Function of Tzolk'in Calendar structures in the Postclassic Maya Codices

Stage Report 3

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Technical Report: Database of Other Calendrical Structures in the Maya Codices

I. INTRODUCTION

This report documents the third and final component of the FileMaker Pro database built for the MayaCal project. Stage Report 1 described the conceptual and technical design of the system and the almanac branch; Stage Report 2 described the hierarchical encoding of codex records and the implementation of the 260-day Tzolk'in calendar. The present report covers Work Package 3: the recording of calendrical structures that can be classified neither as almanacs nor as tables.

Although this is numerically the smallest of the three components, it is the one that closes the corpus. Without it, the database would describe the majority of the calendrical content of the codices but would leave a residue of sections outside any systematic description — precisely the sections whose function is least understood, and among which the calendar table on Paris Codex page 21 is found.

II. SCOPE AND DEFINITION

The three-way typology used across Work Packages 1 to 3 was not imposed on the material in advance; it follows from the way calendrical information is physically organised in the codices.

- Almanacs are repeating structures built from a starting column of Tzolk'in days and a series of distance numbers, generating a set of dates that closes the 260-day cycle. They are type-independent: the same skeleton carries very different subject matter.
- Tables are type-specific structures — Venus, eclipse, seasonal — in which the calendrical apparatus is subordinate to a particular astronomical or ritual purpose, and which frequently combine the Tzolk'in with the 365-day Haab and with the Long Count.
- Other structures are sections that carry calendrical information but conform to neither pattern: sequences of period endings, day-sign inventories, directional or cumulative notations, and passages whose internal logic is not yet established.

Operationally, a structure was assigned to the third category when it contains blocks tagged as calendrical in the block-level corpus but has no almanac record — that is, no recoverable starting column and no series of distance numbers generating a closing cycle.

III. PLACE IN THE DATABASE MODEL

The third branch was deliberately not implemented as a separate database. It reuses the hierarchy established in Work Package 1: the COD_Codices table holds one record per codex; CPG_Codices_Pages holds its pages in a 1:N relationship; CPG_Codices_Registers subdivides each page into registers; and the structure-level tables hang off the register in a further 1:N relationship. The hybrid anchor-buoy model described in Stage Report 1 applies unchanged, so a layout built for one branch can be re-pointed at another without redesign.

The practical consequence is that a query over calendrical content does not have to be written three times. Any structure, whatever its type, resolves to the same codex, page and register keys, and the Tzolk'in calculation fields implemented in Work Package 2 are available to all three branches. This is what makes the corpus statistics reported in section IV possible at all.

It is also the reason this work package took longer than scheduled. The almanac and table branches could each be scripted against a predictable record shape. The third branch cannot: the number of calendrical values per structure varies, some structures carry no coefficient at all, and others carry values belonging to two different calendars in a single block. Making the shared scripts tolerate that variation without weakening them for the other two branches was the substantive difficulty, and it was reported as the single deviation in the first monitoring report.

IV. THE RECORDED CORPUS

The block-level corpus underlying the database comprises 15,332 blocks from the three principal codices, each carrying transcription, semantic classification and — where present — calendrical values.

Codex	Blocks	Share
Dresden	5,787	37.7 %
Madrid	7,890	51.5 %
Paris	1,655	10.8 %
Total	**15,332**	**100.0 %**

Table 1 Block-level coverage of the corpus by codex.

Blocks are classified by semantic category. The distribution shows how much of the codical content is calendrical in the narrow sense and how much of it is the augural and iconographic material the calendar frames.

Semantic category	Blocks	Note
260 cycle	5,026	Tzolk'in date positions
distance number	1,345	interval notations
augury	1,169	prognostic content
deity name	1,168	named agents
distance number + 260 cycle	619	both values in one block
directional	295	world-direction notations
cumulative total	225	running totals
animal	145	zoomorphic references
365 cycle	134	Haab date positions
object reference	112	
title	105	
long count	2	absolute dating

Table 2 Semantic classification of blocks. Categories below 100 blocks are omitted.

The corpus resolves into 334 distinct structures across the three codices. Of these, 312 carry an almanac record and fall under Work Packages 1 and 2. The remaining 22 structures, comprising 1,037 blocks, are the population addressed by the present work package.

