

Conjunction of planets – Historical Records of India

B. S. Shylaja and Geetha Kydala Ganesha

The planets approaching each other as seen in the sky are a natural consequence of their eternal motion. Such events called conjunctions have been recorded by many earlier astronomers and non-astronomers as inferred from stone inscriptions which are scattered all over India and cover a very long range of sev-

eral centuries. The general technical name assigned is either *samāgama* or *yuddha*; those with bright stars are named as *nakṣatra grahayuti*. (The word *yuti* itself is used for conjunction with the sun and *viyuti* is for opposition.)

The stone inscriptions, available in many languages, offer a wealth of infor-

mation on astronomical events like eclipses and have been useful to estimate the change in the speed of rotation of the earth¹⁻⁴. Since a search for astronomical records demands a good knowledge of the language in its archaic form, the examples here are restricted to South India.

Table 1. Inscriptional records of conjunction of planets and stars

Date as given in records (converted to Julian date in AD)	Epigraphical record details	Phrase used	Event with corrected date (in Julian date in AD)
1 956, January 17 or February 17	EKU-I, Ballāri, Siraguppa, Ballakunde No. 33 (A.R. No. 62 of 1985-86; ಕು.ಸಿಂ. 2)	ಭಿದೇಯೋರ್ಣಿ bhidēyōṅṅē	956, February 15 Occultation of Mars by moon
2 28th October 1032	EC-III Mysūru, Nanjangūḍu no 164 and 165	ಕಾರ್ತಿಕಾ ೨ ರೋಹಿಣಿ kārtikaba 2 Rōhiṇi	23rd October 1032 Moon with Aldebaran (Rohiṇi)
3 2nd October 1117	EC-VI Mysore, Krishṇarājapēte, part II no. 66	ಕಾರ್ತಿಕ ಸುಧ ಪಂಚಮೀ ಸನಿ ರೋಹಿಣಿಯೊಳು..... Kārtika śuddha paṅcami sani rohiṇiyōlu.....	10th October 1117 Saturn next to Rohiṇi (Aldebaran)
4 5th November 1223	EC-VII, Maṇḍya, Nāgamangala no 81	ಬೃಹಸ್ಪತಿ ಸಂಕ್ರಮಣ ವ್ಯತೀಪಾತದಲು..... Bṛhaspati saṅkramaṇa vyatīpātadalu.....	5th November 1225 Vyatīpāta implies conjunction of Mars and Saturn; Conjunction of Jupiter with sun implied by saṅkramaṇa
5 1233?	EC-XII (Rice volume) Chikkanāyakanahaḷli, Tumakūru No 31	ರೋಹಿಣೀನಕ್ಷತ್ರ Rōhiṇinakṣatra	1st May 1234 Moon with Aldebaran (Rohiṇi)
6 18th May 1235	EC-VII, (III ಮಂ 121), Maṇḍya, no. 29	ರೋಹಿಣೀನಕ್ಷತ್ರ Rōhiṇinakṣatra	Moon with Aldebaran (Rohiṇi)
7 28th December 1286	EC-VII, Maṇḍya 41 (III ಮಂ 61)	ರೋಹಿಣಿ Rohiṇi	Moon with Aldebaran (Rohiṇi)
8 24th September 1310	EC XIV Gunḍlupēte no. 131	ರೋಹಿಣಿ ವ್ಯತೀಪಾತ Rohiṇi Vyatīpāta	14th September 1310 Occultation of Aldebaran or 12th October 1310 grazing occultation
9 2nd August 1392	EC VIII, Hāsana, Hoḷenarasīpura, No. 4	ಮಕರೇಚಂದ್ರಯುಕ್ತಯೋಃ ... ಗುರೋದಯ. ಭಾರ್ಗವೇಭೌಮ ಸುತಯುತೇ makarēcandrayuktayōḥ.. gurōdaya... bhārgavēbhāuma sutayutē	28th August 1392, Jupiter with Moon in Capricorn and also Mercury with Venus.
10 19th January 1638	EC-VIII MAR 1923–59 Terakanambi	ಗುರುರುಡು ಸಹಿತ Gururuḍu sahita	16th Jan 1637 or 8th Jan 1638 Moon with Jupiter
11 28th March 1674	EKU-II, Koppaḷa District, Gangāvati no 81 (ಸಶುಕಾ. VII. (3–4); A.R. No. B 133 of 1972–73; IK. III No. 72)	ಬುದ್ಧೇಂದ್ರೀ ಸಂಯುಕ್ತೇ budhēndaiḥ samyuktē	8th April 1674 Moon with Mercury
12 3rd April 1679	EC Vol. VIII MAR (1944–29) Nanjanagūḍu	ವೈಷಾಖ ಶುದ್ಧ ೩ ರೋಹಿಣೀ ಅಕ್ಷತದಿಗಿ Vaiśākha śuddha 3 Rohiṇi akṣatadige	13th April 1679 Occultation of Aldebaran

