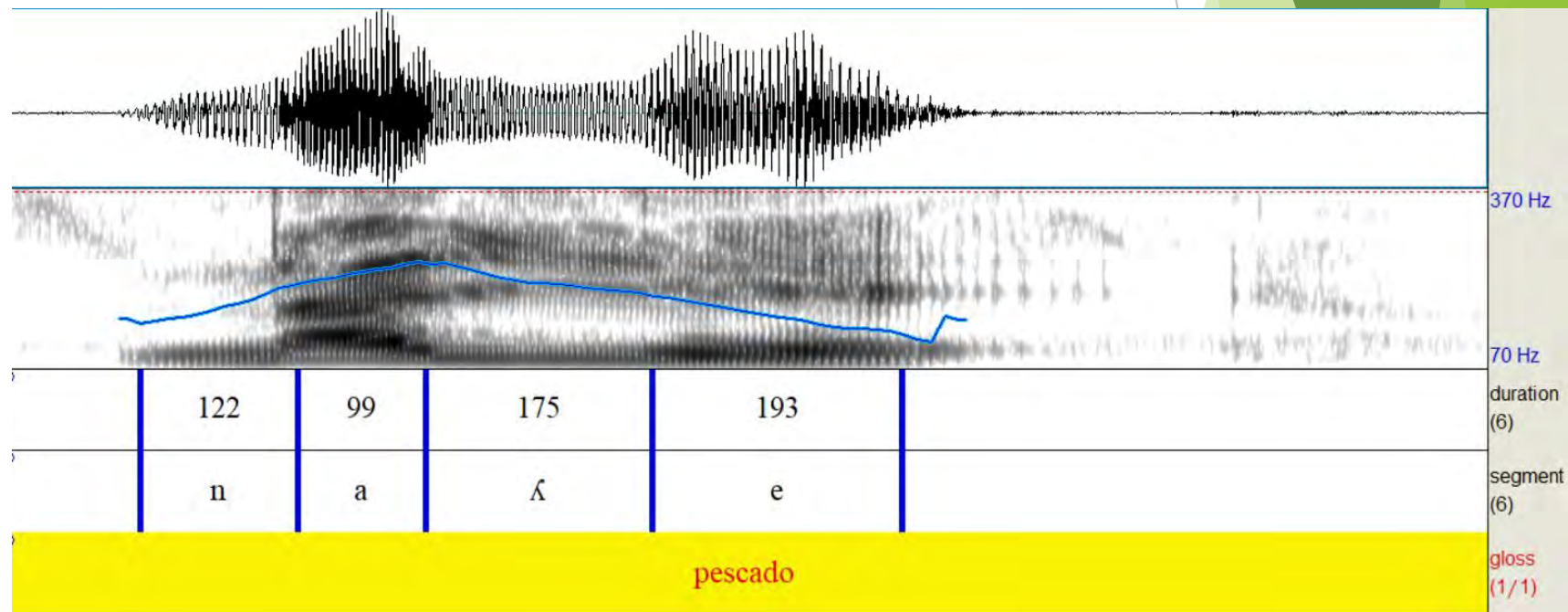
