Pratnakīrti, Volume 5, Issue 2, 2024 ISSN: 2322-0694

The Chronology of Indian Civilization: An Archaeoastronomical Study

Vedveer Arya

Joint Secretary & Addl. FA, DRDO
Ministry of Defence, New Delhi.
Phone: +91 9492927440
vedveer70@gmail.com

Abstract

Indian civilization is one of the world's oldest continuous civilizations, spanning approximately 16,400 years, dating back to around 14400 BCE. Its origins can be traced to the Saraswati River region, where an agriculture-based society began to emerge as the southwest monsoons became regular around 16000 BCE, coinciding with the conclusion of the last ice age. This development marked the inception of a cyclical pattern of seasons in the Indian subcontinent.

Lahuradewa, located in the Trans-Sarayu River region of the Upper Gangetic Plain in Uttar Pradesh, India, is the earliest known archaeological site for rice cultivation. Research conducted by Rakesh Tiwari et al. (2006) sheds light on the significance of this settlement. Excavations carried out from 2001 to 2006 revealed evidence of early human activities such as the burning of vegetation dating back to 9000 BCE.[1] Palynological studies also provide insights into the region's vegetation history, climate changes and early agricultural practices during the early Holocene period on the Middle Ganga Plain. The presence of domesticated rice in the initial phase of the Lahuradewa settlement is compelling evidence of early Holocene agriculture in this region. In addition, Lahuradewa has yielded the earliest pottery discovered in India.

Analysis of sediment samples from Lahuradewa Lake shows the presence of phytoliths from wild rice dating back 10,000 years BP (Before Present), with phytoliths from domesticated rice appearing from 8,300 years BP onwards. Micro-charcoal, found in all 28 sediment samples, indicates regular fire events caused by human activity in the lake's

[1]Tiwari, Rakesh et al, Early Farming at Lahuradewa, Paper presented in the International Seminar on the "First Farmers in Global Perspective", Lucknow, India, 18-20 January 2006, Pragdhara, no.18.

Lalashankar Gayawal and Umesh Kumar Singh (Ed.) pp. 57-84

Recieved 25 September 2024, Accepted 22 October 2024
This paper will be available at https://www.pratnakirti.com/Home/Index

catchment area over the past 10,000 years BP. Radiocarbon dating conducted by the Physical Research Laboratory (PRL), Ahmedabad, supports these findings and provides a period of approximately 10,000 years for the deposition of successive sediments. Furthermore, three new and early radiocarbon dates (see table) determined by PRL contribute to our understanding of the chronological significance of Lahuradewa.

Table 1: Radiocarbon dating of sediment samples from Lahuradewa Lake

PRL No.	Radiocarbon age (yr BP based on $t_{1/2}$ 5568 yr)	Radiocarbon age (yr BP based on $t_{1/2}$ 5730 yr)	Calibrated age* (yr BP)	Calibrated age in CE
3030	9230 ± 100	9510 ± 100	10267 – 10505	8317 – 8555 (8436) BCE
3031	9290 ± 120	9570 ± 120	10290 – 10646	8340 – 8696 (8518) BCE
3032	9590 ± 110	9880 ± 110	10763 – 11121	8813 – 9171 (8992) BCE

*Using calib5.1, calibrated age ranges at 1σ level. Source: Tiwari et al. (2006)

The Mehrgarh site in Balochistan provides valuable insights into the early farming practices in India. Archaeological evidence dating back to around 7000 BCE supports this notion. This discovery, combined with the findings from sites such as Lahuradewa, indicate a more detailed timeline, revealing that early agricultural practices were present in India well before 9000 BCE.

1 The Anchoring Date (22nd February 6778 BCE) for the Astronomical Chronology of India

It is important to understand that establishing the chronological order of ancient civilizations is a multidisciplinary effort including archaeological findings and carbon dating conducted by archaeologists within the historical period. In the case of ancient history of Indian civilization, there is a rich body of surviving literature dating back to the *Ṛgvedic* period as well as a history of advanced knowledge in astronomy, astronomical calendars and mathematics. The study of the extant

Sanskrit literature and the reconstruction of the ancient Indian *Yuga* calendar provide accurate scientific data for reconstructing the historical chronology of Indian civilization.

Ancient Indian astronomy has its origins in the early Vedic period as evidenced by the knowledge of the lunisolar calendar, intercalary lunar months and the division of the zodiac into 28 *nakṣatras* (lunar mansions) and 12 *ādityas* (signs) found in the Vedas. Over time, advancements were made such as the removal of *Abhijit Nakṣatra* (Vega star) and the division of the zodiac into 27 *nakṣatras*. *Māyāsura*'s *Sūrya Siddhānta* revolutionized Indian astronomy by introducing astronomical calculations based on spherical trigonometry, marking a significant milestone in *Siddhāntic* astronomy. Tradition records that *Māyāsura* wrote *Sūrya Siddhānta* at the end of the 28th *Kṛta Yuga* cycle, providing a potential anchor for dating.

Through the exploration of astronomically datable facts recorded in *Sūrya Siddhānta*, *Māyāsura* personally observed a rare conjunction of the Sun, Moon, and all planets aligning in Aries (*Meṣa*) on the new moon day of the first lunar month (*Caitra* month in the Indian calendar) at the end of the 28th *Kṛta Yuga*. Software simulations using the JPL Horizons Ephemeris System confirm that such a conjunction, with the Sun in the first degree of Aries, occurred only once on 22nd February 6778 BCE (-6778) in the last 16,500 years. Notably, simulations have not been extended beyond 14500 BCE, as the evolution of Indian astronomy began after this period, possibly coinciding with the formation of Indian agrarian society around 16000 BCE.

Sūrya Siddhānta (Chapter 1, Verse 57) gives verifiable astronomical information about this rare conjunction. It mentions that the Sun was in the first degree of Aries (*Meṣādau*) when this rare conjunction of planets occurred. Simulations show that Venus, Saturn and the Moon were positioned east of the Sun, while Mercury, Mars and Jupiter were situated west of the Sun during this 26-degree conjunction on 22nd February 6778 BCE (-6778).

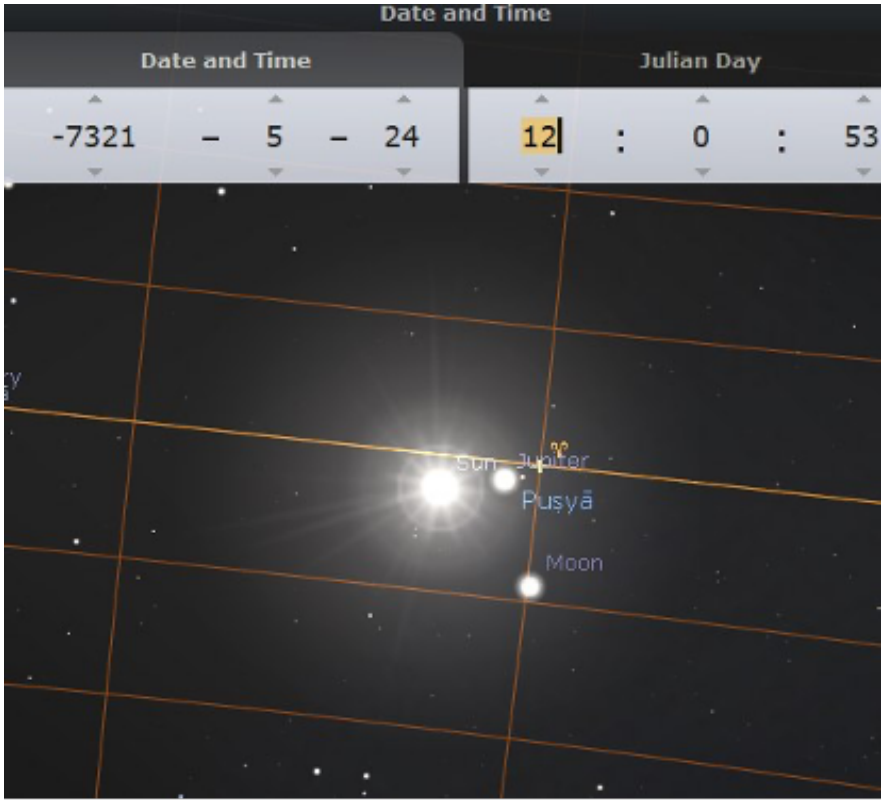

Figure 1: A conjunction of the Sun, Moon and Jupiter in *Puṣya Nakṣatra* in 7322–7321 BCE (Source: Stellarium.org)