EKU, Epigraphia Kannada University; EC, Epigraphia Carnatica; AR, Annual Reports of South India Epigraphy; MAR, Mysore Archaeological Reports; IK, Inscriptions of Karnataka.

Kannada volumes, Kurugodina sindharu, ಕು.ಸಿಂ. – ಕುರುಗೋಡಿನ ಸಿಂಧರು; Satya śuddha kāyaka, ಸಶುಕಾ – ಸತ್ಯ ಶುದ್ಧ ಕಾಯಕ.

The conjunctions of planets include those with some bright stars. It is very difficult to extract this information from the crisp texts of the stone inscriptions, which provide very detailed information on the date with *ṣaka* (year), fortnight of the month, phase of the moon (*tithi*)³. The name of the weekday is sometimes abbreviated to two letters of the planet, which can be mistaken for the planet itself. By definition, conjunction is that instant when the east-west coordinates are equal.

Here are some records which clearly indicate the conjunction of planets/stars from volumes of Epigraphia Kannada University, Epigraphia Carnatica and similar reports. All the events are given in Table 1.

The passage of the moon is marked by 27 stars, called *yogatāra*, which also serve as time markers. They are identifiable based on the coordinates provided in star catalogues⁵. A day is identified by the name of the star (the moon marker), even when the star can be as far apart as several degrees in the north-south direction. However, there are occasions when the moon covers the star akin to an eclipse. These are special and we find that such events called occultation are noted in the stone inscriptions.

The planets also move along the ecliptic with a provision to have conjunctions with these stars. We have a few examples of these in stone inscriptions.

The earliest record of February 15th, 956, corresponds to the occultation of Mars. The word *Bheda yuti* clearly establishes the event. Most of them are occultations of Aldebaran (Rohini). The conjunctions of planets also have been recorded. It may be seen that based on this information the dates of the inscriptions can be fixed more precisely.

Vyati-pāta is the instant when the sun and the moon are in planes which are equidistant from the equator. In simpler words the north-south coordinate of the moon and the sun will be equal. In case of the sun-moon system this information is useful in locating the invisible node, *Rāhu* (or *Ketu*) and hence in the prediction of eclipses. It is interesting that the word has a broader meaning⁶ – it refers to coordinates being equal for the planets too. And therefore, offer a reference to the conjunction of planets. Here are some examples from stone inscriptions.

Tulāpuruṣa dāna (gold equivalent to the weight of the king was offered as

grants and donations) was performed when there are six or more planets in conjunction. (It should be remembered that moon, sun and *Rāhu* or *Ketu* also are called planets). Many inscriptions dated as 20th December 1046 and 16th August 1665, refer to such conjunctions. Events like transit of Mercury are also found in these inscriptions⁷.

Sūryasiddhānta classifies the planetary conjunctions into five categories depending on the minimum angle of approach⁸. The naked eye cannot distinguish angles less than about 5'. Here the definition takes 1 degree (double the angular size of moon) as the reference.

Samāgama is a general word when the east-west coordinates of the two planets are equal; in other words they lie on the same hour circle. In the older texts it was defined with reference to longitude, measured along the ecliptic. Based on the values of the separation between the two planets, *d* and the sum of the diameters, *s*, five different possibilities are defined in the *Sūryasiddhānta*, as

- (1) *Ullekha*, when $d = s$, the discs are just touching each other. This is grazing occultation.
- (2) *Bheda*, when $d < s$, one disc is able to partially or wholly cover the other, this is called occultation.
- (3) *Apsavya*, when $d > s$ but one of the planets is very small. The limit for *d* is taken as 1° .
- (4) *Aṃṣu-vimarda* – when $d > s$, and both the discs are quite large.
- (5) *Samāgama*, when $d \gg 1^\circ$.