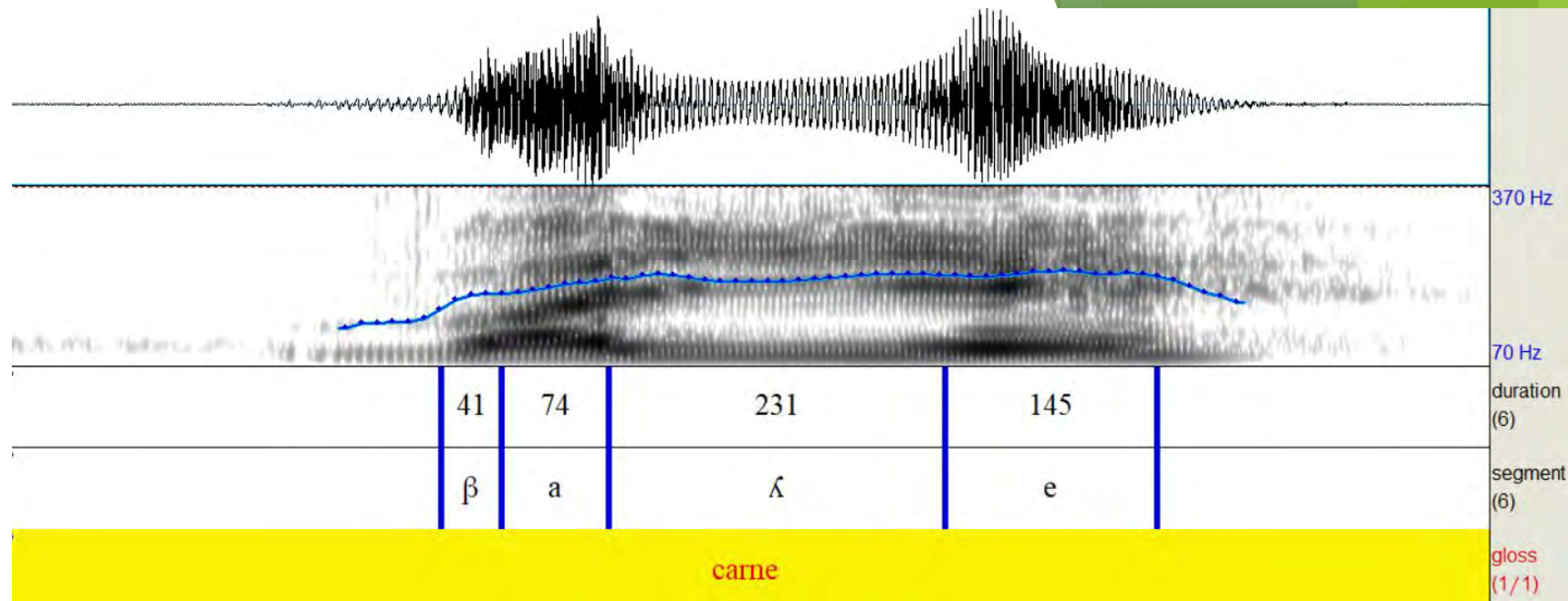




