

INSCRIPTIONS AS RECORDS OF CELESTIAL EVENTS

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The solar and lunar eclipses have always been an integral part of the Indian tradition as implied by the vast number of inscriptions scattered all over India. Some of them date back to 3rd or 4th century BC. Thus it offers a large data base extending to over 1500 years. In this study the eclipses recorded in and around Karnataka are compiled with the purpose of extracting the record any astronomical event mentioned therein. In this first instalment solar and lunar eclipses have been compiled. The verification of the visibility of these events has been helpful in fixing the doubtful dates as recorded by epigraphists.

Key words: Ancient eclipse records, Dating of stone inscriptions

Inscriptions engraved on stones are available in plenty all over India. They were engraved to leave a permanent record of the gifts/donations and grants given by the kings, their feudatories, chiefs and village headmen. A good number of them record the heroic deeds of soldiers and commoners fighting with the enemies, wild animals during hunting. In some cases they mark the self immolation of ascetics, widows and devotees. They are dated from 2-3rd century BC to as recent as 1800 AD and are written in different languages. Dated inscriptions serve as important documents of celestial events that happened during the grant. Here an attempt has been made to document the celestial events provided by these inscriptions and verify the actual dates.

An attempt of this kind done earlier (Shylaja, 1997) successfully fixed some ambiguity in dates of several records. Here, we have initiated a systematic study of stone inscriptions published in different volumes, which, initially, is restricted to the region of Karnataka State and adjoining parts of South India.

The documentation of the stone inscription scattered all over ancient Karnataka (even in abandoned villages called Bechirag villages) began almost two

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hundred years ago by colonial officers. The pioneers in this field were J.F. Fleet and B.L. Rice; both reported their work in *Indian Antiquary*, a journal founded by Dr. Burgess in 1876. Both of them meticulously undertook the task of finding the dates of the records which were in luni-solar system prevalent during that period. The records published by Rice were in volumes called *Epigraphia Carnatica*, which are compiled into 13 volumes. They are now being republished as extended volumes with additional records.

The records published by Fleet are available in various other Journals.

Archeological survey of India undertook the publication of these records, with the series entitled “*South Indian Inscriptions*”. Scholars such as R. Shama Sastry, K.B. Pathak, R.Narasimhachar, P.B. Desai and N. Lashminarayana Rao have contributed to these volumes.

Now, newer titles such as *Karnataka Inscriptions* (Dharwad), *Inscriptions of Karnataka* (Kannada University, Hampi) are being published. A total of 30-40 volumes of inscriptions are now available. The compilation work is in progress as more and more inscriptions are coming to light and are being added to the already published ones.

Here we report the study of volumes I, II and III. These volumes are geographically restricted to a small region around the district of Mysore. Most of the inscriptions are in Kannada and Sanskrit. The name of the village, catalog number in the volumes and the date as recorded in the calendar system are listed in **Table 1**. The date as translated to the AD is included in the last column. *Samvatsara* is a 60 year cycle and the list is provided in Shylaja, 1997. The month is divided into two parts whose names are also specified as *śukla* or *bahula*.

DISCUSSION

The dates of the eclipses were cross checked by the catalogue of Oppolzer (1887), Five Millenium Catalog of eclipses (online) and the software OCCULT v4.0.9 (Occultation Prediction software by David Herald)

It may be seen that the date as available in the published volumes agrees in most of the cases. The name of the *Samvatsara* does not match in some cases.

The word *sankrān̄thi* is also misinterpreted in some cases. Based on the mention of eclipse, it is possible to fix the date without any ambiguity.

