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# SCIENTIFIC DATING OF SAMRAT VIKRAMADITYA

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**Abstract:**

Samrat Vikramaditya, a Great Emperor and warrior, known for defeating the Sakas and establishing a new era known as Vikram Samvat, which is still used in Calendars. Scholars and Indologists such as Shri Kota Venkatachalam, Shri P.N. Oak, etc. generally place Samrat Vikramaditya's time period around 57 BCE based on starting of Vikram Samvat not other contemporary evidences. Due to this, the question arises that Samrat Vikramaditya actually lived in 57 BCE or before that period? To solve this mystery, I have tried to explore the timeline of Samrat Vikramaditya based on the evidences from contemporary sources of his times through this article.

**Keywords:** Vishu, Krttika (Pleaides), Nakshtra, Samvatsara (Year), Saura Kshya Masa (Leap Solar Month), Karka, Makara**.**

## Introduction:

There are many empires and great emperors who have ruled the world but they're lost in the sands of history with due course of time. There are some great emperors whom we remember but can't trace out their exact timeline. Among them, an emperor who was considered as greatest emperor in all ages and he ruled this world but still we don't know his exact time period is, **Samrat Vikramaditya**. According to Bhavishya Purana, he was son of King Gandharvasena of Ambavati (present day near Amravati), who belongs to Parmara lineage. He spent his childhood in forests and learnt the skills of a warrior, diplomacy and administration. After reaching adulthood, he crowned himself as king and then he conquered Saká Kingdom of Ujjain. From there his journey as a Conqueror and as an Emperor started. Kalidasa mentions in his book Jyotirvidabharanam, that Samrat Vikramaditya conquered from Asian Minor to Malay Peninsula. It's unique that wherever he conquered, people in the conquered regions where showered with peace & prosperity [1]. Even after his death his legacy is still alive in the hearts of people. In Sanskrit literature he is mentioned in *Vettal Pachavimshati* and *Brihatkathamanjari*. In many regions of India, he is celebrated as righteous king and his connection with the Indian culture that so deep that during the early medieval period many Hindu kings crowned themselves with the title of '*Vikramaditya'*. Generally, scholars place him around **57 BCE** [2] ** based on Vikram Samvat, Saka year given by Varahmihira in Pancha Siddhantika and inscriptions of various Rajput kings. But there is no actual timeline based on evidences from independent and contemporary sources. So, in this article, we have tried to explore the actual timeline of Samrat Vikramaditya with independent and contemporary sources.

In the process of collecting evidences, Pancha Siddhantika is excluded because it's updated with due course of time which can be found from the text itself which mentions about Yavanapura (Athens) as one of the cardinal points for time determination and changes in Nakshatras of both Solstices [3]. Mainly the evidences given in above-mentioned books are taken because Kalidasa & Varahmihira were one of the ***Nine jewels*** in the court of Vikramaditya [4].

## Objectives:

- Determine the time period of Samrat Vikramaditya.
- A step to inspect the antiquity of Indic civilisation and culture.

## Methodology:

- Collection of Evidences based on contemporary and independent sources.

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- Analysis of the data given in the evidences.
- Use of Occam's razor method which states evidences should be used with less assumption and delivered in layman terms.
- Validation of collected evidences through astronomical softwares based on NASA database.
- Deploying various fields of sciences such as Archeo-astronomy, Physics, Climatology, etc.

**Discussion on Collected Evidences:**

**1. Zodiacs location of Equinoxes:**

Kalidasa, one of the nine jewels in the court of Vikramaditya, mentions in his book **Jyotirvidabharanam (JV)** that during his times Vishuvat (Autumn Equinox) was occurring in the zodiac Tula (Libra) and Viśhu (Spring Equinox) in zodiac Mesha (Aries). Vishuvat is the time period when sun crosses the equator and move towards Southern Hemisphere and Vishu means Sun cross the Equator and move towards Northern Hemisphere.

