

# Observations on the History of Maya Hieroglyphic Writing

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The hieroglyphic writing system of the Maya not only was the most fully developed prehispanic writing system in the Americas, it also was in continuous use longer than any other writing system invented by prehispanic Indians. The first texts written in a hieroglyphic script that can be identified as a direct precursor to Maya hieroglyphic writing date to the Protoclassic.<sup>1</sup> The last texts written by a literate Maya occur in Diego de Landa's *Relación de las Cosas de Yucatán*, compiled shortly after the conquest of the peninsula. The Maya writing system was used one and a half thousand years; it survived both the transformation from Early Classic to Late Classic and the so-called "Classic collapse" in the Southern Lowlands.

Unfortunately, our knowledge of the history of Maya hieroglyphic writing is extremely limited. Archaeologists and epigraphers have investigated the beginnings of writing in Mesoamerica and Maya writing in particular (Coe 1976; Justeson 1986; Justeson, Norman, Campbell, and Kaufman 1985). However, the development of Maya hieroglyphic writing in the centuries after its "invention" has not yet been subject to systematic research. Were the orthographic conventions of the Early Classic the same as those of the codices? Did phoneticism increase in the Late Classic? How did the Maya writing system react to changing social structure and to events of "big man history?" Can

orthographic conventions be tied to changes in the linguistic background of the script? If we could find answers to these challenging questions, we would get considerably deeper insights into many aspects of Maya culture in general.

## Developments in the Sign Inventory

The number of signs employed by a certain script provides important information about its structure. Knorozov (1967:34-37) was the first epigrapher who based his conclusions about the nature of Maya writing on the number of signs he found in the script. In describing the logosyllabic character of Maya writing, he concluded that a script with approximately four hundred signs can neither be a purely logographic script, based only on word signs, nor a purely syllabic or alphabetic script. J. Eric S. Thompson, Knorozov's strongest opponent in the discussion of the general character of the script, also used statistical arguments to deduce the nature of the writing system. In his sign catalogue, Thompson (1962:19-29) calculated the number of signs at 750. He argued that this number is too large for a syllabic script and concluded that Maya writing had to be logographic. Ironically, he never thought about a mixed logosyllabic system.

While the nature of Maya hieroglyphic writing now is established beyond doubt, we still do not know when signs began to be used phonically, under which conditions syllabic signs were intro-

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duced into the writing system, and finally, how many signs constitute the total sign corpus.

If we knew the exact number of signs in Maya hieroglyphic writing, we would be able to calculate approximately the number of syllabic signs. However, the extant sign catalogues have numerous shortcomings and do not permit conclusions about the number of syllabic signs.

The following observations are based on a new computerized sign list.<sup>2</sup> This list documents all signs that constitute the sign corpus of Maya hieroglyphic writing and does not make differences between affixes, main signs, portrait signs, and full-figure signs. Rather, all kinds of graphemes which occur independently in the writing system and that denote a syllable or a morpheme are equally treated in the same systematic fashion. The sign list is different from Thompson's (1962) catalogue in that it does not provide all occurrences of a single sign together with their contexts. However, the list contains other information of great interest: the first and last date a specific sign was used. These data are extremely valuable for investigating changes in the structure of the script.

The total sum of signs in the sign corpus is between 650 and 700. This is less than expected by most epigraphers. This number does not tell us how many signs were used at one point in time in Maya history and thus does not reveal informa-

tion about changes in the structure of the writing system.

The number of signs used at one specific point of time never exceeds four hundred. There was no moment in Maya history when Maya scribes used more than four hundred signs for writing their messages. The average number of signs employed at any time between 9.0.0.0 and 10.4.0.0 is between 250 and three hundred. Included in this number are many glyphs with limited geographical distribution. Thus, the sign corpus a particular Maya scribe had to manage probably did not contain more than 250 signs.

