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Three Purāṇic Statements on the Shape of the Earth

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Résumé de l'article

The article analyses an argument given in Jñānarāja's Siddhāntasundara (ca. 1500) on the shape of the earth according to the Purāṇas. The argument involves the use of the word gola, 'ball, globe,' in the Purāṇas, a Purāṇic statement about the mountain Meru being north of everywhere, and a Purāṇic comparison of the earth to a mirror. The article concludes that Jñānarāja breaks with the Purāṇas as well as the traditional commentaries on these texts, and further suggests that we might have to rethink the dictionary definition of gola.
Three Purānic Statements on the Shape of the Earth

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INTRODUCTION

The present article is part of an investigation into how authors of Sanskrit astronomical treatises thought about, critiqued, and used cosmographical material from the Purāṇas, a corpus of Hindu religious texts. The focus is on an argument on the Purāṇic conception of the shape of the earth presented by the astronomer Jñānarāja (fl. 1500) in the Siddhāntasundara at the dawn of the Early Modern period in Indian history. In the argument, Jñānarāja cites and interprets three Purāṇic statements about the shape of the earth. The argument offers insights into how cosmographical material from the Purāṇas was understood and used at the time of Jñānarāja.

1 SIDDHĀNTAS AND PURĀṆAS

Since at least the time of the astronomer Varāhamihira (fl. sixth century), Indian astronomers composing Siddhāntas were aware of and reacted to cosmographical ideas from other traditions, including both Buddhism and Jainism. However, since the Siddhāntic astronomers belonged to the religious tradition we today call Hinduism, the most important tradition of cosmography that they engaged with was perhaps that of the Purāṇas.

1 In the following, the term “India” will refer to South Asia in general.
2 Varāhamihira lived in Ujjain in the sixth century CE (Pingree 1970–94: 5.503–595; 1976; Plošker and Knudsen 2008b). A Siddhānta is a comprehensive Sanskrit treatise on astronomy and cosmography. As an example of the rejection of a Jain opinion, in Pañcasiddhāntikā 13.8 (Neugebauer and Pingree 1970–1: 1.110), Varāhamihira rejects the Jain idea that there are two suns and two moons.
A corpus of texts belonging to the Hindu tradition of India, the Purāṇas were composed over a long period of time, from the middle of the first millennium CE to the middle of the second millennium CE. The corpus is far from monolithic. Additions and other changes were regularly made to existing Purāṇas, and new Purāṇas would continue to be composed according to various sectarian and regional standpoints. As a consequence, it is difficult to date individual Purāṇas, and even sections of Purāṇas.\(^3\)

As a corpus, the Purāṇas are often considered to be primarily religious texts. More broadly, the Purāṇas are encyclopedic in nature, covering a vast range of subjects. Over time, the Purāṇic corpus grew into a large repository of Brahmanic learning. As part of that process, the cosmographical material in the Purāṇas was expanded and developed. The composite nature of the Purāṇic texts is illustrated by the traditional view that a Purāṇa should possess five components (\(pañcalakṣaṇa\)): (1) the creation of the universe; (2) the destruction of the universe; (3) the genealogy of gods and sages; (4) the reigns of the Manus; and (5) the history of the solar and lunar races.\(^4\)

Two Purāṇas, the \textit{Bhāgavatapurāṇa} and the \textit{Viṣṇupurāṇa}, each of which contains large sections on cosmography, will be important in the following. Rocher considers both texts to be among the “better established and more coherent” Purāṇas.\(^5\) In terms of relative chronology, the \textit{Viṣṇupurāṇa} is considered older than the \textit{Bhāgavatapurāṇa}.

\textbf{THE COSMOGRAPHY OF THE PURĀṆAS}

Purāṇic cosmography consists of and preserves an intermingling of many different ideas from different periods of time. In particular, it contains ideas contrary to the science of astronomy as practised in ancient and medieval India. For example, it is stated in some Purāṇas that the sun is closer to the earth than the moon is.\(^6\)

The Purāṇas conceive of the universe as the \textit{brahmāṇḍa}, a word meaning “Brahmā’s egg.” As such, the word \textit{brahmāṇḍa} itself offers a clue to the shape of the universe, namely, oval, or perhaps even spherical. Inside the \textit{brahmāṇḍa} is the earth as well as multiple regions not accessible to human beings, including Svarga, the heavenly realm, and the Pātālas, the seven subterranean regions.

\(^3\) On the dating of the Purāṇas, see Rocher 1986: 100–103.
\(^4\) For a discussion of the five characteristics of a Purāṇa, see Rocher 1986: 24–30. For a discussion of the Purāṇas as religious documents, see Rocher 1986: 104–115.
\(^5\) See Rocher 1986: 103.
\(^6\) See, for example, \textit{Viṣṇupurāṇa} 2.7.5 (Sārmā 1985: 92v) and \textit{Bhāgavatapurāṇa} 5.22.8 (K. Śāstrī 1966: 495).
The earth is frequently described by the Sanskrit word *bhūmāṇḍala* in the Purāṇas. The word is a compound word formed by combining two words, *bhū*, “the earth,” and *maṇḍala*, “circular, round; circle.” The literal meaning of *bhūmāṇḍala* is therefore “earth-circle.” As such, there is no doubt that the idea of a round earth is present in the Purāṇas. However, the word “round” is ambiguous in Sanskrit, just as it is in English, where a plate, a bracelet, and a ball can be described as “round” despite having different geometrical shapes.

The Purāṇas describe the *bhūmāṇḍala* as covered by continents or landmasses (*dvīpa*) and oceans. At the *bhūmāṇḍala*’s center is a round continent known as Jambūdvīpa, which is subdivided into regions (*varṣa*) separated from each other by mountain ranges. Meru, the world-mountain, is located at the center of Jambūdvīpa. It is in Jambūdvīpa that human beings live, and the region Bhāratavarṣa corresponds to India. Surrounding Jambūdvīpa is an alternating series of seven oceans and seven continents. The oceans and continents are annular in shape (ring-shaped), and the further they are from Jambūdvīpa, the larger they are. Beyond the continents and oceans, the circular Lokāloka mountains mark the boundary for reach of the sun’s light.

Overall, the *bhūmāṇḍala*, as described in the Purāṇas, is enormous in size, vastly larger than the earth described in the Siddhāntas. It is clear, therefore, that the Purāṇic concept of the *bhūmāṇḍala* is different from “the earth” as we think of it today.8

**THE SHAPE OF THE EARTH IN THE PURĀṆAS**

One interpretation of the Purāṇic *bhūmāṇḍala* is that it represents the earth as a flat disk. As we will see in the following, some astronomers from the Siddhāntic tradition believed that the cosmography of the Purāṇas operates with a flat earth. Some modern scholars likewise hold that the earth is flat in Purāṇic cosmography.9 In this interpretation, the *bhūmāṇḍala* exists as a large circle inside the *brahmāṇḍa*. More specifically, it is the Great Circle that divides the *brahmāṇḍa* into two equal halves.

There is evidence that indigenous traditions saw the *bhūmāṇḍala* as a flat disk. One example is a model of the universe found in the Hanūmāṇḍhokā palace in Kathmandu, Nepal. The model, which dates from 1656 ce and is “likely based on Purāṇic concepts”,10 depicts the earth precisely as a flat disk.11 However, there are no known Purāṇic passages that explicitly state that the earth is flat.