Considering the evidence of the positions of equinoxes, these astronomical events was objectively tested in astronomical software such as Stellarium, Sky Gazer, etc. which are based on NASA astronomical data. It states that these phenomena occurred around 1840 BCE to 200 CE for Spring Equinox in Mesha (Aries) and around 2200 BCE to 200 BCE for Autumnal Equinox in Tula (Libra). **[3a]**

**2. Zodiacs location of Solstices:**

He further states that during his (Kalidasa) time Dakshinayana & Uttarayana **(Winter & Summer Solstice)** were occurring in the **"Crocodile part of Makara (Capricorn)"** and on the **"face of Cancer"** [5].

On the day of Winter Solstice, Sun starts moving towards North direction after reaching Tropic of Capricorn, the southmost point whereas on Summer Solstice Sun starts moving towards South after reaching Tropic of Cancer the north most point. Due to this, day is longest on the day of Summer Solstice where's night is longest on day of Winter Solstice.

In the above-mentioned references of Crocodile portion of Makara rashi is region of Dhanishta (Sualocin) Nakshtra and the face of Cancer is the region of Ashlėsha (Zeta Hydrae) Nakshtra. Considering the evidence of the positions of solstice, this astronomical event was objectively tested in astronomical software such as Stellarium which are based on NASA astronomical data, states that this phenomenon occurred around 1850 BCE – 800 BCE and 2090 – 1300 BCE respectively.

**3. Nakshtras for Solstices:**

Kalidasa mentions in **JV** that Varahmihira was one among the nine jewels in the court of Vikramaditya along with him and Varahmihira had guided Kalidasa in compiling **JV** [4]*. So, being contemporary to Vikramaditya and Kalidasa, books authored by Acharya Varahmihira can be used as evidence. In **Brihat Samhita (BS),** Acharya Varahmihira states that Sun starts moving to the North direction when Sun is in the starting portion of Dhanishta Nakshtra and Sun's journey towards South starts when it's in the second half of Ashlėsha Nakshtra. [6]

In this, Varahmihira elaborates the exact point of Solstices along with the nakshatras. So that people can have knowledge to point out that exact timing of these two Solstices because solstices and equinoxes decide the seasons which is very useful for agricultural activities in ancient times.

On analysing the above evidence based on objectively verifying through software, this phenomenon was occurred around 1850 – 1300 BCE for Summer solstice at Ashlesha Nakshatra and Winter Solstice at Dhanishta Nakshatra.

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### 4. Krttika as starting point of Samvatsara & first Nakshtra:

In **BS,** Acharya Varahmihira mentions that Krttika was at the centre of the earth and from there all the directions are determined [7]. He also states that Krttika was the first Nakshtra at his times. This concept can be explained as follows:

In above evidence Varahmihira mentions the path of Sun back and forth between North and South. Sun's Northward journey (**Uttarayana**) from Dhanishta whereas the Southward journey **(Dakshinayana)** starts from ending point of Ashlėsha and Kalidasa mentions that Sun crosses the equator and move towards South in the Zodiac of Tula (Libra). The crossing of Sun and moving towards South occurs at the day of Vishuvat **(Autumn Equinox)**. So, in this Krttika at the centre of the earth means that Krttika is the Nakshtra when Sun crosses the equator and move towards North on the day of Vishu **(Vernal Equinox)**. Being at Equator at the centre point of Earth, Krttika was used at that time to determine the directions of all the Bharatvarsha.

In **BS,** it's mentioned that Kartika as the first year and beginning from Krttika for the tropical year of Jupiter. In this, Varahmihira states that Jupiter and Sun are in a conjunction and when Jupiter came out from that conjunction near particular Nakshtra, that Nakshtra name will be the name of that particular year [8]. For example, when Jupiter will come out of the conjunction with Sun near Nakshtra Vishaka, then that Jovian will be known as **Vaisakha**. It's according to the 12-year Jovian cycle period.

Varahmihira also mentions that Krttika & Rohini were the starting portion of Samvatsara purusha [9]. Samvatsara purusha is a concept where all the Nakshtras are joined together to create an imaginary person in the Sky. Every nakshtra denotes a portion of this Samvatsara purusha. All the movement of planets takes place between the body portions of this man. It's also mentioned that Krttika is the first Nakshtra in sequence of order [10].