The conjunction of all planets in Aries on 22nd February 6778 BCE (Source: Stellarium.org)
This rare conjunction described in the *Sūrya Siddhānta* aligns perfectly with the scientific evidence, confirming that *Māyāsura* indeed personally observed this event, which we can calculate with computer simulations to have occurred on 22nd February 6778 BCE. This astronomical epoch-making event marked a significant milestone in *Māyāsura*'s treatise *Sūrya Siddhānta*, where he introduced concepts for the first time such as the 12-year Jovian cycle, the 60-year cycle and the 7-day week, with 22nd February 6778 BCE designated as Sunday.

The absolute dating of *Māyāsura*'s *Sūrya Siddhānta* to 6778 BCE serves as a reliable anchor date for reconstructing the traditional *Yuga* calendar of the seventh cyclic period known as the "Vaivasvata Manvantara". According to ancient Indian calendrical tradition, a *Yuga*

calendar consisted of a cycle of 5 years, and a *Cāturyuga* (four cycles of 5 years), representing the calendar of four *Yugas* (*Kṛta*, *Tretā*, *Dvāpara*, and *Kali*), had a cycle of 20 years. *Māyāsura* authored *Sūrya Siddhānta* during the *Kṛta Yuga* of the 28th cycle of four *Yugas*.

It is a matter of scientific fact that such a conjunction as the one described in the *Sūrya Siddhānta* has occurred only once during the last 20,000 years. This absolute scientific evidence establishes that *Māyāsura* personally observed this conjunction on 22nd February 6778 BCE and referred to it as an astronomical epoch-making event in his treatise entitled *Sūrya Siddhānta*. As mentioned, he also introduced the 12-year Jovian cycle, the 60-year cycle and the concept of a 7-day week considering the day of the rare conjunction as Sunday. The scientific and accurate dating of *Māyāsura*'s *Sūrya Siddhānta* in 6778 BCE presents a perfect anchor date for reconstructing the traditional *Yuga* calendar of the seventh cyclic period called "Vaivasvata Manvantara". According to the ancient calendrical tradition of India, a *Yuga* calendar had a cycle of 5 years and a *Cāturyuga*, i.e., the calendar of four *Yugas* (the four *Yugas* sequentially named *Kṛta*, *Tretā*, *Dvāpara* and *Kali*) had a cycle of 20 years. *Māyāsura* wrote *Sūrya Siddhānta* in the *Kṛta Yuga* of the 28th *Cāturyuga* cycle of the seventh great cycle (commenced in 7322 BCE). The chronology of the seventh cyclic period of the *Yuga* calendar is as follows:

Table 3: Twenty-seven cycles of four *Yugas* in the *Yuga* calendar from 7322 BCE to 6782 BCE

Each cycle of four *Yugas* lasts 20 years (4 x 5 years)	**Dates**
1st cycle	7322–7302 BCE
2nd cycle	7302–7282 BCE
3rd cycle	7282–7262 BCE
4th cycle	7262–7242 BCE
5th cycle	7242–7222 BCE
6th cycle	7222–7202 BCE
7th cycle	7202–7182 BCE
8th cycle	7182–7162 BCE
9th cycle	7162–7142 BCE
10th cycle	7142–7122 BCE
11th cycle	7122–7102 BCE
12th cycle	7102–7082 BCE
13th cycle	7082–7062 BCE
14th cycle	7062–7042 BCE
15th cycle	7042–7022 BCE
16th cycle	7022–7002 BCE
17th cycle	7002–6982 BCE
18th cycle	6982–6962 BCE
19th cycle	6962–6942 BCE
20th cycle	6942–6922 BCE
21st cycle	6922–6902 BCE
22nd cycle	6902–6882 BCE
23rd cycle	6882–6862 BCE
24th cycle	6862–6842 BCE
25th cycle	6842–6822 BCE
26th cycle	6822–6802 BCE
27th cycle	6802–6782 BCE
28th cycle of four *Yugas*: The first sub-cycle of *Kṛta Yuga* lasted for 5 years.	*Kṛta Yuga* of 5 years: 6782–6777 BCE

Thus, the lifetime of the esteemed Indian astronomer *Māyāsura* can be accurately placed in the 68th century BCE through the meticulous reconstruction of the traditional *Yuga* calendar as shown in the table. Notably, he writes that he observed the remarkable conjunction of all planets during the fourth year of the 28th *Kṛta Yuga*. It was during this time that *Māyāsura* composed his seminal work, the *Sūrya Siddhānta*, a time that corresponds to the year 6778 BCE, coinciding with the conclusion and the last year of the 28th *Kṛta Yuga* cycle, which spanned five years and was set to end in 6777 BCE.

Mayāsura pioneered the establishment of the meridian passing through the city of *Ujjain* in India as the Prime Meridian, marking a pivotal point for the start of longitudinal measurements thousands of years before Greenwich in London became the internationally agreed Prime Meridian in 1884. Additionally, he was among the first astronomers to recognize the Earth's obliquity (axial tilt), which was approximately 24 degrees around 6778 BCE, adding even greater significance to his work.

The inaugural year (7322–7321 BCE) of the first cycle of the seventh *Manvantara* (great cyclic period) holds profound significance in the annals of ancient Indian astronomy. It marked a pivotal moment as the winter solstice transitioned at the first degree of Aries and specifically to *Aśvinī Nakṣatra*, characterized by the stars β and γ Arietis. At that time, Indian astronomers were considering reforms in the classification of the 28 *Nakṣatras* (lunar mansions) established during the *Ṛgvedic* period.

In this transformative period around 7322 BCE, Indian astronomers decided to exclude one *Nakṣatra*, namely *Abhijit* (Vega) and restructured the list to feature only 27 *Nakṣatras*, commencing with *Aśvinī Nakṣatra*. This adjustment was made to align more accurately with the division of the 360-degree zodiac into 27 parts, each spanning approximately 13 degrees and 20 minutes, to better reconcile with the lunar sidereal period of approximately 27.32158 days for a lunar month. It is evident from *Sūrya Siddhānta* that *Māyāsura* followed the scheme of 27 *Nakṣatras*.

The substantial reform in the Vedic *Yuga* calendar catalyzed the inception of the pioneering astronomical calendrical scheme (*Siddhānta*) known as the *Paitāmaha Siddhānta*, marking the advent of a new era in *Siddhāntic* astronomy across India. Furthermore, references in the *Bhāgavata Purāṇa* (12.2.24) and the *Vana Parva* (188.87) of the *Mahābhārata* allude to a noteworthy celestial occurrence: a conjunction involving the Sun, Moon and Jupiter transpiring in the *Puṣya Nakṣatra* within the Cancer constellation during the inaugural year of the first *Kṛta Yuga*, in 7322–7321 BCE to be precise. This conjunction coincided

with the vernal equinox and the day of the new moon, as documented in ancient scriptures. With the help of computer simulation software (see screenshot), we can deduce that such a constellation in fact occurred on 24th May 7321 BCE.