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7 Each ocean consists of a different liquid. An ocean of saltwater surrounds Jambūdvīpa.
8 For an account of the cosmography of the Purāṇas, see Kirfel 1920: 54–173.
9 See, for example, Pingree 1990: 274 and Plofker 2005: 65.
10 See Bühnemann 2020: 2.
11 See Bühnemann 2020 for a detailed discussion of the model.
Besides flatness, there are other possible interpretations of the shape of the bhūmāṇḍala, including the earth having the shape of an inverted bowl. For example, some Purāṇas describe the earth as resembling a turtle shell, that is, having a convex shape, after a destruction has burned away trees and grass. Without a clear and unambiguous Purānic statement on the earth’s shape, there is no certain answer to the question of what the shape of the earth is according to the Purāṇas. Furthermore, given how the Purāṇas have evolved over time and place, even if such a statement was available in some Purāṇa, there is no way to be sure that it would apply consistently across the numerous and different Purānic texts (even different parts of the same Purāṇa) and their traditional commentaries.

THE COSMOGRAPHY OF THE BHĀGAVATA-PURĀṆA

The cosmographical sections of the Bhāgavata-purāṇa warrant an additional comment. Like much of Sanskrit literature, the Purāṇas are composed in verse. But the chapters on cosmography in the Bhāgavata-purāṇa, which are found in the fifth section (skandha) of the text, are in prose rather than in verse.

It is not clear why the Bhāgavata-purāṇa contains material written in prose, but perhaps the reason is that Purānic cosmography involves both a technical vocabulary and huge numbers. Plofker notes that,

Since Sanskrit (like other languages) generally has only one standard number word for each number, it can be difficult to fit such words into the metrical structure of verses so as to convey a desired mathematical meaning without ruining the scansion of the verse.

In the Siddhāntas, which are composed in verse, the problem is solved by employing systems that allow numbers to be expressed in a different way than the corresponding number words. One example is the object-number (bhūtasaṅkhyā) system, which provides synonyms for standard number words. But such systems are not followed in the Purāṇas, in which the standard number words are consistently used. As a result, the Viṣṇupurāṇa sacrifices clarity in its cosmographical parts in order to present the material in versified form. In contrast, the prose account in the Bhāgavata-purāṇa has more clarity and detail. It is possible, therefore, that a desire for clarity and ease of expression is behind the decision to use prose in the Bhāgavata-purāṇa’s cosmographical chapters.

Whatever the reason is for the use of prose in the Bhāgavata-purāṇa’s cosmographical chapters, these chapters stand out in the voluminous Purāṇa, and have attracted significant attention in the commentarial tradition.

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12 See, for example, Brahmāṇḍapurāṇa 3.1.147 (Sharma 2000: 239v) and Kūrmapurāṇa 2.43.23 (Gupta 1971: 665).
13 Plofker 2009: 47.
14 See Sarma 2003.
15 This is not to say that the cosmography in the Bhāgavata-purāṇa is always clear.
The approach to Purāṇic cosmography taken by many prominent Siddhāntic astronomers is to incorporate compatible elements into their own model while rejecting incompatible elements. An example of the incorporation of a compatible element is the astronomers’ placing of Meru, the world mountain, at the earth’s North Pole. An example of the rejection of an incompatible element is the astronomers’ refutation of the Purāṇic idea that the sun is closer to us than the moon is. Minkowski refers to this approach as the “standard accommodation,” and describes it as “substantially standardized, if not quite a stable and uniform one”.

First articulated in Lalla’s Śiṣyadhīvṛddhidatantra in the eight or early ninth century, the standard accommodation was followed for many centuries, propagated by prominent astronomers like Śrīpati (fl. 11 cent.) and Bhāskara II (b. 1114).

In contrast to the standard accommodation is the approach taken by the scholar-astronomer Jñānarāja in the treatise Siddhāntasundara, composed around 1500 CE. Jñānarāja belonged to a Brahman family with a long history of study and scholarship. He lived in Pārthapura, which has been identified as the modern Pathri in Maharashtra. At the time, Pārthapura was a center for astronomy, and Jñānarāja’s family was just one of the families of astronomers residing there. Jñānarāja had two sons, who both contributed to the field of astronomy: Cintāmaṇi, who composed an extensive commentary on his father’s Siddhāntasundara called the Grahagaṇitacintāmaṇi, and Sūryadāsa, a polymath who wrote on a vast range of subjects.

The key difference between Jñānarāja’s approach to Purāṇic cosmography and that of his predecessors is his concern with the authority of the Purāṇas. Contrary to Lalla, Śrīpati, Bhāskara II, and others, Jñānarāja never rejects cosmographical ideas from the Purāṇas. Moreover, he does not hesitate to reject...
tenets from the Siddhāntas in order to preserve the validity of statements from the Purāṇas.

The Siddhāntic tradition holds that the earth does not require external support to remain motionless in space, specifically rejecting the claim that such support is needed. Jñānarāja, however, endorses the Purānic position that the earth needs the support of divine beings for its position to remain fixed in space, and explicitly rejects the argument against external support given in the Siddhānta-śiromaṇi of Bhāskara II.²¹ Jñānarāja even redefines the meaning of the word “up” in order to preserve the validity of a Purānic description.²²

It is noteworthy that Jñānarāja is silent on the Purānic claim that the sun is closer to the earth than the moon is. If this idea were accepted, however, the Siddhāntas’ cosmological model would break down. For example, the model would no longer be able to scientifically account for eclipses, an important topic in astronomy. For this reason, Jñānarāja’s silence is not surprising. Rather than engaging with a problem that would expose a rift between the Purāṇas and the Siddhāntas, he omits a discussion of it in order to avoid calling the authority of the Purāṇas into question.

There is no doubt that within the Siddhāntic tradition, Jñānarāja acts as an apologist for the Purāṇas. An important question arises from this observation: Does Jñānarāja’s emphasis on Purānic authority mean that he follows the traditional interpretation of the Purāṇas? In other words, is Jñānarāja’s interpretation of the Purāṇas (or at least of the relevant passages of the Purāṇas) in agreement with the traditional understanding of the texts given in the many commentaries on the Purāṇas? This question will be explored later in the article.

**THE SHAPE OF THE EARTH**

It is well known that a central tenet of Siddhāntic cosmology is that the earth is small in size and spherical in shape. However, parallel to this Siddhāntic conception of the earth as a small sphere, other traditions had their own ideas about the size and shape of the earth.

In the Siddhāntasundara, Jñānarāja enters into a discussion of how the Purāṇas describe the shape of the earth. He presents an argument based on three statements, which he claims are Purānic, to refute the idea, held by his predecessors in the Siddhāntic tradition, that the Purāṇas describe the earth as flat.

The standard accommodation of the Siddhāntic tradition contains different arguments against a flat earth. More specifically, these arguments refute the idea,

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²¹ See Siddhāntasundara 1.1.29–31 (Knudsen 2008: 263–264).

²² See Siddhāntasundara 1.1.33–38 (Knudsen 2008: 264–266).
generally said to be held by an unspecified “some,” that the earth resembles the surface (tala) or belly (udara) of a mirror. The first astronomer to mention the mirror simile is Bhāskara I. In his commentary on Āryabhaṭa’s Āryabhaṭīya from 629 CE, we find the following statement:

भुवं तावद शकटाकारां दपर्णवृताकारां च मयाते

For one thing, other people believe that the earth is shaped like a cart or has the shape of a round mirror.

The idea of a cart-shaped earth does not seem to be Purāṇic, and later astronomers do not mention it. But the mirror simile is subsequently cited by Lalla, Caturveda Prthūdakasvāmin, Śrīpati, Bhāskara II, and Jñānarāja.

23 The use of one of the words udara or tala with a word for “mirror” indicates the reflective surface of the mirror (“belly” indicating the front as opposed to the back), if it at all changes the meaning of “mirror.” The astronomers use udara and tala synonymously. For example, Śrīpati uses udara in Siddhāntaśekhara 15.8 and tala in 15.9 (Miśra 1932–47:2.138–139). Pingree (1983:356) translates darpaṇodara as “concave mirror,” but there is no evidence that the Siddhāntic astronomers understood the simile to imply concavity. In fact, they use “mirror,” “belly of a mirror,” and “surface of a mirror” synonymously in the simile, the tertium comparationis of which they understand to be flatness.