The starting portion is known for the commencement of the Samvatsara (Year). From ancient times we've ancient records prior to Varahmihira for starting of Samvatsara at Viśhu (Vernal Equinox) [11][12]. Viśhu is phenomena were Sun crosses the equator line and move towards North direction. The nakshtra were Viśhu is taking place was known as the starting point of Samvatsara.

Considering the above evidences, we can analyse that Krttika was the first Nakshtra in the sequence order of Nakshtras and it was the Nakshtra at the time of Viśhu (Vernal Equinox). The Nakshtra during Viśhu starting point of a Samvatsara (year) because Samvatsara always commences from Viśhu. Considering Krttika at Vernal Equinox it would be around 2400-1430 BCE. This evidence decisively gives us a brief time period of 2400-1430 BCE.

### 5. Absence of Pole Star and Andhra's:

Kalidasa **JV** mentions that Andhras were feudatories to Vikramaditya [13]. There is an interesting reference related to Andhras in Matsya Purana.

The author of Matsya Purana mentions about prophecy of Kings from the time of Parikshit to Andhras. Andhras will regain their sovereignty when the Saptarishis (**Ursa Major)** will be brighter as like fire. Further it describes the Saptarishi cycle of 100 years with respect to a nakshtra [14]. Generally, the Saptarishi are brightest constellation. In this, Matsya Purana is trying to convey that there was no pole star in the North direction and north can be determined through Saptarishis only. In traditional Indian text of astronomy & others have the description of a pole Star named Shisumará **(Thuban)** which was pole star around 3200 BCE – 1800 BCE [15].

After fall of Shisumará as pole star, **Pherkad** replaced it as a pole star around 1100 BCE and around 1600 BCE it was closer to the North pole as per data from **NASA** [16]. So, from above evidence, we can firmly state that the time range for Samrat Vikramaditya is narrowed to 1800 BCE - 1600 BCE.

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### 6. Saura Kshya Masa (Solar leap month):

In **JV,** Kalidasa mentions that in the 103rd year of Vikram era started by Vikramaditya had their will be Saura Kshya masa, an astronomical phenomenon which occurs once in 141 years **[17][18].** Saura Kshya Masa is an astronomical phenomenon in which Sun crosses 2 zodiacs within a lunar month. Now in this narrow time frame of 1850 – 1600 BCE, we've only two years as to acknowledge the year when Vikram had conquered the whole Bharatvarsha and started the Vikram Samvat. They're 1750 BCE & 1609 BCE respectively.

### 7. Shravan as starting of rainy season:

In Brihat Samhita, Varahmihira mentions that rainy season commences from the month of Shravan. Acharya mentions that four Nakshatras from Swati in the same month and fortnight, the next 4 months from Shravan there will be rains.[19]

In Brihat Samhita itself there are many references of rainy season commences from the lunar month of Shravan. There are other references of rainy season commencing from 4th day in the dark fortnight of Ashada month [20]. Those references refer to the starting of Summer Monsoon in the Southern regions of India. This can be explained scientifically. If look at the data of monsoon starting period in last 75 years, when Sun reaches the latitude of 21°40' N the monsoon starts to hits the coasts of Kerala and when Sun reach at 22°45'N the monsoon starts in Central India while Summer Solstice is taking place when Sun reaches at 23°26'N [21][22][23][24][25]. Based on above given data, on calculating the pattern of monsoon with respect to the Declination of Sun (Latitude) during the time period between 1850-1600 BCE reveals that monsoon was use to commence in Central India when Sun reaches at 23°08'N and Summer Solstice takes place at 23°54'N, while the day could be around 25 June and Sun use to be in Karkata rashi (Cancer) according astronomical software stimulation [26].

Based on the references, Shravan as the commencing point of rainy season was climatically possible around 2000 BCE – 500 CE.