Totomachapam
'tree' *jaka vs. 'dog'
*PRON nē kw-ekku?



‘meat’ *kweʔnaʔ vs.
‘fish’
*PRON ñẽ kw-eknda



‘agave’ *θukwa?



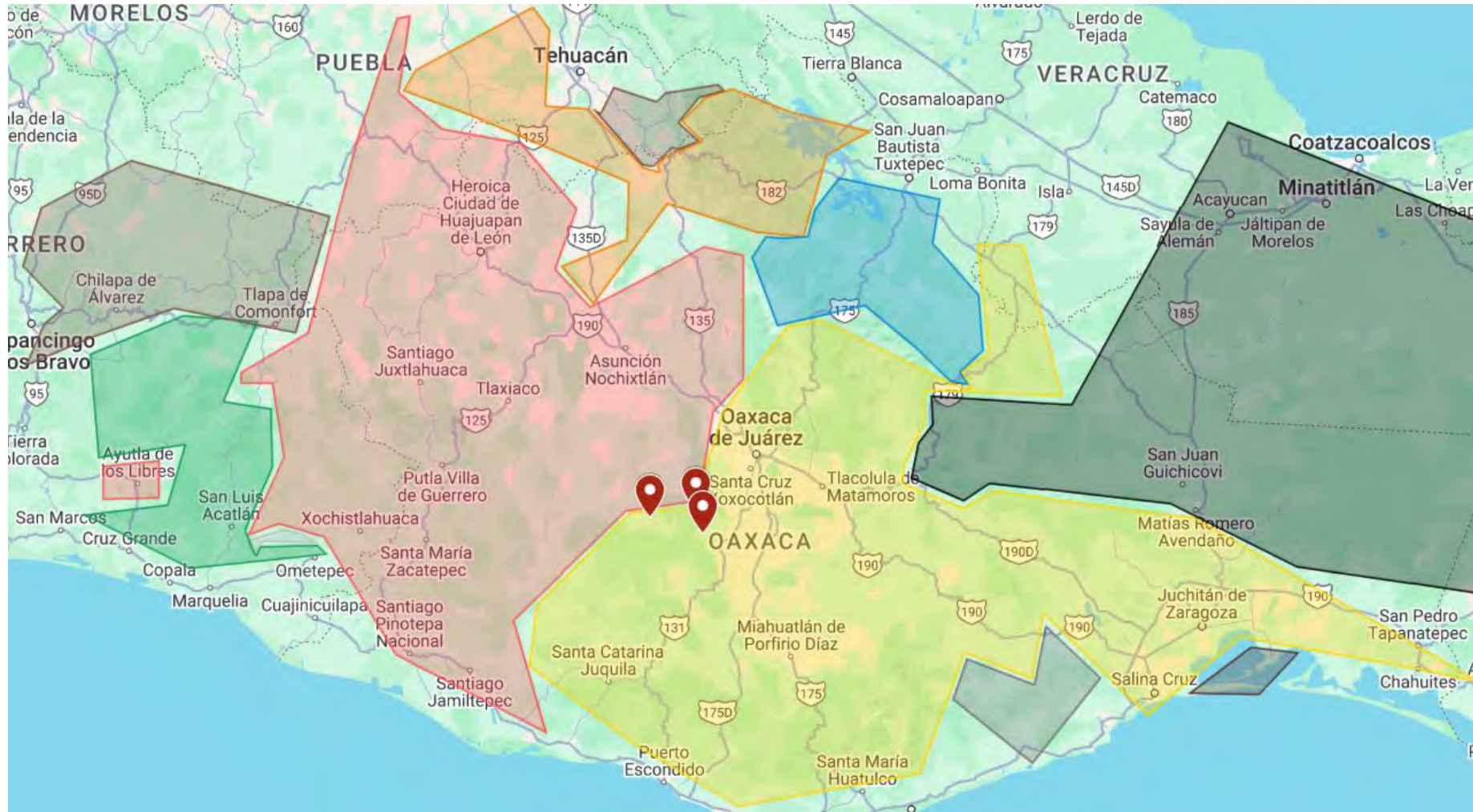
Measurements for ‘agave’ examples in Zapotec

	V1	C2
Petapa	198	103
Tlacolulita	219	79
Zabache	179	135
Texmelucan	191	112
Elotepec	234	81
Asunción Mixtepec	114	141
San Mateo Mixtepec	110	268
Totomachapam	106	261

Zapotec languages with long medial reflexes of singleton *O(bstruent) and *S(onorant)