Table 1. Details of inscriptions

| No. | Place | Date on Inscription records | Reference |
|-----|--|--|--|
| 1 | Mullooru, Somavarapete Talluk, Kodagu | Dec, 24, 1058; Śaka 980, Vilambi, Uttharāyana Sankrān̄thi | Ep.Car.(I) No.72(35) |
| 2 | Doddabetta, In the enclosure, on a stone leaning against the wall, Shrvanabelagola | Dec, 26, 1231; Śaka ?, Cyclic year Khara, Pauṣya Śuddha, Friday, Uttharāyana Sankrān̄thi | Ep.Car. (II) No.286(186) |
| 3 | Shrvanabelagola, At Akkana basadi, on a stone near the doorway, Shrvanabelagola | Dec, 25, 1181; Śaka 1104, Plava, Pauṣya, Bahula 3, Friday, Uttharāyana Sankrān̄thi | Ep.Car. (II) No.444(327) |
| 4 | Shrvanabelagola, On a sone standing to the west of Bhandara Basadi, Shrvanabelagola | Dec. 25, 1159; Śaka 1081, Pramadhi, Pauṣya, Śuddha 14, Friday, Uttharāyana Sankrān̄thi | Ep.Car. (II) No.481(349) |
| 5 | Honakanahalli, On a stone to the west of the village site, Gundlupete Taluk | Feb, 27, 1506; Śaka 142[7], Krodhana, Phalguṇa, Śuddha 4, Mīna Sankrān̄thi | Ep.Car.(III) No.26 (Ep.Car. IV Gu. 67) |
| 6 | Raghavapura, On a stone erected in a field situated to the east of the village, Gundlupete Taluk | July, 20, 1320; Śaka 1243, Roudri, Śrāvaṇa, Śuddha 15, Śrāvaṇa-Nakṣatra, Lunar Eclipse | Ep.Car.(III) No.40 (Ep.Car. IV Gu. 69) |
| 7* | Taggaluru, On an inscribed stone to the east of the village, Gundlupete Taluk | Śaka 1248, Dundhubhi, Mārgasīra, Bahula 30, Monday, Solar Eclipse (?) | Ep.Car.(III) No.41 (Ep.Car. IV Gu. 85) |
| 8* | Belachalavadi, On a slab in the field to the north of the village, Gundlupete Taluk | Dec, 24, 1013; Śaka 935, Sunday, Solar Eclipse (?) | Ep.Car.(III) No.48 (M.A.R. 1935-17) |
| 9 | Nitre, On a stone lying outside the north wall of Mallikarjuna temple, Gundlupete Taluk | Dec, 24, 1009; Śaka 931, Saumya, Pauṣya, Shree pañchamī, Uttharāyana Sankrān̄thi | Ep.Car.(III) No.62 (Ep.Car. IV Gu. 79) |

*Discussed in the text.

Table 1. Details of inscriptions — *contd.*

| No. | Place | Date on Inscription records | Reference |
|-----|---|--|--|
| 10* | Somahalli, Copper plate of Brahmanavrittis in the village, Gundlupete Taluk | Śaka 1344, Shobhakrith, Śrāvana, Suddha 15, Monday, Lunar Eclipse (?) | Ep.Car.(III) No.78 (Ep.Car. IV Gu. 24) |
| 11* | Lakkuru, Stone set up in front of the chavadi of the village, Gundlupete Taluk | Jan, 6, 1665; Śaka 1586, Krodhi, Pauṣya, Bahula 30, Friday, Planetary conjunction. | Ep.Car.(III) No.112 (Ep.Car IV Gu. 25) |
| 12 | Triyambakapura, On a stone in the enclosure of the temple of Triyambakeśvara, Gundlupete Taluk | Dec, 28, 1521; Śaka 1444, Vishnu, Pauṣya, Bahula 30, Saturday, Makara-Sankrānṭhi | Ep.Car.(III) No.134 (Ep.Car IV Gu.1) |
| 13* | Kodihalli, On a stone lying near Mari-shrine, Gundlupete Taluk | Dec, 28, 1521; Śaka 1444, Vishnu, Pauṣya, Bahula 30, Saturday, P. Āṣāda Nakṣatra, Solar Eclipse(?) | Ep.Car.(III) No.156 (Ep.Car. IV Gu. 35) |
| 14* | Bachahalli, Stone in front of the village, Gundlupete Taluk | Mar, 24, 1598; Śaka 1518, Hevilambi, Phālgūṇa, Bahula 12, Uttarāyana(?) | Ep.Car.(III) No.183 (Ep.Car. IV Gu. 51) |
| 15* | Nanjanagudu, Fourth copper plate record in the same matha, Nanjanagud Taluk | Oct, 22, 1580; Śaka 1502, Vikrama, Karthika, Lunar Eclipse(?) | Ep.Car.(III) No.116 (M.A.R. 1944-23) |
| 16* | Nanjanagugu, Thirteenth copper plate record in the same matha, Nanjangud Taluk | Sep, 13, 1699; Śaka 1621, Pramadhi, Bhādrapada, Bahula 30, Wednesday, Hastha Nakṣatra, Solar Eclipse(?) | Ep.Car.(III) No.122 (M.A.R. 1944-32) |
| 17* | Hullahalli, On a stone to the north-east of the outer enclosure of the same temple, Nanjangud Taluk | Mar, 27, 1332; Śaka 1254, Angirasa, Prathama-Caitra, Bahula 30, Monday, Purvabhadrā Nakṣatra, Solar Eclipse(?) | Ep.Car.(III) No.138 (Ep.Car. III Nj.65) |
| 18* | Nandigunda, On a stone lying in front of the Malledeva temple, Nanjangud Taluk | Mar, 1, 1021; Śaka 943, Phālgūṇa-Pūrṇima, Wednesday, Urthara-nakṣatra, Lunar eclipse(?) | Ep.Car.(III) No. 201 (Ep.Car. III Nj.134) |