### 8. Visibility of Agastya Tara (Canopus):

In Brihat Samhita, Acharya Varahmihira mentions that during his times, Agastya Tara (Canopus) was visible when Sun lies at 7° in the zodiac Kanya (Virgo) for first time in the year and it was the time of conjunction between Varsha (Rainy season) and Sharad (Autumn season) []. On testing this evidence through astronomical software, this time period corresponds to 1800 BCE – 1400 BCE.[28]

***Comparative analysis of both years with available evidence:***

| Evidences | 1750 BCE | 1609 BCE |
|---|---|---|
| **1.** Krttika as the point of Vernal Equinox | Yes, Sun was in the 1st quarter of Krttika. | Yes, Sun was in the 1st quarter of Krttika. |
| **2.** Zodiacs at the time of Solstices | Capricorn at WS and Cancer at the time of Summer Solstice. | Capricorn at WS and Cancer at the time of Summer Solstice. |
| **3.** Nakshtra of Solstices | Dhanishta at the time of WS and Ashlèsha at the time of SS | Same as in 1750 BCE. |
| **4.** Shravan as 1st month of Rainy season | Yes | Yes |

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| | | |
|---|---|---|
| **5.** Absence of Pole Star | Thuban left the North Pole as a pole star. | No pole star |
| **6.** Saura Kshya Masa | Yes | Yes |
| **7.** Zodiac of Vernal Equinox | Mesha (Aries) | Mesha (Aries) |
| **8.** Visibility of Agastya Tara (Canopus) | Yes | Yes |

Since, we know that Vikramaditya was an undefeated Emperor and his empire remained for 10 years after him. If 1750 BCE is selected as the year of commencing of Vikram Samvat, it will be contrary because on adding 102 years with 1750 BCE will take us around 1852 BCE which is defying the astronomical evidences.

So, 1609 BCE will perfectly match with the statement of Kalidasa. If 102 is added to 1609 BCE then around 1711 BCE Samrat Vikramaditya had commenced the famous Vikram Samvat era after conquering the Bharatvarsha.

## 9. Computing Ayanamsha during Kalidasa's time:

In JV, it's mentioned how to trace the current Samvatsara (Year) through calculating the years passed in the epoch [29]. For this we've taken the years passed of Bali Samvat mentioned by Kalidasa [30]. Through calculating all the mentioned procedure, we found that the Samvatsara name was ***Dhāta*** ($10^{th}$ Samvatsara) when Kalidasa was writing **JV.**

Now, we have to find out the exact year, so we take the Kali year mentioned in **JV** and deduct from the years mentioned by Varahmihira in **BS** for starting point of Shàka **rule [31][32][33]**. Then taking the remaining years, we calculated the method mentioned by Varahmihira in **BS** and got the same result. The number of years passed from commencing of Shàka rule was 542 years. In second method, the Nakshtra of Jupiter in the year Dhāta needed to be traced. The result shows that Jupiter was near ***Anuradha***. On computing this, it was around 1671 BCE when this phenomenon was occurred. If we add the number of Shàka years with 1671 BCE, then we can conclude around ***2213/2212 BCE Shàkas had established their rule in Central India.***

We've found that **Jyotirvidabharanam** was composed around 1671 BCE. On deducting it from starting point of Vikram Samvat, 40 years of Vikram Samvat has already passed. Kalidasa mentions a method how to calculate the ***Ayanamsha (Precession of Equinoxes)*** [34]. In this phenomenon, ***aphelion*** (the nearest point of Sun with Earth at centre) and ***perihelion*** (farthest point of Sun with Earth at centre) shifts by 1° in every 72 years due to which seasons changes along Lunar months and Nakshtra of Sun. It's the main reason for changing of Pole Stars.

**Kalidasa** states that Vikram Samvat should be deducted from 445 and the years we got the it should be multiplied by 50" (rate of precession of equinoxes). The resulting number should be divided by 60. The answer will be Ayanamsha of his (Kalidasa's) times [35]. The result of this method is 5°31'40". It means that Vernal Equinox was taking place in the 5°31'40" of Aries, the starting portion of Krittika. It's like in our times, the Ayanamsha is 23°56' in Zodiac Pisces in Uttara Bhadrapada Nakshtra.