Figure 2: The conjunction of all planets in Aries on 22 February 6778 BCE (Source: Stellarium.org)

The introduction of the Jovian cycle of 12 years for calendrical calculations by *Māyāsura*'s *Sūrya Siddhānta* in 6778 BCE marked a transformative moment in Indian astronomy. This innovation revolutionized the field, paving the way for significant advancements. The *Yuga* calendar outlined in the *Paitāmaha Siddhānta* also embraced the Jovian cycle, extending the length of the 28th *Tretā Yuga* by 1,200 years starting from 6777 BCE, encompassing 100 cycles of 12 years each. Although the traditional 5-year calendar persisted, the intercalation method now aligned with the Jovian cycle reflected the progressive methods adopted by Indian astronomers.

Consequently, astronomers of the *Paitāmaha Siddhānta* school initially recalibrated the duration of a *Cāturyuga* from 20 years to 4,800 years, establishing a *Yuga* cycle spanning 1,200 years for the 28th *Tretā Yuga*. Subsequently, following the conclusion of the 28th *Tretā Yuga* in 5577 BCE, the *Cāturyuga* cycle (a cycle consisting of four cycles of *Yuga*) expanded further to 12,000 years, with the durations of *Yugas* adjusted in a ratio of 4:3:2:1 (*Kṛta* – 4,800 years, *Tretā* – 3,600 years, *Dvāpāra* – 2,400

years and *Kali* – 1,200 years). As a result, the 28th *Dvāpāra Yuga* endured for 2,400 years within this revised framework. Notably, preceding the *Mahābhārata* war (3162 BCE) and the end of the 28th *Dvāpāra Yuga* (3177 BCE), the duration of a *Yuga* expanded from 1,200 years to 432,000 years, while that of a *Cāturyuga* cycle increased from 12,000 years to 4,320,000 years. These adjustments aimed to facilitate precise calendric and astronomical calculations, emphasizing whole-number intervals for enhanced accuracy and comprehension. The chronology of the 28th cycle of four yugas:

Table 4: The 28th cycle of four yugas in the Yuga Calendar

28th cycle of four *Yugas*	**Dates**
Kṛta Yuga of 5 years	6782–6777 BCE
Tretā Yuga of 1,200 years	6777–5577 BCE
Dvāpāra Yuga of 2,400 years	5577–3177 BCE
Kali Yuga of 432,000 years	3176 BCE onwards

2 Sūrya Siddhānta's Influence on World Astronomy

Mayāsura's *Sūrya Siddhānta* marks the genesis of the concept of a seven-day week, commencing from the epochal day of *Sūrya Siddhānta*, i.e., 22nd February 6778 BCE, designated as Sunday. This paradigm was later adopted globally, underscoring its profound influence on calendrical systems worldwide. The discrepancy arises in the Julian calendar's erroneous categorization of the epochal day of *Sūrya Siddhānta*, as well as the *Śaka* era's commencement on 1st April 78 CE, both incorrectly labelled as Wednesdays. Consequently, there's a compelling argument for revising the modern Gregorian calendar to rectify these inaccuracies. My proposal is the adoption of the *Sūrya Siddhānta* day of the rare conjunction as Day 0 of Year 0 of a universal timeline beginning from 22nd February 6778 BCE.

Contrary to the belief of Western scholars that the introduction of the Sabbath (Saturday) can be attributed to ancient Babylonians, the astronomical dating of *Sūrya Siddhānta* suggests that the concept of a seven-day week originated from ancient Indians, thereby challenging established historical narratives.

Moreover, all cycles of 60 years or 12 years around the world trace back to the start of the *Sūrya Siddhānta* cycle dating back to 6777 BCE.

Abul Fazal notes the utilization of a 12-year cycle in the ancient Turkish calendar[2] while ancient China also adopted a 60-year cycle, with the current Chinese cycle commencing in 1984. Both cycles originate from the ancient Indian system.

Abul Fazal refers to an astrological era of creation that started when all planets were in conjunction in Aries. In his book *Kitab al-qirānāt*, the Arab astronomer *Abu Ma'shar* says that the world was created when the Sun, Moon and all the five planets gathered at the first degree of Aries. He proposed cycles of events choosing a cycle of 180,000 years similar to the cycles stated in *Māyāsura*'s *Sūrya Siddhānta*. *Al Bīrūnī* states that *Abu Ma'shar* derived his conclusions from Indian sources.

Abul Fazal mentions that at the time of his writing, 184,696 years had elapsed starting from the time of the astrological era of creation. Persian astronomers might have counted roughly 3,000 years from the time of the conjunction in Aries to the time of the Deluge in 3708 BCE. According to *Varāhamihira*, a *Yuga* of *Māyāsura*'s *Sūrya Siddhānta* had a duration of 180,000 years.[4] It appears that astronomers multiplied 3,000 years by 60 and assumed that 180,000 years had elapsed by the time of the Deluge in 3708 BCE. If only 3,000 years are added (instead of 180,000 years) to the time of the Deluge (38$^{\text{th}}$ century BCE), the Persian time given for the conjunction in Aries is exactly the same as the time of the rare conjunction of 6778 BCE recorded in *Sūrya Siddhānta*.

The Greek scholars *Plato* and *Cicero* also referred to a "great year" commencing with the conjunction of the Sun, Moon and all planets,[5] corresponding to the celestial alignment documented in *Sūrya Siddhānta*. This convergence of astronomical narratives across different cultures around the ancient world suggests the pivotal role of the rare conjunction mentioned in *Sūrya Siddhānta* as an astrological epoch-making event globally. A passage found by Professor Jacobi in the *De Die Natali* of *Censorinus* tells us thus:

> "There is also the year, which Aristotle calls Maximus rather than Magnus, which the orbits of the sun, the moon and the five planets bring to an end when they are all together carried back to that same sign in which they once were at one and the same time; and of which year the midwinter ...."[6]

It appears that the Greek and Persian sources refer to the great conjunction mentioned in the *Sūrya Siddhānta* of India.

Additionally, evidence from Greek astrology, exemplified by *Thema Mundi*'s horoscope (vernal equinox at Cancer) dating back to the 7$^{\text{th}}$ millennium BCE, reveals influences from *Māyāsura*'s *Sūrya Siddhānta*, further corroborating its widespread impact.

The theological transformation of *Sūrya Siddhānta* into the worship of *Mithra*, the Sun God, and the celebration of Mithra's birthday on the winter solstice in Mithraism of the West underscores the enduring legacy of *Māyāsura*'s astronomical innovations, shaping religious and cultural practices across civilizations.

3 Indian Astronomical Siddhāntas Evolved Around 7322–3101 BCE

Varāhamihira's *Pañcasiddhāntikā* presents the fundamental principles of five Indian *Siddhāntas*: *Sūrya*, *Paitāmaha*, *Vasiṣṭha*, *Romaka*, and *Pauliśa Siddhāntas*. Among these, the *Romaka Siddhānta* notably adheres to a cycle lasting 2,850 years. Despite Western Indologists speculating on its foreign origin and purported linkage to the Greek and Byzantine Roman tropical systems, evidence supports its Indian roots predating Hellenistic astronomy and the foundation of Rome. Originally a lunisolar calendar, the *Romaka Siddhānta*'s 2,850-year cycle is derived from the *Śatapatha Brāhmaṇa*'s 95-year cycle (95 x 30 = 2850), challenging the notion of its foreign origins.

Furthermore, the Metonic cycle of 19 years is believed to have stemmed from a sub-cycle of 95 years (19 x 5 = 95) within the *Romaka Siddhānta*. *Lātadeva*'s commentary on *Romaka* and *Pauliśa Siddhāntas*[7] around 3101 BCE provides additional historical context, reinforcing its Indian origin.