Such a small corpus of signs is a strong argument for the logosyllabic character of Maya writing. It indicates that phoneticism probably was more important than hitherto was believed. Furthermore, it turns out that the writing system of the codices, which was formerly taken to be more phonetic than the inscriptions is not so different from the Classic script. At least the number of signs employed in the codices—approximately three hundred—is close to the average number of signs used during the Classic period. Interestingly, the number of signs employed did not remain the same over time. Alterations in the number of signs available in the script reflect not only changes in orthographic conventions but also social, linguistic, and historical processes in Maya history. Periods of great change alternate with periods of



**Fig. 1.** Proto- and Early Classic syllabic spellings: a) **yi-ta-hi**/y-itah 'his/her sibling', Hauberg Stela, D13 (drawing after Schele 1985b); b) **yu-ch'i-bi**/y-uch'ib 'his/her vessel'. COL Coe 1982:no. 33; c) **mu-ka-ha**/muk-ah 'buried', RAZ Tomb 12 (after a drawing by David Stuart in Adams 1986:456); d) **yu-ne** 'his/her child', TIK Stela 31, side; e) **ch'a-ho-ma**/ch'ahom 'sprinkler' or 'boy', CPN Stela 63, front; f) **ka-ka-wa**/kakaw 'cacao', RAZ vessel (after a drawing by David Stuart); g) **ch'oko**/ch'ok 'young/unripe', YAX Lintel 19, B3; h) **ah ts'i-ba**/ah ts'ib 'he, the scribe', YAX Lintel 19, D4; i) **ts'a-pa-ha**/ts'a-pa-ha 'erected (is his ballcourt marker)', TIK BC marker E8-F8.

stagnation in which no signs were added or eliminated.

Maya hieroglyphic writing evolved in Baktun 8. Several early texts indicate that the phonic use of signs and even the use of syllabic signs was established well before the beginnings of the Early Classic (fig. 1). By the second half of Baktun 8 Maya hieroglyphic writing was distributed over most of the Southern Lowlands. It is obvious that the expansion of Maya writing was associated with the dramatic growth of monumental public works and the increased concern about the legitimation of royal succession. The expansion of the writing system was paralleled by continuous invention of new signs for the sign corpus. These rapid developments didn't slow before the first *katuns* of Baktun 9. A second significant enlargement of the sign corpus occurred between 9.4.0.0.0 and 9.5.0.0.0. In this *katun*, more than fifty signs appear for the first time. This is the *katun* immediately before monumental activities cease in parts of the core area of the Lowlands, a period known as the "hiatus." It seems that additions to the sign corpus were consequences of dramatic changes in the political organization of certain areas in the Southern Lowlands. Interestingly, most of the signs which entered the writing system in this period were logographic signs. During the hiatus itself, the sign corpus remained almost unchanged.

Another period of dramatic change begins at about 9.11.0.0.0. These changes are reflected in numerous additions to the sign corpus as well as in an increased application of the already known phonetic principle. About eighty new signs were invented shortly after 9.11.0.0.0. Among the newly invented signs were both logograms and many syllabic signs. As a consequence of these additions, the sign corpus grew to almost four hundred signs at about 9.14.0.0.0. While Maya culture continued to flourish in the Southern Lowlands for more than one hundred years after this date, no significant innovations to the sign corpus can be observed for the time span between 9.14.0.0.0 and the Classic collapse. Only the scribes of Chichén Itzá modify the corpus of signs for writing their texts. The total number of signs employed in the inscriptions of Chichén Itzá is about 220. Among these are twenty signs which are used exclusively at Chichén Itzá.

This discussion of the size of the sign corpus shows that the number of signs employed in Maya hieroglyphic writing never remained static. One may ask whether there are signs in Maya writing which were kept in use for more time than just one or a few *katuns*. The number of signs used for only a very short period is indeed large. More than one third of all signs of the Maya sign corpus were used only one *katun* or less. However, eighty-five signs already occur in the earliest Maya text and were kept in use in the codices. This shows that there was also a certain amount of "basic" signs which constitute the core of the sign corpus.

Another question arises at this point: is the function of a sign in the writing system responsible for the permanence of its use? All of the 240 signs which remain one *katun* or less in the Maya script and which can be read are logographic signs. No known syllabic sign is among this group. On the other hand, half of the eighty-five signs in the group of most permanently used signs are known syllabic signs. All of the signs with documented syllabic use in the Early Classic are in the group of the most permanently used signs. If we could read all signs in this group, the number of syllabic signs probably would be significantly higher. Two more statistics support the hypothesis that syllabic signs were used over longer periods of time than logographic signs. The average life of a logographic sign in Maya writing was nine *katuns*. In contrast, the average duration of use of syllabic signs was twenty and one-half *katun* periods. These data show that Maya scribes more easily invented new logographic signs than syllabic signs. Syllabic signs seem to have been more essential to the writing system and were not invented and added easily. Once the syllabic signs were developed, they remained in use. It should be noted, however, that syllabic signs and logograms were not always strongly separated. In Maya scribal practice, logograms sometimes could be used as syllabic signs or were polyvalent (Fox and Justeson 1984).