24 Shukla 1976:250. Note that śakaṭākāra in the printed edition has been corrected to śakaṭākāraṁ. The astronomer Āryabhaṭa was born in 476 CE, and he completed the Āryabhaṭīya in 499 CE. See Pingree 1970–94:1.50–53, 2.15, 3.16, 4.27–28, 5.16–17 and Plofker and Knudsen 2008a. The astronomer Bhāskara I wrote the Āryabhataśīla on the Āryabhaṭīya in 629 CE. See Pingree 1970–94:4.297–299, 5.254.

25 In the Indian tradition, “cart-shaped” (śaṭakāra) refers to an isosceles trapezoid or triangle, but it is not immediately clear how the earth could have such a shape. However, Bhāskara I is likely critiquing a Buddhist idea. In the Abhidharmakosa of Vasubandhu (3.53) (Shastri 1998:1.404), Jambūdvipa is said to have the shape of a cart. In Hindu cosmography, Jambūdvipa is the central circular continent of the bhū-mandala. But in pre-Mahāyāna Buddhist cosmography, Jambūdvipa refers to the Indian subcontinent only (see Sadakata 1997:31). In this Buddhist context, Jambūdvipa is a trapezoid, the short side facing outward. In fact, it is virtually a triangle. It has three sides of 2,000 yojanas each; the short side is 3.5 yojanas (Sadakata 1997:30–31 and 33, fig. 11). In other words, the Buddhist Jambūdvipa is shaped like a trapezoidal cart. Perhaps Bhāskara I confused the Buddhist notion of Jambūdvipa with that of the Purāṇas, and thought the bhū-mandala is cart-shaped in Buddhist thought.

26 See Śiṣyādhīvṛddhiḥdatattra 20.6 and 20.34 (B. Chatterjee 1981:1.232, 1.237); Caturveda Prthūdakasvāmin’s Viśnūbhāṣya on Brahmagupta’s Brāhmaṇasphuta-siddhānta 21.1 (Ikeyama 2002:17, 18); Siddhāntaśekhara 15.8–9 (Miśra 1932–47:2.138–139); Śiṣyādhīvṛddhiḥdatattra 23.11 (D. Apt 1943–52:1.40); and Siddhāntasundara 1.1.27–28 (Knudsen 2008:262–263). The astronomer Caturveda Prthūdakasvāmin lived around 864 CE (Pingree 1970–94:4.221–222). The astronomer Brahmagupta composed the Brāhmaṇasphuta-siddhānta in 628 CE at the age of 30 (Pingree 1970–94:4.254–257, 5.239–240).
It is clear from the texts that the Siddhāntic astronomers understood the simile (comparing the earth to a mirror) to mean that the earth is flat. For example, Lalla writes the following in the Śisyadhīvṛddhidatantra:27

अभितामवनी प्रश्नहते  
सुसमा केचन दर्षणायमाम्

Some say that the earth is immense; others that it is perfectly flat like a mirror.

The first of the Siddhāntic astronomers to identify the source of the mirror simile is Bhāskara II, who cites the simile in the Siddhāntaśiromaṇi:28

यदि समा मुकुरोदरस्वभिम  
भवती दर्शणी तर्कन:  
उपरि दूरगतोऽवि परिभ्रमन  
किमु नैरसरसरिन नेत्यते

If the glorious earth is flat like the belly of a mirror, why is the sun, which is revolving far above the earth, not [always] visible to humans like it is to the gods?

In the Vāsanābhāṣya, Bhāskara II’s own commentary on the Siddhāntaśiromaṇi, the following comment is made on the verse:29

पुराणे भूः समादशोऽदरस्वभिम कहते

It is described in the Purāṇas that the earth is flat like the belly of a mirror.30

Unfortunately, Bhāskara II does not reveal where in the Purāṇas the mirror simile is found.

Besides Bhāskara II, the only other astronomer to identify the source of the mirror simile is Jñānarāja, who also points to the Purāṇas. A detailed discussion of Jñānarāja’s treatment of the mirror simile is found in the next section.

Additionally, in his compendium on India, the Muslim scholar Al-Bīrūnī (born 973 CE) writes that some people in India hold that the earth is flat like a mirror. He further notes that sayings about the shape of the earth are especially common among the followers of the Purāṇas.31

27 See Śisyadhīvṛddhidatantra 20.6 (B. Chatterjee 1981: 1.232). Lalla presents arguments against the earth being flat in Śisyadhīvṛddhidatantra 20.34–37 (B. Chatterjee 1981: 1.237).
28 Siddhāntaśiromaṇi 2.3.11 (D. Apte 1943–52: 1.40).
29 See the Vāsanābhāṣya on Siddhāntaśiromaṇi 2.3.11–12 (D. Apte 1943–52: 1.40). This work is not to be confused with Catuveda śrīthūḍakasvāmin’s commentary on the same name on the Brāhmasphutasiddhānta.  
30 The word purāṇe is here interpreted as a singular standing for the whole category.  
31 Sachau 1910: 267–268. Al-Bīrūnī cites Brahmagupta as his source. However, as noted by Pingree (1983: 356), the information given by Al-Bīrūnī is not from Brahmagupta, but appears to be from Catuveda śrīthūḍakasvāmin’s commentary on Brahmagupta’s Brāhmasphutasiddhānta.
JṆĀNARĀJA ON THE PURĀṆAS AND THE SHAPE OF THE EARTH

As one would expect from a member of the Siddhāntic tradition, Jñānarāja maintains that the earth is spherical in shape. Not only does he state that the earth is a sphere, he gives a number of scientific arguments for the sphericity of the earth.

However, unlike his predecessors, Jñānarāja does not attempt to refute the supposedly Purānic belief that the earth flat like a mirror. He argues instead that the mirror simile has been misinterpreted and that a spherical earth is consistent with the cosmographical statements in the Purāṇas. In other words, Jñānarāja makes the point that a spherical earth is supported not only by scientific demonstrations, but also by Purānic authority.

JṆĀNARĀJA’S ARGUMENT

Jñānarāja presents his argument on the Purāṇas and the shape of the earth in two Sanskrit verses in the Siddhāntasundara’s first chapter, the chapter on cosmography (bhuvanakośa):

[Even] after seeing the straightforward word bhūgola used in the Purāṇas, as well as the statement “Meru is north of everywhere,” obstinate people say that the statement “resembling the surface of a mirror” [applies to] the entire earth. But they do not know the

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32 See Siddhāntasundara 1.21–26 (Knudsen 2008: 260–262).
33 Even though he argues that a spherical earth is consistent with Purānic cosmography, Jñānarāja concedes that some cosmographical descriptions given by the followers of the Purāṇas differ from the descriptions given in the Siddhāntas. While such descriptions are deemed true by Jñānarāja, he argues that they can be explained by “epoch-difference” (kalpabheda). That is, they are descriptions of the universe during a different epoch (kalpa) (in a previous creation). Jñānarāja holds that in the present epoch (the current creation), the texts of the Siddhāntic tradition should be consulted for cosmographical knowledge. See Siddhāntasundara 1.1.76 (Knudsen 2008: 280).
34 See Siddhāntasundara 1.1.27–28 (Knudsen 2008: 262–263). Note that 1.1.27 in Knudsen’s edition incorrectly has mānavāḥ instead of the correct reading mānavāḥ.
meaning of the Purāṇas, nor [do they know] that the spherical nature of the earth is established by excellent demonstrations.