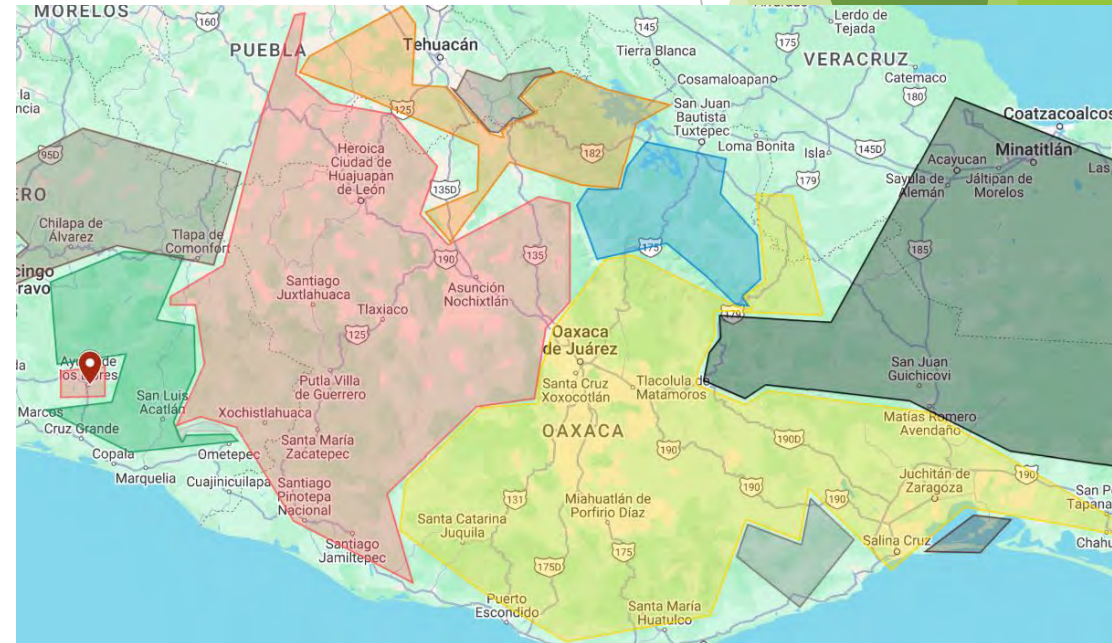
	*VO	*Vko	*VS	*Vks
Asunción Mixtepec	VO:	VO:	V·S·	V·S·
San Mateo Mixtepec	VO:	VO:	V·S·	V·S·
Totomachapam	VO:	VO:	VS:	VS:

The Mixtec substrate hypothesis

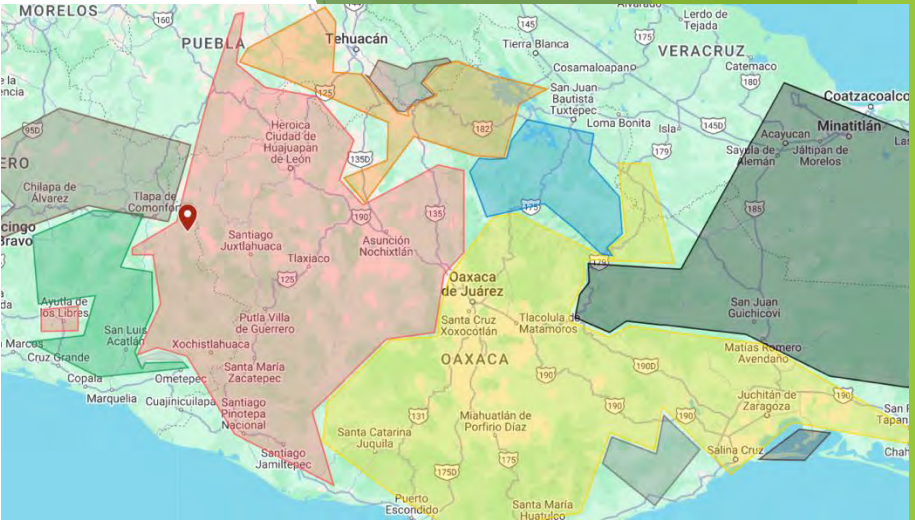


The fixed, root-initial stress of Tu'un Savi (Mixtec) of Ayutla

- ▶ Previously claimed (Pankratz and Pike (1967) to have tonally-conditioned stress (see also De Lacy 1999, 2002).
- ▶ Beam de Azcona & Gregorio Porfirio (2023) give acoustic evidence that shows prominence in this language is not dependent on tone but is cued phonetically by length.
- ▶ Lexical roots are typically of the shape '(C)V(C)V
 - ▶ '(C)VV
 - ▶ '(C)V^hCV, '(C)CVC:V