### **Changes in the Degree of Phonic Use of Signs**

These basically statistical data on the number of signs become more vivid when we look at the changes in phoneticism and scribal practice. Changes in scribal practice correspond chronologically to periods of innovation of signs. The

**Fig. 2.** The change of spelling conventions at ca. 9.11.0.0.0. The dates under the glyphs refer to the dedication date of the monument on which the specific glyph is written: a) CPN Stela 9, B10; b) NAR Hieroglyphic Stair 1, Step XII, Z2 (after Graham 1978:109); c) PNG Lintel 2, X2-Z1 (drawing by David Stuart in Schele and Miller 1986:pl. 40a); d) COL RAZ Plaque #1, B6; e) COL Site Q Panel 3, A3; f) CPN Stela 13, D8 (after a drawing by Linda Schele); g) RAZ Tomb 26 (after Stuart 1987b:fig. 28a); h) CPN Stela 1, C3a (after Stuart 1987b:fig. 23c); i) PUS Stela D, H11; j) TIK MT 140, C (after Coe 1965:30); k) COL Site Q Glyphic Panel 7, B3; l) PAL Palace bench 1, south (after Stuart 1987b:fig. 50a).

most important changes in the number of signs, as we have seen, took place immediately before the hiatus and between 9.11.0.0.0 and 9.16.0.0.0. For the history of Maya hieroglyphic writing, the events immediately before and after 9.11.0.0.0 seem to be of crucial importance.

Syllabic signs and purely phonic spellings of words are known from the very beginnings of Maya hieroglyphic writing (fig. 1). On the Protoclassic Hauberg Stela (Schele 1985b) hieroglyphs such as the *y-itah* 'sibling' (?) glyph document the early syllabic use of signs (fig. 1a). Other

glyphs which unequivocally represent early syllabic spellings are the *ts'ap* verb for the erection of monuments which is found on Bejucal St. 1 at 8.17.17.0.0 and the Tikal ballcourt marker (fig. 1i), the verb *mukah* 'buried', on a wall from Rio Azul Tomb 12 (fig. 1c), the *y-une* 'child of' glyph from Tikal St. 31 at 9.0.10.0.0 (fig. 1d), the *ch'ahom* title from Copán St. 63, dated 9.0.0.0.0 (fig. 1e), the glyphs *ch'ok* 'child' and *ah ts'ib* 'he, the scribe' from the earliest text from Yaxchilán (figs. 1g-h), and two important glyphs from the Primary Standard Sequence (fig. 1b, 1f). Proto- and Early



**Fig. 3.** The addition of new signs to the syllabary at about 9.11.0.0.0 (A.D. 652).

**Fig. 4.** The Early Classic syllabary of about 9.5.0.0.0 (A.D. 534)

Figure 5

**Fig. 5.** The Late Classic syllabary of about 9.14.0.0.0 (A.D. 711)

Classic Maya texts are still not sufficiently well understood, but more research will certainly bring to light additional examples proving the existence of phoneticism in Protoclassic texts.

The Protoclassic and the first half of the Early Classic witnessed the consolidation of Maya hieroglyphic writing. Many new signs were added to the sign corpus, and the basic spelling conventions probably became standardized during this time. The developments in the writing system were paralleled by the expansion of calendrical mathematics, as can be seen in the introduction of the "Lord of the Night" glyphs and the "Lunar Series" to the Initial Series. Probably before the beginning of Baktun 9, Maya hieroglyphic writing was perfectly developed.

The most important modifications of the writing system happened about 9.11.0.0.0 (A.D. 652). Following this date a dramatic increase in phonetic spellings can be observed. While in the Early Classic the spellings of common glyphs were strongly conventionalized, Maya scribes tried not to write a certain word twice in exactly the same way after 9.11.0.0.0. At the same time, more new signs were added to the syllabary and to the sign corpus in general than at any time before.