The resemblance to the surface of a mirror, which is mentioned in the Purāṇas, [applies] only to a one-hundredth part of the earth, not to the [entire] sphere of the earth. A one-hundredth part of the circumference [of the earth] is perceived [to be straight] like a stick. Therefore the sphere of the earth appears to human beings as if it is flat.

Jñānarāja does not reveal the identity of the obstinate people that he reprimands, nor does his son Cintāmanī in his commentary on the above two verses. Minkowski refers to them as “offstage voices”. The most obvious candidates are:

1. The traditional guardians and interpreters of Purānic lore.
2. The astronomers of the Siddhāntic tradition.

We know that the Siddhāntic astronomers ascribe the mirror simile to another tradition (identified as the Purānic tradition by Bhāskara II and Jñānarāja), and that they interpret the simile to mean that the earth is flat. However, it would be odd for Jñānarāja to state that the astronomers are ignorant about arguments for and demonstrations of the spherical shape of the earth. On the other hand, Jñānarāja assumes that his antagonists know specific, perhaps obscure, Purānic passages, which points to the first possibility. This group is also not likely to know the Siddhāntas’ arguments that the earth is a sphere. As things stand, though, it is not clear exactly who Jñānarāja has in mind.

The question of Jñānarāja’s antagonists aside, the two verses introduce three separate statements, all of which are attributed to the Purāṇas:

1. bhūgola, “earth-sphere.”
2. sarvato meruḥ saumyadiśi, “Meru is north of everywhere.”
3. ādarśatalopamā or mukuratalanibhatvam, “resembling the surface of a mirror” or “resemblance to the surface of a mirror.”

The argument can be broken down as follows: Jñānarāja claims that the word bhūgola and the statement sarvato meruḥ saumyadiśi are (1) found in the Purāṇas, and (2) indicate that the earth is a sphere. According to Jñānarāja, even though his antagonists are aware of these two statements (and presumably know how they should be interpreted), they nonetheless proceed to cite a third Purānic statement, ādarśatalopamā, as evidence that the earth is described as flat in the Purāṇas. However, according to Jñānarāja, his antagonists are misinterpreting

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35 Minkowski 2004: 356.
the third statement, which he argues means only that the earth locally appears to be flat.\textsuperscript{36}

In the following, each of the three statements in Jñānarāja’s argument will be carefully analyzed. Attention will be given to the context of the statements in the Purāṇas, as well as to how the statements have been interpreted by the traditional commentators—and whether Jñānarāja’s interpretation of the statements deviates from this context and traditional interpretation.\textsuperscript{37}

\textbf{The first statement in Jñānarāja’s argument is a single Sanskrit word, bhūgola.}\n
More specifically, it is a compound word formed as a combination of the word bhū, which means “the earth,” and the word gola. In Jñānarāja’s verse, it occurs as part of a larger compound, sadbhūgolapadam, translated as “the straightforward (sat) word (pada) bhūgola” above.\textsuperscript{38}

\textbf{2 THE WORD BHŪGOLA}

\textbf{SCHOLARLY DICTIONARIES ON GOLA AND BHŪGOLA}

Before Jñānarāja’s argument can be properly critiqued, it is essential to have a full understanding of the meaning(s) of the Sanskrit word gola. The most commonly used scholarly dictionaries all have an entry for gola.

Böhtlingk and Roth’s \textit{Sanskrit-Wörterbuch}, an extensive Sanskrit-German dictionary published between 1855 and 1875, gives Kugel, that is, “ball, globe,” as the primary meaning of both gola and the related word golaka.\textsuperscript{39} Besides references to Sanskrit-Sanskrit lexicons, the dictionary states that this meaning of gola is attested in \textit{Bhāgavatapurāṇa} 3.23.43, 5.16.4,\textsuperscript{40} 5.20.38, 5.20.43, and 5.25.12, as well as \textit{Gītāgovinda} 1.16.\textsuperscript{41} In these examples, gola and golaka occur with bhū, either in

\textsuperscript{36} This is an old Siddhāntic argument. See, for example, \textit{Śiṣyadhīvṛddhidatantra} 20.35 (B. Chatterjee 1981:1.237).

\textsuperscript{37} Due to its popularity, the \textit{Bhāgavatapurāṇa} has attracted more commentaries than any other Purāṇa. We often do not know much about the individuals who wrote the commentaries. A brief note on the commentators on the \textit{Bhāgavatapurāṇa} is given by Tagare (1986:lxvi-lxix).

\textsuperscript{38} The adjective sat, used by Jñānarāja in the larger compound, is difficult to translate. Cintāmanī understands it to indicate that the word bhūgola is used in its basic, literal sense. See MS Ujjain, Scindia Oriental Institute 9401 f. 20r. For that reason, the word is translated as “straightforward.”

\textsuperscript{39} Böhtlingk and Roth 1855–75:2.813–814.

\textsuperscript{40} Note that \textit{Bhāgavatapurāṇa} 5.16.4 is cited under the entry golaka.

\textsuperscript{41} Each of the \textit{Bhāgavatapurāṇa} passages will be carefully discussed in the following. For the \textit{Gītāgovinda}, see Telang 1937:17, but note that the verse is numbered differently in Telang’s edition of the text. The \textit{Gītāgovinda}, a famous poem, falls outside of the Purānic context and will not be considered here. However, it can be noted that a quick survey shows that the available commentaries on the \textit{Gītāgovinda} mainly gloss gola as maṇḍala, “circle.”
one of the compound forms bhūgola and bhūgolaka, or, in the case of Bhāgavatapurāṇa 3.23.43, in the form bhuyogolam.

Monier-Williams’ A Sanskrit-English Dictionary from 1899 and Apte’s The Practical Sanskrit-English Dictionary from 1890 similarly both give “ball, globe” as the primary meaning of gola and golaka.42

Mayrhofer’s Kurzgefasstes etymologisches Wörterbuch des Altindischen = A Concise Etymological Sanskrit Dictionary lists only “globe, ball, jar in the form of a ball” as the meanings of gola.43

For the compound word bhūgola, Böhtlingk and Roth give the meaning Erdkugel, “earth-ball,” and Monier-Williams gives “earth-ball, the terrestrial globe, earth.” Böhtlingk and Roth have no entry for bhūgolaka, but Monier-Williams has “the terrestrial globe.” Apte and Mayrhofer have no entries for bhūgola and bhūgolaka.44

It is important to note that while the dictionaries of Böhtlingk and Roth, Monier-Williams, and Apte give “ball, globe” as the primary meaning of gola, they also give a secondary meaning, namely, “circle.” Taken in this secondary sense, the word gola can be understood as a synonym of the word maṇḍala, “circular, round; circle.” As we have seen, the Purāṇas commonly use the word bhūmaṇḍala, “earth-circle,” to describe the earth. Using the secondary meaning of gola, it is possible to interpret the word bhūgola as a synonym of the word bhūmaṇḍala. However, the scholarly dictionaries do not give any examples from Sanskrit literature of gola used in the sense of “circle,” but only refer to Sanskrit-Sanskrit lexicons.