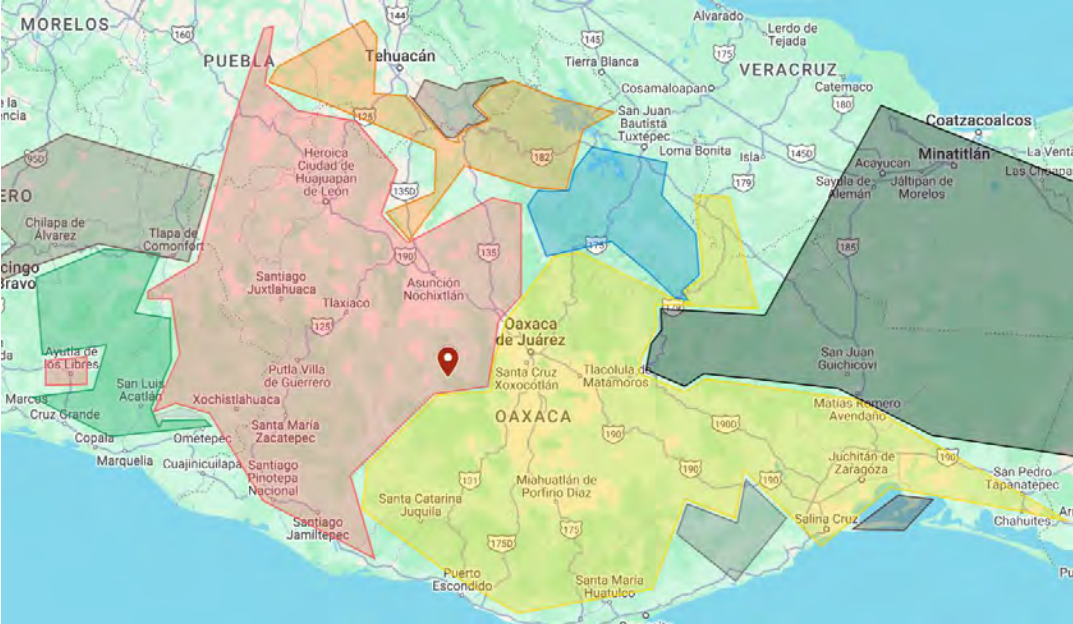
Duration measured in Alcozauca examples (courtesy Juana Mendoza Ruiz)



	V1	C2	V2
‘rabbit’ /leko/	87	221	103
‘lime’ /kaka/	59	210	112
‘animal’ /kiti/	75	204	129
‘four’ /kumĩ/	105	143	103
‘feather’ /tũmĩ	106	145	76
‘corn’ /nũñi/	127	145	108



Huitepec Mixtec (courtesy Nicasio García Martínez)