Similarly, *Pauliśa Siddhānta* predates the *Mahābhārata* era. Both *Pauliśa* and *Sūrya Siddhāntas* align in defining the length of the sidereal year as 365.25875 days. While Western scholars suggested *Pauliśa Siddhānta*'s reliance on *Yavanajātaka*, a text on Indo-Greek astronomy, chronological evidence indicates its precedence over Hellenistic astronomy, underscoring its Indian origins.

Brahma Siddhānta introduced a calendar scheme with cycles of 12 and 60 years from 6773 BCE, influenced by *Sūrya Siddhānta*, thereby initiating the first 60-year cycle of the *Kali Yuga* cycle in 3173 BCE. Presently, Indians and Tibetans follow the 60-year cycle of *Brahma Siddhānta*. Another tradition of the 60-year cycle marks the commencement of the *Kali Yuga* cycle in 3126 BCE, correlating with Jupiter's transit through *Dhaniṣṭhā Nakṣatra* in the sign of Capricorn.

The extant text of *Sūrya Siddhānta*, compiled by *Lātadeva* around 3101 BCE, draws from *Māyāsura*'s *Sūrya Siddhānta* of 6778 BCE. *Varāhamihira*'s *Pañcasiddhāntikā* provides a summary of *Māyāsura*'s work, highlighting a key difference: *Māyāsura* espoused a *Yuga* of

3,000 years and 180,000 years in the *Asura* tradition, whereas *Lātadeva* advocated for a *Cāturyuga* of 12,000 years and 4,320,000 years in the *Deva* tradition.

4 Lātadeva's Observation and the 28th Kaliyuga Cycle

Lātadeva's observation of a rough planetary conjunction on *Chaitra Śukla Pratipadā*, i.e., on 18th February 3101 BCE, served as the foundation for compiling the *Sūrya Siddhānta* text, marking the inception of the 28th *Kaliyuga* cycle. However, the beginning of the 28th *Kaliyuga* cycle slightly varies in different schemes of Indian *Siddhāntas*:

Table 5: The beginning of the cycle of the 28th *Kaliyuga* in various Indian calendars

Magha Śukladi Yuga Calendar:	
Paitāmaha Siddhānta	3176 BCE
Yudhiṣṭhira era	3161 BCE
Chaitra Śukladi Yuga Calendar:	
Brahma Siddhānta (Jupiter in Aries)	3173 BCE
Brahma Siddhānta (Jupiter in Capricorn)	3126 BCE
Lātadeva's Sūrya Siddhānta	3101 BCE

Traditionally, various calendars within the *Kaliyuga* cycle were prevalent in ancient India. However, Indian astronomers eventually recognized the discrepancies in the *Magha Śuklādi* calendar of *Paitāmaha Siddhānta* and the traditional intercalation of *Pauṣa-Āṣāḍha* months within the lunisolar calendar. Consequently, around 2000 BCE, the *Baisākhi* (*Vaiśākhādi*) calendar was introduced based on the premise that the vernal equinox used to occur in the sign of Taurus.

However, as astronomical knowledge progressed, the *Chaitra Śuklādi* calendar and the *Kaliyuga* cycle established by *Lātadeva*'s *Sūrya Siddhānta* (3101 BCE) gained prominence for astronomical calculations around the 1st century BCE and 1st century CE. This shift was prompted by the vernal equinox's relocation from Taurus to Aries in the 2nd century BCE. Over time, the *Magha Śuklādi* calendar associated with the *Paitāmaha* calendar (3176 BCE) became primarily limited to Vedic rituals.

Thus, the tradition of *Siddhāntic* astronomy in India and the utilization of the *Yuga* calendar have remained continuous from 7322 BCE and 6777 BCE to the present day, demonstrating the enduring legacy and adaptability of Indian astronomical systems.

5 The Calendar of the Saptarshi Cycle of 2,700 Years (Since 6777 BCE)

The *Saptarṣi* cycle, introduced into the *Yuga* calendar of the *Paitāmaha Siddhānta* in 6777 BCE, was a significant innovation aimed at facilitating easier tracking of elapsed time. This cycle spans 2,700 years and consists of 27 sub-cycles, each lasting 100 years and named after one of the 27 *Nakṣatras*. This novel approach provides a convenient method to recall the number of elapsed 100-year sub-cycles following the expansion of the *Yuga* duration to 1,200 years in 6777 BCE.

Traditionally, regions like Kashmir, Multan and Himachal Pradesh adhered to the *Saptarṣi* cycle. The adoption of the *Chaitra Śuklādi* calendar in Kashmir after 78 CE necessitated a recalibration of the *Saptarṣi* calendar in 3076 BCE, marking the start of the *Laukika era* or *Śāstrīya era*.

Classical Indian sources (*Vāyu Purāṇa* 99.419, *Viṣṇu Purāṇa* 4.24.105, *Bṛhat Saṃhitā* 13.3.4 and *Kalhaṇa's Rājataraṅgiṇī*) indicate that King *Yudhiṣṭhira* of the *Mahābhārata* era ascended to the throne during the *Maghā Nakṣatra* sub-cycle (3176–3076 BCE). Inscriptional evidence from *Hisse Borala* in Maharashtra, India, refers to the *Uttara Phālgunī* sub-cycle (276–176 BCE), further validating the continuous use of the *Saptarṣi* calendar.[8]

An inscription from Chamba, Himachal Pradesh, known as the *Sai Fountain inscription* dating to the time of King *Ajayapāladeva*, is dated in the 45th year of the *Śāstrīya era* and the 4,270th year of the *Kaliyuga* era, corresponding to 1169 CE.[9] These classical and inscriptional sources provide compelling evidence of the continuous utilization of the *Saptarṣi* calendar for over 8,800 years, underscoring the deep antiquity of ancient Indian civilization and its sophisticated astronomical traditions.

The continuous use of the *Saptarṣi* calendar is evident in historical records, inscriptions and classical texts, which document its implementation and relevance across different eras. This enduring continuity highlights the deep-rooted cultural heritage and scientific prowess of ancient Indian civilization.

6 Indian Calendar of the Saptarṣi Cycle – from 6777 BCE to 2025 CE

6.1 The First Cycle of 2,700 Years

1. Aśvinī — 6777–6677 BCE
2. Bharaṇī — 6677–6577 BCE
3. Kṛttikā — 6577–6477 BCE
4. Rohiṇī — 6477–6377 BCE
5. Mṛgaśirā — 6377–6277 BCE
6. Ārdrā — 6277–6177 BCE
7. Punarvasu — 6177–6077 BCE
8. Puṣya — 6077–5977 BCE
9. Āśleṣā — 5977–5877 BCE
10. Maghā — 5877–5777 BCE
11. Pūrvaphālgunī — 5777–5677 BCE
12. Uttaraphālgunī — 5677–5577 BCE
13. Hasta — 5577–5477 BCE
14. Citrā — 5477–5377 BCE
15. Svātī — 5377–5277 BCE
16. Viśākhā — 5277–5177 BCE
17. Anurādhā — 5177–5077 BCE
18. Jyeṣṭhā — 5077–4977 BCE
19. Mūla — 4977–4877 BCE
20. Pūrvāṣāḍhā — 4877–4777 BCE
21. Uttarāṣāḍhā — 4777–4677 BCE
22. Śravaṇa — 4677–4577 BCE
23. Śraviṣṭhā (Dhaniṣṭhā) — 4577–4477 BCE
24. Śatabhiṣaj — 4477–4377 BCE
25. Pūrvabhādrapadā — 4377–4277 BCE
26. Uttarabhādrapadā — 4277–4177 BCE
27. Revatī — 4177–4077 BCE