SANSKRIT-SANSKRIT LEXICONS ON GOLA AND BHŪGOLA

Though a careful study of the history of the words gola and golaka in the traditional Sanskrit-Sanskrit lexicons (kośas) will not be undertaken here, a quick survey shows that the early lexicons mostly do not provide relevant information. However, the following is worth noting:

The Śāśvatakośa has golaka as guḍa, “ball”.45 The Medinīkośa, which Vogel places between 1200 and 1275 ce,46 is the earliest lexicon to give maṇḍala, “circle,”

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42 Monier-Williams 1899: 368; V. S. Apte 1890: 469–470.
43 Mayrhofer 1956–80: 1.349.
44 Böhtlingk and Roth 1855–75: 5.334 and Monier-Williams 1899: 761. Böhtlingk and Roth cite Bhāgavatapurāṇa 5.20.38 and 5.25.12, Gītāgovinda 1.16, and Nāradapāñcarītra 4.8.37 (Banerjea 1865: 281) as attestations of the meaning Erdkugel for bhūgola. In non-technical literature, the earliest known occurrence of bhūgola is found in the Mālatīmādhava (verse 5.22 (Telang 1936: 126)), a celebrated play by Bhavabhūti (8th century ce). However, the context does not provide valuable insight into the precise meaning of the word.
45 See Śāśvatakośa 383 (Kulkarni 1929: 34). The lexicon also has “son of a widow” for golaka, but that meaning is not relevant.
46 Vogel 1979: 347.
as a synonym of gola. Contrary to Böhtlingk and Roth, the 19th-century Sanskrit-Sanskrit lexicon Śabdakalpadruma gives Bhāgavatapurāṇa 3.23.43 as an example of the use of gola in the sense of manḍala, citing the Mediniṅkośa as an authority for this sense of the term. The Śabdakalpadruma furthermore cites Hemacandra (born 1088 CE) as an authority for the definition sarvavartula, “round everywhere,” that is, “spherical,” of gola.

THE WORD BHŪGOLA IN THE SIDDHĀNTAS

Before proceeding to a discussion of the occurrences and meaning of the word bhūgola in the Purāṇas, it is necessary to discuss its meaning in the Sanskrit treatises on astronomy.

The word gola is a technical term in the Siddhāntic tradition. In the context of astronomy, the word gola and the equivalent word golaka mean either “sphere” or “hemisphere.”

Neither gola nor golaka are found in the Vedāṅgajyotiṣa, the earliest text on astronomy in India, and golaka is used only as the name of a certain conjunction of planets in the Yavanajātaka of Sphujidhvaja. The earliest attestation of the word golaka meaning “hemisphere” is the Paitāmahasiddhānta, which Pingree dates to the first half of the 5th century CE. Āryabhaṭa uses gola both as “sphere” and as “hemisphere” in the Āryabhaṭiya, composed in 499 CE. Subsequent astronomers, including Brahmagupta, Varāhamihira, Lalla, Bhāskara I, and Bhāskara II, use gola as both “sphere” and as “hemisphere” as well.

In other words, the Indian astronomical tradition has consistently used the word gola (and its equivalent golaka) to denote a sphere or a hemisphere since at least the time of Āryabhaṭa.

When it comes to the word bhūgola, all Indian astronomers, including Āryabhaṭa, Varāhamihira, Brahmagupta, Lalla, Bhāskara I, Bhāskara II, and, as we have seen, Jñānarāja, use it in the sense of “earth-sphere.” That is, the earth is a sphere. The Siddhāntic tradition accepts as a basic tenet that the earth is spherical in shape. The compound word bhūgola (or an equivalent thereof) is the tradition’s standard nomenclature for the spherical earth of its model.

47 See first half of verse 15 in Hośiṅga 1968:146.
48 See Rādhākāntadeva 2002:2.363. For Hemacandra’s date and life, see Vogel 1979:335–336.
49 Pingree (1981:9–10) dates the Vedāṅgajyotiṣa to around 400 BCE.
50 See Yavanajātaka 36.45 (Pingree 1978:1.291).
51 For the dating of the Paitāmahasiddhānta, which is part of the Viṣṇudharmottarapurāṇa, see Pingree 1967–8:473. For the occurrence of gola in the sense of “hemisphere,” see the Viṣṇudharmottarapurāṇa 2.171 (Śrīkṛṣṇadāsa 1912:298v).
52 Varāhamihira uses the equivalent word mahīgola in Pañcasiddhāntikā 13.1 (Neugebauer and Pingree 1970–1:1.108).
As we have seen, Jñānarāja tells his readers that the word bhūgola is used in the Purāṇas. However, he does not tell us where in the Purānic corpus it occurs. Cintāmaṇi's commentary is likewise silent in this regard, but Sūryadāsa, Jñānarāja's other son, cites Bhāgavatapurāṇa 10.8.37, where the word is indeed found.

In the extant Purāṇas, the word bhūgola (or the variant mahīgola) is known to occur five times in the Bhāgavatapurāṇa, once in the Brahmāṇḍapurāṇa, twice in the Narasiṅhapurāṇa, and once in the Padmapurāṇa:

- Bhāgavatapurāṇa 3.23.43 (bhuvō golam); 5.16.4 (bhūgolaka–); 5.20.38 (bhūgolasya); 5.25.12 (~bhūgolam); and 10.8.37 (bhūgolam).
- Brahmāṇḍapurāṇa 3.22.76 (mahīgolam).
- Narasiṅhapurāṇa 30.1 (bhūgolam) and 31.119 (bhūgolasya).
- Padmapurāṇa 6.221.5 (bhūgolam).

In the following, we will carefully go through each occurrence of the word in the Bhāgavatapurāṇa, a text we know from Sūryadāsa that Jñānarāja was familiar with, to try to ascertain whether the word bhūgola can be taken to indicate a spherical earth. However, we will not enter into a discussion of the occurrences in the other three Purāṇas. It is not certain that Jñānarāja used these texts, and the occurrences of bhūgola in them do not add anything substantial to the discussion.

Bhāgavatapurāṇa 3.23.43

The first occurrence of the word bhūgola (in this case written as bhuvō golam) in the Bhāgavatapurāṇa is verse 3.23.43:

प्रेक्षयित्वा भुवो गोलं
पतिये यावान्यस्तथया
बहुधर्थं महायोगी
स्वाधृतम् न्यवलेत

After showing his wife the gola of the earth as far as [it extends] by its arrangement, which is abundant with wonders, the great sage returned to his hermitage.

The context is the sage Kardama traveling with his wife Devahūti in an airborne vessel (vimāna). Their journey brings them to various locations known from Purānic cosmography, including the mountain Meru and the lake Mānasa.

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53 See Siddhāntasundara 1.1.27–28, cited above.
54 See Minkowski 2004: 367, n. 64.
55 See Sharma 1991: 282v.
56 Joshi and Trivedi 2003: 96, 112.
57 C. Śāstrī 1964: 3.218v–218v.
58 K. Śāstrī 1965: 859.
Can the word *gola* in the verse be taken as evidence that the earth is considered a sphere in the *Bhāgavatapurāṇa*? As noted previously, Böhltlingk and Roth’s *Sanskrit-Wörterbuch* cites this verse as an example of the word *gola* used in the sense of *Kugel*, that is, “ball.” However, the commentators do not see the text’s use of the word as warranting any special discussion. Śrīdharasvāmin, Vijayadhvaja Tīrtha, Visvanātha Cakravartin, Śukadeva, Giridhara, and Gaṅgāsahāya all gloss *gola* as *maṇḍala*, “circle”.59 No commentator takes the discussion beyond this gloss, and some commentators do not even comment on the word. In other words, *bhūgola* is seen by the traditional commentators as having the same meaning as *bhūmaṇḍala*. As we have noted, in support of this interpretation, the Šabdakalpadruma cites this verse as an example of the use of the word *gola* in the sense of *maṇḍala*, “circle.”

**Bhāgavatapurāṇa 5.16.4**

The second occurrence of *bhūgola* in the *Bhāgavatapurāṇa* is 5.16.4:60

> न वै महाराज भगवतो मायागुणिवभूतेः काठां मनसा वचसा वािधगतुमलं िवबुधायुषािप पुरुषतमााधायेनैव भूगोलक िवशेषं नामरूपमानलक्षणतो यायायामः।
>
> O great king, no human being, not even one with a lifespan like that of the gods, can adequately understand by the mind or [express] by speech, the extent of the Lord’s mighty manifestation through *māyā* and the *guṇas*. Therefore, we will mainly describe the characteristics of the *bhūgolaka* from its names, form, extent, and qualities.

