Date of the Mahabharata War (3162 BCE): A Study of Evidence and Methodology

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Introduction

Indian historical tradition, along with multigenerational literary, epigraphic, and traditional evidence, has consistently affirmed the historicity and dating of the Mahabharata War and the coronation of Mahapadma Nanda. However, modern historical research has attempted to reconstruct Indian chronology beginning with the Buddha, selectively accepting, and ignoring traditional evidence in an effort to reconcile Indian and Western chronologies, particularly regarding the contemporaneity of Alexander and Chandragupta Maurya. This flawed methodology has not only resulted in the loss of ancient Indian chronological traditions but has also constrained the historical period to not extend beyond the time of the Buddha. Consequently, historians have dismissed the traditional date and historicity of the Mahabharata War over the past 200 years of modern Indian historical research.

Unconvinced by the mainstream historians' dismissal of the historicity of the Mahabharata, Indic scholars have initiated numerous studies to validate traditional accounts through internal astronomical evidence while reconciling this information with external data. Some of these scholars have critically examined the traditional Indic chronology and sought to authenticate the traditional date using literary and epigraphic evidence, while others have aimed to extend the historical period beyond the date of the Buddha, as defined by modern historians, to establish the date of the Mahabharata War. This endeavour has resulted in greater divergence of opinion among Indic scholars regarding the timeline of the Mahabharata War, rather than fostering a consensus. It is evident that these scholars have employed their own methodologies, often influenced by personal biases, frequently overlooking the quality of the astronomical evidence due to the absence of a regulatory framework for archaeo-astronomical studies. Before examining these methodologies in detail, it is important to briefly review the research conducted to date concerning the dating of the Mahabharata War.

An Overview of the Studies on Dating of the Mahabharata War

The research on the dating of the Mahabharata War can be categorized into the following four groups:

1. **Traditional date (32nd century BCE):** TS Narayana Shastri, Kota Venkatachalam, and several other scholars adhered to the traditional Puranic chronology of the Magadha Empire, spanning from the Brihadratha dynasty to the Gupta dynasty. They proposed a date for the Mahabharata war around 3138 BCE, referencing the traditional dates of

historical figures such as Buddha (19th century BCE), Adi Shankaracharya (6th century BCE), and the Kaliyuga calendar epoch (3101 BCE). In contrast, Professor Srinivasa Raghavan and Professor B.N. Narahari Achar assigned a date of 3067 BCE, based on their analysis of internal astronomical evidence.

2. **The Date between 1900-1400 BCE:** Dr. Subhash Kak, Professor R.N. Iyengar, Ashok K. Bhatnagar, and others have adhered to the date of Buddha's nirvana (483 BCE) as established by contemporary historians. Based on their analysis of both internal and external evidence, they have determined that the date of the Mahabharata War falls between 1900 BCE and 1400 BCE.
3. **The Date between 900-1100 BCE:** Dr. B.B. Lal and others have dated the Mahabharata war to approximately 900-1000 BCE based on the archaeological study of the cities mentioned in the text of the Mahabharata.
4. **The Date of 5561 BCE:** P.V. Vartak and Nilesh Oak have dated the Mahabharata war to 5561 BCE, independently of traditional and chronological evidence, based on their analysis of Arundhati-Vasishtha observation.

Although the date of 3138 BCE is broadly consistent with the traditional chronology, it does not align with the internal astronomical evidence. Consequently, some scholars have proposed alternative dates for the Mahabharata war: 3136 BCE (Jayashree Saranathan), 3139 BCE (Saroj Bala), and 3143 BCE (P.V. Holey), based on their analysis of the internal astronomical data. Professor Srinivasa Raghavan, B.N. Narahari Achar and Manish Pandit determined the date to be 3067 BCE, considering the occultation of Rohini by Saturn and the occurrence of an eclipse pair in the year of the Mahabharata War. S. Balakrishna proposed the date of 3128 BCE, taking into account the occurrence of a solar eclipse occurring less than 14 days after a lunar eclipse.

Disregarding the epoch of the Kaliyuga calendar and the traditional chronology, Professor R.N. Iyengar conducted a systematic examination by verifying all double eclipses from 501 to 3000 BCE and analysing the proximity of Saturn and Jupiter to Vishaka. He concluded that 1478 BCE was the most plausible year for the war. Ashok Bhatnagar suggested a date of 1793 BCE, focusing on the seasons, the location of equinoxes and solstices, a pair of eclipses, and other astronomical events referenced in the Mahabharata text. Dr Subhash Kak considered a gap of 1500 years between the Nandas and the Mahabharata War and concluded that the chronology of the Puranic king lists suggests 1924 BCE as the date of the Mahabharata War.

Dr. B.B. Lal conducted excavations at Indraprastha and Hastinapur during the years 1951-1952, establishing the Mahabharata period to approximately 800-900 BCE. He referred to this period as the Painted Grey Ware (PGW) culture, noting that it represented the earliest common pottery linking all the Mahabharata sites, including Hastinapur, Mathura, Kurukshetra, and Kampilya.

Based on archaeological evidence obtained from onshore and offshore excavations conducted in Dwaraka, Bet Dwarka, and the Kurukshetra region, Dr. S.R. Rao proposed a date of approximately 1900-1700 BCE. Recently, some archaeologists have unofficially suggested that the Mahabharata could date back to 1500-2000 BCE, following the discovery of "war chariots" at the excavation site of Sanauli.

The Methodology

It is important to recognize that the Mahabharata era is a significant part of an unbroken tradition of Indian history, as it is traditionally associated with the Puranic Kings-lists and the date of Mahapadma Nanda and the Kaliyuga calendar. Consequently, establishing the date of the Mahabharata War through archaeological findings is not feasible. Archaeologists primarily investigate past societies through their material culture, including artifacts and carbon dating of organic materials, often overlooking evidence from other scientific disciplines. Thus, archaeology alone is insufficient to resolve the complexities involved. Instead, it can act as a supplementary source of evidence for reconstructing the chronology of Indian civilization's historical period. Accordingly, this research paper carefully avoids altering or distorting the traditional chronology solely due to a lack of archaeological or material evidence.

John Bintliff questions the theoretical approach used in the field of archaeology in the book *The Death of Archaeological Theory?* co-edited by him. He asks whether the study of past societies through their material culture, i.e. archaeology – would benefit considerably by discounting the burden of somewhat dogmatic theory and ideology which has inexorably begun to obscure our pathways to reconstruct the past. He argues that it is time to leave behind the somewhat dogmatic theory and ideology that has defined archaeological debate and shaped archaeology. He quotes David Clarke while indicating that the New Archaeology formally opened an elaborate discussion on the need to set out a critique of the principles of archaeology:

> Archaeology is an undisciplined empirical discipline. A discipline lacking a scheme of systematic and ordered study based upon declared and clearly defined models and rules of procedure. It further lacks a body of central theory capable of synthesizing the general regularities within its data in such a way that the unique residuals distinguishing each particular case might be quickly isolated and easily assessed.

John Bintliff cautions that “Reliance on a personal dogma, on an *a priori* claim that ‘the world works like this’, surely impoverishes the researcher’s ability to discover how the past was created, since alternative approaches or insights are from the first ruled out of the investigation.

Thus, the methodology for investigating the chronology of the historical period must be grounded in evidence collected from literary, epigraphic, and traditional sources. Archaeo-astronomy represents a unique discipline that can potentially uncover absolute dates of

historical events. Historical records of astronomical phenomena will serve as primary sources of evidence. A reliable approach to verifying the dates of events involves examining written accounts of planetary movements and stellar positions during the relevant timeframes. Historical accounts of phenomena such as eclipses are typically rich in detail, enabling the use of modern computer simulations to accurately determine their occurrence. The positions of celestial bodies are objective and not subject to falsification. Consequently, astronomical observations documented in the text of the Mahabharata would constitute the most reliable physical evidence, provided they can be subjected to scientific dating.

A Guiding Principles for the Archaeo-astronomical Studies

It is important to note that numerous astronomical studies concerning the dating of the Mahabharata War have produced conflicting results and counterclaims, leading to ongoing controversy regarding the relevance of internal astronomical evidence for chronological studies. In the absence of established guiding principles and regulatory mechanisms, researchers have employed their own methodologies, often influenced by personal biases. This has resulted in a divergence in conclusions in archaeo-astronomical studies of the Mahabharata. Therefore, analysing the methodology of a source is essential for evaluating the quality of the evidence presented. Such analysis will also enhance the understanding of the methodologies employed and help identify potential issues and biases.

Accordingly, this research paper has adopted the following guiding principles for evaluating the quality of internal astronomical evidence related to the dating of the Mahabharata War:

- Compile a comprehensive list of both internal and external evidence, analyzing all data without selective acceptance or rejection. Any dismissal of evidence must be substantiated by factual explanations.
- Utilize unequivocally verifiable astronomical events, such as eclipses, planetary positions, and conjunctions, as primary evidence.
- In instances of conflicting facts or discrepancies in translations, such astronomical references may be assessed as secondary evidence, provided they do not undermine the primary evidence.
- Only grammatically valid translations will be deemed acceptable.
- Examine the Siddhanta and the calendar system employed during the Mahabharata era, and reconstruct the calendar to facilitate the calculation of dates for astronomical observations.

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

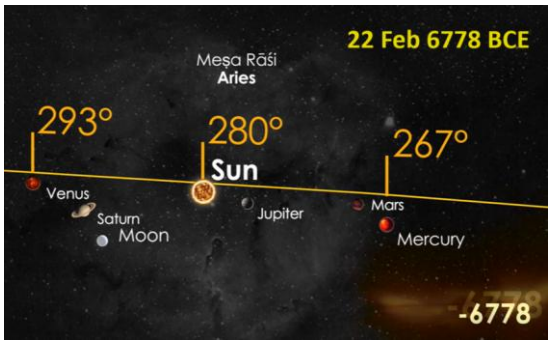
Establishing the chronology of ancient civilizations is a multidisciplinary endeavour. In the context of the ancient history of Indian civilization, there exists a substantial body of surviving literature dating back to the Rigvedic period, as well as a history of advanced knowledge in astronomy, astronomical calendars, and mathematics. The examination of extant Sanskrit

literature and the reconstruction of the ancient Indian Yuga calendar yield precise scientific data for the reconstruction of 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 nakshatras (lunar mansions) and 12 adityas (signs) found in the Vedas. Over time, advancements were made such as the removal of Abhijit Nakshatra (Vega star) and the division of the zodiac into 27 nakshatras. Mayasura's Surya Siddhanta revolutionized Indian astronomy by introducing astronomical calculations based on spherical trigonometry, marking a significant milestone in Siddhantic astronomy. Tradition records that Mayasura wrote Surya Siddhanta at the end of the 28th Krita Yuga cycle, providing a potential anchor for dating.

Through the exploration of astronomically datable facts recorded in *Surya Siddhanta*, Mayasura personally observed a rare conjunction of the Sun, Moon, and all planets aligning in Aries (Mesha) on the new moon day of the first lunar month (Chaitra month in the Indian calendar) at the end of the 28th Krita 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 as the southwest monsoons became regular around 16000 BCE.

Surya Siddhanta (*Chapter 1, Verse 57*) gives verifiable astronomical information about this rare conjunction. It mentions that the Sun was in the first degree of Aries ("*Meshādau*") 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).



This rare conjunction described in the *Surya Siddhanta* aligns perfectly with the scientific evidence, confirming that Mayasura indeed personally observed this event, which we can calculate with computer simulations to have occurred on 22 February 6778 BCE. This astronomical epoch-making event marked a significant milestone in Mayasura's treatise *Surya*

Siddhanta, 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 Mayasura's *Surya Siddhanta* 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 *Chaturyuga* (four cycles of 5 years), representing the calendar of four Yugas (*Krita, Treta, Dvapara, and Kali*), had a cycle of 20 years. Mayasura authored *Surya Siddhanta* during the Krita 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 *Surya Siddanta* has occurred only once during the last 16,500 years. This absolute scientific evidence establishes that Mayasura personally observed this conjunction on 22 February 6778 BCE and referred to it as an astronomical epoch-making event in his treatise entitled *Surya Siddhanta*. 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 Mayasura's *Surya Siddhanta* 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 Chaturyuga. i.e., the calendar of four Yugas (the four Yugas sequentially named Krita, Treta, Dvapara and Kali) had a cycle of 20 years. Mayasura wrote *Surya Siddhanta* in the Krita Yuga of the 28th Chaturyuga cycle of the seventh great cycle (commenced in 7322 BCE). The chronology of the seventh cyclic period of the Yuga calendar is as follows:

The 7th cyclic period of the Yuga calendar	
Each cycle of four Yugas lasts 20 years (4 x 5 years)	**In CE**
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 Krita Yuga lasted for 5 years.	***Krita Yuga of 5 years:*** 6782-6777 BCE

Thus, the lifetime of the esteemed Indian astronomer Mayasura 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 Krita Yuga. It was during this time that Mayasura composed his seminal work, the *Surya Siddhanta*, a time that corresponds to the year 6778 BCE, coinciding with the conclusion and the last year of the 28th Krita Yuga cycle, which spanned five years and was set to end in 6777 BCE.

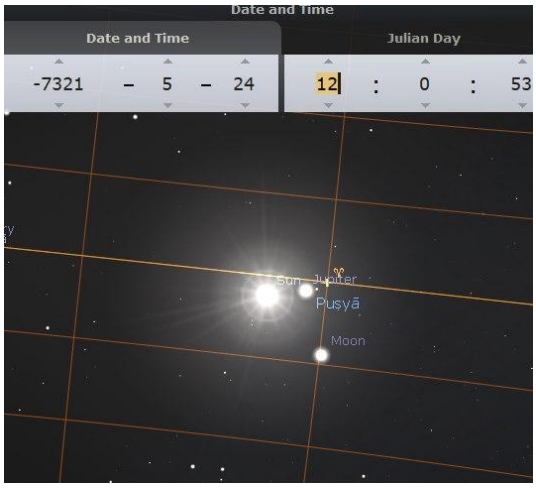
Mayasura pioneered the establishment of the meridian passing through the city of Ujjain in India as the Prime Meridian, marking a pivotal point for the start of longitudinal measurements thousands of years before Greenwich in London became the internationally agreed Prime Meridian in 1884. Additionally, 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 Ashvini Nakshatra, characterized by the stars β and γ Arietis. At that time, Indian astronomers were considering reforms in the classification of the 28 Nakshatras (lunar mansions) established during the Rigvedic period.

In this transformative period around 7322 BCE, Indian astronomers decided to exclude one Nakshatra, namely Abhijit (Vega) and restructured the list to feature only 27 Nakshatras, commencing with Ashvini Nakshatra. 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 Surya Siddhanta that Mayasura followed the scheme of 27 Nakshatras.

The substantial reform in the Vedic Yuga calendar catalyzed the inception of the pioneering astronomical calendrical scheme (*Siddhanta*) known as the *Paitamaha Siddhanta*, marking the advent of a new era in Siddhantic astronomy across India. Furthermore, references in the *Bhagavata Purana (12.2.24)* and the *Vana Parva (188.87)* of the *Mahabharata* allude to a noteworthy celestial occurrence: a conjunction involving the Sun, Moon and Jupiter transpiring in the Pushya Nakshatra within the Cancer constellation during the inaugural year of the first Krita 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, we can deduce that such a constellation in fact occurred on 24th May 7321 BCE.



A conjunction of the Sun, Moon and Jupiter in Pushya Nakshatra in 7322-7321 BCE (Source: Stellarium)

The introduction of the Jovian cycle of 12 years for calendrical calculations by Mayasura's *Surya Siddhanta* 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 *Paitamaha Siddhanta* also embraced the Jovian cycle, extending the length of the 28th Treta 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 *Paitamaha Siddhanta* school initially recalibrated the duration of a Chaturyuga from 20 years to 4,800 years, establishing a Yuga cycle spanning 1,200 years for the 28th Treta Yuga. Subsequently, following the conclusion of the 28th Treta

Yuga in 5577 BCE, the Chaturyuga 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 (Krita – 4,800 years, Treta -3,600 years, Dvapara – 2,400 years and Kali – 1,200 years). As a result, the 28th Dvapara Yuga endured for 2,400 years within this revised framework. Notably, preceding the Mahabharata era and the end of the 28th Dvapara Yuga (3176 BCE), the duration of a Yuga expanded from 1,200 years to 432,000 years, while that of a Chaturyuga 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:

28th cycle of four Yugas	**In CE**
Krita Yuga of 5 years	6782-6777 BCE
Treta Yuga of 1,200 years	6777-5577 BCE
Dvapara Yuga of 2,400 years	5577-3177 BCE
Kaliyuga of 432,000 years	3176 BCE onwards

Indian Astronomical Siddhantas Evolved Around 7322-3101 BCE

Varāhamihira's *Panchasiddhantika* presents the fundamental principles of five Indian Siddhantas: Surya, Paitamaha, Vasishtha, Romaka, and Paulisha Siddhantas. Among these, the Romaka Siddhanta 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 Siddhanta's 2,850-year cycle is derived from the Shatapatha Brahmana's 95-year cycle (95 x 30 = 2850), challenging the notion of its foreign origins.