The sudden increase of phonetic spellings can be observed in the case of words which are spelled as logograms before 9.11.0.0.0 (fig. 2). The word *wits* 'mountain' is spelled with a word sign during the entire Early Classic and later (Stuart 1987b: 16-23). The first syllabic spelling as *wi-tsi* occurs at 9.10.15.0.0 on Pusilhá St. D. The first purely syllabic spelling for the word *otot* 'house' can be observed on Palenque Throne 1, dating exactly to 9.11.0.0.0. At the same time the "hand-scattering verb" is written syllabically for the first time on Copán St. 12. The word *k'aba* 'name' is usually written with a word sign corresponding to Thompson's (1962) T187. At 9.11.15.0.0 the word is spelled syllabically as *k'a-ba* on Piedras Negras Lintel 2. Stephen Houston and David Stuart recently identified a main sign showing a human eye to be the logogram for the Maya word *il* 'to see'. The first phonetic substitution is found again on Pusilhá St. D at 9.10.15.0.0. Simultaneously, many logograms occur for the first time with phonetic complements. The four words discussed above are spelled for the first time with a comple-

ment added to the logogram between 9.10.10.0.0 and 9.12.3.14.0 (fig. 2). This shows clearly that Maya scribes became concerned with the unambiguous pronunciation of words. These examples give only an impression of the great changes that took place after 9.11.0.0.0. A more detailed analysis of the first appearance of syllabic or complemented spellings for words that were written with only a logographic sign in the Early Classic confirms the significance of this observation.

Both Lounsbury (1984) and Houston (1984) have proven the importance of the principle of homophony in the Maya script. Logograms which have the same sounds, but different meanings can substitute for each other. For example, the word *chan* 'snake' can be written by a logogram representing *chan* 'sky', thus losing its semantic value. An analysis of the temporal distribution of such homophonic substitutions also shows that they do not occur before 9.11.0.0.0. It is after this important date that logograms can represent different morphemes on the basis of phonic similarity.

The expanded application of the phonetic principle made it necessary to have syllabic signs in all sizes and shapes available. This may have been the cause for the introduction of many new signs into the syllabary (fig. 3). In the Early Classic, except for two syllables, every syllable was represented by only one sign. Figure 4 provides the Early Classic Syllabary of about 9.5.0.0.0. The signs included are those which are unequivocally used syllabically. Most likely, homophonic signs did not exist in the Early Classic, at least not to the same degree as in the Late Classic.

After 9.11.0.0.0 many new signs were added to the syllabary. It can be shown that aesthetic principles may have guided the addition of new syllabic signs. A syllabic value that was represented only by a main sign in the Early Classic got a second sign in the shape of an affix in the Late Classic. Those syllables which were written by affixes in the Early Classic got additional main signs after 9.11.0.0.0 (fig. 3). Unfortunately, the syllabary is not yet completely known, and many empty fields still exist. We may ask whether the Late Classic syllabary finally turns out to represent every syllable by at least two signs of different size.



**Fig. 6.** Titles and parentage glyphs introduced at about 9.11.0.0.0: a) *sahal*, YAX Hieroglyphic Stair 3, Step IV (9.11.18.5.1) (after Graham 1982); b) *bacab*, Site Q Glyphic Panel B (9.12.0.0.0); c) *pitzal* 'ballplayer', Palenque Bodega #1075 (ca. 9.11.2.0.0) (after Schele and Mathews 1979); d) "lady title," Site Q Panel 1 (ca. 9.11.15.0.0); e) dynasty founder title, YAX Lintel 25 (9.12.9.8.1); f) *u chanal* 'captor of', YAX Hieroglyphic Stair 3, Step IV (9.11.18.5.1) (after Graham 1982); g) *u huntan* 'the caretaker of', ALS Stela 4 (9.10.10.0.0) (after Graham 1972:fig 12); h) "child of parent," ALS Stela 4 (9.10.10.0.0) (after Graham 1972:fig. 12).