*Bhāgavatapurāṇa* 5.16 opens with King Parīkṣit asking the sage Śuka for detailed information about the earth. The present passage is the beginning of Śuka’s reply. Importantly, the *Bhāgavatapurāṇa* uses the word *bhūmaṇḍala*, “earth-circle,” when King Parīkṣit makes his request for knowledge.61 Furthermore, as Śuka continues his reply, he uses the word *kuvalaya* twice.62 The word *ku* means “the earth” and the basic meaning of the word *valaya* is “bracelet,” hence “circle.” As such, the word *kuvalaya* is synonymous with *bhūmaṇḍala*. There is no indication that the *bhūmaṇḍala* in Parīkṣit’s question is any different from the *bhūgolaka* and *kuvalaya* in Śuka’s reply. In other words, the three words denote the same thing and are used interchangeably in this section of the *Bhāgavatapurāṇa*.

The commentators do not engage with the word *bhūgolaka*. This is not surprising since it is clear from the text itself that *bhūgola* is used as a synonym of *bhūmaṇḍala*. As such, we should be careful with arguments that infuse the word *gola* with special significance in this context.

59 K. Śāstrī 1965:859, 861, 862, 863 and K. Śāstrī 1968:167.
60 K. Śāstrī 1966:327.
61 See *Bhāgavatapurāṇa* 5.16.1 (K. Śāstrī 1966:327).
62 See *Bhāgavatapurāṇa* 5.16.5 and 5.16.7 (K. Śāstrī 1966:327).
The third occurrence of *bhūgola* in the *Bhāgavatapurāṇa* is 5.20.38:

So far [that is, up to the Lokaḻoka mountains], the arrangement of the world with respect to its dimensions, characteristics, and manifestations has been considered by the sages. The Lokaḻoka mountain range [has a measurement of] a quarter of the *bhūgola*, which is calculated to be five hundred million *yojana*.

According to Böhtlingk and Roth’s Sanskrit-Wörterbuch, the word *bhūgola* means *Kugel*, that is, “ball,” in this passage. But that is not reflected in the commentaries, the majority of which are silent on the word *bhūgola*. However, one commentator, Viśvanātha Cakravartin, whose commentary on the *Bhāgavatapurāṇa* was completed in January 1705, presents an explanation:

“*It* (sah) means the Lokaḻoka [mountains] and “of the *bhūgolaka*” means “of the hemisphere (*gola*) of the [universal] egg joined to the earth (*bhū*).”

This is the meaning: Like the sun, the earth (*bhū*) is also [located] between the two hemispheres (*golaka*) of the [universal] egg. For that reason, the *bhūgola*, like the *khagola*, measures five hundred million *yojana*. [The Lokaḻoka mountain range] has a distance and height of one hundred twenty-five million *yojana*, which is a quarter of that.

Viśvanātha Cakravartin’s interpretation of the word *bhūgola* refers to the Purānic conception of the universal egg (the *brahmāṇḍa*). There are two *golakas* in the cosmography of Viśvanātha Cakravartin. One, the *bhūgola*, is the lower half of the universal egg (the lower hemisphere, if the egg is understood as being spherical), and the other, the *khagola*, is the upper half. As such, Viśvanātha Cakravartin is...
telling us that bhūgola does not mean that the earth is a sphere or a hemisphere. Rather, the earth exists within a sphere (the brahmāṇḍa).  

It is noteworthy that gola and golaka mean “hemisphere” in Viśvanātha Cakravartin’s commentary, a meaning used in the Siddhāntic tradition, but not attested in earlier commentaries on the Bhāgavatapurāṇa. Not only that, the commentary also uses the word khagola, “sphere of the heavens,” which is a technical term in the Siddhāntas. However, Viśvanātha Cakravartin does not interpret bhūgola to mean that the earth is a sphere, but follows a traditional understanding of the shape of the earth.

It appears that Viśvanātha Cakravartin is engaging with words and concepts coming from the Siddhāntic tradition. Unlike Jñānarāja, Viśvanātha Cakravartin is not attempting to reconcile the inconsistencies between the cosmographies of the Siddhāntas and the Purāṇas. However, another follower of the Purāṇas, Nilakaṇṭha Caturdhara, who flourished in the second half of the 17th century, attempted such a reconciliation.  

Later commentators on the Bhāgavatapurāṇa likewise engaged in an attempt to reconcile the two cosmographies. It is possible that Jñānarāja’s engagement with Purānic cosmography led to this development.  

To summarize, according to Viśvanātha Cakravartin’s interpretation, the word bhūgola means “the earth within a sphere,” not “the earth that is a sphere.” While gola and golaka have the sense of “hemisphere,” a spherical shape is not attributed to the earth.

Bhāgavatapurāṇa 5.25.12  
The fourth occurrence of bhūgola in the Bhāgavatapurāṇa is verse 5.20.38:

मूधर् अयिपर्तमणुवत् सहस्रमूनो भूगोलं सिगिरसिरसमुदसम आनिदिनिमतिवकयम भूनः को वीणांभियमणयेतसहस्र्गजिहः

Just like an atom, the earth, with its mountains, rivers, oceans, and living beings, is resting on one of the heads of the thousand-headed [serpent Śeṣa]. Because of his limitlessness, who can count the heroic

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65 This interpretation ignores that the Bhāgavatapurāṇa itself parses bhūgola as bhuvo golan in 3.23.43.  
66 Nilakaṇṭha Caturdhara, a scholar who is famous for his commentary on the Mahābhārata, wrote the Saivapurūṇikamata-samarthana, a treatise on reconciling the Purānic and Siddhāntic cosmographies. See Gangadharma 1997 and Minkowski 2000.  
67 Two late commentators, Vamśidhara and Gaṅgāsahāya, cite from Viśvanātha Cakravartin’s commentary on Bhāgavatapurāṇa 5.20.38 in their own commentaries. See K. Śāstri 1966: 458–459 and K. Śāstri 1968: 346. Note that Bhāgavatapurāṇa 5.20.38 is numbered 5.20.59–60 in Gaṅgāsahāya’s edition of the text.  
68 K. Śāstri 1966: 545.
deeds of the Lord whose power is immeasurable, [even if they had] a thousand tongues?

Once again, Böhtlingk and Roth’s *Sanskrit-Wörterbuch* states that this verse uses *bhūgola* in the sense of “Kugel,” that is, “ball.” None of the commentators engage in a discussion of the word. However, Ṣīrāj al-Dīn and Jīva Gosvāmin use the word *bhūmaṇḍala* in their commentaries instead of *bhūgola*, as does Vāmśīdharā, who is quoting Jīva Gosvāmin.69 In other words, there is no indication that the word *bhūgola* in 5.25.12 is used in a different sense than *bhūmaṇḍala*.

**Bhāgavatapurāṇa 10.8.37**

Perhaps the most important occurrence of *bhūgola* in the *Bhāgavatapurāṇa* is verse 10.8.37. The verse is part of the story of the god Kṛṣṇa, the most popular episode of the *Bhāgavatapurāṇa*. As such, the verse has attracted much more attention than the other four occurrences of *bhūgola* in the text. It is precisely this verse that Jñānarāja’s son Sūryadāsa cites as an example of an occurrence of *bhūgola* in the Purāṇas. Note that this occurrence of *bhūgola* is not cited in Böhtlingk and Roth’s *Sanskrit-Wörterbuch*.