Furthermore, the Metonic cycle of 19 years has stemmed from a sub-cycle of 95 years (19 x 5 = 95) within the Romaka Siddhanta. Lāṭadeva's commentary on Romaka and Paulisha Siddhantas provides additional historical context, reinforcing its Indian origin.

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

Brahma Siddhanta introduced a calendar scheme with cycles of 12 and 60 years from 6773 BCE, influenced by *Surya Siddhanta*, thereby initiating the first 60-year cycle of the Kaliyuga cycle in 3173 BCE. Presently, Indians and Tibetans follow the 60-year cycle of Brahma Siddhanta. Another tradition of the 60-year cycle marks the commencement of the Kaliyuga cycle in 3127 BCE, correlating with Jupiter's transit through Dhanishtha Nakshatra in the sign of Capricorn.

The extant text of *Surya Siddhanta*, compiled by Lāṭadeva around 3101 BCE, draws from Mayasura's *Surya Siddhanta* of 6778 BCE. Varahamihira's *Panchasiddhantika* provides a summary of Mayasura's work, highlighting a key difference: Mayasura espoused a Yuga of 3000 years and 180,000 years in the Asura tradition whereas Lāṭadeva advocated for a Chaturyuga of 12000 years and 4,320,000 years in the Deva tradition.

Lāṭadeva's observation of a rough planetary conjunction on Chaitra Shukla Pratipada, 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 Siddhantas:

The beginning of the cycle of the 28th Kaliyuga in the Indian calendars:	
Magha Shukladi Yuga calendar:	
Paitamaha Siddhanta	3176 BCE
Yudhishthira era	3161 BCE
Chaitra Shukladi Yuga calendar:	
Brahma Siddhanta (Jupiter in Aries)	3173 BCE
Brahma Siddhanta (Jupiter in Capricorn)	3127 BCE
Latadeva's *Surya Siddhanta*	3101 BCE

Traditionally, the Magha Shukladi calendar has been followed in ancient India since the Post-Vedic period. With the introduction of Siddhanta astronomy in 6777 BCE, North India adopted the Magha Shukladi calendar of Paitamaha Siddhanta and the Saptarshi cycle, while South India utilized the Chaitra Shukladi calendar of Brahma Siddhanta. However, Indian astronomers eventually recognized the discrepancies in the *Magha Shuklādi* calendar of Paitamaha Siddhanta and the traditional intercalation of Pausha-Ashadha months within the lunisolar calendar. Consequently, the Baisakhi (*Vaishakhādi*) calendar was introduced in North India based on the premise that the vernal equinox used to occur in the sign of Taurus around 2000 BCE.

However, as astronomical knowledge progressed, the *Chaitra Shuklādi* calendar and the Kaliyuga cycle established by Latadeva's *Surya Siddhanta* (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 Shuklādi* calendar associated with the Paitamaha calendar (3176 BCE) became primarily limited to Vedic rituals.

Thus, the tradition of Siddhantic 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.

The calendar of the Saptarshi cycle of 2,700 years (Since 6777 BCE)

The Saptarshi cycle, introduced into the Yuga calendar of the Paitamaha Siddhanta 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 Nakshatras. This novel approach provided 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 Saptarshi cycle. The adoption of the Chaitra Shuklādi calendar in Kashmir after 78 CE necessitated a recalibration of the Saptarshi calendar in 3076 BCE, marking the start of the *Laukika* era or *Sāstriya* era.

Classical Indian sources (*Vayu Purana 99.419, Vishnu Purana 4.24.105, Brihat Samhita 13.3.4 and Kalhana's Rajatarangini*) indicate that King Yudhishthira of the Mahabharata era ascended to the throne during the Maghā Nakshatra sub-cycle (3176-3076 BCE). Inscriptional evidence from Hisse Borala in Maharashtra, India, refers to the Uttara Phālguni sub-cycle (276-176 BCE), further validating the continuous use of the Saptarshi calendar.

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 Sāstrīya era and the 4,270th year of the Kaliyuga era, corresponding to 1169 CE. These classical and inscriptional sources provide compelling evidence of the continuous utilization of the Saptarshi calendar for over 8,800 years, underscoring the deep antiquity of ancient Indian civilization and its sophisticated astronomical traditions.

The continuous use of the Saptarshi 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.

Indian calendar of the Saptarshi cycle – from 6777 BCE to 3076 BCE:

	Name of nakshatra	**In CE**
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	Punarvasū	6177-6077 BCE
8	Puṣya	6077-5977 BCE
9	Āśleṣa	5977-5877 BCE

10	Maghā	5877-5777 BCE
11	Pūrva Phālgunī	5777-5677 BCE
12	Uttara Phālgunī	5677-5577 BCE
13	Hasta	5577-5477 BCE
14	Chitrā	5477-5377 BCE
15	Svāti	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	Sravaṇa	4677-4577 BCE
23	Sraviṣṭhā (Dhaniṣṭhā)	4577-4477 BCE
24	Satabhiṣaj	4477-4377 BCE
25	Pūrva Bhādrapadā	4377-4277 BCE
26	Uttara Bhādrapadā	4277-4177 BCE
27	Revatī	4177-4077 BCE
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	Punarvasū	3477-3377 BCE
8	Puṣya	3377-3277 BCE
9	Āśleṣa	3277-3176 BCE
10	**Maghā**	**3176-3076 BCE**

Traditional Date of the Mahabharat War (3162 BCE)

The entirety of traditional Indian evidence, along with the internal evidence presented in the Mahabharata (Adi Parva 2.9), clearly indicates that the Mahabharata War took place at the conclusion of the Dvapara Yuga and the onset of the Kaliyuga. The subsequent verses of the Mahabharata suggest that the Kaliyuga commenced shortly before the Mahabharata War:

यस्मिन् यत्नः कृतोऽस्माभिः स नो हीनः प्रयत्नतः, अकृते तु प्रयत्नेऽस्मान् उपावृत्तः **कलि**र्महान् ॥

एतत् **कलियुगं** नाम अचिराद्यत् प्रवर्तते, युगानुवर्तनं त्वेतत् कुर्वन्ति चिरजीविनः ॥ (Vana Parva 148.37)

प्राप्तं **कलियुगं** विद्धि प्रतिज्ञां पाण्डवस्य च, आनृण्यं यातु वैरस्य प्रतिज्ञायाश्च पाण्डवः॥ (Shalya Parva 59.21)

कौमुदे मासि रेवत्यां शरदन्ते हिमागमे, स्फीतसस्यमुखे काले **कले:** सत्त्ववतां वरः॥ (Udyoga Parva 8.17)

While discussing the Saptarshi cycle, the Vayu Purana (99.419), Vishnu Purana (4.24.105), Varahamihira's Brihat Samhita (13.3.4), Kaliyuga Rajavrittanta, and Kalhana's Rajatarngini document that the 100-year sub-cycle of the Saptarshi calendar was in Magha Nakshatra during the reign of Yudhishthira (आसन् मघासु मुनय: शासति युधिष्ठिरे नृपतौ ।).

The reconstruction of the Magha Shukladi calendar of Paitamaha Siddhanta and the Saptarshi cycle, as discussed in detail, establishes that according to the Magha Shukladi calendar of Paitamaha Siddhanta, the Dvapara Yuga concluded and the Kaliyuga commenced in 3176 BCE. The 100-year sub-cycle in the Saptarshi calendar related to Magha Nakshatra can be accurately dated to the period of 3176-3076 BCE. Consequently, it can be conclusively determined that the traditional date of the Mahabharata War falls within the Magha nakshatra period of 100 years, i.e., 3176-3076 BCE.

The traditional date of the Mahabharata War can be decoded from the Aihole inscription which is dated not only in the Saka calendar but also in relation to the epoch of the Mahabharata War. It is noteworthy that there are two distinct epochs within the Saka calendar as conclusively established in my book titled "*The Chronology of India: From Mahabharata to Medieval Era*". The Saka era began in 583 BCE, while the Sakanta era commenced in 78 CE. Historians have erroneously considered both epochs to be identical, resulting in a 661-year discrepancy in Indian chronology. As the Aihole inscription references the Saka era (583 BCE), the Saka year 556 can be accurately dated to 27 BCE (583 BCE - 556).

The Aihole inscription dated in Śaka 556 (27 BCE), explicitly states that 30 + 3000 + 100 + 5 = 3135 years elapsed up to 27 BCE from the year of the Mahābhārata War; therefore, 3135 years + 27 BCE = 3162 BCE marks the year of the Mahābhārata War.

"त्रिंशत्सु त्रिसहस्रेषु भारतादाहवादितः, (सौ)प्ताब्दशतयुक्तेषु गतेष्वब्देषु पञ्चसु ॥ पञ्चाशत्सु कलौ काले षट्सु पञ्चशतासु च, समासु समतीतासु शकानामपि भूभुजाम्॥"

Date in the Epoch of Mahabharata War (3162 BCE)	**Date in the Epoch of Saka Era (583 BCE)**
भारतात् आहवात् इतः (भारतयुद्धात्) = Starting from the year of the Mahabharata War. त्रिंशत्सु = 30 (Thirty) त्रिसहस्रेषु = 3000 (Three Thousand) **(सौ)**प्ताब्दशतयुक्तेषु = 100 (one hundred) **ग**तेष्वब्देषु पञ्चसु = 5 (Five) (30+3000+100+5 = 3135 years elapsed) 27 BCE + 3135 years = **3162 BCE**	पञ्चाशत्सु = 50 षट्सु = 6 पञ्चशतासु = 500 (50+6+500 = 556 years) Saka 556 = **27 BCE**

Historians have misinterpreted the statement of the Aihole inscription *"Sauptābda-śata-yukteṣu"* as "*Saptābda-śata-yukteṣu*," leading to the miscalculation of 30 + 3000 + 700 + 5 = 3735 years elapsed, rather than 3135 years. By considering the epoch of the Śakānta era (78 CE) as the starting point for the Śaka era (583 BCE), historians arrived at the year 3101 BCE [3735 - (556 + 78) = 3101] and concluded that Ravikirti, the author of the Aihole inscription, referred to the epoch of the Kaliyuga as the epoch of the Mahābhārata War. However, none of the Indian traditional sources refer to the Surya Siddhanta year of Kaliyuga (3101 BCE) as the year of the Mahābhārata War.

Therefore, the reading "*Sauptābda-śata-yukteṣu*" should be regarded as the correct version. The term "*Saupta*" refers to the nighttime battle that occurred on the 18th day of the Mahabharata War, as detailed in the *Sauptika Parva*. Consequently, the Aihole inscription indicates that 3,135 years elapsed from "*Bhāratāt Āhavāt*," which translates to "the war of Bharatas," referring to the Mahābhārata War. As a result, the traditional date for the Mahābhārata War is documented as 3162 BCE in the Aihole inscription of Saka 556 (27 BCE).

During the second half of the 19th century, some scholars proposed that the Mahābhārata War occurred in 3138 BCE. This theory gained popularity despite a lack of epigraphic or literary evidence to substantiate it. The Mahābhārata records that Sri Krishna died in the 36th year elapsed, while the Bhāgavata, Vishnu, and Brahma Purāṇas mention that the epoch of Kaliyuga commenced with his death. By considering the epoch of Kaliyuga as beginning in 3102 BCE, the traditional date of the Mahābhārata War was approximated at 3138 BCE.

As previously explained, the beginning of the 28th Kaliyuga cycle slightly varies in different schemes of Indian Siddhantas:

The beginning of the cycle of the 28th Kaliyuga in the Indian calendars:	
Magha Shukladi Yuga calendar:	
Paitamaha Siddhanta	3176 BCE
Yudhishthira era	3161 BCE
Chaitra Shukladi Yuga calendar:	
Brahma Siddhanta (Jupiter in Aries)	3173 BCE
Brahma Siddhanta (Jupiter in Capricorn)	3127 BCE
Latadeva's *Surya Siddhanta*	3101 BCE

It is important to note that the epoch of 3101 BCE gained prominence only after the 2nd century BCE, when Indian astronomers began to follow the Sūrya Siddhānta of Latadeva. Prior to the 2nd century BCE, Indian astronomers did not reference the epoch of 3101 BCE. Aryabhaṭa indicated that the Kaliyuga commenced prior to the Mahābhārata War (कल्पादेः युगपादाः ग च गुरुदिवसाच्च भारतात्पूर्वम् - 1.5). According to the Brahma Siddhānta followed by Aryabhaṭa, the Kaliyuga began in the Prabhava Samvatsara, the first year of the 60-year cycle

when Jupiter was in Aries. The year 3173 BCE was the Prabhava Samvatsara preceding the Mahābhārata War. Yallayya, the author of *Jyotisha Darpana* and a commentary on *Aryabhatiyam*, stated that thePāndava era (Yudhishthira Samvat) commenced 12 years after the epoch of Kaliyuga (3173 BCE) [कल्यब्दाः रूप (12) रहिताः पाण्डवाब्दाः प्रकीर्तिताः]. Thus, Yallayya also indicated that the Yudhishthira Samvat commenced in 3161 BCE, 12 years after the epoch of Kaliyuga (3173 BCE) as per the Brahma Siddhānta.

The following numerous traditional sources unequivocally indicate the date of the Mahabharata War in the 32nd century BCE:

1. Kalidasa noted in his treatise *Jyotirvidabharanam*, composed in the Kaliyuga Year 3067 (34 BCE), that the epoch of the Yudhiṣṭhira era was abandoned after 3044 years.

2. Varāhamihira cites the treatise of Vriddha Garga, and records that a total of 2526 years elapsed leading up to the epoch of the Śaka-kāla (583 BCE or 636 BCE), which clearly indicates a date of 3176 BCE for Yudhiṣṭhira's reign over Indraprastha.
3. Additionally, a Vākāṭaka inscription of King Devasena indicates that the Saptarshis were located in Uttara Phālguni in Śaka 380 (203 BCE) suggesting that the Saptarshis were in Uttara Phalguni around 276-176 BCE. Thus, this Vakataka inscription also validates the traditional Saptarshi calendar and the fact that the Saptarshis were in Maghā nakshatra around 3176-3076 BCE.
4. The Kaliyuga Rājavrittānta states: "When Yudhiṣṭhira was crowned King at Śakraprastha, i.e., Indraprastha, the constellation of the Great Bear or the Saptarṣis entered the region of the star Maghā. Seventy-five years before the commencement of the Kaliyuga (3101 BCE), the Seven Rishis crossed over into the Maghā star while Yudhiṣṭhira was ruling the Earth." [यदा युधिष्ठिरो राजा शक्रप्रस्थे प्रतिष्ठितः । तदा सप्तर्षयः प्रापुर्मघाः पितृहिते रताः ॥ पञ्चसप्ततिवर्षाणि प्राक्कलेः सप्त ते द्विजाः। मघास्वासन् महाराजे शासत्युर्वीम् युधिष्ठिरे ॥]
5. An ancient manuscript detailing the chronological succession of the kings of Hastinapur was published in the fortnightly magazine “Hariśchandra Chandrikā and Mohan Chandrikā” in 1872. By aggregating the years from Yudhiṣṭhira’s reign in Indraprastha to the end of Vikramāditya II’s rule, the total amounts to 3178 years.
6. A verse from a lost text titled “Kutūhalamañjarī” informs us that Varāhamihira was born on the 8th *tithi* of the bright half of the Chaitra month, in Jaya Saṁvatsara, and in the year 3042 of the Yudhiṣṭhira era. Presumably, the Kutūhalamañjarī references the year 3188 BCE as the year of Yudhiṣṭhira’s coronation in Indraprastha.
7. The Nidhanpur copper plates of Bhāskaravarman (5th century BCE) record that the lineage of Naraka ruled for 3,000 years in Pragjyotiṣa, after which Puṣyavarman ascended the throne in the 7th century BCE. Bhagadatta, a descendant of the Naraka Dynasty, participated in the Mahābhārata War and supported the Pāndavas. Bhāskaravarman, the author of the Nidhanpur plates, was a descendant of Bhagadatta

and reigned over Kāmarūpa (comprising Assam and parts of northern Bangladesh) in the 5th century BCE. Thus, the Nidhanpur plates indirectly suggest that the traditional date of the Mahābhārata is around the 32nd century BCE.