6.2 The Second Cycle of 2,700 Years

1. Aśvinī — 4077–3977 BCE
2. Bharaṇī — 3977–3877 BCE
3. Kṛttikā — 3877–3777 BCE
4. Rohiṇī — 3777–3677 BCE
5. Mṛgaśirā — 3677–3577 BCE
6. Ārdrā — 3577–3477 BCE
7. Punarvasu — 3477–3377 BCE

8. Puṣya — 3377–3277 BCE
9. Āśleṣā — 3277–3176 BCE
10. Maghā — 3176–3076 BCE
11. Pūrvaphālgunī — 3076–2976 BCE
12. Uttaraphālgunī — 2976–2876 BCE
13. Hasta — 2876–2776 BCE
14. Citrā — 2776–2676 BCE
15. Svātī — 2676–2576 BCE
16. Viśākhā — 2576–2476 BCE
17. Anurādhā — 2476–2376 BCE
18. Jyeṣṭhā — 2376–2276 BCE
19. Mūla — 2276–2176 BCE
20. Pūrvāṣāḍhā — 2176–2076 BCE
21. Uttarāṣāḍhā — 2076–1976 BCE
22. Śravaṇa — 1976–1876 BCE
23. Śraviṣṭhā (Dhaniṣṭhā) — 1876–1776 BCE
24. Śatabhiṣaj — 1776–1676 BCE
25. Pūrvabhādrapadā — 1676–1576 BCE
26. Uttarabhādrapadā — 1576–1476 BCE
27. Revatī — 1476–1376 BCE

6.3 The Third Cycle of 2,700 Years

1. Aśvinī — 1376–1276 BCE
2. Bharaṇī — 1276–1176 BCE
3. Kṛttikā — 1176–1076 BCE
4. Rohiṇī — 1076–976 BCE
5. Mṛgaśirā — 976–876 BCE
6. Ārdrā — 876–776 BCE
7. Punarvasu — 776–676 BCE
8. Puṣya — 676–576 BCE
9. Āśleṣā — 576–476 BCE
10. Maghā — 476–376 BCE
11. Pūrvaphālgunī — 376–276 BCE
12. Uttaraphālgunī — 276–176 BCE
13. Hasta — 176–76 BCE
14. Citrā — 76 BCE–23 CE
15. Svātī — 23–123 CE
16. Viśākhā — 123–223 CE
17. Anurādhā — 223–323 CE
18. Jyeṣṭhā — 323–423 CE
19. Mūla — 423–523 CE

20. Pūrvāṣāḍhā — 523–623 CE
21. Uttarāṣāḍhā — 623–723 CE
22. Śravaṇa — 723–823 CE
23. Śraviṣṭhā (Dhaniṣṭhā) — 823–923 CE
24. Śatabhiṣaj — 923–1023 CE
25. Pūrvabhādrapadā — 1023–1123 CE
26. Uttarabhādrapadā — 1123–1223 CE
27. Revatī — 1223–1323 CE

6.4 The Fourth Cycle of 2,700 Years: Nakṣatra & Period

1. Aśvinī — 1323–1423 CE
2. Bharaṇī — 1423–1523 CE
3. Kṛttikā — 1523–1623 CE
4. Rohiṇī — 1623–1723 CE
5. Mṛgaśirā — 1723–1823 CE
6. Ārdrā — 1823–1923 CE
7. Punarvasu — 1923–2023 CE
8. Puṣya — 2023–2123 CE

7 Pre-siddhantic or Vedic Yuga Calendar: From 13322 BCE to 7322 BCE

As previously discussed, Indian astronomers initiated a reform of the Vedic Yuga calendar by transitioning from the traditional 28-nakṣatra scheme to a revised 27-nakṣatra scheme, commencing with the *Aśvinī* nakṣatra in 7322 BCE. This reform marked the inception of the first *Siddhānta*, known as the *Paitāmaha Siddhānta*, within Indian astronomy. Consequently, the Vedic Yuga calendar significantly transformed into the *Siddhāntic* Yuga calendar in 7322 BCE.

Let us now delve into reconstructing the Vedic Yuga calendar's chronological sequence that prevailed before 7322 BCE. Traditionally, Vedic astronomers measured elapsed calendar years through the cycles of *Yuga* (a 5-year cycle), *Caturyuga* (a 20-year cycle), and *Mahāyuga* (a 1,000-year cycle) during both the Vedic and post-Vedic eras.

With the commencement of the Seventh Mahayuga, also known as the Great Cycle, in the year 7322 BCE, the chronology of the Yuga calendar can be reconstructed spanning six Mahayugas, equivalent to 6,000 years, as follows: The above chronology can be scientifically validated through the archaeo-astronomical study of verifiable astronomical and calendrical data recorded in Vedic and post-Vedic classical literature:

Table 6: Reconstruction of the six great cycles of 1000 years in the Pre-siddhantic calendar

Pre-siddhantic Yuga Calendar (28-nakṣatra scheme)	**Cycle Length**	**Dates**
First Mahayuga	1,000 years	13322–12322 BCE
Second Mahayuga	1,000 years	12322–11322 BCE
Third Mahayuga	1,000 years	11322–10322 BCE
Fourth Mahayuga	1,000 years	10322–9322 BCE
Fifth Mahayuga	1,000 years	9322–8322 BCE
Sixth Mahayuga	1,000 years	8322–7322 BCE
Siddhantic Yuga Calendar (27-nakṣatra scheme)	**Cycle Length**	**Dates**
Seventh Mahayuga (*Vaivasvata Manvantara*)	The cycle has gradually increased to millions of years.	7322 BCE onwards

– The Vedic Yuga calendar operates on a five-year lunisolar cycle, commencing with the autumnal equinox. This calendar gained widespread acceptance with the arrival of *Śarad Ritu* (autumn season), which is celebrated as the New Year throughout the Vedic and post-Vedic eras. The *Ṛgveda* contains over 33 references to autumn (*Śarada*), while the *Taittirīya Saṃhitā* includes more than 18 instances of autumn being synonymous with a year[10]. These references underscore the significance of this season within the calendar framework. Classical literature from both the Vedic and post-Vedic periods consistently refers to the Yuga calendar based on the autumnal equinox.
– The mention of "*Pañca-Śārāḍīya Yajña*" in the *Jaiminīya Brāhmaṇa* (2.175–176) establishes the implementation of the *Śarad Ritu* calendar, which spans five years.
– Numerous references to "*Viṣuvān*" (equinox) in Vedic literature are associated with the beginning of the New Year. The *Gopatha Brāhmaṇa* (1.4.18) states: *Viṣuvān āt mā saṃvatsarasya-*"*Viṣuvān* (equinox) is the *Ātma* (soul) of *Saṃvatsara* (year)." The term

"*Ayana*" is employed in Vedic texts to refer to solstices and, at times, equinoxes; however, *Viṣuvān* is never used to describe a solstice. Additionally, the term "*Udāṅga*" in Vedic literature denotes the six-month period extending from the autumnal equinox to the vernal equinox.