Table 1. Details of inscriptions — *contd.*

| No. | Place | Date on Inscription records | Reference |
|-----|---|---|---|
| 19 | Kalkunda, Stone to the east of Mari-gudi, Nanjangud Taluk | Dec. 25, 1241; Śaka 1136, Plava, Wednesday, Uttarāyana-Sankranthi | Ep.Car.(III) No. 256 (Ep.Car. III Nj.145) |
| 20* | Dodda Homma, On a stone in a field to the north-west of the village, Nanjangud Taluk | July, 3, 977; Śaka 899, Eeshwara, Āṣāda, Śuddha 15, Tuesday, Lunar Eclipse | Ep.Car.(III) No. 294 (Ep.Car. III Nj.182) |
| 21* | Dodda Kavalande, On a stone behind the Masjid, Nanjangud Taluk | Apr. 26, 1376(?); Śaka 1296, Ananda, Vaisāka, Śuddha 15, Thursday, Lunar Eclipse | Ep.Car.(III) No. 308 (Ep.Car. III Nj.108) |
| 22* | Maliyuru, On another stone near the same temple, Heggadadevanakote Taluk | May 18, 1277(?); Śaka 1198, Eeshwara, Jyaeṣṭa, Śuddha 15, Lunar Eclipse | Ep.Car.(III) No. 30 (Ep.Car. IV Hg.8) |
| 23* | Narasipura, On a hero-stone in the field or Javane-gauda, Heggadadevanakote Taluk | Nov 25, 1137; Śaka 1060, Pingala, Mārgasīrā Śuddha 11, Thursday, Sankramana | Ep.Car.(III) No.107 (Ep.Car. IV Hg.50) |
| 24* | Kitturu, On a stone set up in front of Ramesvara temple, Heggadadevanakote Taluk | Nov 26, 1079; Śaka 1001, Siddarthi, Mārgasīrā-Amavasye, Sankranthi(?), Solar Eclipse(?) | Ep.Car.(III) No.123 (Ep.Car. IV Hg.57) |
| 25* | Sagare, On a stone set up at the village entrance, Heggadadevanakote Taluk | Dec. 28, 1499; Śaka 1421, Siddarthi, Pauṣya, Bahula 11, Makara Sankranthi(?) | Ep.Car.(III) No.150 (Ep.Car. IV Hg.59) |
| 26* | Nanjanagudu, Copper plate record in the possession of Sanubhaga Subbaraya, Nanjanagud Taluk | Dec. 13, 1498; Śaka(?), Kalayukthi, Mārgasīrā, Solar Eclipse | Ep.Car.(III) No. 398 (Ep.Car.III Nj.16) |
| 27* | Gattavadi, Copper plate found record in the village, Nanjanagud Taluk | Nov. 25, 904; Śaka 826, Mārgasīrā, Pūrṇimā, Sunday, Lunar Eclipse | Ep.Car.(III) No. 402 (Ep.Car. XII Nj.269) |

However, the word *sankrān̄thi* cannot be used with the same amount of certainty since it may not mean the entry in to Capricorn always. In fact, it may be any other *sankrān̄thi* for example, Meṣa Sankramana or entry in to Aries.

We will now discuss the ambiguous cases:

The first four entries in the table correspond to only the entry of Sun into Capricorn which is declared as Makara Sankrān̄thi. Interestingly the word Uttarāyana also is mentioned. During the 11th and 12th centuries these two indeed coincided. The shift thereafter has been discussed by Abhyankar (1993) and is the source of the common misconception of today that the two are same. They do not agree anymore. This is demonstrated by various texts describing the need of accurate observations as well as the temple architecture studies (Shylaja, 2008).

The fifth entry corresponds to the Meena Sankran̄thi; the date is not ambiguous.

The entry #7 mentions the Śaka (1243) as well as a lunar eclipse. The compilers cite the date as July 20, 1320 AD. There was a lunar eclipse on July 10, 1321 AD as well as July 20, 1322 AD. The second of the three eclipses was not visible in India, but the Śaka year matches. The name of the *nakṣatra* is mentioned. (This indicates the position of the moon in the zodiac.) Therefore it is quite possible that they cited the eclipse based on calculation and not observation.