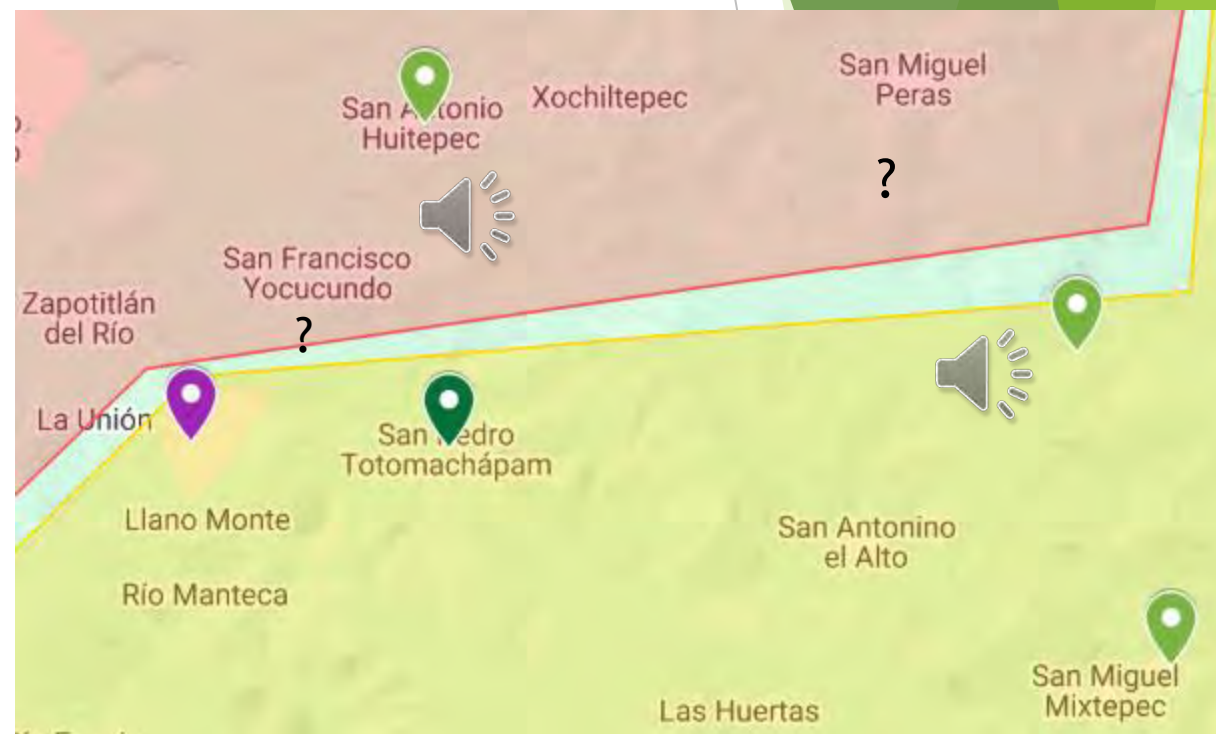


	V1	C2	V2
‘lime’ kaka	117	198	94
‘animal’ kiti?	85	240	61
	91	269	59
‘corn’ nuni?	186	159	113
‘four’ himi?	156	133	110
‘turkey’ kolo	121	170	75



Summary of varieties surveyed

	Medial stop	Medial sonorant
Ayutla	V ^h C·	VC·
Alcozauca	V ^h C·	VC·
Huitepec	VC:	V·C·
Asunción	VC:	V·C·
San Mateo	VC:	V·C·
Totomachapam	*VC > VC: *VkC > V ^h C:	*VC, *VkC > VC:
Elotepec	*VC > V:C *VkC > VC:	*VC, *VkC > V:C



Pottery styles

Mixtec red and cream ware



Zapototec grayware



Petapa Lienzo (courtesy Michel Oudijk)

Ruler of Zaachila is separated by his descendents, the rulers of Tehuantepec, by a road with footsteps, symbolizing the migration to Tehuantepec following the dynastic crisis of 1450.

Precolumbian Zapotec rulers shown squatting Mesoamerican-style on jaguar-skin covered cushion and wearing a Xipe costume.