In addition to the aforementioned points, various literary and epigraphic sources indicate that the Mahabharata War took place in the 32nd century BCE. Specifically, the Aihole inscription and Yellayya explicitly record that the Mahabharata War occurred in 3162 BCE.

Internal Astronomical Evidence: The Date of Mahabharata War (3162 BCE)

Internal evidence from the Mahabharata suggests that the Mahabharata War occurred at the transition from Dvapara Yuga to Kaliyuga; however, no specific date within the Dvapara Yuga or Kaliyuga calendar is provided. Due to the absence of an internally specified date, this research paper utilizes external evidence to establish the traditional date of the Mahabharata War as 3162 BCE, as the historicity of the Mahabharata is fundamentally reliant on an unbroken tradition. Prior to discussing the methodology for arriving at the date of 3162 BCE based on external evidence, it is essential to examine the internal astronomical evidence to validate the traditional date of the Mahabharata War. A comprehensive list of internal astronomical references has been provided in ***Appendix I***.

Internal references to Eclipses, Planetary Positions and Tithi Nakshatras

<u>Eclipses</u>

Mahabharata contains three explicit references to eclipses:

1. **A solar eclipse at the time of the Pandavas' departure for the forest:** Three explicit references in the *Sabha Parva (72.21, 79.29, and 80.23)* indicate the observation of a solar eclipse occurring precisely as the Pandavas left Hastinapura for the forest.
2. **A pair of eclipses (a lunar eclipse followed by a solar eclipse) in the year of the Mahabharata War:** The *Bhishma Parva (3.11, 3.28, 3.29)* and the *Shalya Parva (55.10)* mention that a lunar eclipse followed by a solar eclipse transpired prior to the date of the Mahabharata War. Additionally, it is noted in the *Bhishma Parva* that these eclipses occurred before the completion of the fourteenth tithi (within 14 days).
3. **A solar eclipse in the 35th year following the Mahabharata War:** The *Mausala Parva (2.19, 2.20, 3.16)* indicates that a solar eclipse took place in the 35th year, again before the completion of the fourteenth tithi (within 14 days).
4. **Prediction of a solar eclipse:** In the *Udyoga Parva (141.10)*, Karna informs Krishna seven days prior to the commencement of the Mahabharata War that a solar eclipse is anticipated, based on his observations of the moon.

<u>Planetary Positions</u>

Numerous planetary positions in relation to their proximity to Nakshatras are referenced in the Mahabharata:

1. **Saturn (Shani):** The occultation of Rohini by Saturn (*Bhishma Parva 2.23*), Saturn was retrograde near Bhagya Nakshatra, i.e., Purva Phalguni nakshatra (*Bhishma Parva 3.13*). Saturn in Vishakha Nakshatra (*Bhishma Parva 3.25*),
2. **Jupiter (Brihaspati):** Jupiter in Vishakha Nakshatra (*Bhishma Parva 3.25*), Jupiter was retrograde in Shravana Nakshatra (*Bhishma Parva 3.13*), Jupiter in Rohini Nakshatra (*Karna Parva 95.51*).
3. **Mars (Angaraka):** Mars was in retrograde in Magha Nakshatra (*Bhishma Parva 3.13*). Mars completed its retrograde motion near Chitra and Svati nakshatras and approached Anuradha and Jyeshtha Nakshatra. Thereafter, Mars was in Shravana prior to the date of the Mahabharata War (*Bhishma Parva 3.16*, *Udyoga Parva 141.8* & *Bhishma Parva 3.17*).
4. **Venus (Shukra):** Venus is poised to enter retrograde in Purva Bhadrapada nakshatra (*Bhishma Parva 3.15*), Venus and Mars were in conjunction on the 17th day of the MB War (*Shalya Parva 11.17*).
5. **Mercury (Budha):** Mercury was in retrograde in three nakshatras prior to the date of the Mahabharata War (*Bhishma Parva* 3.27).

Eclipses as Primary Evidence

The eclipse observations documented in the Mahabharata serve as the primary evidence for establishing the absolute date of the Mahabharata War. Regardless of other evidence, reconciling the eclipse data is essential for dating the Mahabharata era. The subsequent analysis of the eclipse data confirms that only the year 3162 BCE qualifies as the year of the Mahabharata War.

Eclipse 1: A solar eclipse at the time of the Pandavas' departure for the forest:

As previously noted, the Mahabharata war began on the day of Karttika Amavasya in 3162 BCE. The Pandavas completed their 13-year period of exile approximately seven to ten months prior to the day of Karttika Amavasya in 3162 BCE. Consequently, the solar eclipse observed when the Pandavas departed for the forest likely occurred no earlier than Magha Amavasya and no later than Vishakha Amavasya.

The Pandavas departed from Hastinapura 13 years prior to 3162 BCE, during which an annular solar eclipse was recorded on Chaitra Amavasya, occurring on 26 February 3175 BCE, and this eclipse was visible in Hastinapura.

Solar eclipse on 26 February 3175 BCE

आसीन्निष्टानको घोरो निर्घातश्च महानभूत्। दिवोल्काश्चापतन्घोरा राहुश्चार्कमुपाग्रसत्॥

(Sabha Parva 72.21) अनभ्रे विद्युतश्चासन् भूमिश्च समकम्पत । राहुरग्रसदादित्यं अपर्वणि विशांपते ॥ *(Sabha Parva 79.29)*

Eclipse 2: A pair of eclipses (a lunar eclipse followed by a solar eclipse) in the year of the Mahabharata War

The Bhishma Parva of the Mahabharata states, "A fortnight from a full moon to a new moon typically consists of 14 days (*Chaturdashi*), 15 days (*Panchadashi*), or 16 days (*Shodashi*). However, it is noted for the first time that the day of the new moon can occur on the 13th day (*Trayodashi*) following the full moon. During this same fortnight, both the moon and the sun experienced eclipses, with the solar eclipse occurring on the 13th day." This indicates that the Mahabharata takes into account the elapsed days (*tithis*) of the fortnight. Since the solar eclipse occurred before the completion of the 14th day, the Mahabharata affirms that the eclipse took place on the 13th day.

Considering the "Thirteen day" eclipse pair to be a unique astronomical observation, Dr S Balakrishna, a scientist at NASA, extensively analysed all pairs of eclipses visible at Kurukshetra from 3300 BCE to 700 BCE. He writes in his article "*Dating Mahabharata: Two Eclipses in Thirteen Days*" published in February 2002:

> "*A very detailed scan of all the visible lunar and solar eclipses for every year from 3300 BC to 700 BC was made on the Lodestar software for Kurukshetra location. The maximum eclipse time gap (end of one eclipse and beginning of the next eclipse for naked eye observers) was found to be about 379 hours while the minimum was about 332 hours. During the period 3300 BC to 700 BC, nearly 672 pairs of eclipses occurred on earth, which in principle may have been visible at Kurukshethra. Amongst these, nearly 32 pairs would be occurring for period less than 14 days. Many of these were found to be weak penumbral eclipses of moon, and solar eclipses had such low obscurity as to raise the issue whether anybody could see them. Six pairs of "thirteen day" eclipses could be seen unambiguously. The conclusion is that such eclipse pairs have occurred and observers could easily identify the duration using sunset/sunrise transitions. 3128 BCE and 2558 BCE dates appear to be very viable dates for the Mahabharata war.*"

Table 1: Six eclipse pairs visible at Kurukshetra occurring in less than or near 14 days

Year BC	Eclipse	Julian Day	Initial Con	Max	End	Sunrise	Sunset	End/Start Dt
3128	Solar	Aug 11	18:53:48	19:48:04	20:38:54		19:22	13d20h20m
3128	Lunar	Aug 25	16:58:50	18:21:36	19:44:21		19:17	
2558	Solar	Jul 11	03:50:53	04:36:27	05:24:36	05:12		13d20h8m
2558	Lunar	Jun 27	03:29:54	05:13:45	06:57:36	05:07		

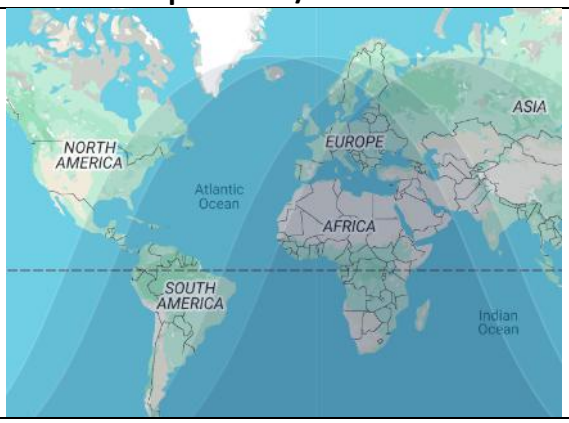
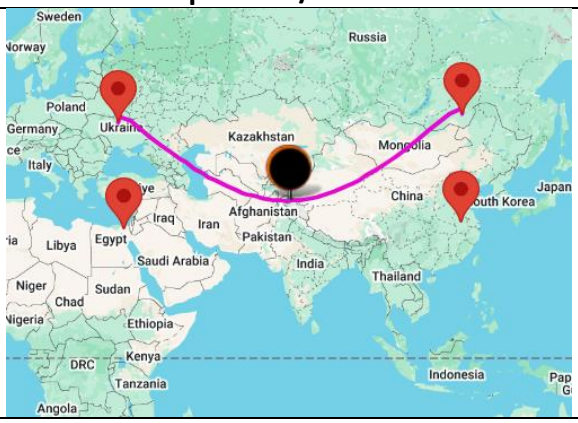
2057	Solar	Nov 25	16:50:19	17:52:24	18:48:02		17:38	13d21h40m
2057	Lunar	Dec 09	16:27:47	18:12:55	19:58:05		17:32	
1852	Solar	Dec 30	15:47:28	17:00:02	18:03:38		17:29	13d22h14m
1852	Lunar	Jan 13	16:17:56	17:24:16	18:30:37		17:36	
1707	Solar	Mar 27	04:55:14	05:47:28	06:44:15	06:37		13d20h18m
1707	Lunar	Apr 10	03:02:36	04:46:36	06:30:55	06:19		
1396	Solar	Jul 04	19:00:34	19:36:54	20:11:34		19:21	13d21h30m
1396	Lunar	Jul 18	17:41:38	19:34:00	21:26:30		19:23	

The analysis of all pairs of eclipses presented by Dr. S. Balakrishna offers valuable insights into the eclipse pairs visible at Kurukshetra occurring within 14 days or less. However, Dr. Balakrishna utilized Lodestar Software in 2002, whereas we now have access to the JPL Horizons Ephemeris System developed by NASA, which provides significantly greater accuracy. Additionally, Dr. Balakrishna focused on eclipse pairs occurring within 336 hours (14 days). Given that the duration of tithi can range from 21.5 hours to 26 hours in the Indian lunar calendar, it would be more appropriate to consider the timings of eclipse pairs occurring within 14 days using the JPL Horizons Ephemeris System for software simulation. Thereafter, the Indian lunar calendar may be reconstructed for the period to verify the occurrence of a new moon on Trayodashi (13th Day).

Accordingly, the present study examines the lunar eclipse that occurred on 20/21 December 3163 BCE followed by the solar eclipse on 3/4 January 3162 BCE, and finds that this pair of eclipses corresponds precisely to the description of eclipses provided in the Mahabharata. This eclipse pair consists of a lunar eclipse followed by a solar eclipse, with the solar eclipse occurring on the *tithi* of *Trayodashi* (13th Day), as clearly indicated in the Mahabharata. The lunar eclipse occurred on the night of 20 December 3163 BCE, and ended on the morning of December 21, 3163 BCE. Therefore, 21 December 3163 BCE, was considered the day of the full moon. Software simulations using Stellarium and JPL Horizons clearly show an eclipsed rise of the Sun on 4 January 3162 BCE. Consequently, Amavasya (New Moon) commenced on Trayodashi, 3 January 3162 BCE.

Table 2: Reconstructed Indian lunar calendar from 21 Dec 3163 BCE to 4 Jan 3162 BCE

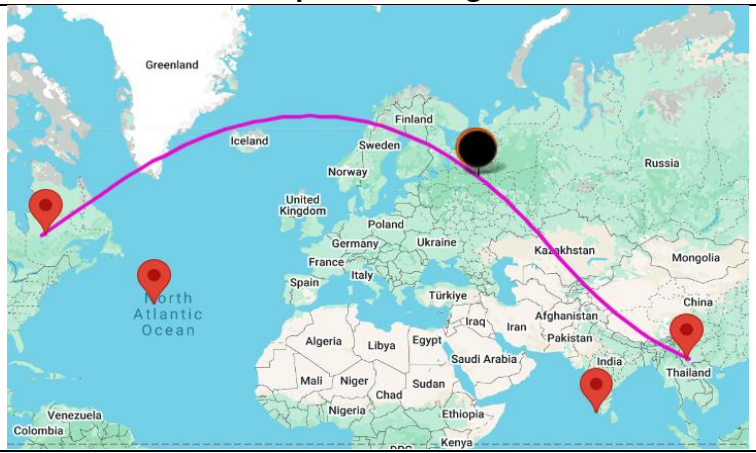
21 Dec 3163 BCE	*Purnima*	29 Dec 3163 BCE	*Ashtami*
22 Dec 3163 BCE	*Pratipada*	30 Dec 3163 BCE	*Navami*
23 Dec 3163 BCE	*Dvitiya*	31 Dec 3163 BCE	*Dashami*
24 Dec 3163 BCE	*Tritiya*	1 Jan 3162 BCE	*Ekadashi*
25 Dec 3163 BCE	*Chaturthi*	2 Jan 3162 BCE	*Dvadashi*
26 Dec 3163 BCE	*Panchami*	3 Jan 3162 BCE	*Trayodashi*
27 Dec 3163 BCE	*Shashthi*	4 Jan 3162 BCE	*Chaturdashi*
28 Dec 3163 BCE	*Saptami*		

Lunar Eclipse on 20/21 Dec 3163 BCE	Solar Eclipse on 3/4 Jan 3162 BCE
	

चतुर्दशीं पञ्चदशीं भूतपूर्वा च षोडशीम्, इमां तु नाभिजानामि अमावास्यां त्रयोदशीम्॥
चन्द्रसूर्यावुभौ ग्रस्तौ एकमासे त्रयोदशीम्, अपर्वणि ग्रहावेतौ प्रजाः संक्षपयिष्यतः॥ *(Bhishma Parva 3.28-29)*
राहुश्चाग्रसदादित्यमपर्वणि विशां पते । चकम्पे च महाकम्पं पृथिवीं सवनद्रुमाः ॥ *Shalya Parva 55.10*

Eclipse 3: Solar Eclipse in the 35th Year or 36th Year Following the Year of the Mahabharata War

In the Mausala Parva, it is noted that upon the arrival of the 36th year following the Mahabharata War, numerous ominous signs were observed. The 14th day (Chaturdashi) was transformed into the 15th day (Panchadashi) by Rahu, similar to occurrences noted prior to the Mahabharata War. The Mausala Parva mentions a solar eclipse that took place in the 35th or 36th year after the Mahabharata War. The year 3128 BCE corresponds to the 35th year when counting from 3162 BCE, the year of the Mahabharata War. A solar eclipse was recorded on the morning of 12 August 3128 BCE, followed by a lunar eclipse on 26 August 3128 BCE. Dr. S. Balakrishna has previously established that this pair of eclipses occurred within a span of less than 14 days. Since the lunar eclipse was not visible in India, the Mausala Parva recorded only the occurrence of a solar eclipse.

