

ON SOME GEOLOGICAL ASPECTS OF THE *SURYASIDDHĀNTA*

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The paper presents a brief introduction to the *Suryasiddhānta*, a popular geomathematical treatise in Sanskrit followed by a discussion on the geological implications of the geographical data contained in the text. The possible evidences inferred from such studies in support of Plate Theory of the Earth are brought out.

INTRODUCTION

Siddhāntas are geomathematical treatises in Sanskrit, generally presented in a poetic style. There are umpteen *siddhāntas* available at present and many have also been lost. Of these texts *Paitāmahasiddhānta*, *Brahmasiddhānta*, *Sūryasiddhānta*, *Somasiddhānta*, *Sundarasiddhānta*, *Siddhānta Sārvabhouma*, *Siddhānta Śiromaṇi* etc. are some of the more important ones, but of all these the *Sūryasiddhānta* enjoys the place of pride, in Hindu Astronomy.

The present text of the *Sūryasiddhānta* that is available, is latest redaction of the numerous versions of the same text which have been lost. The material of the text, is perhaps, as old as that of the *Vedāṅga Jyotiṣa* of Lagadha or little later to it. However, the date of *Vedāṅga Jyotiṣa* is not certain excepting that the scholars have been able to consider the text of the same as of the *Ṛg Veda* which in their understanding is about 1500 B. C. The present version of *Sūryasiddhānta* is believed to have been rendered some times between 628 A. D. and 966 A. D. (Shukla)¹. However, as per author of the text of *Sūryasiddhānta*, it should be dated about 2, 163, 103 B. C. (Shukla, *ibid*) conforming to the verse no. 2 of the Chapter I of the text, i. e. '*Alpāvaśiṣṭe Tu Kṛte*' meaning that 'when there was little of *Kṛta Yuga*'. As per the Hindu Calender, the date of the *Sūryasiddhānta* given in the text accounts for such an antiquity, which is nothing but staggering. However, the matter has been discussed elsewhere by the present author (Murthy)².

The difficulties in accepting such an antiquity for a record are well known. From the linguistics, human evolution, advanced mathematics etc.

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points of view, the above date cannot simply be accepted. By history, archaeology and anthropology this fact cannot be substantiated, for man's evolution has been considered only recently in geological history, i. e. about 3.75 million years ago and the Old Stone Age is considered to be about 1.7 million years ago. When man had not at all been evolved, where then could be the knowledge of language, mathematics and observational data that has gone into the text of the *Sūryasiddhānta* obtained? This aspect has been discussed by Prasad and the present author exclusively (Prasad and Murthy)².

However, the commentators on the present version of the *Sūryasiddhānta* accept that there had been earlier versions of the text which have been lost. In this connection many important aspects of the text and also other related ones appear to be interesting. From the geological point of view, there is no mention of the Himalayas but the name of the mountain Meru is described as the Prime Meridian along with Kurukṣetra, Ujjain and Laṅkā. Whether a part of the Himalayas was considered to be Meru or they meant by the same name any other mountain, is again debatable.

The author of the *Sūryasiddhānta* is stated to be Mayāsura. Who was this Mayāsura and where he lived etc. details are wanting. The text is mentioned to govern his discussion with the representative of the Sun, or a person who was perhaps well versed in solar sciences.

There are some 28 commentaries available at present on the present version of the *Sūryasiddhānta* listed by Shukla (ibid), while number of other treatises have freely drawn on the material of the text.

BRIEF CONTENTS OF THE TEXT

The *Sūryasiddhānta* in its present form consists of 14 Chapters of which the first eleven Chapters are devoted to astronomy while the last three to cosmogony, geography, astronomical instrumentation and systems of measuring time. The text, all total, has 500 verses and has the reputation of being the most popular *Siddhānta* texts, presenting in a nutshell the vast data of the Hindu astronomical and related observations. In its achievement the text has left ordinary mathematical lessons of arithmetic, algebra and exercise problems in astronomy as is generally done in other *siddhāntas* as also alternative methods while emphasising only the most important points. Similarly, the Chapters dealing with geography, cosmogony, instrumentation and systems of the measurement are precise keeping the text to the minimum.

From the point of a student of the Earth, many important geological problems find their solution in the *Sūryasiddhānta*. The size, shape, age,

movements of the earth, its relation to the other members of the solar system, the system of time measurement most applicable to geological concepts, are some of the more important problems solved to the time, with scope for improvement, of course. The most important amongst the other data is the geographical distribution which has great geological implications from the modern view of Plate Theory (Murthy ; *ibid*).

THE GEOGRAPHY OF THE SŪRYASIDDHĀNTA AND ITS GEOLOGICAL IMPLICATIONS

In the *Bhūgolādhyāya*, i. e. the thirteenth Chapter of the *Sūryasiddhānta* is given a brief description of the 'Creation' of the Universe. The Universe is described as an 'Egg' in shape called *Brahmāṇḍa*. The geocentric theory of the Universe is presented. The philosophical aspect of the evolution of space into celestial objects is then presented. The earth is then described as follows :—

*Anekaratnaniçayo jambūnadamayo girihi
Bhūgolamadhye meruhu ubhayatra vinirgataha—34*

which means that a mountain by name Meru which is characterised by the presence of gold and precious stones extends on the earth in a N-S disposition.