- The *Taittirīya Saṃhitā* (7.4.8) explicitly states that *Viṣuvān* (equinox) occurs at the end of the rainy season, indicating the start of the *Śarad* (autumn) season. The autumnal equinox is recognized as the beginning of the New Year, as reflected in the text: *Sāṃmeghye viṣuvān saṃpadyate*– "Autumnal Equinox occurs at the end of the rainy Season."
- The Vedic ritual of "*Cāturmāsya*" has been established as a seasonal ritual lasting four lunar months during the rainy and autumn seasons (spanning the three lunar months from the summer solstice to the autumnal equinox, and the first lunar month of the autumn season) since the Vedic era. The *Kauṣītaki Brāhmaṇa* (5.1 & 6.15) and *Gopatha Brāhmaṇa* (2.1.19) highlight the occurrence of *Phālguna Paurnimāsī* (the full moon day of the *Phālguna* lunar month) and *Viṣuvān* (autumnal equinox) at the start of the *Saṃvatsara* (New Year). The texts also note the occurrence of *Phālguna Paurnimāsī* during the *Ṛtusaṃdhi* (the transition between the *Varṣā* and *Śarad* seasons, i.e., the autumnal equinox).
- The *Aśvinī* hymns (7.69.3) of the *Ṛgveda* compiled by Vasiṣṭha Maitrāvaruṇi, a descendant of Sage Vasiṣṭha, indicate the positioning of the autumnal equinox at *Aśvinī Nakṣatra*. This suggests that Sage Vasiṣṭha, a contemporary of Sage Viśvāmitra around 13350 BCE, recognized the limitations of the summer solstice calendar traditionally followed during the early Vedic era (14400 BCE to 13322 BCE). The Vedic families of the *Saptarṣis* unanimously agreed to introduce the five-year Yuga calendar, commencing with the *Viṣuvān* (autumnal equinox). As Sage Vasiṣṭha observed the autumnal equinox at *Aśvinī Nakṣatra* around 13350 BCE, *Aśvinī* became the deity associated with the fifty hymns authored by the Vasiṣṭha family in the *Ṛgveda*. *Aśvinī* is a significant deity in *Ṛgvedic* hymns, following Indra, Agni, and Soma. Astronomy software simulations indicate that the astronomical observation of the autumnal equinox at the *Aśvinī* star occurred around 13800–12800 BCE.
- Thus, the five-year Yuga calendar, commencing at the beginning of the autumn season and concluding at the end of the rainy season, was formally established for the first time around 13322 BCE. In this calendar system, "*Caitra*" marked the first month, as the autumnal equinox coincided with Aries (*Meṣa*) during that period, and the

full moon of the first lunar month occurred in *Citrā Nakṣatra*. The 20th-year *Caturyuga* cycle was also introduced for the intercalation of *Ardhamāsa* (half lunar month) instead of one full lunar month in the 20th year of every *Caturyuga* cycle to account for the 14/15 extra days accumulated by the Yuga calendar every 20 years.

- The *Caitra* lunar month was recognized as the first month of *Saṃvatsara* during the early Vedic period because the autumnal equinox, marking the beginning of *Saṃvatsara* (the New Year), coincided with the full moon at *Citrā Nakṣatra* during the period of 2,000 years around 13322–11322 BCE. However, this was shifted to the *Phālguna* lunar month around 11322 BCE. Consequently, the Vedic Yuga calendar underwent reforms, leading to *Phālguna* becoming the first lunar month. This change prompted Dakṣa Prajāpati of the *Ṛgvedic* era to perform the Vedic Yajña and New Year ritual (*Agrayana*) on *Phālguna Paurnimāsī* at Kankhal, Haridwar, around 11217 BCE.
- The *Jaiminīya Brāhmaṇa* (3.386) provides valuable insights into the twelve months of the reformed *Ṛgvedic* Yuga calendar, commencing with *Phālguna* as the first lunar month and concluding with *Māgha*. The months are as follows: 1. *Phālguna*, 2. *Caitra*, 3. *Vaiśākha*, 4. *Āṣāda*, 5. *Śravaṇa*, 6. *Śatabhiṣaja*, 7. *Prauṣṭhapāda*, 8. *Āśvayuja*, 9. *Kārtika*, 10. *Mārgaśīrṣa*, 11. *Pauṣa* (*Taiṣa*), and 12. *Māgha*. Additionally, the calendar includes two intercalary months: *Prāyaṇīya* (the first intercalary month after 2.5 years) and *Udayanīya* (the second intercalary month after five years). These legends suggest that Dakṣa Prajāpati of the *Ṛgvedic* era conducted a *yajña* on the full moon of *Phālguna*, indicating the introduction of this calendar around 11322 BCE.
- The Vedic legend of Dakṣa Prajāpati and his 27 daughters is significant in its correlation with the list of 28 *nakṣatras*, starting with the *Mṛgaśīrṣa nakṣatra* in the Orion constellation. This alignment became particularly relevant as the winter solstice transitioned to the first degree of the *Mṛgaśīrṣa nakṣatra* around 11322 BCE. Therefore, it is plausible that the finalization of the earliest list of 28 *nakṣatras*, with *Mṛgaśīrṣa* as the starting point, occurred around 11217 BCE when Dakṣa Prajāpati performed the *yajña* at Kankhal.
- Over the millennium (a 1,000-year cycle) from 11322 BCE to 10322 BCE, it was observed that the winter solstice shifted from the *Mṛgaśīrṣa nakṣatra* to the *Rohiṇī nakṣatra*. Consequently, the Vedic astronomers revised the list of 28 *nakṣatras*, designating *Rohiṇī* as the first *nakṣatra* around 10322 BCE.

- After the completion of 2,000 years from 11322 BCE to 9322 BCE, it was observed that the autumnal equinox, marking the beginning of *Saṃvatsara* (the New Year), coincided with the full moon in the *Māgha nakṣatra*. This observation prompted reform in the Vedic Yuga calendar and the introduction of the *Māgha Śuklādi* calendar, replacing the *Phālguna Śuklādi* calendar. It was also observed around 9322 BCE that the winter solstice had shifted from the *Rohiṇī nakṣatra* to the *Kṛttikā nakṣatra*, establishing *Kṛttikā* as the first *nakṣatra* in the list of 28 *nakṣatras*. Consequently, the *Nakṣatra Sūkta* of the *Atharvaveda* was recompiled to incorporate the list of 28 *nakṣatras* with *Kṛttikā* as the initial *nakṣatra*, along with the autumnal equinox noted in the *Māgha* lunar month (*ayanam maghasu cha*). Nearly all post-Vedic literature references the *Kṛttikādi* list of 28 *nakṣatras*, indicating that this literature was compiled around 9322 to 8322 BCE.
- Following the completion of 2,000 years from 9322 BCE to 7322 BCE, it was observed that the winter solstice had shifted to the *Aśvinī nakṣatra*. By 7322 BCE, Indian astronomers had progressed from basic trigonometry to spherical trigonometry. It was realised that dividing 360 degrees by 27 is more precise than by 28 and avoids fractions; consequently, a list of 27 *nakṣatras*, beginning with the *Aśvinī nakṣatra* (excluding the *Abhijit nakṣatra*), was introduced in 7322 BCE. They also recognized that maintaining alignment between the seasons and lunar months was not feasible for periods exceeding 2,000 years. As a result, they adopted the *Nirāyana* (Sidereal) calendar system to establish a perpetual lunisolar calendar. This decision explains why the *Māgha Śuklādi* calendar continued to be utilized despite the autumnal equinox shifting to the *Pauṣa* lunar month after 7322 BCE. Numerous references to *Puṣya* in the *Valmiki Rāmāyaṇa* (5674–5603 BCE) suggest that the autumnal equinox and the full moon in the *Puṣya nakṣatra* coincided during the *Rāmāyaṇa* era.
- Interestingly, the *Nirāyana Māgha Śuklādi* calendar transitioned from the autumnal equinox (9322 BCE) to the winter solstice (*Uttarāyana*) during the *Mahābhārata* era (3162 BCE). It appears that the existing *Vedāṅga Jyotiṣa* text was recompiled a few hundred years prior to the *Mahābhārata* era (3162 BCE), taking into account the occurrence of the winter solstice within the *Māgha* lunar month.
- Thus, the calendars of the five-year Yuga, 20^{th}-year *Caturyuga*, and 1,000-year *Mahāyuga* were in use from 13322 BCE to 6777 BCE. The *Atharvaveda* (8.2.21) references the ancient practice of marking the passage of time in terms of *Yugas*, *Caturyugas*, and the cyclical

periods of 100, 1,000, and 10,000 years during the Vedic period. It articulates this concept by stating:

> "We delineate 100 or 10,000 years within the framework of *Yugas*, such as two *Yugas*, three *Yugas*, and four *Yugas*, and so forth."