Total solar eclipse on 12 August 3128 BCE


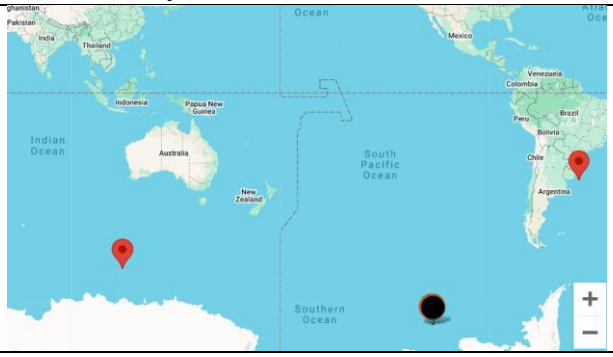
षट् त्रिंशे त्वथ संप्राप्ते वर्षे कौरवनन्दन, ददर्श विपरीतानि निमित्तानि युधिष्ठिरः .....
एवं पश्यन् हृषीकेशः संप्राप्तं कालपर्ययम्, त्रयोदश्याम् अमावास्यां तान्दृष्ट्वा प्राब्रवीद् इदम्॥

चतुर्दशी पञ्चदशी कृतेयं राहुणा पुनः, तदा च भरते युद्धे प्राप्ता चाद्य क्षयाय नः॥
विमृशन्न एव कालं तं परिचिन्त्य जनार्दनः मेने पराप्तं स षट्त्रिंशं वर्षं वै केशि सूदनः
(Musala Parva 1.1 & 3.16-18)

Eclipse 4: Prediction of a solar eclipse

In the Udyoga Parva, Karna informs Krishna of an anticipated solar eclipse, which is based on specific observations of the moon. It appears that the astronomers of the Mahabharata era devised a method for predicting eclipses through astronomical observations of the moon and mathematical simulations. Notably, a solar eclipse did occur on 25 November 3162 BCE, immediately following the Mahabharata War; however, it was not visible in India.

Solar Eclipse on 25 November 3162 BCE



सोमस्य लक्ष्म व्यावृत्तं राहुरर्कम् उपेष्यति।
दिवोल्काश्च पतन्त्येताः सनिर्घाताः सकम्पनाः॥
(Udyoga Parva 141.10)

Supermoon or Lunar Eclipse Prior to the Date of the Mahabharata War

One verse from the Bhishma Parva suggests that a Supermoon or Harvest Moon occurred on the full moon day of the Karttika month (10 Oct 3162 BCE), just before the Mahābhārata War.

अलक्ष्यः प्रभयाहीनः पौर्णमासीं च कार्त्तिकीम्, चन्द्रोऽभूद् अग्निवर्णश्च समवर्णे नभस्तले॥ (Bhishma Parva 2.23)

Some scholars have misinterpreted this shloka, asserting that a penumbral lunar eclipse took place on Karttika Purnima immediately prior to the date of the Mahabharata War. If it had been a penumbral lunar eclipse, the term "रक्तवर्णः" would have been used instead of "अग्निवर्णः." Furthermore, the phrase "समवर्णे नभस्तले" indicates that the colour of the horizon matched that of the Moon. Therefore, this verse from the Bhishma Parva refers to a Supermoon or Harvest Moon, rather than a penumbral lunar eclipse.

Planetary Positions of Saturn, Jupiter and Mars

The Mahabharata references Saturn's regular occultation of Rohini as a negative omen. Additionally, it notes Saturn's position in Vishakha and Purva Phalguni.

> रोहिणीं पीडयन्नेष स्थितो राज**ञ्शनैश्चरः**। (*Bhishma Parva 2.23),* प्राजापत्यं हि नक्षत्रं ग्रहस्तीक्ष्णो महाद्युतिः । **शनैश्चरः** पीडयति पीडयन् प्राणिनोऽधिकम् ॥. *(Udyoga Parva 141.10),* संवत्सरस्थायिनौ च ग्रहौ प्रज्वलितावुभौ। विशाखयोः समीपस्थौ बृहस्पति**शनैश्चरौ**॥ *(Bhishma Parva 3.25)*, मघास्वङ्गारको वक्रः श्रवणे च बृहस्पतिः। भाग्यं नक्षत्रमाक्रम्य **सूर्यपुत्रेण** पीड्यते॥ *(Bhishma 3.13)*

The Mahabharata also references Jupiter's position in Rohini, Vishakha, and Shravana Nakshatras.

> **बृहस्पती** रोहिणीं संप्रपीड्य बभूव चन्द्रार्कसमानवर्णः । (*Karna Parva 95.51*), विशाखयोः समीपस्थौ **बृहस्पति**शनैश्चरौ॥ *(Bhishma Parva 3.25)*, मघास्वङ्गारको वक्रः श्रवणे **च बृहस्पतिः**। *(Bhishma 3.13)*

Some scholars have translated these slokas and posited that Saturn was in Rohini during the year of the Mahabharata War, while others have argued that Saturn was in Vishakha, leading to attempts to determine the date of the Mahabharata War that ultimately produced conflicting results. This methodology is fundamentally flawed, as the Mahabharata does not specify the positions of Saturn and Jupiter during the year of the war. Rather, the text references negative omens that occurred prior to the Mahabharata War. Consequently, the positions of Saturn or Jupiter in specific nakshatras are not relevant to the dating of the Mahabharata War.

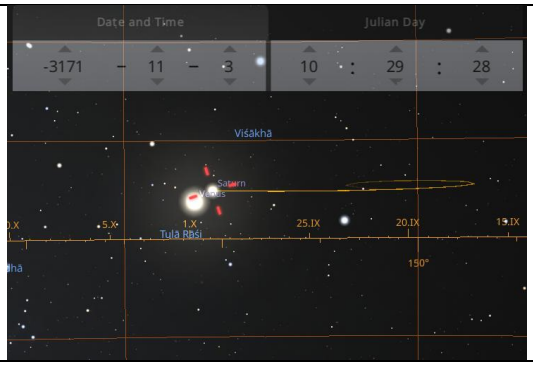
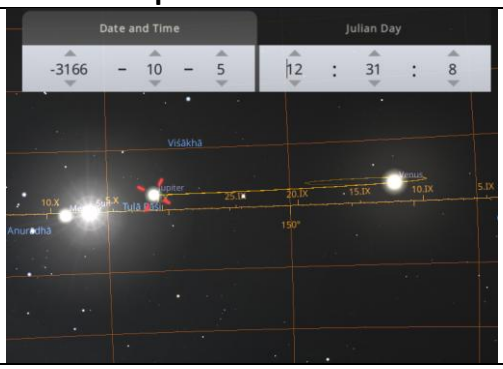
Regular Occultation of Rohini by Saturn

The Mahabharata states that Saturn regularly occults Rohini. In Sanskrit, the term "पीडयन्" is derived from the suffix "शानच्". Panini's sutra "लक्षणहेत्वोः क्रियायाः" (*Ashtadhyayi 3.2.126*) indicates that the suffix "शानच्" in the phrase "पीडयन् पीडयति" is used in the context of "लक्षण," akin to "शयानो भुञ्जानाः यवनाः" *(Yavanas regularly eat their meals on bed)*. The concept of "लक्षण" applies when unusual phenomena are observed consistently. Consequently, the Mahabharata employs the phrase "पीडयन् पीडयति" in reference to Saturn, as Saturn was regularly occulting Rohini during the period around 3500-3000 BCE. Therefore, the assertion that Saturn was located in Rohini during the year of the Mahabharata War is inaccurate.

Saturn and Jupiter in Vishakha

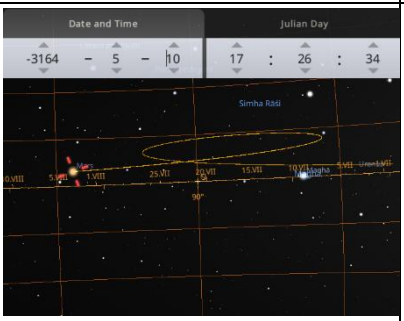
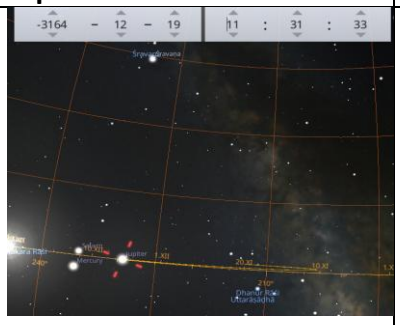
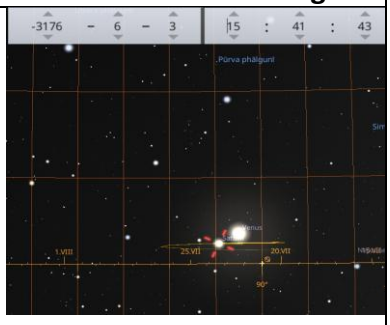
While discussing negative omens, the Mahabharata notes that two planets,namely Saturn andJupiter, have approached the constellation Vishakha (in Libra) and have become stationary there for a Samvatsara, or an entire year. The term "स्थायिनौ" clearly suggests

retrograde motion. Saturn entered retrograde in Vishakha in 3171 BCE, and Jupiter was retrograde in Vishakha in 3166 BCE. Notably, both 3171 BCE and 3166 BCE correspond to Samvatsara, representing the first year in the five-year Yuga calendar of Vedanga Jyotisha. Vishakha is the last Nakshatra in Libra. Although Saturn is exalted in Libra, an exalted planet in retrograde is considered debilitated. Jupiter, while the ruling planet of Vishakha, does not yield favourable results when situated in Libra due to its conflict with Venus, the lord of Libra. Consequently, the presence of retrograde Jupiter in Vishakha is deemed inauspicious. Therefore, the Mahabharata suggests negative omens associated with the retrograde positions of Saturn and Jupiter in Vishakha.

Saturn in Vishakha	Jupiter in Vishakha
	
संवत्सरस्थायिनौ च ग्रहौ प्रज्वलितावुभौ। विशाखयोः समीपस्थौ बृहस्पति**शनैश्चरौ**॥ *(Bhishma Parva 3.25)*	

Saturn in Purva Phalguni, Jupiter in Shravana and Mars in Magha

The Mahabharata identifies three instances of retrograde motion in Bhishma Parva, which are considered negative omens. Mars was retrograde in Magha, Jupiter was retrograde in Shravana, and Suryaputra (Saturn) approached the constellation Bhaga, afflicting it. Saturn was retrograde near Purva Phalguni in 3177-3176 BCE, Jupiter was retrograde near Shravana and Mars was retrograde in Magha in 3164 BCE.

Mars near Magha	Jupiter near Shravana	Saturn near Purva Phalguni
		
मघास्वङ्गारको वक्रः श्रवणे च बृहस्पतिः। भाग्यं नक्षत्रमाक्रम्य **सूर्यपुत्रेण** पीड्यते॥ *(Bhishma 3.13)*		

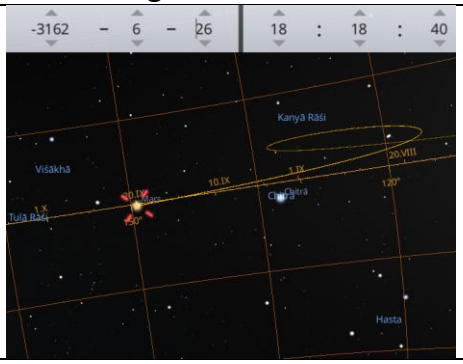
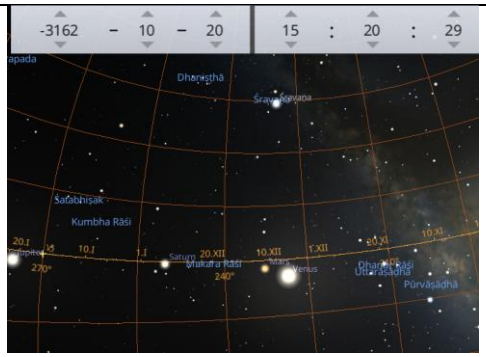
Jupiter in Rohini

The Mahabharata also mentions that Jupiter approached Rohini and afflicted it. This statement also indicates retrograde Jupiter near Rohini. Jupiter was retrograde in Rohini in 3171 BCE.

बृहस्पती रोहिणीं संप्रपीड्य बभूव चन्द्रार्कसमानवर्णः।
(*Karna Parva 95.51*)

Mars retrograde close to Chitra and Swati in the Year of Mahabharata War

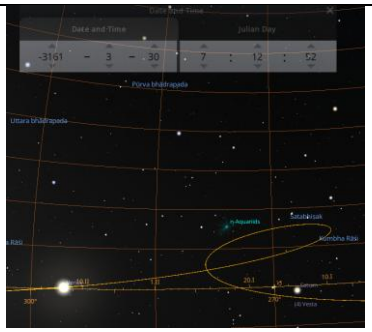
The Mahabharata states that Mars has positioned itself near the constellations of *Citra* and *Swati* and has entered a retrograde motion. Following the completion of this retrograde phase, Mars is currently located near the Shravana nakshatra in Brahma Rashi. Therefore, the Mahabharata clearly and unequivocally discusses the retrograde motion of Mars near Citra and Swati, as well as its position in Shravana just prior to the date of the Mahabharata War.

Mars in retrograde near Chitra & Swati	Mars in Shravana before MB War
	
ध्रुवः प्रज्वलितो घोरमपसव्यं प्रवर्तते ।चित्रास्वात्यन्तरे चैवधिष्ठितः परुषोग्रहः॥, वक्रानुवक्रं कृत्वा च श्रवणे पावकप्रभः। **ब्रह्मराशिं** समावृत्य लोहिताङ्गो व्यवस्थितः॥(Bhishma Parva 3.16-17)	

The position of Mars is further elaborated in the Udyoga Parva, stating that after completing its retrograde motion, Mars approached Jyeshtha and appeared to be pleading to Anuradha (also known as Maitra Nakshatra) to pacify her. Thereafter, Mars approaches Brahmarashi (Constellation Cygnus) and positions in Shravaṇa Nakshatra. [कृत्वा चाङ्गारकॊ वक्रं ज्येष्ठायां मधुसूदन। अनुराधां प्रार्थयते मैत्रं संशमयन् इव ॥ (Udyoga Parva 141.8)]

Venus in Purva Bhadrapada

The Mahabharata indicates that just prior to the commencement of the War, Venus is set to enter retrograde motion in Purva Bhadrapada. Venus was in Shravana at the beginning of the War and went retrograde in December 3162 BCE/ January 3161 BCE in Purva Bhadrapada.

Venus went retrograde in Purva Bhadrapada

शुक्रः प्रोष्ठपदे पूर्वे समारुह्य विशांपते, उत्तरे तु परिक्रम्य सहितः प्रत्युदीक्षते ॥(Bhishma Parva 3.15)

Mercury in retrograde three times

The Mahabharata suggests a concerning omen indicating that Mercury was frequently in retrograde and had completed its retrograde motion in three Nakshatras prior to the onset of the War.

त्रिषु पूर्वेषु सर्वेषु नक्षत्रेषु विशां पते। बुधः संपतते अभीक्ष्णं जनयन् सुमहद् भयम् II (Bhishma Parva 3.27)

Mercury was in retrograde across three Nakshatras—Purva Bhadrapada (in January 3162), Pushya (in May 3162 BCE), and Vishakha (in September 3162 BCE)— in less than 10 months prior to the commencement of the Mahabharata war on October 25, 3162 BCE.

Venus and Mars in conjunction along with Mercury on the 17th/18th day of MB War

In the Gita Press edition of the Mahabharata, it is noted that Venus and Mars were in conjunction, with Mercury in close proximity, on the 17th/18th day of the war. Specifically, Venus and Mars were in conjunction in Dhanishtha on 11/12 November 3162 BCE, while Mercury was positioned in Purvashadha. Considering that the war commenced on 25 October 3162 BCE, 11 November marked the 17th day, and 12 November marked the 18th day.

Venus and Mars in conjunction

भृगुसूनुधरापुत्रौ शशिजेन समन्वितौ, चरमं पाण्डुपुत्राणां पुरस्तात् सर्वभूभुजाम् ॥ (Shalya Parva 11:17)

The Observation of all Planets when Moon was in Magha

Bhishma Parva (17.2) provides the observation that on 18 October 3162 BCE, eight days prior to the commencement of the Mahabharata War (26 October 3162 BCE), the Moon ascended in Magha Nakshatra. It is noted that during this occurrence, none of the seven planets – five planets, Rahu, and Ketu – were visible in the nighttime sky as they all arose during daylight hours.