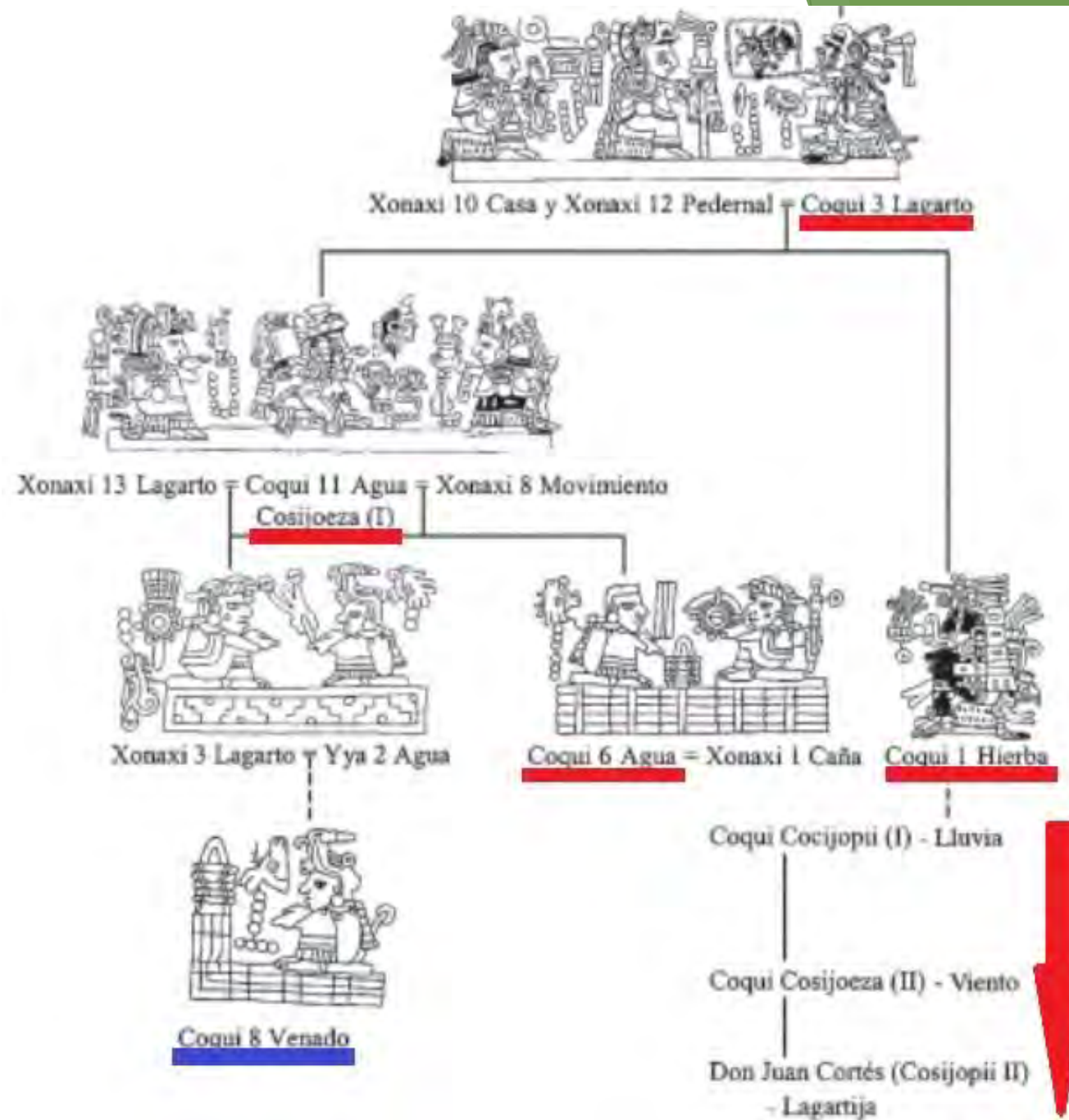
Don Juan Cortés (Cocijopii II) seated in European-style chair and wearing European-style clothing and headgear.



Ethnohistorical documents



Oudijk 2008



Our first meal in
San Pedro
Totomachapam:
masa mixteca



Conclusions and questions for future work

- ▶ Mesoamerica is a linguistically diverse area where there is a wealth of resources to learn about the past: pre-Columbian and Colonial documents, archaeological artifacts, oral traditions, and more.
- ▶ Much of the work that's been done on language contact in Mesoamerica has focused on contact with Spanish, but the deeper history is revealed by looking at contact between Mesoamerican peoples.
- ▶ Soltec data is scarce, but is still able to trigger new hypotheses about Proto-Zapotecan stress, highlighting the importance of language documentation.
- ▶ In Mesoamerican ethnohistory, relationships between Mixtec and Zapotec elites have received attention. What did their alliances and conflicts mean for the people they ruled, especially when they lived in close proximity?
- ▶ If geminate reflexes of Zapotec singleton consonants come from a Mixtec substrate, a question to consider further is whether that substrate first entered one of these languages, perhaps Asunción or San Mateo, and then diffused to the others, or if the phenomenon happened simultaneously in adjacent Zapotec communities.



Members of our team who will work on these questions going forward

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