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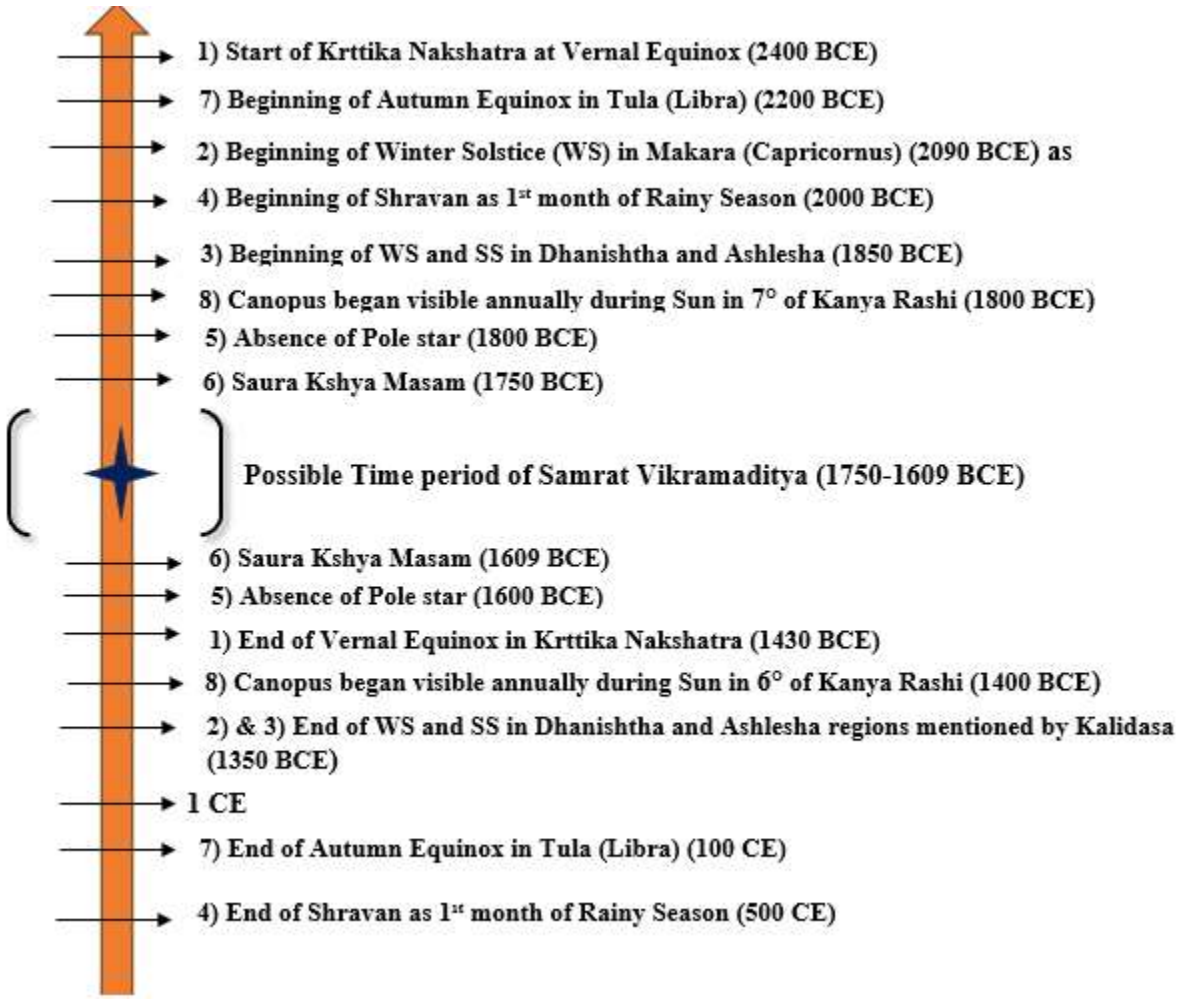


**Framing of Evidences in a Time period scale**

**Conclusion:**

From the above evidences from astronomy, climatology, archeo-astronomy, we can firmly determine that the famous Emperor Samrat Vikramaditya, his companion great poet Kalidasa and great astronomer Varahmihira lived in 18-19th Century BCE not in 1st century BCE or 4th Century CE as claimed by traditional sources and the pre-determined dating by historians. The Shàkas had established their rule in Central regions of India around 2213/2212 BCE. The famous Vikram Samvat was started by Vikramaditya in the year 1711 BCE and around 57 BCE it was readjusted according the calendar point of view at that time.

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