मघाविषयगः सोमस्तद्दिनं प्रत्यपद्यत । दीप्यमानाश्च सम्पेतुर्दिवि सप्त महाग्रहाः ॥ *(Bhishma Parva 17.2)*

Shveta Graha and Shyama Graha

The Mahabharata mentions the positions of two Grahas - *Shveta Graha* in Chitra and *Shyama Graha* in Jyeshtha. Seemingly, *Shveta Graha* refers to Ketu and *Shyama Graha* refers to Rahu. However, accurately explaining the positions of Rahu and Ketu during the Mahabharata era requires a thorough understanding of the astrological charts used at that time.

> अभीक्ष्णं कम्पते भूमिरर्कं राहुस्तथाग्रसत् । श्वेतो ग्रहस्तथा चित्रां समतिक्रम्य तिष्ठति ॥ (Bhishma Parva 3.11), श्यामो ग्रहः प्रज्वलितः सधूमः सहपावकः । ऐन्द्रं तेजस्विनक्षत्रं ज्येष्ठामाक्रम्य तिष्ठति ॥ (Bhishma Parva 3.15)

As discussed the internal astronomical evidence in detail, the primary evidence—specifically, all four eclipses and planetary positions—can be accurately corroborated for the year 3162 BCE.

As regards the solar eclipse at the time of the Pandava's exile, there is a dispute regarding whether the Mahabharata war took place in the 14th year or after the 14th year from the date of the Pandavas' exile. The internal evidence clearly indicates that the war occurred in the 14th year. According to the Udyoga Parva, Krishna travelled from Upaplavya to Hastinapur on his peace mission; however, the dialogues failed, leading to the war shortly after that. When Krishna met Kunti during his peace mission, she stated, "This is the fourteenth year I haven't seen my sons and Draupadi" *(Udyoga Parva 88.46)*.

However, Professor R.N. Iyengar speculated that the war did not occur in the 14th year. He cites Krishna's statement during the conclave of kings at Upaplavya, in which Krishna mentions that almost a year has elapsed since the cattle-stealing episode *(Udyoga Parva 88.19-20)*. It is important to note that Krishna was referencing the time elapsed from the cattle-stealing episode to the beginning of the last peace mission. The cattle-stealing episode did not occur in the last month of the 13th year of exile; it took place roughly five to six months

before the end of the 13th year. Moreover, Kunti's dialogue with Krishna unambiguously indicates that the Mahabharata War took place in the 14th year from the date of exile. Thus, from the date of the solar eclipse that occurred close to the date of the Pandavas' exile to the commencement of the war, a total of 13 years and 8 or 9 months elapsed.

Based on the comprehensive analysis of eclipses and planetary positions presented above, the following three eclipses and three planetary positions serve as the primary astronomical evidence that researchers must consider when determining the date of the Mahabharata War.

1. **Eclipse 1:** A solar eclipse occurred 13 years and 7 to 10 months prior to the Mahabharata War. [*Sabha Parva (72.21, 79.29, and 80.23)]*
2. **Eclipse 2:** A pair of eclipses—a lunar eclipse followed by a solar eclipse—took place within 14 days (on *Trayodashi tithi*) and less than one year before the Mahabharata War. *[Bhishma Parva (3.11, 3.28, 3.29) & Shalya Parva (55.10)]*
3. **Eclipse 3:** A solar eclipse occurred in the 35th or 36th year following the Mahabharata War and took place within 14 days (on *Trayodashi tithi*). *[Mausala Parva 3.16-18]*
4. **Planetary Position 1 (PP1):** Mars completed its retrograde motion near Citra and Swati, approached Jyeshtha from Anuradha, and was positioned in Shravana just before the Mahabharata War. *[Bhishma Parva 3.16-17 & Udyoga Parva 141.8]*
5. **Planetary Position 2 (PP2):** Venus went retrograde in Purva Bhadrapada immediately after the Mahabharata War. *[Bhishma Parva 3.15]*
6. **Planetary Position 3 (PP3):** On the 17th or 18th day of the Mahabharata War, Venus and Mars were in conjunction, with Mercury nearby. *[Shalya Parva 11:17 of the Gita Press edition]*

The table below illustrates that none of the proposed dates for the Mahabharata War, as suggested by various scholars, adequately align with the primary astronomical evidence, except 3162 BCE.

		Eclipse 1	**Eclipse 2**	**Eclipse 3**	**PP 1**	**PP2**	**PP3**
Connected with traditional reckoning and chronology							
1	**-3162 [3163 BC] (Vedveer Arya)**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
2	-3142 [3143 BC] (PV Holey & ML Raja)	**N**	**N** SE not visible	**Y**	**N**	**N**	**N**
3	3138 BCE (Kota Venkatachalam)	**N** SE not visible	**N** SE not visible	**Y**	**N**	**Y**	**N**
4	-3138 [3139 BC] (Saroj Bala)						
5	-3136 [3137 BC] (Jayashree Saranathan)	N SE not visible	**N** LE & SE not visible	**N** SE not visible	**N**	**N**	**N**

6	-3128 [3129 BC] (S Balakrishna)	**N** SE not visible	**N** LE not visible	**N** SE not visible	**Y**	**N**	**N**
7	-3066 [3067 BC] (Srinivasa Raghavan, Narahari Achar, MM Pandit)	**N**	**N** SE not visible	**N** SE not visible	**Y**	**N**	**Y**
Disconnected with traditional reckoning and chronology							
8	-2558 [2559 BC] (S Balakrishna)	**N** SE not visible	**N** SE not visible	**Y**	**N**	**N**	**N**
9	-1952 [1953 BC] (Mohan Gupt)	**N**	**N** SE not visible	**N** SE not visible	**N**	**N**	**N**
10	-1792 [1793 BC] (Ashok Bhatnagar)	**N**	**Y**	**N**	**N**	**Y**	**N**
11	-1503 [1504 BC] (Krishnakumar Ramamoorty)	**N**	**Y**	**Y**	**Y**	**N**	**N**
12	-1477 [1478 BC] (RN Iyengar)	**N**	**Y**	**N** SE not visible.	**N**	**Y**	**N**
13	-1297 [1298 BC] (PR Sarkar)	**N**	**N**	**Y**	**N**	**N**	**N**
14	-1197 [1198 BC] (Dieter Koch)	**N**	**Y**	**N**	**N**	**N**	**Y**
15	-1196 [1197 BC] (Keshav Lakshman Daftari)	**N**	**Y**	**N**	**N**	**N**	**N**
16	-5560 [5561 BC] PV Vartak, Nilesh Oak	**N**	**N** SE not visible.	**N** SE not visible.	**Y**	**Y**	**Y**

As previously discussed, the references to three eclipses in the Mahabharata are unequivocal and leave no room for differing interpretations. Hence, these three eclipses serve as the main evidence for determining the chronology of the Mahabharata era. It would be irrational to selectively consider the position of Saturn or Jupiter in one nakshatra out of the three, given that the Mahabharata describes their positions in three different Nakshatras as negative omens. However, the Mahabharata clearly specifies the position and retrograde motion of Mars and Venus, as well as their conjunction on the 17th/18th day of the Mahabharata War. Consequently, the primary evidence comprises the position and retrograde motion of Mars, the position and retrograde motion of Venus, and the conjunction of Mars and Venus on the 17th/18th day of the Mahabharata War. The comparative study of various researches as presented above definitively establishes that only 3162 BCE can be considered as the year of

the Mahabharata War, as it aligns with all the primary evidence, including the occurrence of two solar eclipses within a span of 14 days.

Other Internal Astronomical Evidence

Yuga Calendar of the Paitamaha Siddhanta

Internal evidence from *Adi Parva (133.24)* and *Sabha Parva (11.28)* clearly indicates that the 5-year Yuga calendar outlined in the Paitamaha Siddhanta was in use during the Mahabharata era. *Adi Parva (2.9)* specifies that the conflict between the Kuru and Pandava armies occurred at the transition between Dvapara Yuga and Kaliyuga. The new year commenced on Magha Shukla Pratipada according to the 5-year Yuga calendar. Furthermore, *Virata Parva (52.3)* describes the intercalation scheme, which included one intercalary month (Ashadha) every two and a half months and an additional intercalary month (Pushya) every five years within the Yuga calendar.

When a dispute arose at the conclusion of the Pandavas' 13th year of exile regarding whether they had completed a full 13 years or fell slightly short, Bhishma clarified the 5-year Yuga calendar in *Virata Parva (47.3-4)*, stating that the Pandavas spent 13 lunar years, 5 lunar months, and 12 nights in exile.

According to Vedanga Jyotisha and the Paitamaha Siddhanta, a solar year consisted of 366 days, while a lunar year comprised 354 days, with a lunar month averaging 29.5 days. To understand Bhishma's clarification, it is essential to reconstruct the 5-year Magha Shukladi calendar of the Paitamaha Siddhanta, spanning from 3176 BCE to 3157 BCE as under:

- First 5-year calendar – From 10 January 3176 BCE to 12 January 3171 BCE
- Second 5-year calendar - From 13 January 3171 BCE to 17 January 3166 BCE
- Third 5-year calendar – From 18 January 3166 BCE to 22 January 3161 BCE
- Fourth 5-year calendar – From 23 January 3161 BCE to 29 December 3157 BCE

The Paitamaha Siddhanta calendar of 5-years followed a concept of *Kshayamasa* (deleted month). It appears that in the year 3175 BCE, Phalguna month was a *Kshayamasa*. Therefore, Pandavas left Hastinapur for exile on Chaitra Amavasya on 26 February 3175 BCE, a solar eclipse day. It was expected that the exile of Pandavas would be completed on Chaitra Amavasya on 1 April 3162 BCE. Since the Pandavas were found fighting on the side of the Virata King on 15 Mar 3162 BCE, 16 days before Chaitra Amavasya. Therefore, Duryodhana claimed that the Pandavas violated the terms of exile and they must go back to another 13-year term of exile. Bhishma intervened and explained that the Pandavas spent 13 lunar years, 5 lunar months, and 12 nights in exile which means the Pandavas were in exile for 4762 days [13 lunar years = 29.5 days x 156 = 4602 days, 5 lunar months = 29.5 days x 5 = 148 days and 12 nights = total 4762 days (4602+148+12)]. According to the Paitamaha Siddhanta, a solar year had 366 days. If 4762 days are divided by 366, the Pandavas already spent 13 solar years (366 x 13 = 4758 days) and 4 days extra. Thus, Bhishma logically explained the conversion of

5-year Yuga calendar into lunar years and the conversion of lunar years into the solar years and opined that the Pandavas successfully completed their 13-year exile. Despite the logical clarification provided by Bhishma, Duryodhana refused to accept his counsel, ultimately leading to the commencement of the Mahabharata war on 25 October 3162 BCE.

Tithi Nakshatras

The Mahabharata references various tithi nakshatras to specify the exact dates of historical events:

1. **Karttika Amavasya, Jyeshtha Nakshatra:** Udyoga Parva (140.18) explicitly states that the Mahabharata War commenced on Karttika Amavasya, Jyeshtha Nakshatra.
2. **Balarama returned from pilgrimage on the 18th Day of War, Shravana Nakshatra:** Balarama embarked on his pilgrimage on a day marked by Pushya Nakshatra and returned after 42 days on the 18th day of the Mahabharata War, coinciding with Shravana Nakshatra. [पुष्येण संप्रयातौ sस्मि श्रवणे पुनरागतः, ततौ मन्युपरीतात्मा जगाम यदुनन्दनः तीर्थयात्रां हलधरः सरस्वत्यां महायशाः I, मैत्रे नक्षत्रयोगे सम सहितः सर्वयादवैः I रौहिणेये गते शूरे पुष्येण मधुसूदनः (9.34.12-14)]

There appears to be an internal inconsistency in the text of the Mahabharata. If the first day of the Mahabharata War was on Jyeshtha Nakshatra, then the 18th day cannot be on Shravana Nakshatra. Furthermore, the Mahabharata states that Balarama convened a meeting of all Yadavas and decided to embark on a pilgrimage on the day of Maitra (Anuradha Nakshatra). It is unclear why Balarama waited from Maitra to Pushya (18 days). It is likely that Balarama went on his pilgrimage on Shravana (the 5th day from Maitra) and returned on Pushya. This timeline also aligns with the first day of the Mahabharata War occurring on Jyeshtha Nakshatra. It seems probable that an updater in the Gupta era made an error by interchanging the tithis associated with Balarama's pilgrimage.

Kārttika, the month of Śarad Ritu, during the Mahābhārata era

Udyoga Parva unambiguously indicates Kārttika month to be the month of Śarad Ritu (कौमुदे मासि रेवत्यां शरदन्ते हिमागमे I). In Sanskrit literature, Kārttika Māsa is well known as Kaumuda Māsa in Sanskrit. In Simhalese language, Kārttika month is also known as Kaumuda month. Nilesh Oak argues that Mārgaśirṣa month was the first month of Śarad Ritu during the Mahābhārata era. He quotes "मासानां मार्गशीर्षोस्मि" from the Bhagavad Gitā but it simply indicates that Mārgaśirṣa has been traditionally considered to be a sacred month since the post-Vedic era. There is no credible evidence to establish that Mārgaśirṣa was the first month of Śarad season during the Mahābhārata era.

Autumn (Sharad) Season, Winter Solstice and Magha Shukla Ashtami

Ashok Bhatnagar utilized references to prevailing seasons, along with a description of calendrical elements (sidereal), to ascertain the location of the autumnal equinox among the stars and argued that this approach aligns with the direct description of the winter solstice's location on Magha Shukla Ashtami, the day of Bhishma's demise in the Mahabharata. He posits that the description of Kartika Purnima and Revati nakshatra during the autumn season indicates the positioning of the autumnal equinox between the Vishakha and Anuradha nakshatras, thereby constraining the timeframe of the Mahabharata to between 2250 BCE and 1280 BCE. Beyond these limits, the Kartika month of the sidereal lunisolar Indian calendar begins to lose its correlation. The precise details of the winter solstice in the Amanta Magha month, when the Moon was in its first quarter phase, help to determine the precession of Magha (α Leonis), which brings us closer to the year 1773 BCE. Consequently, Ashok Bhatnagar determined the date of the Mahabharata War to be 14 October -1792 (Gregorian), based on the occurrence of an eclipse pair and a lunar eclipse on Kartika Purnima in that same year.

Professor Narahari Achar accurately identified a flaw in Ashok Bhatnagar's argument, noting that for Karttika Purnima, the moon can appear anywhere from Bharani to Rohini. It is important to clarify that the Karttika full moon does not consistently occur in Krittika, as the mean sidereal month is approximately 2.2 days shorter than the mean synodic month. Consequently, an intercalary month must be inserted at appropriate intervals. While acknowledging that the Karttika full moon does not always align with Krittika, Ashok Bhatnagar contended that its average position, when considered over several years, will not deviate from the mean nakshatra, unless the timeframe exceeds 960 years, at which point the effects of precession would shift the mean to the next nakshatra. As such, Ashok Bhatnagar argues that the traditional date in the 32nd century BCE significantly contradicts the descriptions of the corresponding seasons and the positioning of the equinoxes.

Ashok Bhatnagar argues that the Mahabharata suggests a direct relation between the winter solstice and the Shravishtha Nakshatra [अहः पूर्वं ततो रात्रिः मासाः शुक्लदयःस्मृताः । श्रविष्ठादीनि ऋक्षाणि ऋतवः शिशिरादयः II 14.44.2]. The winter solstice occurred in the Shravishtha (Dhanishtha) Nakshatra during the period from 2250 to 1280 BCE, with its principal star, identified as β Delphini, positioned at the beginning of the Nakshatra division. Consequently, Bhatnagar concludes that the Mahabharata War cannot be dated earlier than 2250 BCE.