The case of number 8 is peculiar; there was no eclipse in the month of December (Mārgasīra) in that entire decade. Hence the deduction of the interpreter may be wrong. The text does not corroborate with the eclipse description. Based on Śaka year and coronation of the king mentioned, the date of solar eclipse has been speculated. On the other hand, there was a solar eclipse on January 4, 1014 AD. This is exactly ten days after the specified date. That brings in a question whether the month Mārgasīra extended up to January. This is not unreasonable since the scheme of introducing an extra month to match the solar and lunar cycles was already prevalent. The difference of 10 days may be because of the correction applied to the Gregorian calendar in 18th century.

Number 9 mentions about the phase of the moon as the 5th day (Pañcamī). The date 24th December also is Uttarāyana Sankrān̄thi. This gives a shift of about 2 days in winter solstice from the current epoch. However since the exact time is not available there can be error of almost half a day. The name Pausya here raises doubts since now we find it occurring in January. It is also possible that in

that particular year there was a *Kṣaya māsa* (missed month) making the arrival of Pausya earlier than usual.

The entry number 10 of Aug 2, 1422 AD refers to a lunar eclipse; the Samvatsara name corresponds to Śubhakrith and not Śobhakrith as pointed out by the compilers.

The planetary conjunction of inscription number 11 in the table has been considered very important. Many more inscriptions of the same event are available elsewhere (Shylaja, 1997) with contextual details.

Number 12 and 13 correspond to the same date; the associated details are different. There was no eclipse.

Entry number 14 mentions a Sankrān̄thi. However, Meṣa Sankrān̄thi occurred March 28 of that year.

Entry number 15 is in error since there was no lunar eclipse occurred on that day.

An annular solar eclipse was seen on September 23 of AD 1699; this appears to be recorded in entry number 16. The error in the date is 10 days.

There was an annular solar eclipse on May 25 of AD 1332; this has been recorded in entry number 17 with an error in the date.

Thus we find that in many cases the word “eclipse” is mentioned but there was no eclipse in that particular year at all. This can be brushed aside as an error made by the person who prepared the inscription. On the other hand a date of plus or minus 60 years can also be tried out whenever the Śaka year is not available.

There was a possible umbral eclipse on March 2nd of the year 1021 AD. Entry number 18 shows this record as March 1st; this is quite understandable since the reckoning of the day varied from midnight to dawn in different places.

Number 19 mentions about Uttarāyana Sankrān̄thi; this can be in error by about 2 days.

There is no ambiguity in respect of the date of entry number 20 because of the reference to the eclipse.

A simple arithmetical error has crept in entry number 21. Clearly the mistake is in calculating Julian year ($1296+78=1374$ AD). There was a lunar

eclipse on Aug 22, 1374 AD, visible from India. But this cannot be Vaisākha month. Therefore the only possibility is another extra month prior to this (*Adhika māsa*) which could have pushed Vaisākha to August! Based on the name of the Samvatsara (Ananda) it is possible to put the year to 1376 AD. This year also there were no lunar eclipses in April-May, the possible period for Vaisākha. Penumbral eclipses were visible in July. This raises a question on the capability of observing penumbral eclipses. Further this may help us to understand how the width of the earth's shadow was calculated from observations.

A similar ambiguity exists in case of number 22. A simple calculation for Julian year yields $1198+78=1276$ AD. However, the assigned date is May 18, 1277 AD, the year 1276 AD also had a lunar eclipse on May 29th; but that was not visible from India. Considering this the epigraphists might have assigned 1277 AD.

Number 23 refers to Sankaramana; it can only be Dhanur sankramana - Sun entering Sagittarius.

Number 24 refers to an eclipse; the epigrapher mentions that neither of the two types occurred on that day. However, a solar eclipse indeed occurred on December 26, 1079AD. Perhaps it was also the winter solstice day. Therefore the date can be safely corrected to December 26.

In number 25, the date given by the compiler is December 28, whereas actually the event occurred on 27th. This may be because of the notion of beginning of the "day", which used to be from sunrise to sunrise. This fixes the time of solstice between 0 and 6 hours of 28th December.

For number 26, the Śaka year for the first date, can be verified with the help of the other date given in the inscription. It turns out to be 1420. Therefore, the Julian date is 1498 AD, December 13. For this date there was a Total Solar eclipse visible from India.

In the case of number 27, the cyclic year was Raktākṣi and Nakṣatra was Rohiṇī according to the compilers. On the given date there was an umbral Eclipse, visible from India.

CONCLUSIONS

We are reporting the study of twenty seven records on eclipses and solstices from inscriptions found in and around the district of Mysore. Many of

them match with the calculated days of the events; in some cases the ambiguity on the dates is resolved by the calculations. One case of penumbral lunar eclipse serves as an important tool in trying to decipher the technique used for fixing the width of the shadow of earth.

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