In the story, which takes place during Kṛṣṇa’s childhood, Kṛṣṇa’s friends inform Kṛṣṇa’s mother Yaśodā that Kṛṣṇa has eaten dirt. When Yaśodā looks into Kṛṣṇa’s mouth, she sees the entire universe:70

\[
\begin{align*}
\text{सा तन दृश्ये विद्ये} & \\
\text{जगत्स्थल्यु च ख दिशा} & \\
\text{सदिन्दूपाधिभुगोलं} & \\
\text{सन्तःहरा प्रसिद्धितराकम्} & \\
\end{align*}
\]

There [in Kṛṣṇa’s mouth], she [Yaśodā] saw the entire universe, moving and unmoving; space; the directions; the *bhūgola* with its mountains, landmasses, and oceans; [the celestial sphere] with wind and fire, the moon, and the stars; ...

Śrīdharasvāmin, Vīrāghava, Giridhara Lāla, and Bhagavatprasādācārya gloss *bhūgola* as *bhūrloka*, “earthly world,” and Vijayadhvaja and Satyadharma gloss *bhūgola* as *bhūmaṇḍala*.71 The late commentator Gāṅgāsahāya glosses *bhūgola* as *bhūloka*, “earthly world”.72 In other words, the traditional commentators do not see anything unusual about the use of the word *bhūgola* in the verse.

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69 K. Śāstrī 1966: 546, 547.  
70 Bhāgavatapurāṇa 10.8.37 (K. Śāstrī 1985: 1054).  
71 K. Śāstrī 1985: 1054, 1055, 1057, 1059, 1060.  
72 K. Śāstrī 1985: 1060.
SUMMARY AND CONCLUSIONS ON THE WORD BHŪGOLA IN THE BHĀGAVATAPURĀṆA

Given the evidence from Sanskrit texts and modern scholarly dictionaries, we see that the earliest attestations of the word gola in the sense of “sphere” come from the Indian astronomical tradition. The scholarly dictionaries give the non-technical attestations of the word in this sense as the Bhāgavatapurāṇa, the poem Gītāgovinda, and the Nāradapañcarātra. However, as we have seen, it is not clear at all that the word means “sphere" in the Bhāgavatapurāṇa like it does in the Siddhāntic tradition. In fact, it appears that the Bhāgavatapurāṇa uses the word gola to mean “round” in a general sense, and as a synonym of maṇḍala, ‘circular, round; circle.’

An example in support of this interpretation is provided by the model of the universe in the Hanūmāṇḍhokā palace in Kathmandu, Nepal, which was mentioned earlier. The earth, represented as a flat disk in the model, has the word bhūgola, glossed as pṛthvī, “the earth,” inscribed on it.73

If there were different opinions about the shape of the earth among the followers of the Purāṇas, as there surely was, the word “round” would apply to them all: the earth as a flat disk, the earth as an inverted bowl, and the earth as a sphere. In other words, the meaning “round” in a vague sense, as conveyed also by the English word “round,” would fit the context well.

In Kāvya (Sanskrit high poetry), it is considered a fault when a word is repeated in the same verse.74 In Sanskrit literature in general, there is similarly a tendency to avoid repetition of a word in a verse. To avoid such repetitions, a synonym is used when a word is needed a second time in the same verse. It is natural, therefore, that the authors of the Purāṇas would need synonyms of the word maṇḍala.

To summarize, it seems unlikely that the word gola is used in the sense of “sphere” in the Purāṇas. Rather, the word is used in the general sense of “round,” serving as a synonym to the word maṇḍala.

3 NORTHINESS OF MERU

THE SECOND OF THE THREE STATEMENTS attributed to the Purāṇas by Jñānarāja deals with the mythological mountain Meru and its relationship to the rest of the earth:

सवर्तो मेरुः सौयिदिश
Meru is north of everywhere.

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73 See Bühnemann 2020: 2.
74 When a repetition of a word occurs in the same verse, the fault is referred to as kathitapada. See Jha 1967: 217.
In the cosmography of the Siddhāntas, the mountain Meru is located at the earth’s North Pole, and is therefore north of any given place on the earth. An explicit statement to this effect is given by Bhāskara II in the *Siddhāntaśiromaṇi*:75

यतोदतोऽकर्ः िकल तत् गतः पूवार्
तत्तपरा यत् गतः पििस्थाम्
उदितो ततोऽिखलानाम्

East is where the sun rises, west is where it sets. The other two [cardinal directions, that is, north and south] are [determined] from [a figure shaped like] a fish [derived from] them [that is, the east and west points]. Therefore it is well known that Meru is located north of everything.

Bhāskara II starts by defining the cardinal directions east and west to be the directions of the rising and setting sun, respectively. With the east and west points thus determined, he proceeds to use them to determine the north and south points.

The method is outlined in Figure 1, where $E$ and $W$ denote the east and west points, respectively. Two circles with the same radius are drawn, one centered at $E$ and the other at $W$. The common radius is chosen so that the two circles intersect at two distinct points, denoted $N$ and $S$ in the figure. The “fish figure” mentioned in the verse is formed by the two thick arcs. It is this figure that determines the points $N$ and $S$ in Bhāskara II’s construction.

The straight lines $EW$ and $NS$ are perpendicular to each other. Since $E$ and $W$ are the east and west points, it follows that $N$ and $S$ are the north and south points, respectively. Moreover, the line $NS$ coincides with the local meridian, for which reason it will reach the North Pole if extended toward the north. It follows that Meru, which the Siddhāntas say is located at the North Pole, is due north of any given location on the earth.

Furthermore, in his refutation of the the earth being flat with Meru at its center, Bhāskara II mentions the Purāṇic view that Meru lies to the north:76

यदि निशाणकः कनोस्त्रीतः
किम् तदन्तरः स न दक्षिणते
उदगयं ननु मेरुरथांशुमान्
कथम् उदेित च दक्षिणभागके

75 *Siddhāntaśiromaṇi* 2.3.45 (D. Apte 1943–52:1.70).
76 See *Siddhāntaśiromaṇi* 2.3.12 D. Apte 1943–52:1.40.
If the Golden Mountain [that is, Meru] is the cause of night, why is it not seen when it is between them [that is, when Meru is between the observer’s position and the sun]? If Meru is to the north, why does the sun rise to the south?

In the last half-verse, Bhāskara II essentially states that Meru lies to the north by the Purāṇas’ own admission. It is clear that the statement sarvato meruḥ saumyadiśi is consistent with a spherical earth. However, it is not clear that the statement contradicts the earth having another shape. Jñānarāja does not present any arguments for why the statement implies a spherical shape of the earth, and, in fact, it does not. There are shapes other than a sphere that are consistent with the statement, such as an inverted bowl.

DIRECTIONS AT MERU

More broadly, the statement sarvato meruḥ saumyadiśi is connected to the question of whether there are directions at Meru. In the cosmography of the Siddhāntas, it is not meaningful to speak of directions at Meru; there is only one direction at Meru, namely, south. However, the astronomer Lalla mentions the belief that

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77 Bhāskara II’s Viṣanābhāṣya on Siddhānta-śiromani 2.3.11–12 (D. Apte 1943–52:1.40) has this explanation: यिद मेरुणामतिहतो रिवतिहतो मेरुः कथं न दृश्यते, “If the sun is covered by Meru, then why is Meru not seen?”

78 While the Purāṇas are not mentioned in the verse, it immediately follows Siddhānta-śiromani 2.3.11 (D. Apte 1943–52:1.40). As seen earlier, the latter verse cites the mirror simile, which Bhāskara II attributes to the Purāṇas. Since the two verses and the arguments presented in them contextually belong together, it is reasonable to assume that Purānic material is being critiqued throughout them.
there are directions at Meru. While Lalla does not identify who in ancient India believed that there are directions at Meru, it is likely that he had the followers of the Purāṇas in mind. For example, the Viṣṇupurāṇa states that the region Harivarṣa is south of Meru while the region Ramyakavarṣa is north of Meru. Bhadrāśvavarṣa and Ketumālavarṣa are similarly said to be east and west of Meru, respectively. The Bhāgavatapurāṇa and other Purāṇas have similar descriptions.