It is important to note that the Mahabharata adheres to the 5-year Yuga calendar of the Paitamaha Siddhanta. The Samvatsara, the first year of this calendar, begins from Magha Shukla Pratipada and the Shravishtha Nakshatra. During the Mahabharata era, the month of Magha used to occur in the Shishira season. This explains why the Mahabharata states that the Nakshatra scheme begins with Shravishtha and the seasons commence with Shishira. Therefore, the Mahabharata does not indicate a direct relation between the winter solstice and the Shravishtha Nakshatra.

Ashok Bhatnagar also recognizes that the calendar referenced in the Mahabharata is the Magha Shukladi calendar of the Vedanga Jyotisha. But he assumes that in this system, the year commences with the winter solstice, and the months are lunar, with their names derived from the nakshatra in which the full moon occurs in the middle of each month. Additionally, this 5-year period encompasses 62 synodic months. However, he incorrectly assumes that intercalation was conducted as needed based on observational criteria.

While discussing the calendar and intercalation, Bhishma states, “The wheel of time revolves with its divisions, namely, Kalas, Kasthas, Muhurtas, days, fortnights, months, constellations, planets, seasons, and years. As a result of their fractional excesses and the deviations of the heavenly bodies, there is an increase of two months every five years. 'तेषां कालातिरेकेण ज्योतिषां च व्यतिक्रमात् । पञ्चमे पञ्चमे वर्षे द्वौ मासावुपजायते ॥' (Virata Parva 47.3). This internal evidence suggests that the Paitamaha Siddhanta referenced in the Mahabharata incorporates intercalation in Ashadha (the 30th month) and Pausha (the 60th month). The Ashadha-Pausha intercalation was a recognized practice in ancient India and Nepal. Given that the Ashadha-Pausha intercalation was a fixed method, a concept of Kshayamasa was employed periodically as necessary. The condition was that while the first year (Samvatasara) of the five-year Yuga started on the day of Magha Shukla Pratipada, when the sun and moon were close to the winter solstice. Therefore, when reconstructing the five-year calendar of the Mahabharata era, it is crucial to utilize the Ashadha (30th month) - Pausha (60th month) intercalation method, along with the periodic Kshayamasa, aligning Magha Shukla Pratipada close to the winter solstice. HK Deb also notes in his book “The Hindu Calendar and the Earlier Siddhantas” that the Paitamaha Siddhanta acknowledges the five-yearly Yuga system and intercalation in Ashadha (30th month) and Pausha (60th month).

It is fundamentally flawed to assert that the internal evidence of the Mahabharata indicates the positioning of the autumnal equinox between the Vishakha and Anuradha nakshatras, as this perspective neglects the intercalation and Kshayamasa method utilized during the Mahabharata era. Considering the Ashadha (30th month) intercalation occurring every two and a half years and the Pausha (60th month) intercalation every fifth year in the Vedanga Jyotisha calendar, the conventional date in the 32nd century BCE aligns with the descriptions of the corresponding seasons and the positioning of the equinoxes.

Bhishma’s Demise

According to the Mahabharata, Bhishma fell on the 10th day of the War. The Mahabharata War commenced on Karttika Amavasya, making the 10th day Margashirsha Shukla Navami. Shanti Parva (47.3) notes that Bhishma died on Magha Shukla Ashtami during the Rohini nakshatra at noon (शुक्लपक्षस्य चाष्टम्यां माघमासस्य पार्थिव । प्राजापत्ये च नक्षत्रे मध्यं प्राप्ते दिवाकरे ॥). A critical examination of the internal evidence indicates that Bhishma was on the bed of arrows for 88 days. The reconstruction of the Magha Shukladi calendar from the Mahabharata

era suggests that 3162 BCE corresponded to the fifth year of the 5-year Yuga calendar, with a second month of Pushya intercalated.

Magha Shukladi Calendar (3162-3161 BCE)	**Julian Calendar (3162-3161 BCE)**
Mahabharata War on Karttika Amavasya	25 October 3162 BCE
Margashirsha Month	26 October to 24 November 3162 BCE
Pushya Month	25 November to 23 December 3162 BCE
Intercalary month of Pushya	24 December 3162 BCE to 21/22 January 3161 BCE
Magha Shukla Pratipada to Magha Shukla Ashtami	22/23 January to 29 January 3161 BCE

Thus, the reconstructed Magha Shukladi calendar indicates that Bhishma was on bed of arrows for 88 days from 3 November 3162 BCE to 29 January 3161 BCE. Internal evidence also suggests that Bhishma was on bed of arrows for 88 days:

	In Julian Calendar
The Mahābhārata War began on Kārtika Amāvāsyā.	25 Oct 3162 BCE
The fall of Bhishma on the 10th day of the war and the Mahābhārata War ended on the 18th day.	3 Nov 3162 BCE to 11 Nov 3162 BCE
After the war, the Pāndavas stayed on the banks of the Ganga River for roughly a month (21 days).	12 Nov 3162 BCE to 2 Dec 3162 BCE
Seemingly, Yudhishthira was coronated on Pausha Shukla Ashtami, Ashvini Nakshatra.	2 Dec 3162 BCE
Yudhiṣṭhira and Krishna visited Bhishma the following day (Pausha Shukla Navami). Krishna pointed out that Bhishma had only fifty-six days remaining (from Pausha Shukla Navami to Magha Shukla Shasthi) until the day of Uttarayana (Magha Shukla Saptami).	3 Dec 3162 BCE
Yudhiṣṭhira came back to Hastinapur and lived there for fifty nights.	4 Dec 3162 BCE to 22 Jan 3161 BCE
Yudhiṣṭhira confirmed that Uttarāyaṇa commenced on Magha Shukla Pratipada. Therefore, he left Hastinapur to meet Bhishma.	23 Jan 3161 BCE
Bhishma told Yudhiṣṭhira that Uttarāyaṇa had already commenced and hinted at the date as Māgha Śukla Saptami.	28 Jan 3161 BCE
Bhishma left the mortal world on Māgha Śukla Aṣṭami	29 Jan 3161 BCE

Numerous verses of Mahabharata (Shanti Parva 47.3 & Anushasana Parva 152.10, 153.5, 6, 26, 27, 28) indicate that Bhishma left this mortal world immediately after the Uttarayana day.

निवृत्तमात्रे त्वयने उत्तरे वै दिवाकरे। समावेशयदात्मानं आत्मन्येव समाहितः ॥ 12.47.3

आगन्तव्यं च भवता समये मम पार्थिव। विनिवृत्ते दिनकरे प्रवृत्ते चोत्तरायणे ॥ 13.152.10

स निर्ययौ गजपुरात् याजकैः परिवारितः। दृष्ट्वा निवृत्तमादित्यं प्रवृत्तं चोत्तरायणम्॥ 13.153.6
दिष्ट्या प्राप्तोऽसि कौन्तेय सहामात्यो युधिष्ठिर। परिवृत्तो हि भगवान् सहस्रांशुर्दिवाकरः॥ 13.153.26
माघोऽयं समनुप्राप्तो मासः पुण्यः युधिष्ठिर। त्रिभागशेषः पक्षोयं शुक्लो भवितुमर्हति॥ 13.153.28

It is essential to recognize here that ancient Indians traditionally followed the lunar calendar for the celebration of festivals, rather than the solar calendar. During the Mahabharata era, Magha Shukla Saptami, commonly referred to as Ratha Saptami, was observed as the concluding tithi of Uttarayana in the Magha Shukladi calendar. Uttarayana was traditionally observed for seven days in the lunar calendar, spanning from Magha Shukla Pratipada to Magha Shukla Saptami.

Furthermore, the term "त्रिभागशेषः" clearly indicates the passage of one part (seven days) out of four parts of the Magha month. Thus, it can be inferred that Bhishma was indicating the conclusion of the tithi of Magha Shukla Saptami to Yudhishthira. Bhishma also informed Yudhishthira that he had been on the bed of arrows for the past fifty-eight days, a duration he equated with one hundred years (अष्टपञ्चाशतं रात्र्यः शयानस्याद्य मे गताः। शरेषु निशिताग्रेषु यथा वर्षशतं तथा॥ – Anushasana Parva 153.27). Based on this statement, many scholars have concluded that Bhishma, after falling in battle on the 10th day, spent the subsequent 58 days on the bed of arrows. Consequently, he died on the 68th day following the onset of the battle. In reality, Bhishma counted 58 days starting from 3 December 3162 BCE, when he met Yudhishthira after his coronation, rather than from the 10th day of the Mahabharata War. This also supports Krishna's statement on 3 December 3162 BCE, indicating that Bhishma had only fifty-six days remaining until the day of Magha Shukla Saptami (पञ्चाशतं षट् च कुरुप्रवीर शेषं दिनानां तव जीवितस्य। ततः शुभैः कर्मफलोदयैस्त्वं समेष्यसे भीष्म विमुच्य देहम्।। -Shanti Parva 51.14). Thus, both the statements of Bhishma and Krishna are complementary and not contradictory.

Arundhati-Vasishtha Observation

In the Mahabharata, Vyasa cautions Dhritarashtra by enumerating numerous ominous signs, and also hints that Arundhati was observed ahead of Vasistha as Nimitta (या चैषा विश्रुता राजंस्त्रैलोक्ये साधुसंमता। अरुन्धती तयाप्येष वसिष्ठः पृष्ठतः कृतः॥ Bhishma Parva, 2.31). The seven stars of the Saptarshi constellation are circumpolar, with the Vasishtha star (Mizar) regularly rising first on the horizon at night, followed by the Arundhati star (Alcor). However, on rare occasions, Arundhati rises before Vasishtha. Such instances of Arundhati rising early are interpreted as a bad omen, as it is traditionally considered inappropriate for a wife to walk ahead of her husband in Indian culture.

PV Vartak and Nilesh Oak suggest that the Mahabharata references a rare astronomical phenomenon that persisted for thousands of years. Nilesh posits that the position of the North Celestial Pole was such that Arundhati would have appeared to walk ahead of Vasishtha

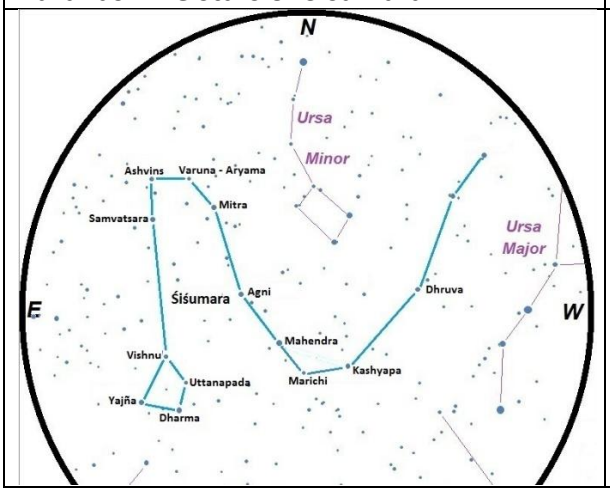
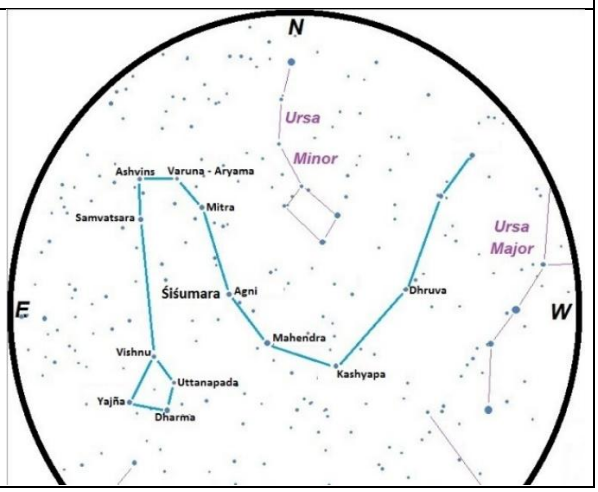
from 11091 BCE to 4508 BCE. Consequently, Nilesh Oak contends that the Mahabharata era cannot be dated later than 4508 BCE.

Firstly, an astronomical phenomenon that is regularly observed over thousands of years cannot be classified as a bad omen or Nimitta. Secondly, such speculative dating of the Mahabharata War not only contradicts both internal and external evidence but also challenges established Indian chronology and the Yuga calendar. Therefore, the methodology employed by Nilesh Oak does not meet the scientific standards necessary for interdisciplinary, multidisciplinary, and transdisciplinary studies of Indian chronology.

Alpha Draconis (Thuban) was the Pole Star During the Mahabharata Era

Vyāsa is traditionally recognized as the author of the Mahābhārata and eighteen Purāṇas. He also composed a commentary on the Yoga Sūtras of Patanjali. The Puranas attributed to Vyāsa denote the celestial position of the pole star in the tail of the Śiśumāra (Draco) constellation. The Bhāgavata, Matsya, Brahmāṇḍa, Vishnu, and Vāyu Purāṇas each provide descriptions of the stars within the Śiśumāra (Draco) constellation.

According to these Puranic descriptions, Alpha Draconis (Thuban) is identified as Dhruva. The account presented in the Vishnu Purāṇa differs slightly from those in the other Purāṇas; however, all Purāṇas consistently identify Alpha Draconis as Dhruva.

Bhagavata, Matsya, Brahmanda and Vayu Puranas: The stars of Śiśumāra	**Vishnu Purāṇa: The stars of Śiśumāra**
	

Latadeva's Surya Siddhanta (composed around 3101 BCE) refers to the observation of two pole stars, one located at the Northern celestial pole and the other at the Southern celestial pole. Thuban, or Alpha Draconis, part of the constellation Draco, served as the North Pole star from approximately 3900 to 1800 BCE. Alpha Eridani, or Achernar, functioned as the South Pole star from around 3400 to 2000 BCE. Around 3400 BCE, Achernar's declination was 82°40', placing it within 7.5 degrees of the South celestial pole.

The Bhāgavata, Matsya, Brahmāṇḍa, Vishnu, and Vāyu Purāṇas also provide descriptions of the stars within the Śiśumāra (Draco) constellation and reference the position of the celestial North Pole star located in the tail of the Śiśumāra constellation. Based on these Puranic descriptions, only Alpha Draconis (Thuban) can be identified as the North Pole star. Evidently, Vyasa, from the Mahabharata era, compiled the Puranas in the 32nd century BCE and Alpha Draconis (Thuban) of the Śiśumāra constellation was the celestial pole star during his lifetime.

Krishna's Demise (4 Feb 3127 BCE)

Bhāgavata, Vishnu, Brahma, Brahmanda and Vayu Purānas mention that the Kaliyuga commenced immediately after the demise of Sri Krishna in the Mahabharata era.

यस्मिन्नहनि यर्हयेव भगवान् उत्ससर्ज गाम् । तदैवेहानुवृत्तोऽसौ अधर्मप्रभवः कलिः॥ Bhagavata 1.18.6, यस्मिन्दिने हरिर्यातो दिवं संत्यज्य मेदिनीम् । तस्मिन्नेवावतीर्णोऽयं कालकायो बली कलिः॥ Vishnu 5.38.8, यस्मिन्दिने हरिर्यातो दिवं संत्यज्य मेदिनींम्। तस्मिन्दिनेऽवतीर्णोऽयं कालकायः कलिः किल ॥ Brahma 212.8, यस्मिन्कृष्णो दिव्यं यातस्त स्मिन्नेव तदा दिने । प्रतिपन्नः कलियुगस्तस्य संख्यां निबोधत ॥ Brahmanda 2.74.241, यस्मिन् कृष्णो दिवं यातस्तस्मिन्नेव तदा दिने । प्रतिपन्नः कलियुगस्तस्य सङ्ख्यां निबोधत ॥ Vayu 2.37.422

The Musala Parva (Chapter 2) of the Mahabharata states that in the thirty-sixth year following the Mahabharata War, the Vrishnis and Andhakas engaged in mutual destruction while Sri Krishna was still alive. This thirty-sixth year began in January 3127 BCE, based on a calculation from 3162 BCE in the Magha Shukladi calendar. In contrast, the Puranas adhered to the Chaitra Shukladi calendar of the Brahma Siddhanta and the 60-year cycle tradition, wherein the first year (Prabhava Samvatsara) commenced when Jupiter entered Dhanishtha Nakshatra. The Prabhava Samvatsara began on 6 March 3127 BCE, marking Chaitra Shukla Pratipada considering the position of Jupiter in Dhanishtha Nakshatra. Consequently, the Kaliyuga of the Brahma Siddhanta and the 60-year cycle (Jupiter in Dhanishtha) began on 4 Feb 3127 BCE, the same day Sri Krishna departed from this mortal world. According to Srivaishnava Guruparampara and "Eedu" commentary of Nammalwar's Thiruvoimozhi, Sri Krishna left the world in the beginning of the Kaliyuga, on Friday, Chaitra Shukla Pratipada, Uttaraproshthapada (Uttara Bhadrapada) nakshatra. Precisely, Chaitra Shukla Ptaripada (4 Feb 3127 BCE) of the Prabhava Samvatsara was on Friday and the moon was in Uttara Bhadrapada Nakshatra.