- Before the introduction of the Yuga calendar in 13322 BCE, it is likely that the early Vedic period utilized a calendar year based on the summer solstice, measured from rainy season to rainy season. According to the *Mahābhārata* (1.65.34), Sage Viśvāmitra initiated the counting of *nakṣatras*, beginning with *Śravaṇa nakṣatra*, while the *Gopatha Brāhmaṇa* (2.6.1) attributes the first observation of "*Sampāta*" (precession), to him. It seems that Sage Brahmā of the early Vedic era observed the summer solstice in *Dhaniṣṭhā nakṣatra* of the *Brahmarāśi* constellation and established the *nakṣatra* scheme starting from *Dhaniṣṭhā* around 14400 BCE. Living 1,000 years after Brahmā, Viśvāmitra noted the summer solstice at *Śravaṇa nakṣatra* around 13800–12800 BCE, attributing this observation to a precession of 13°20 . The *Rāmāyaṇa* (1.57.4–5) indirectly supports this timeline by suggesting that Viśvāmitra lived a millennium after Brahmā. Archaeo-astronomical studies indicate that the astronomical observation of the summer solstice at *Dhaniṣṭhā nakṣatra* should be dated around 14800–13800 BCE and at *Śravaṇa nakṣatra* around 13800–12800 BCE.
- The *Ṛgveda* (1.158.6) indicates that Sage Dīrghatama Māmateya aged into an old man after ten *Yugas*, which corresponds to fifty years. Classical post-Vedic sources further elaborate that Sage Dīrghatama presided over the coronation of King Bharata, the son of Puru king Duṣyanta and Śakuntalā, the daughter of Sage Viśvāmitra. The reference to ten *Yugas* in Sage Dīrghatama's lifetime implies a transition from the summer solstice calendar, which was prevalent during Sage Viśvāmitra's time, to the Yuga calendar, which began with the autumnal equinox and was introduced during Sage Dīrghatama's lifetime.
- Vedic astronomers observed Prajāpati positioned atop his daughter *Uṣas*, symbolizing the transition of the winter solstice from the Orion constellation (*Mṛgaśīrṣa*) to the *Rohiṇī nakṣatra* (Tauri). This significant astronomical phenomenon is referenced in numerous Vedic texts, including the *Pañcaviṃśa Brāhmaṇa*, *Aitareya Brāhmaṇa*, *Śatapatha Brāhmaṇa*, *Bṛhadāraṇyaka Upaniṣad*, and *Maitrāyaṇī Saṃhitā*. Archaeo-astronomical studies indicate that Vedic astronomers adopted the *Mṛgaśirādi* list of 28 *nakṣatras*

around 11322 BCE. Approximately a millennium later, they observed the heliacal rising of the *Rohiṇī nakṣatra*, signifying the shift of the winter solstice from *Mṛgaśīrā* to *Rohiṇī* around 10322 BCE. The *Mahābhārata*'s *Vanaparva* (Chapter 219) suggests that Brahmā subsequently reordered the *nakṣatras*, beginning with *Rohiṇī*. By 9322 BCE, the winter solstice shifted from *Rohiṇī* to *Kṛttikā*, establishing *Kṛttikā* as the first *nakṣatra* within the list of 28 *nakṣatras*. *Atharvadeva*'s *Nakṣatra Sūkta* (19.7) reflects this progression, presenting a list of 28 *nakṣatras* commencing with *Kṛttikā*, suggesting its compilation around 9322 BCE. Ultimately, Indian astronomers recalibrated the *nakṣatra* sequence, beginning with *Aśvinī* in 7322 BCE, coinciding with the winter solstice's relocation to *Aśvinī*. This signified the transition from the Vedic Yuga calendar of 28 *nakṣatras* to the Siddhāntic Yuga calendar of 27 *nakṣatras*, excluding the *Abhijit nakṣatra*.

Thus, based on the discussed archaeo-astronomical evidence, it's plausible to scientifically reconstruct the Vedic *Yuga* calendar spanning approximately 6,000 years followed by the *Siddhāntic Yuga* calendar from 7322 BCE onward. This detailed analysis illuminates the rich astronomical knowledge and meticulous observations of ancient Vedic astronomers.

Table 7: Varsha Ritu (Rainy Season) Calendar: The Early Vedic Period

Period	**Dates**	**Duration**	**Archaeo-astronomical Evidence**
Early Vedic period (14400–13322 BCE)	14400–13322 BCE	–	The summer solstice occurred at Dhanishtha Nakshatra around 14400 BCE, shifting to Shravana around 13350 BCE, coinciding with the lifetime of Sage Vishvamitra.

Table 8: Sharad Ritu (Autumnal Equinox) Calendar of Yuga (5-year) Cycle

Period	**Dates**	**Duration**	**Archaeo-astronomical Evidence**
Vedic period (13322–10322 BCE)	13322–10322 BCE	–	
First Mahayuga	13322–12322 BCE	1000 years	Around 13350 BCE, the autumn equinox occurred in Ashvini, with Chaitra marking the onset of the first lunar month. A scheme of Nakshatras was introduced starting from Punarvasu around 13322 BCE. By the winter solstice around 11250 BCE, the position shifted to Mrigashira, with Phalguna marking the lunar calendar start. The scheme of 28 nakshatras was introduced from Mrigashira.
Second Mahayuga	12322–11322 BCE	1000 years	
Third Mahayuga	11322–10322 BCE	1000 years	–
Post Vedic period (10322–7322 BCE)	10322–7322 BCE	–	The winter solstice shifted to Rohini around 10200 BCE and further to Krittika around 9200 BCE. The Nakshatra Sukta in the Atharvaveda provides a comprehensive list of 28 nakshatras, commencing from Krittika.
Fourth Mahayuga	10322–9322 BCE	1000 years	–
Fifth Mahayuga	9322–8322 BCE	1000 years	–
Sixth Mahayuga	8322–7322 BCE	1000 years	–

Table 9: Siddhantic Yuga Calendar (27-Nakshatra Scheme)

Period	**Dates**	**Duration**	**Archaeo-astronomical Evidence**
Seventh Mahayuga or Vaivasvata Manvantara	7322 BCE onwards	–	In 7322 BCE, the winter solstice shifted to Ashvini. A notable astronomical event occurred on 24th May 7321 BCE with a conjunction of the Sun, Moon, and Jupiter in the Pushya nakshatra. The 27 nakshatra scheme, excluding Abhijit, commenced from Ashvini.
1–27 Chaturyugas	7322–6782 BCE	540 years	One Chaturyuga had a cycle of 20 years.
28th Krita Yuga	6782–6777 BCE	5 years	Mayasura compiled Surya Siddhanta in 6778 BCE. Great conjunction of the Sun, Moon, and all five planets in Aries occurred on the new moon day of Chaitra month, i.e., 22nd February 6778 BCE.
28th Treta Yuga	6777–5577 BCE	1200 years	Mahayuga duration increased due to Jovian cycle introduction. Saptarshi cycle of 2700 years introduced in 6777 BCE. Ramayana era: 5677–5577 BCE.

Period	**Dates**	**Duration**	**Archaeo-astronomical Evidence**
28th Dvapara Yuga	5577–3176 BCE	2400 years	Chaturyuga length increased to 12,000 years (4:3:2:1 ratio). Dvapara Yuga cycle lasted 2400 years.
28th Kaliyuga	3176 BCE onwards	432,000 years	The Mahabharata war occurred in 3162 BCE. Saptarshi cycle in Magha Nakshatra (3176–3076 BCE). Chaturyuga length expanded from 12,000 to 432,000 years (12,000 × 360).