Codex	Structure	Blocks	Dominant calendrical content
Dresden	43b–45b	136	distance number (82), 260 cycle (29)

Codex	Structure	Blocks	Dominant calendrical content
Dresden	70a–73a	148	260 cycle (50), distance number (37)
Dresden	70b–73b	169	260 cycle (43), distance number (42)
Madrid	75–76	44	260 cycle (40), directional (4)
Madrid	108a	41	260 cycle (10), animal (4)
Madrid	42a	30	260 cycle (10), directional (4)
Madrid	2a	20	distance number + 260 cycle (4)
Madrid	49c	19	260 cycle (12)
Madrid	39b	18	260 cycle (12)
Madrid	54c	17	260 cycle (6), directional (4)
Paris	21–22	137	260 cycle (70), distance number (7)
Paris	15b–18b	99	distance number (8), 260 cycle (6)
Paris	15c–17c	52	distance number (6), 260 cycle (6)
Paris	19–20	26	260 cycle (26)
Paris	15a–18a	23	—

Table 3 The largest structures without an almanac record. Seven further structures of fewer than 17 blocks are omitted.

Two entries in this table matter directly for the project's research objectives. Paris 21–22 is the largest single structure in the group: 137 blocks, of which 70 carry Tzolk'in date positions. This is the day-sign table that Work Package 5 analyses, together with the adjoining Otherworld section. Paris 19–20 consists of 26 blocks, every one of them a Tzolk'in date position and none of them a distance number — a structure that records calendar positions without recording intervals between them.

It is worth stating plainly what this means for the project. The two sections of the Paris Codex on which the whole project turns are not almanacs and not conventional tables. They only became visible as a describable population once this third branch of the database existed. In that sense Work Package 3, the smallest of the three, is what made Work Packages 5 and 7 possible.

V. CALENDRICAL FEATURES BEYOND THE ALMANAC PATTERN

The third branch also had to accommodate calendrical devices that occur inside otherwise regular structures but do not belong to the almanac skeleton. Four are frequent enough to have required their own fields.

Cumulative totals. 225 blocks, concentrated almost entirely in the Dresden Codex: pages 51–58 account for 138 of them, the 24 / 46–50 group for 40, and pages 58–59 for a further 39. These are running sums rather than interval steps, and they are what allows a table to be read as an absolute rather than a relative sequence.

Directional notations. 296 blocks across 68 structures. Nineteen of these blocks fall outside any almanac record. Their wide distribution — Dresden 24 / 46–50 with 49 blocks, Madrid 34–37 with 12, Madrid 77–78 with 9 — shows that direction is a general organising device rather than a feature of one section type.

Haab positions. 135 blocks carry 365-day cycle positions, again concentrated in Dresden: 63 in the 24 / 46–50 group, 27 in pages 61–64, 14 in pages 69–70. The recording of a Haab position alongside a Tzolk'in position is what distinguishes the great astronomical tables from the almanacs.

Long Count. Only two blocks in the entire corpus carry an absolute Long Count date, one in Dresden 24 / 46–50 and one in Dresden 69–70. The scarcity is itself a finding: the codices are almost entirely a cyclical, non-absolute record.

VI. SCRIPTING AND INTEGRATION

The Tzolk'in engine described in Stage Report 2 was extended rather than duplicated. The calculation fields that derive a coefficient and a day name from a sequence position remain the single source of truth, and the recalculation script that propagates a series of distance numbers across all levels of an almanac now tolerates records in which no distance numbers are present. Where a structure carries date positions but no intervals — Paris 19–20 is the clearest case — the script records the positions and leaves the interval fields empty rather than inferring values.

That decision was deliberate. An inferred interval is indistinguishable, three years later, from a recorded one. Keeping the two apart costs a little completeness in the interface and preserves the evidential value of the database, which is the point of building it under open-science principles.

VII. OPEN POINTS

Three items remain open and are recorded here so that they are not lost.

- Day-name orthography is not yet uniform across the whole system. The reference cycle file uses B'en, Eb', Kab'an and Kib', while the codex data and the calculation fields use Ben, Eb, Kaban and Kib. The codex spelling is treated as canonical and the reference file is to be normalised to it before the database is used for lookups.
- A small number of source-level irregularities are carried through rather than silently corrected: a day recorded as "ok" in Dresden 10b, a glyph code in place of a date in Madrid 43c, and missing or duplicated separators in Madrid 92a–93a, 111c' and 112c. These surface as unrecognised values rather than being guessed at.
- Public release via FileMaker WebDirect is prepared but not yet complete. The intention stated in the project proposal — that the database be openly accessible — is met in the interim by publication of the derived datasets and of the reconstruction tool alongside the project reports.

With this component in place, the database covers the complete calendrical content of the Dresden, Madrid, Paris and Grolier codices: 2,041 almanac records, the full set of type-specific tables, and the 22 residual structures described above. The analytical work packages draw on it directly, and the results are reported in the project's Final Report.