Submergence of Dwarka: The Evidence of Burckle Crater, and Tablet K8538 (29 June 3122 BCE)

The Musala Parva of the Mahabharata provides a detailed account of the city of Dwarka, which was submerged by the sea 36 years after the Mahabharata war (3162 BCE).

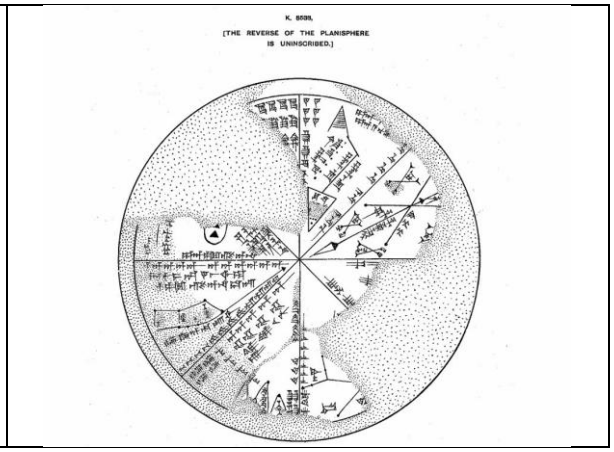
इमां च नगरीं सद्यः प्रतियाते धनंजये, प्राकाराट्टालिकोपेतां समुद्रः प्लावयिष्यति ॥ (The city of Dwaravati, following Arjuna's departure, will inevitably be engulfed by the ocean, along with its walls and edifices, without delay.)

निर्याते तु जने तस्मिन् सागरो मकरालयः, द्वारकां रत्नसंपूर्णां जलेनाप्लावयत् तदा ॥ (After all the inhabitants had departed, the ocean—inhabited by sharks and alligators—submerged Dwaraka, a city still abundant in wealth of every kind. Wherever the water flowed, it engulfed the land beneath it.)

In addition to the submergence of the city of Dwaraka, the chronology of the Pandya dynasty, as detailed in Tamil Sangam literature, suggests that Kavatapuram, the capital of the Pandyas, also submerged under the sea around the same period. Undoubtedly, a massive tsunami abruptly engulfed the cities of Dwaraka and Kavatapuram 36 years after the Mahabharata War.

Scientific studies of Burckle Crater in the Indian Ocean indicate that it was formed between 2800 and 3000 BCE , likely due to a fragment of a comet. Research shows that Burckle Crater is located in the central Indian Ocean, on the edge of a fracture zone at coordinates 30.87° S, 61.36° E. The crater spans approximately 29±1 km in width and is identified as the inferred source of layers exhibiting high magnetic susceptibility in three deep-sea cores. Each layer extends to the top of the core, with two out of the three cores dating to the basal Pleistocene period, while the basal age of the third core remains undetermined. The high susceptibility layers contain fragments of plagioclase, spinel peridotite, and chrysotile asbestos. One sample includes pure nickel with droplets of oxidized nickel. Given that pure nickel melts at 1453°C, it is highly probable that these droplets formed as a result of an impact. Additionally, the high susceptibility layers from two of the cores are more than five times thicker than would be expected from a 29 km wide source crater. It is also evident that a crater of this size cannot vaporize sufficient seawater to produce several meters of rain, even within a restricted area 4750 to 7250 km from the crater. Therefore, it can be inferred that Burckle Crater was created as part of a Shoemaker-Levy-type impact of a comet. This fragmented comet also generated two other significant impact centers, one in the northwest Pacific and another in the central eastern Pacific. Where the precipitation from these impact centers converges, we observe deluge events lasting over a week. This impact event also resulted in devastating tsunamis, intense winds, and significant social upheaval. One study has dated this event to approximately 2807 BCE. This scientific dating may have an error margin of ~300 years.

A cuneiform tablet (K8538) discovered in the ancient city of Nineveh is believed to date back to the reign of Assyrian King Ashurbanipal. This tablet features a remarkable ancient star map indicating that the Sumerians documented the observation of an asteroid over a kilometer in diameter, which impacted Burckle Crater near Madagascar in the early morning of 29 June 3122 BCE.



Utilizing modern computer programs capable of simulating trajectories and reconstructing the night sky from millennia ago, researchers have determined that this tablet serves as a copy of the astronomical journal of a Sumerian astronomer, who recorded celestial events prior to dawn on 29 June 3122 BCE. The first half of the tablet details planetary positions and cloud cover, consistent with any other night, while the latter half notes an object sufficiently large for its shape to be recognized, despite its presence in space.

It appears that a significant asteroid impacted Burckle Crater on 29 June 3122 BCE, resulting in a mega-tsunami that submerged both the city of Dwarka and the city of Kavatapuram of the Pandyas during the Mahabharata era. The astronomical dating of the asteroid, as recorded on the Sumerian tablet K8539, along with the evidence of the Burckle Crater impact, further substantiates the dating of the Mahabharata war to 3162 BCE.

Absolute Dating of the Historical Events of the Mahabharata Era

Interestingly, the following verses in the Southern recension of the Mahabharata provide invaluable information about the age of the Pandavas.

पाण्डवानामिहायुष्यं शृणु कौरवनन्दन। जगाम हास्तिनपुरं षोडशाब्दो युधिष्ठिरः॥ 1-134-2 (5935)
भीमसेनः पञ्चदशो बीभत्सुर्वै चतुर्दशः। त्रयोदशाब्दौ च यमौ जग्मतुर्नागसाह्वयम्॥ 1-134-3 (5936)
तत्र त्रयोदशाब्दानि धार्तराष्ट्रैः सहोषिताः। षण्मासाञ्जातुषगृहान्मुक्ता जातो घटोत्कचः॥ 1-134-4 (5937)
षण्मासानेकचक्रायां वर्षं पाञ्चालके गृहे। धार्तराष्ट्रैः सहोषित्वा पञ्च वर्षाणि भारत॥ 1-134-5 (5938)
इन्द्रप्रस्थे वसन्तस्ते त्रीणि वर्षाणि विंशतिम्। द्वादशाब्दानथैकं च बभूवुर्द्यूतनिर्जिताः॥ 1-134-6 (5939)
भुक्त्वा षट्त्रिंशतं राजन्सागरान्तां वसुन्धराम्। मासैः षड्भिर्महात्मानः सर्वे कृष्णपरायणाः॥ 1-134-7 (5940)
राज्ये परीक्षितं स्थाप्य दिष्टां गतिमवाप्नुवन्। एवं युधिष्ठिरस्यासीदायुरष्टोत्तरं शतम्॥ 1-134-8 (5941)
अर्जुनात्केशवो ज्येष्ठस्त्रिभिर्मासैर्महाद्युतिः। कृष्णात्संकर्षणो ज्येष्ठस्त्रिभिर्मासैर्महाबलः॥ 1-134-9 (5942)
पाण्डुः पञ्चमहातेजास्तान्पश्यन्पर्वते सुतान्। रेमे स काश्यपयुतः पत्नीभ्यां सुभृशं तदा॥ 1-134-10 (5943)
सुपुष्पितवने काले प्रवृत्ते मधुमाधवे। पूर्णे चतुर्दशे वर्षे फल्गुनस्य च धीमतः॥ 1-134-11 (5944)

यस्मिन्नृक्षे समुत्पन्नः पार्थस्तस्य च धीमतः। तस्मिन्नुत्तरफल्गुन्यां प्रवृत्ते स्वस्तिवाचने॥ 1-134-12 (5945)
रक्षणे विस्मृता कुन्ती व्यग्रा ब्राह्मणभोजने। पुरोहितेन सहितान्ब्राह्मणान्पर्यवेषयत्॥' 1-134-13 (5946)

Based on the aforementioned verses and the astronomical dates outlined in this article, a definitive timeline of the historical events of the Mahabharata era can be established.

1	Yudhishthira was born on Shukla Panchami, Jyeshtha Nakshatra. He was 108 years old when he transferred the kingdom to Parikshit in 3126 BCE. Based on the other dates provided, it can be inferred that Yudhishthira was born on Ashvayuja Shukla Panchami, Jyeshtha Nakshatra, in 3234 BCE.	19 Aug 3234 BCE
2	Bhimasena was nearly one year younger than Yudhishthira, having been born on Krishna Trayodashi, Magha Nakshatra. Consequently, his birthdate is recorded as Bhadrapada Krishna Trayodashi in 3233 BCE.	1 Aug 3233 BCE
3	Arjuna was three months younger than Keshava (Sri Krishna), having been born under the Uttara Phalguni Nakshatra. It is recorded that Arjuna celebrated his 14th birthday during the solar months of Madhu-Madhava. If we consider the lunar month of Ashadha to correspond with the month of Madhava during the Mahabharata era, Arjuna's birth occurred on Ashadha Shukla Shashthi, under the Uttara Phalguni Nakshatra, in the year 3232 BCE.	29 May 3232 BCE
4	Keshava (Sri Krishna) of the Mahabharata era was three months older than Arjuna, having been born under the Rohini Nakshatra on Chaitra Shukla Chaturthi. It is important to note that Devakiputra Krishna of the Rigvedic period was born on Bhadrapada Krishna Ashtami, also under the Rohini Nakshatra.	29 Feb 3232 BCE
5	Balarama was younger than Yudhishthira but older than Bhimasena. Keshava (Sri Krishna) was younger than Balarama by one year and three months.	Dec 3234 BCE
6	Nakula and Sahadeva (twin brothers) were one year younger than Arjuna.	3231 BCE
7	King Pandu died on the 14th birthday of Arjuna, at the beginning of the month of Madhava.	25/26 May 3218 BCE
8	Pandavas entered Hastinapura when Yudhishthira was 16 years old.	Aug/Sep 3218 BCE
9	Pandavas stayed in Hastinapur for 12 years.	3218-3206 BCE
10	One year in Varanavata. Duryodhana arranged a palace in Varanavata. Pandavas went to Varanavat on Phalguna Shukla	3206-3205 BCE

	Ashtami, Rohini Nakshatra. Exactly one year later, the palace in Varanavata was set on fire on Phalguna Shukla Chaturdasi.	
11	Pandavas stayed in the Ashrama of Rishi Shalihotra for 6 months and also stayed in Ekachakrapura for 6 months.	3205-3204 BCE
12	Draupadi marries Pandavas. They stayed in Panchala for one year.	3204-3203 BCE
13	Pandavas returned to Hastinapur and Dhritarashtra gave half kingdom to Yudhishthira. They stayed for five years in Hastinapur.	3203-3198 BCE
14	Yudhishthira shifted his capital to Indraprastha.	3198 BCE
15	Arjuna Married Subhadra.	3189 BCE
16	Yudhishthira concluded Rajasuya Yajna on Amavasya, Jyeshtha Nakshatra (Karttika Amavasya) and became Emperor (Chakravarti or Samrat) Yudhishthira.	13 Oct 3188 BCE
17	Abhimanyu was born.	3188 BCE
18	The Epoch of the Kaliyuga Magha Shukladi calendar of Paitamaha Siddhanta.	10 Jan 3176 BCE
19	The Epoch of the Kaliyuga Chaitra Shukladi calendar of Brahma Siddhanta and the Prabhava Samvatsara of the 60-year cycle when Jupiter was in Aries.	5 Mar 3173 BCE
20	Yudhishthira lost his kingdom in Dyuta (Gambling) and the Pandavas left for Vanavasa for 13 years on the day of the Solar eclipse, Chaitra Amavasya.	26 Feb 3175 BCE
21	Vanavasa of 12 years (Chaitra Amavasya to Chaitra Amavasya)	26 Feb 3175 BCE to 10 April 3163 BCE.
22	Agyatavasa of 1 year (Chaitra Amavasya to Chaitra Amavasya) but they were identified on 15 Mar 3162 BCE before Chaitra Amavasya. Bhishma explains that the Pandavas were in exile for 13 lunar years, five lunar months and 12 days (total of 4762 days). Therefore, the Pandavas lived in exile for more than 13 solar years.	11 Apr 3163 BCE to 1 Apr 3162 BCE
23	During the Agyatavasa, a cattle stealing episode occurred around Sep/Oct 3163 BCE. Abhimanyu married Uttara, the princess of the Virata Kingdom.	Sep/Oct 3163 BCE
24	A pair of eclipses: the Lunar eclipse followed by a Solar eclipse was observed. Solar eclipse occurred less than 14 days (on Trayodashi tithi)	21 Dec 3163 BCE & 4 Jan 3162 BCE
25	Disappointed Balarama met all Yadavas on Maitra Nakshatra.	27 Sep 3162 BCE
26	Balarama proceeded on a pilgrimage of 42 days on Shravana Nakshatra (Not Pushya nakshatra).	2 Oct 3162 BCE
27	Sri Krishna left Upaplavya for Hastinapura on Karttika Shukla Dvadashi, Revati Nakshatra for the final diplomatic mission.	7 Oct 3162 BCE

28	Sri Krishna reached Hastinapura on Bharani	9 Oct 3162 BCE
29	Duryodhana finally rejected all conditions for peace on Pushya Nakshatra, Karttika Krishna Panchami.	15 Oct 3162 BCE
30	Sri Krishna left Hastinapur on Uttara Phalguni and met Karna.	18/19 Oct 3162 BCE
31	The First Day of the Mahabharata War on Karttika Amavasya, Jyeshta Nakshatra.	25 Oct 3162 BCE
32	Bhishma fell on the 10th Day.	3 Nov 3162 BCE
33	Abhimanyu died on the 13th day in Chakravyuh at the age of 26 years.	6 Nov 3162 BCE
34	Balarama returned from pilgrimage on the 18th day of the War, Pushya Nakshatra (not Shravana Nakshatra).	11 Nov 3162 BCE
35	Pandavas did penance on the banks of the Ganga River	12 Nov-2 Dec 3162 BCE
36	Yudhishthira was coronated in Hastinapur.	2 Dec 3162 BCE
37	Yudhishthira and Sri Krishna met Bhishma.	3 Dec 3162 BCE
38	Magha Shukladi calendar of Yudhishthira Samvat commenced on 22 January 3161 BCE, Magha Shukla Pratipada, Dhanishtha Nakshatra.	22 Jan 3161 BCE
39	Yudhishthira left Hastinapur to meet Bhishma.	23 Jan 3161 BCE
40	Bhishma left this world on Magha Shukla Ashtami, Rohini Nakshatra, at noon time.	29 Jan 3161 BCE
41	In the 35th year, a solar eclipse occurred on Chaturdashi (less than 14 days).	12 Aug 3128 BCE
42	In the 36th year, the Kaliyuga Chaitra Shukladi calendar commenced in the Prabhava Samvatsara, the first year of the 60-year cycle when Jupiter was in Dhanishtha.	4 Feb 3127 BCE
43	Sri Krishna died on Chaitra Shukla Pratipada, Uttara Bhadrapada Nakshatra, in the Prabhava Samvatsara, on the first day of Kaliyuga.	4 Feb 3127 BCE
44	Yudhishthira entered his 108th year of Age.	Aug 3127 BCE
45	Yuidhishthira coronated Parikshit in Hastinapur	3126 BCE
46	The sea submerged the cities of Dwaraka and Kavatapuram.	29 Jun 3122 BCE
47	The Kaliyuga Chaitra Shukladi calendar of Latadeva's Surya Siddhanta commenced and the conjunction of all planets in Meena Rashi.	18 Feb 3101 BCE.