Some of the signs added to the syllabary after 9.11.0.0.0 did exist long before this date. The "gopher" allograph for the syllable *ba*, for example, occurs as early as 8.17.2.16.17 on Tikal St. 4. However, it is not before 9.11.0.0.0 that the gopher is used in free substitution with T501, the most widely distributed *ba* sign. At about the same time, T501, the old and well-known *ba*-sign, begins to show up in the same glyphic environments as the gopher head. This phenomenon can also be observed in regard to the deer and the torch signs for the syllables *chi* and *ta*, respectively. The Maya words for deer and torch are *chih* and *tah*. Obviously, the syllabic value was derived from the logographic value of these signs by deleting the final consonant, which was a weak -h in both cases. The female head which is used as a logographic sign NA' 'woman' all the time throughout the Lowlands cannot be used as a syllabic *na* before 9.11.0.0.0. Here, the final glot-

tal stop is dropped to transfer the logogram into a syllabic sign. The process by which logographic signs are transferred to syllabic signs at 9.11.0.0.0 is partly known. Usually, these logograms have the structure CVC, where the final consonant is "weak." "Weak" consonants are those which the world's scripts frequently choose to ignore, such as ' , h, w, and y (Campbell 1984:12).

In inventing new syllabic signs, Maya scribes sometimes used two or more old signs and merged them to a new sign of different reading. An obvious example of an intentional composition of a new sign is one of the *ma* signs. This sign, which occurs for the first time at 9.12.14.10.11 on one of the shell plaques from Piedras Negras (Stuart 1985b), is composed of the *ahaw* head infixed into the sign for the syllable *ba*. The whole sign represents a new syllable which is not related to the readings of its components. Another sign which was invented at about 9.11.0.0.0 and added to the

syllabary is the main sign *to*. This sign consists of the old T44 *to* affix on top of another sign. This second sign as a single sign has a reading not yet known to us. As a fusion, the two signs substitute for the comparatively small T44 *to* sign.

Thus, Maya scribes used different ways to add new syllabic signs to their syllabary. The changes that occurred in Maya hieroglyphic writing at 9.11.0.0.0 finally led to the development of the hieroglyphic syllabary of the Late Classic (fig. 5). Most of the signs we find in the Late Classic syllabary were also used in the codices.

### **Hypothesis Concerning the Structural Changes at 9.11.0.0.0**

One of the most interesting questions in regard to the sudden increase of phoneticism at about 9.11.0.0.0 is the question of its motives. What happened to Maya writing and to its historic and linguistic background?

The terminal date for the Early Classic has been set at 9.5.0.0.0 (AD. 534) or 9.8.0.0.0 (AD. 593), depending upon whether the hiatus is viewed as part of the Early Classic or not (Willey 1985:176-177). The investigation of the historical development of Maya hieroglyphic writing seems to indicate that the dividing line between the Early Classic and the Late Classic lies three *katuns* later than these dates, if the writing system is taken into account. Maya hieroglyphic writing did not change significantly in the Early Classic, and it remained the same as in the Early Classic even after 9.8.0.0.0. The specific features of Early Classic hieroglyphic writing, such as limited use of syllabic signs and a relatively strong consistency in spellings, were given up and substituted by new conventions after 9.11.0.0.0. Thus, while the transition from Early Classic to Late Classic had already taken place, the writing system is more conservative and develops more slowly. This is not unexpected, since writing as part of elite culture is more conservative than other aspects of civilization in general (Goody 1987:27-38).

A suitable explanation for the great increase of phoneticism at 9.11.0.0.0 in Maya writing cannot yet be offered. Any explanation will be somewhat premature under the present conditions. The transformation from Early Classic to Late Classic certainly was caused by several different factors but

may have been supported by Caracol's successful war against Tikal at 9.6.8.4.2 (AD. 562) (A. Chase and D. Chase 1987:34). The conquest of one of the largest cities in the heartland of Early Classic civilization and the subsequent depopulation of the areas pertaining to the Tikal polity<sup>3</sup> may have caused the first collapse of the highly stratified society and the extinction of royal dynasties in the central Petén. The resurrection of royal dynasties in the Petén was accompanied by the rise of new polities and the participation of new dynasties in royal succession and elite interaction.

Hieroglyphically, the new political structures are reflected in the introduction of new titles, such as the *sahal* title for subsidiaries and lords of minor centers (Stuart 1984); the *bacab* title, closely associated with Emblem Glyphs; the "lineage founder" title (Grube 1988); and other royal titles (figs. 6a-f). All these titles show up for the first time on monuments which were erected in a range of one *katun* before and after 9.11.0.0.0. The appearance of new titles and ranks was paralleled by changes in social structure and social relations. This can be inferred from the introduction of new relationship glyphs close to 9.11.0.0.0. On Altar de Sacrificios St. 4, a monument erected on 9.10.10.0.0, both the *huntan* 'child of mother' glyph and the T712 'child of parent' glyph occur for the first time in the corpus of Maya inscriptions (figs. 6g-h).<sup>4</sup>

