



BOOK REVIEW



Grahaṇa-Mukura – 16th-century astronomy text in Sanskrit & Kannaḍa, Edition, translation & analysis by B.S. Shylaja Ramakrishna Pejathaya and Seetharama Javagal, Bengaluru: Navakarnataka Publications Pvt. Ltd., 2025, ISBN 9788198356758, Pp. xlix + 125, Price Rs. 295/- (India) US \$ 20/- (Abroad)

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It is heartening to note that some scholars have been working hard to publish unpublished manuscripts pertaining to ancient Indian Astronomy. There are a number of manuscripts still lying untouched by scholars in the oriental libraries and with some individuals. At this juncture, the effort of a team of scholars led by Dr. B.S. Shailaja is laudable. They have edited and published *Grahaṇa-Mukura*, an astronomical work of the sixteenth century. This small text has been confined to the subject of the lunar and solar eclipses as suggested by the name itself. The text is in Sanskrit with a brief Kannaḍa commentary. But the author of the text and the commentary are unknown. The editors of the text provided the Sanskrit meaning and an English translation of the text. This is a *karaṇa* text composed based on the parameters of *Sūrya-Siddhānta*.

The text consists of seven chapters, beginning with *madhyādhikāraḥ*, which comprises 17 verses. For the computation of the eclipses, longitudes of the Sun, the Moon, the *mandocca* and of the Rahu are necessary. Therefore, the computation methods for the mean positions of these are explained. The rectification procedure for the circumference of the Earth at the locality in question, as well as corrections to the planets known as *deśāntara*, are also explained.

The second chapter, the *grahasphuṭādhikāraḥ* consists of 10 verses. In the very first verse, the computation method of the *ayanānśa* value of procession of equinoxes has been explained. Here, the author of the text follows the

theory of the *Sūrya-Siddhānta*. In the second verse procedure of obtaining the *mandakendra*, the mean anomaly is explained. According to the verse, the *mandakendra* is to be obtained by subtracting the *mandocca* from the longitude of the planet. But in the English translation, it is explained in the other way. The sixth verse of the chapter explains the method of obtaining the *mandabhujaphala* equation of centre. According to the verse *bhujajyā* of the Sun and of the Moon are to be multiplied by 60 and to be divided by respective divisors to obtain the *mandabhujaphala*. This is positive if the *mandakendra* is *meṣādi* or negative in the case of *tulādi*, but this is not clearly reflected in the English translation. The eighth verse of the chapter explains the method of *bhujāntara* correction. The *bhujaphala* of the Sun earlier obtained is to be divided by 27 the result in *kalās* is positive or negative to the Sun and the Moon according as the equation of the centre of the Sun is positive or negative. The planets are originally computed for the rising time of the mean Sun. To bring them at the rising time of the true Sun this correction named *bhujāntara* arises. So even the Sun is not exempt from this correction. Even here, English translation does not give a clear meaning.

The third chapter *chāyādhikāraḥ* consists of 14 verses. Though *chāyādhikāra* or also known as *tripraśnādhikāra* in other ancient astronomical texts is exhaustive in nature where formulae of trigonometry, gnomonic observations with the help of gnomon and other important subjects are explained, but in this it is very brief. Only astronomical functions that are useful in the computation of eclipses are explained. Subjects such as method of finding the equinoxial shadow, obtaining of declination, the *cara* segments, duration of the day and the night and finding the rising times of the *rāśis* and the computation of the *lagna* are explained.

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The third verse of the chapter narrates the classification, such as *uttaragola*, *dakṣiṇagola*, *uttarāyaṇa*, and the *dakṣiṇāyaṇa*. When the Sun lies in the North and South of the celestial Equator, it is called *uttaragola* and *dakṣiṇagola*, respectively. This is when the Sun is in six *rāśis* from Meṣa and from Tulā. Similarly, when the Sun is in six *rāśis* from Makara, it is *uttarāyaṇa*, and when it is in six *rāśis* from Karkāṭka, it is *dakṣiṇāyaṇa*. There is some confusion in the English translation.

The fourth chapter *somagrahaṇādhikāraḥ* consists of 17 verses. The first verse narrates the possibility of lunar and solar eclipses, the second verse explains the procedure of obtaining the Sun and the Moon at the time of the eclipse. While translating the verse, it is written as the duration of the interval from *parva* पर्व to the end of the *tithi*. Instead, this should have written as the duration of the interval from the given time to the end of the *tithi*. The method of obtaining *śara* of the Moon, the angular diameters of the Sun, the Moon, and the shadow of the Earth, as well as the magnitude of obscurity in finding total or partial eclipses, is explained. In the context of *valana* the author quotes a verse from the *Brāmha Siddhānta*. The thirteenth verse explains the method of obtaining true declination of the Moon. According to the verse *vilomamauryā* versed sine the *utkramajya* is to be

taken to compute the declination of the Moon. But in English translation, it is mentioned as *bhuja*.

The fifth chapter, *suryagrahaṇādhikāraḥ*, begins with the explanation of the computation of *lambana* (parallax in longitude) and *nati* (parallax in latitude), as well as their rectification methods, which are unique features of the Solar eclipse.

The sixth chapter, named *digparijyānādhya* consists of only five verses. The determination method of the directions is explained here. Normally, this subject is part of *chāyādhikāra* in other ancient astronomical texts.

The seventh chapter *parilekhanam* consists of 21 verses. The geometrical drawing of the eclipses is narrated in this chapter, as in other ancient texts.

I sincerely congratulate the editors and publishers for making this text available to the readers of ancient Indian astronomy.

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