In summary, the chronology of the continuous Vedic Yuga calendar, which spans over 15,300 years, can be established as follows:

- 13322–11222 BCE – *Chaitradi Yuga* calendar (*Chaitra*, the first lunar month)
- 11222–9200 BCE – *Phalgunādi Yuga* calendar (*Phalguna*, the first lunar month)
- 9200 BCE onwards – *Magha Shukladi* calendar (*Magha*, the first lunar month)
- 7322 BCE onwards – *Paitāmaha Siddhānta*'s *Magha Shukladi* calendar and the scheme of 27 *nakṣatras* starting from the *Aśvinī* star. It also marks the beginning of the 7th great calendrical cycle known as the "Vaivasvata Manvantara".
- 6777 BCE onwards – *Saptarṣi* cycle of 2,700 years.
  - 1st cycle – 6777 – 4077 BCE
  - 2nd cycle – 4077–1376 BCE
  - 3rd cycle – 1376 BCE – 1323 CE
  - 4th cycle – 1323 CE onwards

Table 10: The chronology of the Siddhantic calendar

Siddhantic Calendars	**Dates**
Yuga calendar of *Paitāmaha Siddhānta* (*Magha Shukladi*)	7322 BCE
Sūrya Siddhānta calendar (*Chaitra Shukladi*)	6778 BCE
Yuga calendar of the Saptarṣi cycle in *Paitāmaha Siddhānta*	6777 BCE
Brahma Siddhānta calendar (*Chaitra Shukladi*) and 60-year cycle	6773 BCE
Kaliyuga calendar of *Brahma Siddhānta* by *Āryabhaṭa* (*Chaitra Shukladi*) and 60-year cycle (Jupiter in Aries)	3173 BCE
Magha Shukladi calendar of *Yudhiṣṭhira Samvat* (*Paitāmaha Siddhānta*)	3161 BCE
Kaliyuga calendar of *Brahma Siddhānta* (*Chaitra Shukladi*) and 60-year cycle (Jupiter in Capricorn)	3126 BCE
Kaliyuga calendar of *Latadeva's Sūrya Siddhānta* (*Chaitra Shukladi*) and 60-year cycle (Jupiter in Capricorn)	3101 BCE
Laukika or *Śāstriya Samvat* calendar of Kashmir (*Chaitra Shukladi*)	3076 BCE
Vernal equinox calendar of *Vaiśākha Shukladi* (Baisakhi)	∼2000 BCE
Kārttikādi calendar of *Vikrama Samvat*	719 BCE
Śaka calendar of *Yavana Jātaka* (*Chaitra Shukladi*)	583 BCE
Chaitra Shukladi calendar of *Vikrama Samvat*	57 BCE
Sakanta calendar (*Chaitra Shukladi*) and alignment with the *Kaliyuga* calendar of *Latadeva's Sūrya Siddhānta*	78 CE

8 The Chronology of the Siddhantic Calendars of Ancient India

Indian Siddhantic astronomy traces its origins to 7322 BCE with the introduction of the division of the zodiac into 27 *nakṣatras* within the Vedic Yuga calendar. This foundational step laid the groundwork

for subsequent advancements in astronomical timekeeping. A pivotal moment in the development of Siddhantic calendars occurred in 6778 BCE with the publication of Mayasura's *Sūrya Siddhānta*. This treatise introduced several key innovations including the Jovian cycle of 12 years, the concept of a 7-day week, a 60-year cycle and the *Chaitradi* (*Chaitra*, the first lunar month) calendar. These contributions formed the bedrock of Siddhantic astronomy and facilitated the creation of various Siddhantic calendars that gained popularity throughout ancient India.

The above chronological reconstruction of ancient Indian calendars, based on archaeoastronomical studies and supported by multidisciplinary evidence, provides a scientifically robust foundation for reconstructing the chronology of ancient India. This reconstruction allows for the organization of Indian chronology into the following nine distinct periods:

1. Early Vedic period and the era of 33 *Devas* (14400–13322 BCE)
2. Vedic period and three cycles of 1,000 years (13322–10322 BCE)
3. Post Vedic period and three cycles of 1,000 years (10322–7322 BCE)
4. Beginning of the 7th Great Cycle (7322 BCE) and 27 cycles of four *yugas* (7322–6782 BCE)
5. The 28th *Kṛta Yuga* (6782–6777 BCE) and the 28th *Tretā Yuga* (6777–5577 BCE)
6. Post *Rāmāyaṇa* era and the 28th *Dvāpāra Yuga* (5577–3177 BCE)
7. The *Mahābhārata* War (3162 BCE) and the *Magadha Empire* (3162–89 BCE)
8. Post-Gupta period (89 BCE – 532 CE)
9. Medieval period (532–1761 CE)

Bibliography

1. Tiwari, Rakesh et al. Early Farming at Lahuradewa, Paper presented in the International Seminar on the "First Farmers in Global Perspective", Lucknow, India, 18-20 January 2006, *Pragdhara*, no.18.
2. Jarrett, Colonel H.S. The Ain-i-Akbari by Abul Fazl Allami, Volume II, published by The Asiatic Society of Bengal, Calcutta, 1891, pp. 21-23.
3. Jarrett, Colonel H.S. The Ain-i-Akbari by Abul Fazl Allami, Volume II, published by The Asiatic Society of Bengal, Calcutta, 1891, pp. 21-30.
4. Sastry, T.S. Kuppanna. *Panchasiddhantika of Varahamihira* with translation and notes, P.P.S.T. Foundation, Adyar, Madras, 1995, Verse 1.14, pp. 15-16.
5. Coleman-Norton, P.R. Cicero's Doctrine of the Great Year, *Laval théologique et philosophique*, University of Laval, Volume 3, Number 2, 1947, pp. 293-302. https://id.erudit.org/iderudit/1019794ar, https://doi.org/10.7202/1019794ar.

6. Gysembergh, Victor. Aristotle on the Great Year, Eudoxus, and Mesopotamian Goal Year Astronomy. *Annali*, 2013, XXXV, pp.111-124. DOI: 10.1400/228696. hal-02893656.
7. Sastry, T.S. Kuppanna. *Panchasiddhantika of Varahamihira* with translation and notes, P.P.S.T. Foundation, Adyar, Madras, 1995, Verse 1.3, pp. 4.
8. Gokhale, Shobha. Hisse Borala Inscription of Devasena, Saka 380, *Epigraphica Indica*, Volume XXXVII, 1967-68, pp. 1-4 & G.S. Gai, S. Shankaranarayanan, Note on the date of Hisse Borala inscription of the time of Vakataka Devasena, *Epigraphica Indica*, Volume XXXVII, 1967-68, pp. 5-8.
9. Appendix to *Epigraphica Indica*, Volumes XIX to XXIII, 1929, pp. 198, No. 1450.
10. Rigveda (1.72.3, 1.86.6, 1.89.9, 1.131.4, 1.173.3, 1.174.2, 1.179.1, 1.181.6, 2.12.11, 2.24.5, 2.27.10, 3.32.09, 3.36.10, 4.16.19, 4.18.04, 4.19.8, 5.2.2, 6.20.10, 6.24.7, 6.38.4, 6.39.3, 6.47.17, 7.37.7, 7.61.2, 7.66.11, 7.66.16, 7.91.2, 7.101.06) & Taittiriya Samhita (1.6.2.3, 2.1.2.5, 2.1.4.2, 2.6.1.1, 4.3.2.2, 4.3.3.2, 4.3.13.5, 4.4.11.1, 4.4.12.3, 5.6.10.1, 5.6.23.1, 5.7.2.3, 5.7.2.4, 5.7.6.6, 7.1.15.1, 7.1.18.2, 7.2.10.2, 7.5.14.1).