One wonders whether there were certain conditions that created an intellectual atmosphere in which these transformations could happen. Indeed, the era between 9.8.0.0.0 and 9.12.0.0.0 sees the reign of several rulers who were extremely long-lived and who were responsible for extensive building programs (Fash 1988:159; Mathews and Willey 1986:32-33). Since writing was an important tool in the hands of the Maya elite, it is very likely that rulers had a direct impact on structure and form of the script. There is even evidence that members of the elite, if not the rulers themselves, were literate (Stuart 1986a, Reents 1987).

The increased use of phonetic complements and syllabic spellings after 9.11.0.0.0 can also be explained as a reaction to changes in the linguistic foundation of Maya writing. Phonetic complements and phonetic spellings are employed in writing systems to fix the pronunciation of words. It is possible, therefore, that Maya scribes wanted

to limit ambiguities which arose in the changed linguistic landscape after 9.11.0.0. Interestingly, the so-called hiatus coincides precisely with the glottochronological estimate for the divergence of Cholan into Eastern and Western branches at ca. A.D. 550 (Kaufman and Norman 1984:82-83). As a direct consequence of changing social patterns after the hiatus, the linguistic background of the hieroglyphic writing may have moved from a monolingual to a multilingual Lowland. In communities where several languages, dialects, and sociolects were spoken, even by the same persons, it was important to fix the pronunciation of a word as precisely as possible. Many more research efforts are needed to understand what happened in the linguistic geography of the Southern Lowlands with the beginning of the Late Classic.

Though phoneticism increased with the beginning of the Late Classic, Maya writing never lost its logographic constituents. Even in the codices, which were often falsely considered to be more phonetic than the inscriptions, a large number of logographic signs is encountered. It is clear that ancient Maya writing was in the hands of a small literate elite, who manifested great conservatism in the practice of their craft, and, so far from being interested in its simplification, often chose to demonstrate their virtuosity by a proliferation of signs and values. Furthermore, as logographic signs often were more depictive than the more ancient syllabic signs, they could have been understood even by illiterate people (Schele and Miller 1986:327).

### Summary

The basic principles of Maya hieroglyphic writing remained unchanged over the entire time of its use. Syllabic spellings can be observed even on Protoclassic monuments. Until the time of the Spanish Conquest, Maya writing employed two basic types of signs, logograms and syllabic signs. While the number of syllabic signs increases after 9.11.0.0, the logographic component of the script was never given up in favor of pure phoneticism. Thus, Maya hieroglyphic writing is characterized, like most logosyllabic scripts, by strong conservatism.

Important developments and additions to the sign corpus were made shortly before the hiatus and also shortly after 9.11.0.0. The enlargement

of the sign inventory is paralleled by a period of increased application of the phonetic principle, which probably was caused by changes in the linguistic foundation of the script.

### Notes

1. There are many Protoclassic hieroglyphic texts from the Southern Lowlands. Unfortunately, these texts usually do not bear dates. Probably the earliest dated text with a Maya inscription is found on a celt fragment in the Dumbarton Oaks collection (Schele and Miller 1986:pl. 22). The date on this jadeite celt can be reconstructed as 8.4.0.0 (July 15, 150). However, the date cannot be read securely. Another dated monument from the Protoclassic is the so-called Hauberg stela (Schele 1985b). The date of the stela can be deciphered, and it corresponds to 8.8.0.7.0 (October 9, 199).

2. The sign list was compiled for a research project on the history of Maya hieroglyphic writing and will be published as an appendix to my Ph.D. dissertation (Grube 1989a).

3. Recent excavations in the outskirts of Caracol indicate that Caracol witnessed a 300 percent increase in population after the conquest of Tikal (Diane Chase and Arlen Chase, pers. com. 1989). Most likely, much of the population from the Tikal polity was forced to move and to resettle in the greater Caracol area.

4. There are also important verbal glyphs which have their first occurrence close to 9.11.0.0, e.g., *chuk-ah* 'capture' at 9.10.0.0 (Chinikiha Throne 1), the *sak-ik'-ahaw* death phrase at 9.10.10.0 (Altar de Sacrificios St. 4), and the *acta* auxiliary verb at about 9.11.0.0 (Deletaille Panel).

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