Among the planets, Venus is the brightest and so all texts declare that whenever *Sukra* is involved in a *yuddha*, he always emerges 'victorious'.

The word *Bheda* is found in the 19th century monograph on the transit of Venus by Ragoonathachary^{9,10}, *Siddhānta Darpaṇa* of Chandrasekhara Samanta¹¹ and also in many old Kannada texts^{12,13}. The conjunctions of planets namely Mars and others, are simple consequences of their motion which may be direct, or retrograde, which is discussed in a great detail in a medieval Kannada text called *Ganitagannaḍi*¹⁴. Thus conjunctions have been events of interest in the past as they were predicted, meticulously observed and reported in stone inscriptions.

1. Shylaja, B. S., Stone inscriptions from South Asia as sources of astronomical

records, 2018; <https://www.cambridge.org/core/journals/proceedings-of-the-international-astronomical-union/article/stone-inscriptions-from-south-asia-as-sources-of-astronomical-records/81A752BD4E1-7E4CA178E09149354F367>

2. Shylaja, B. S. and Geetha, K. G., *Indian J. Hist. Sci.*, 2011, **46**(2), 335–343.
3. Shylaja, B. S. and Geetha, K. G., *History of Sky – On Stones*, Infosys Foundation, Bengaluru, 2016.
4. Tanikawa, K., Sōma, M., Shylaja, B. S. and Vahia, M., In *The Growth and Development of Astronomy and Astrophysics in India and the Asia-Pacific Region*. Astrophysics and Space Science Proceedings (eds Orchiston, W., Sule, A. and Vahia, M.), Springer, Singapore, 2019, vol. 54; https://doi.org/10.1007/978-981-13-3645-4_11; https://link.springer.com/chapter/10.1007%2F978-981-13-3645-4_11
5. Pai, R. V. and Shylaja, B. S., *Curr. Sci.*, 2016, **111**(9), 1551–1558; <https://www.currentscience.ac.in/Volumes/111/09/1551.pdf>
6. Shylaja, B. S. and Geetha, K. G., *Indian J. Hist. Sci.*, 2016, **51**(2); https://insa.nic.in/writereaddata/UploadedFiles/IJHS/Vol51_2016_2_1_Art03.pdf
7. Rathansree, N., Shylaja, B. S., Kaidala, G. and Mukherjee, A., *Curr. Sci.*, 2012, **113**(1), 95; <https://www.currentscience.ac.in/Volumes/103/01/0095.pdf>
8. Shukla, K. S., In *History of Astronomy in India* (eds Sen, S. N. and Shukla, K. S.), Indian National Science Academy, New Delhi, 1985, pp. 212–251.
9. Shylaja, B. S., *Curr. Sci.*, 2009, **96**(9), 1271; https://www.currentscience.ac.in/Downloads/article_id_096_09_1271_1273_0.pdf
10. Shylaja, B. S., *Chinatmani Raghoo-nathachary and Contemporary Indian Astronomy*, Navakarnataka Publications, Bengaluru, 2012.
11. Upadhyay, A. K., Open Source, 2013; <https://archive.org/details/SiddhantaDarpana2>
12. Chikkanna, C., *Driksiddhanta Darpanam*, Mysore Crown Printers, 1914.
13. Naraharaya, S. N., *Treatise on Astronomy in Kannada*, Mysore University Publication, 1924.
14. Shylaja, B. S. and Seetharama, J., *History of Science in South Asia*, 2020, **8**(2020): 13–15; doi:10.18732/hssa.v8i0.46; <https://journals.library.ualberta.ca/hssa/index.php/hssa/article/view/46/100>

B. S. Shylaja is in the Jawaharlal Nehru Planetarium, Bengaluru 560 001, India; Geetha Kydala Ganesha is in the 4th Cross, Magadi Road, Bengaluru 560 023, India.*

*e-mail: shylaja.jnp@gmail.com