The Post Mahabharata Chronology of India

King Yudhishthira and Successors:

King Yudhishthira	3162-3126 BCE
Parikshit (son of Abhimanyu and grandson of Arjuna)	3126-3100 BCE
Janamejaya	3100-3050 BCE
Shatānika	3050-3030 BCE
Ashvamedhadatta	3030-3000 BCE
Adhisima Krishna	3000-2970 BCE
Nichakshu	2970-2930 BCE

According to the Puranas, it is mentioned that the city of Hastinapura was devastated by the Gangā River during the reign of King Nichakśu (2970-2930 BCE). The Vishnu Purana further suggests that following the destruction, King Nichakśu relocated to Kaushāmbi, indicating that the demise of Hastinapur can be roughly dated to around 2950 BCE. From 2950 to 2750 BCE, northwestern India experienced a 200-year drought, leading to the depletion of the Sarasvati River and the abandonment or ruination of numerous cities. Extensive archaeological evidence from the Indus-Sarasvati Rivers region has unearthed various cities that were either deserted or destroyed due to the arid climate and the drying up of the Sarasvati River around the same period.

Geologists have determined that a 200-year drought occurred around 2200 BCE, which has been named the 4.2 kiloyear event. Recently, geologists designated the current geologic age as the Meghalayan age, which began in 2251 BCE. However, Helama & Oinonen (2019) have dated the start of the Meghalayan age to around 2190 BCE and have shown that the tree-ring $\delta^{13}C$ chronology exhibits an isotopic anomaly between 2190 and 1990 BCE. It appears that the geologists have underestimated the start date of the Meghalayan age due to a chronological error of 661 years.

The Magadha Empire

After the catastrophic flood that transpired in Hastinapur around 2950 BCE, the lineage of the Pandavas witnessed a decline, subsequently paving the way for the emergence of the Brihadratha dynasty as the predominant ruling power in India. This dynasty went on to establish the Magadha Empire. The chronology of the dynasties that governed the Magadha Empire, as meticulously documented in the Puranas, extends from the year of the Mahabharata War (3162 BCE) until the eventual decline of the Gupta dynasty. The reconstructed chronology of the Magadha Empire is detailed below:

		No. of kings	**No. of years**	**In CE**
1	Brihadratha dynasty	22	1000 y	3162-2162 BCE
2	Pradyota dynasty	5	138 y	2162-2024 BCE
3	Shishunaga dynasty	10	360 y	2024-1664 BCE
4	Nanda dynasty	1 + 8	32 + 68 y	1664-1596 BCE

5	Maurya dynasty	10	137 y	1596-1459 BCE
6	Shunga dynasty	10	112 y	1459-1346 BCE
7	Kanva dynasty	4	45 y	1346-1301 BCE
	Interregnum			1301-826 BCE
8	Shatavahana dynasty	32	492 y	826-334 BCE
9	Gupta dynasty	9	245 y	334-89 BCE

During the occupation of Ujjain by the Saka kings, Ujjain gradually replaced Pataliputra as the power center of North India. Following the decline of the Gupta Empire around 89 BCE, King Vikramaditya (82-1 BCE) ruled over North India and established the Chaitradi Vikrama Samvat in 57 BCE.

The Mahabharata: A Historical Text Consistent in Astronomical and Chronological Context

As extensively discussed and established above, the Mahabharata is not only consistent with traditional Indian chronology but also remarkably aligns with all astronomical observations and tithis recorded in the Magha Shukladi Yuga calendar, with the exception of one error in the tithis associated with Balarama's pilgrimage, which appears to have occurred during the recompilation of the text in the Gupta era.

It also seems that during the recompilation, the narratives of Jaiminiya Ashvamedha and Vyasa's Mahabharata were conflated, leading to the inclusion of the Ashvamedhika Parva, Mahaprasthanika Parva, Svargarohana Parva, and others. Reconstructing the Mahabharata text of the Pre-Gupta era may now prove challenging. Interestingly, Kumara Vyasa's Bharata Kathamanjari (the Mahabharata in Kannada) comprises only 10 Parvas. It covers the history only up to the Gadayuddha, the battle between Duryodhana and Bhima, and the defeat of Duryodhana. Subsequent sections, such as Ashvamedha and Svargarohana, are not included. Therefore, it is essential to separate the Mahabharata from the narrative of Jaiminiya Ashvamedha to establish the veracity of the historical context of the Mahabharata.

The Indus Valley civilization (Aratta-Saka-Bahlika kingdom of India) and The Mahabharata Era

Numerous historians posit that the so-called Indus Valley civilization was Meluha because Sumeria had trade relations with the Indus region. There is sufficient evidence and also Indus seals found in archaeological sites of Sumeria indicate that the Indus region traded with Sumeria.

It is noteworthy that Persians, who were the immediate western neighbours of India, had never referred to the name "Meluha". The region of Afghanistan and Baluchistan located on the west side of the Indus region was dominated by Nāgas of Kashmir and Takshashila. The Arattas started dominating the region of Afghanistan from the Vedic era. This is the reason why the Sumerian legends of Enmerkar and Lugalbanda among others refer to India

(Afghanistan) as the land of Arattas. The shepherd people of Sumer originally belonged to the region of Sumeru, in close proximity to the land of Arattas. With the help of Inanna or Ishtar, sister of the lord of Aratta, Enmerker, the son of the sun god Utu, wanted to take control over the hills of the Hindu Kush and the land of Arattas for resources such as lapis lazuli, precious stones, gold and silver. Though the military expedition of Enmerker and Lugalbanda led to friction between Sumer and Aratta, Inanna, the sister of the king of Aratta, helped Sumer to have healthy trade relations with Aratta. Eventually, Inanna or Ishtar attained the status of a goddess in Sumer because the kings of Sumer and the kings of Aratta had a common origin.

The Arattas were well-known as horse breeders during the Vedic and post-Vedic periods. As already discussed, the *Ashva* or horse mentioned in Rigveda was a Shivalik horse having only 34 ribs. The legend of Inanna and Gilgamesh informs us that Inanna brought the Bull of Heaven from Aratta to Sumer and unleashed the bull on Gilgamesh. The bull of heaven depicted on Sumerian cylinder seals or tablets resembles the unicorn depicted on the Indus seals. This unicorn has the body of a bull and the elongated neck of a horse with one horn on its head. This may be the reason why the Sumerians referred to the unicorn as a bull whereas the Indians of the Vedic period referred to the unicorn as *Ashva* or horse.

Ancient Greeks also knew about Indian unicorns. Ctesias described Indian unicorns: “Wild asses, a fleet of foot, having on the forehead a horn a cubit and a half in length, coloured white, red and black; from the horn were made drinking cups which were a preventive of poisoning.”[8] Aristotle also mentioned one-horned animals: “The oryx, a kind of antelope; and the so-called Indian ass.” Pliny the Elder’s *Natural History* mentions the oryx and an Indian ox as one-horned beasts. He called the Indian ass “a very ferocious beast, similar in the rest of its body to a horse, with the head of a deer, the feet of an elephant, the tail of a boar, a deep, bellowing voice, and a single black horn, two cubits in length, standing out in the middle of its forehead.” Pliny added that “it cannot be taken alive.” Aelian, quoting Ctesias, added that India produces one-horned horses. Strabo said that in India there were one-horned horses with stag-like heads.

The same unicorn of India is depicted on most of the seals found in the archaeological sites of the so-called Indus Valley civilization. The Arattas and the Scythians of the Afghanistan and Baluchistan region were the founders of this powerful kingdom. Since they were the breeders of unicorn horses before extinction around 8000 BCE, the Arattas and the Scythians (Sakas) adopted unicorns as their power symbol. Therefore, the so-called Indus Valley Civilisation was indeed an integral part of Indian civilization and it can be called the “Aratta-Saka-Bahlika kingdom” of India.

The Arattas and the Scythians shared a common culture and jointly dominated the region of Afghanistan and Baluchistan from the Vedic era. At that time, the Nāgas of the Ahi Takshak lineage were ruling over the kingdom of Takshashila. Gradually, the Turanians of the Turkmenistan and Uzbekistan region and the Scythians of southwestern Afghanistan developed close relations and militarily supported each other and entered into marital

relations. This growing comradery between the Scythians and the Turanians created friction between the Arattas and the Scythians. Garshasp, the Scythian-Turanian founded the city of Sakasthan (Sistan), the capital of Zabolistan, and reigned over Greater Persia around 7800-7700 BCE with the support of Turanians. The Persian sources indicate that the king of Kabul and Gandhar (a King of Aratta) defeated Etret, the father of Garshasp which led to a military conflict between the Scythians and the Arattas. Garshasp killed the king of Gandhar and Kabul. To avoid further conflicts with the kings of Gandhara, seemingly, Garshasp became an ally of the Nāga king of the Takshashila region of India. He defeated Bahu, a king of India, by the order of the king of Takshashila. Thereafter, Garshasp went off to woo the daughter of the king of Rum, i.e. the Romaka kingdom of Sindh region.

The Kayanian dynasty re-established their rule in Persia after the death of Garshasp around 7700 BCE. The invasion by Dionysus II of Persia around 7400 BCE led to the fall of the Kayanian dynasty of Persia. The 300-year Greek occupation of India and Persia (~7400-7100 BCE) witnessed the first migration of the Scythians to the area east of the Black Sea and the ancient Greeks called them “Cimmerians”.

Before delving into the chronological outline of the Aratta-Saka-Bahlika kingdom of India, it is important to gain an understanding of the origin of the different communities in Afghanistan. According to ancient Indian literary sources, Aratta, a descendant of the Vedic king Druhyu, was the progenitor of the Arattas. Gandhara, another descendant of Druhyu, was the progenitor of the Gandharas. Bahlika, the son of Vedic Kuru king Pratipa, was the progenitor of the Bahlikas (Bactrians), while the Scythians were the original inhabitants of the Afghanistan-Baluchistan region to the west of the Indus River since the Vedic period. In addition to the Scythians, other communities such as the Yavanas, Pahlavas, Kambojas, Tusharas, Nishadas, and Shuras have also resided in this region since the Vedic period. Given the intermingling of the Arattas and Bahlikas with these communities, the people of India residing east of the Indus River regarded them as "Mlecchas" and generally refrained from engaging with them socially.

After enduring Greek occupation for a period spanning 300 years (~7400-7100 BCE), the Arattas, Bahlikas, and Sakas (Scythians) recognized the potential of their unity and forged an alliance. The Scythians assumed control over Zabolistan (southwestern Afghanistan and Balochistan), as well as northern Iran (a part of Persia), while the Arattas and Bahlikas governed the remaining territories of Afghanistan and Turan (the region comprising Turkmenistan and Uzbekistan). Consequently, a formidable and expansive kingdom emerged after 7000 BCE, which has been mistakenly referred to as the "Indus Valley civilization" by modern historians.

Around 6000 BCE, the Aratta-Saka-Bahlika kings commenced their kingdom expansion towards the eastern region of the Indus River. During this period, the Kekayas, Madras, and Sauviras held dominion over the area east of the Indus River (present-day Pakistan), while the Ikshvaku kings of Ayodhya ruled over northern and central India. Notably, King Raghu of

Ayodhya, one of the most esteemed rulers (~5800-5700 BCE), led a military campaign to reprimand the Mlechcha kings (Arattan and Scythian kings). The expedition is extensively chronicled in Kalidasa's *Raghuvamsa*. Typically, Indian kings refrained from engaging in military conflicts with the Mlechcha kings. However, when these kings began trespassing across the Indus River and seizing control of the Kekaya and Sauvira janapadas, King Raghu of Ayodhya resolved to mount a military expedition to the Afghanistan region. Raghu successfully traversed the Indus River and triumphed over the Aratta-Saka-Bahlika kingdom, extending his dominion up to the Vakshu (Oxus) River. Furthermore, he crossed the Oxus River and emerged victorious against the Kambojas.

After King Raghu's resounding victory, the Kekaya and Sauvira kingdoms entered into a lasting alliance with Ayodhya. The king of Kekaya married off his daughter, Kaikeyi, to Dasharatha, the grandson of King Raghu. During the Ramayana era (5677-5600 BCE), Kusha, son of Sri Rama (5674-5604 BCE) reigned over the Ayodhya kingdom. Bharata's two sons, Pushkala and Taksha inherited the kingdom of Kekaya, located in the central Pakistan region. Pushkala established the city of Pushkalavati on the banks of the Swat River, while Taksha built the city of Takshashila.

From 5000 BCE onward, taking advantage of the weakening Ikshvaku dynasty in Ayodhya, the Aratta-Saka-Bahlika kings began expanding their realm to encompass the Punjab, Haryana, Rajasthan, and Saurashtra regions of India. From 5000 BCE to 3200 BCE, these kings reigned over an extensive territory, stretching from northern Persia to Saurashtra, Rajasthan, and Haryana. The unicorn was adopted as their symbol of royal authority. The archaeological sites associated with the so-called Indus Valley or Harappan civilization found in this area belonged to the Aratta-Saka-Bahlika kingdom, which formed an integral part of ancient Indian civilization.

Archaeological research and relative chronology duly accounting for the 1381-year error in dating of Buddha reveals that the Aratta-Saka-Bahlika kingdom of northwestern India can be divided into three distinct phases:

- Early Aratta-Saka-Bahlika kingdom [Early Harappan phase] (5000-4000 BCE)
- Mature Aratta-Saka-Bahlika kingdom [Mature Harappan phase] (4000-3200 BCE)
- Late Aratta-Saka-Bahlika kingdom [Late Harappan phase] (3200-2600 BCE)

The people of the Aratta-Saka-Bahlika kingdom in northwestern India traditionally spoke the Gandhari/Bahlika (Bactrian) Prakrit language and used a logo-syllabic script known as the Indus script. Influenced by the Sumerians, they built brick-based houses and planned cities in India. In contrast, the rest of India traditionally utilized a phonetic script (archaic Brahmi) and generally preferred wooden houses until the Mahabharata era (3200-3100 BCE). After 3000 BCE, the rest of India also began constructing brick-based houses, influenced by the practices of the Aratta-Saka-Bahlika kingdom.

During the period from 3300-3250 BCE, King Shantanu and his son Bhishma of the Kuru-Bharata dynasty of India expanded their kingdom up to the Indus River, putting an end to the Mlechcha (Aratta-Saka-Bahlika) occupation of northwestern India. Thus, the Aratta-Saka-Bahlika kingdom declined and the Gandharas and the Madras reestablished their kingdoms. The King of Gandhara married off his daughter Gandhari to King Dhritarashtra and the King of Madra married off his daughter Madri to King Pandu of the Kuru-Bharata dynasty.

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According to the Indian historical epic, Mahabharata, it is said that King Yudhishthira performed the Rajasuya Yajna around 3188 BCE. During this ceremony, Arjuna, the brother of King Yudhishthira, led a campaign to the north and brought under his control the kings of Simhapura, Paurava, Kāshmiraka, Traigartas, Dārva, Kokanada, Abhisāra, Uraga, Bāhlīka, Darada, Kāmboja, Paramakāmboja, Loha, Rishika, Śvetaparvata, the Hāṭaka kingdom near Mānasa lake, Uttara-Harivarṣa, and Uttara-Kurus. Nakula, another brother of King Yudhishthira, led an expedition to the west and subjugated the kings of Uttara-Jyotiṣa, Vṛndātaka-Pura, Dvārapālas, Rāmaṭhas, Hunas, Hārahūṇas, Madras, Mleccḥas, Pahlavas, and Barbaras. The Aratta king, acknowledging King Yudhishthira's authority, sent gifts to him on the occasion of the Rajasuya Yajna.

The Mahābhārata also indicates that Balarāma visited a major city situated on the banks of the Sarasvati River. Although the city is not named in the Mahābhārata, it was described as having a large marketplace for international trade, where Balarāma purchased horses, chariots, and jewels. This city likely corresponds to the archaeological site of Chanhudaro in Sindh, Pakistan. The Mahābhārata mentions that after Balarāma visited the unnamed city, the Sarasvati River turned east at a specific location. By examining satellite maps of the Post-Vedic Sarasvati River, it is evident that the river did indeed turn east after the city of Chanhudaro. Additionally, archaeological studies indicate that Chanhudaro was abandoned around 3000-2500 BCE, coinciding with the complete drying up of the Sarasvati River by 2500 BCE.

According to the Mahabharata, the entire northwestern region of India came under the control of the Pandavas of the Kuru-Bharata dynasty in the 32nd century BCE. Following the decline of the Aratta-Saka-Bahlika kingdom, the use of phonetic scripts such as Kharoshthi and Brahmi became prevalent, leading to the extinction of the logo syllabic script (known as the Indus script).