The northern section of the Meru is called 'Sumeru' while the southern section is described as 'Kumeru'. Dividing the *Sumeru* and *Kumeru* is the extension of the ocean as a waist ornament of the Earth is meant by the following verse ;—

*Tataḥ Samantāt Paridihi kramenayam mahārnavaha
Mekhaleva sthito dhatriya Devāsura vibhāgakṛt—36.*

This statement at once reminds a modern student of the earth the division of the northern Laurasian continent and the southern Gondwana continent of the geological past, separated by the equatorial sea called the 'Tethys'. Hence, the Earth was also addressed by the ancients as 'Abdhi-mekhala'.

The next verse described the disposition of other islands with reference to the above geographical distribution :—

*Samantānmerumdhayat tu tulyabhāgeṣu toyadhehe
Dwīpeṣu dikṣu pūrvādi nagaryo deva nirmitaḥ—37.*

Accordingly, islands are distributed through the east at equal distances in the ocean which divides the *Meru* Mountain. Then the four islands and their cities are stated as follows :

*Bhuvṛttapade pūrvasyām yamakotiṭi viśruta
Bhadraśwavarṣa nāgarī swārnaprākāra torana—38.*

*Yamyayam bhārte varṣe laṅkā tadwanimahāpurī
Paścime kēsumālākhye romakākhya prakertita
Udak Siddhapurī namā kurvuarṣe prakertita—39*

meaning that the following cities are located in the respective islands on the equator at equidistant and they are ;

Direction from MERU	Island	City
East	Bhadrashwavarṣa	Yamakoti (Java Isles ?)
South	Bhāratavarṣa	Laṅkā (Ceylon ?)
West	Kethumalavarṣa	Romaka (Rome ?)
North	Kuruvarṣa	Siddhapurī (Maya, Inca ?)

This description of Islands and their geographical distribution is interesting if we consider the distribution of Islands of ancient Pre-historic civilisations like the Atalantis, Maya, Inca, Nazaka etc.

If the above equation is acceptable, then the present distribution of these places away from the equator as they are found now call for explanation. Some of them have submerged in the oceans—observes the commentator Kapileshwara Chaudhury in his *Tatwāmṛta* Commentary (Kashi Sanskrit Series No. 144, p. 259)* by his remarks that '*Paratra Kālakarmena tasam pradeśaḥ samudramgnu ato nirakṣe adhuna ta nopalabhante*'.

In the world history there is no record of these places and archaeological studies have yet to make out such distribution of cities for want of more data. The record of such distribution of the Islands itself is sufficient to give an indirect evidence to the antiquity of the text, perhaps in its original rendering, which is not available at present, but part of which has been adopted by later versions, the last redaction of which has got the statement reproduced perhaps unaware of its geological significance. The unmistakable omission of the name of the Himalayas in favour of Meru is prominent and island cities sound the late Tertiary distribution of land and oceans on the Earth as known to modern students of Geology.

Was it that the Himalaya was non-existent or was named as the Meru or there is deliberate omission of the Himalayas by the author of the text is uncertain. According to Amarasimha the author of *Nāmaliṅgānuśasanam*⁵—the sanskrit lexicon—

Merussumerurhemādrihi ratnasānussurālayaha

is different from the Himalaya when he observed that

Himavānnishado vindhyo malyavān pāriyatrikaha

Gandamadana manye ca Hemakutadayo nagah, which suggest that the Himalayas were included under hills, i. e. *nāgas* than *parvatas*, latter are actually the mountain ranges. In the absence of the other versions of the *Sūryasiddhānta* text, it becomes clear that it was perhaps composed when the Himalayas did not get the recognition as they do now. This geological situation would have arisen only when the *Himalayas* were just rising from the *Tethys* sea as it did in several stages and had not completely attained their lofty heights of commanding snow and serenity.

The present distribution of Islands mentioned in the *Sūryasiddhānta* text when equated, fit surprisingly with the concept of the movement of the ocean floor, especially as noted in the modern theory of Plate Tectonics (Blacket *et al.*,⁶ Dietz *et al.*,⁷ Heintzier⁸ and Hurley⁹). It is probable that some of them have been submerged and lost identity. This can be substantially proved for, distribution of lands was different even by a million years ago. The author of the *Sūryasiddhānta* claims that the original text was composed about 2 million years ago. The antiquity of the text cannot be accepted on the face value as has already been stated. The problem is open for the students of Pre-history, Archaeology and Anthropology to ponder upon, for geologically it is possible to substantiate the above statements of the very important, extremely popular text of Hindu Astronomy—the *Sūryasiddhānta*.

Sarcar¹⁰ mentions that 'Of these four-continent (*Caturdwīpa vasumatī*) and seven-continent (*Saptadwīpa vasumatī*) theories, the first may be regarded as earlier on the following grounds. In the first place, the number of four associating the continents within the four directions is quite natural, while the number of seven is regarded by scholars as conventional even in the *R̥g Veda*. This observation is something prophetic, for, human evolution first took place on the main land of India as the earliest fossils of Primates in the world were found in Pandaung rock formations of Burma¹¹, which are geologically about 50 million years old, suggesting that the main land was no more than an Island as has already been described and was associated with *Bhāratavarṣa* and *Laṅkā* city—one of the four equatorial cities. The migration of Primates in later geological ages to other land areas and a knowledge of other continents would have given the ancients the idea of seven Islands later, named as *Jambū*, *Plakṣa*, *Kuśa*, *Krauñca*, *Śaka*, *Śālmālī* and *Puṣkara*.

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