If such Purānic passages are what Lalla had in mind, the critique is largely unjustified. While the Purāṇas speak of places east, west, north, and south of Meru, such passages define the cardinal directions “in relation to the centre of the world, which is occupied by Meru.” The descriptions are therefore based on a bird’s-eye view of Jambūdvīpa, where east, west, north, and south are absolute directions defined with respect to Meru.

Bhāratavarṣa (India) is considered to be the southern part of Jambūdvīpa. The region on the other side of Meru from Bhāratavarṣa is similarly considered to be the northern part of Jambūdvīpa, and therefore described as being north of Meru. Regions east and west of Meru are determined similarly.

In daily and religious life, however, east is understood in precisely the same way as Bhāskara II defines it in the Śiddhāntaśiromani, namely, as the direction of the rising sun. The Viṣṇupurāṇa says:

उदयातमना च सूर्यास्यपिपरे दिशा

The east and west cardinal points are defined by [the sun’s] rising and setting.

PURĀNIC SOURCES

As noted previously, Jñānarāja does not reveal where in the Purānic corpus the statement sarvato meruḥ saumyadiśi can be found. However, without mentioning

79 See Śiṣyadhīvṛddhidatatantra 20.5 (B. Chatterjee 1981:1.232).
80 See Viṣṇupurāṇa 2.2.13-14 (Śarmā 1985:59v).
81 See Viṣṇupurāṇa 2.2.24 (Śarmā 1985:60r).
82 See, for example, Bhāgavatapurāṇa 5.16.27 (K. Śāstrī 1966:342).
83 See Kintaert 2011-2:95, n. 46.
84 An example from our modern world can be used as an illustration: Utqiagvik (Alaska, USA) and Longyearbyen (Svalbard, Norway) are close to being on opposite sides of the North Pole. If a resident of Utqiagvik casually says that Longyearbyen is to the north, the statement makes sense.
85 See Viṣṇupurāṇa 2.8.18 (Śarmā 1985:98r). The identification of the cardinal direction east with the direction of the rising sun is found as early as the Ṛgveda. See Jurewicz 2016:268.
a source, his son Cintāmaṇi cites half of a verse that closely resembles the last half of Viṣṇupurāṇa 2.8.20.86

सवेष्षां द्वीपवर्षाण्या
मेरुरूतरतः विथतः

Meru lies to the north of all dvīpas and varṣas.

The half-verse is also found in the Devībhāgavatapurāṇa:87

सवेष्षां द्वीपवर्षाण्या
मेरुरूतरतो विथतः
यैयर्तः दृश्यते भानुः
सैव प्राणाति चोच्यते
तद्वाबभागतो मेरुः
वतर्तेित विनणर्यः

Meru lies to the north of all dvīpas and varṣas. East is said to be where people see the sun [rising], [at which time] Meru is known to be on their left side.

In other words, Meru is always to the north because it is on the left side of a person facing the rising sun, that is, who is facing east.

The Devībhāgavatapurāṇa is less likely to be Jñānarāja’s source than the Viṣṇupurāṇa, which is why we will focus on the latter Purāṇa in the following.88

86 See the Grahagantacintāmaṇi on Siddhāntasundara 1.1.27 (MS Ujjain, Scindia Oriental Institute 9401, f. 20r). Minkowski notes that Sūryadāsa cites the same half-verse in the Siddhāntasamhitāsārasamuccaya, though he errs when he states that Cintāmaṇi does not cite it. See Minkowski 2004: 367, n. 64. The Marīci, a commentary by Munīśvara on the Siddhāntāvingīlamanī, cites the half-verse as well. See D. Apte 1943–52: 1.43. The astronomer Munīśvara was born in 1603 CE. See Pingree 1970–94: 4.436–441. 5.314. The half-verse is also cited outside of the Purānic context, for example by Hemādri (13th century) in his commentary Ayurvedasāgara on Vāgbhaṭa’s Aṣṭāṅgahṛdaya Kumțe et al. 1939: 2.

87 Devībhāgavatapurāṇa 8.15.26, cited here with the first half of 8.15.27 (Khemakā et al. 2010: 2.257).

88 Other than the Viṣṇupurāṇa and the Devībhāgavatapurāṇa, three other Purāṇas—the Brahmāṇḍapurāṇa, the Matsyapurāṇa, and the Vāyupurāṇa—state that Meru is north of everywhere. See Brahmāṇḍapurāṇa 1.21.51 (Sharma 2000: 45r), Matsyapurāṇa 124.38 (Ānandāśrama Pandits 1981: 223), and Vāyupurāṇa 50.108 (Ānandāśrama Pandits 1983: 258). Each of these three passages deal with why the sun cannot be seen at night. Since the phrasings of the statement differ from the half-verse cited by Cintāmaṇi, we omit a discussion of the passages.
Cited in full, *Viṣṇupurāṇa* 2.8.20 reads:  

\[\text{Tasmāhiḥdvūtustu}\]  
\[\text{diva rātriḥ \ Sātvat hi}  
\[\text{dvāraḥ hīpyavāpyaḥ}  
\[\text{meru-rūtratāḥ yat} \]

Note that the *Viṣṇupurāṇa* has *yataḥ* as the last word of the verse whereas Cintāmaṇi’s citation has *sthitaḥ*, a reading not attested in the critical edition of the *Viṣṇupurāṇa*. If we accept the reading *sthitaḥ* given by Cintāmaṇi, the half-verse is a simple sentence:

Meru lies to the north of all *dvīpas* and *varṣas*.

However, as given in the *Viṣṇupurāṇa*, it forms part of a compound sentence: “Therefore (tasmād) ..., since (yataḥ) ...”

Wilson notes that *Viṣṇupurāṇa* 2.8.20 is an obscure verse. In order to interpret it correctly, it is necessary to consider the preceding verses as well:

The east and west cardinal points are defined by [the sun’s] rising and setting. As far as [the sun] sends out light in front, so far [it

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89 Šarmā 1985:98r. Both Šarmā 1985:98r and Pathak 1997–9: 1.215 read *divārātriḥ* in the second quarter of 2.8.20. Following Wilson (1865: 2:243), the better reading *divā rātriḥ* is used here.  
90 Pathak 1997–9: 1.215.  
91 Wilson 1865: 2:243, n. 1.  
92 *Viṣṇupurāṇa* 2.8.18–20 (Šarmā 1985: 98r).  
93 The Sanskrit root *tap* means “to give out heat” but can also mean “to shine.” Both meanings are probably intended here, but given the exception that will be mentioned subsequently, the emphasis in the translation is on the sun emitting light.
likewise sends out light] behind and on either side, with the exception of Brahmā’s court on top of Meru, the mountain of the gods. The rays of the sun that reach Brahmā’s court are repelled by the palace’s luster and reverse course. Therefore, in the northern quarter it is always night during the day [here, in our location], since Meru is north of all dvīpas and varṣas.

According to the passage, the sun emits an equal amount of heat and light in all directions. There is an exception to the reach of the sun’s light, however. The city of the god Brahmā lies on the top of Meru, and the luster of Brahmā’s court in the city drives away any sunlight that reaches it.

Since Meru is north of all dvīpas and varṣas, it follows that by “northern quarter” (diśy uttarasāyāṁ), the Viṣṇupurāṇa means the region of Jambūdvīpa on the other side of Meru from the observer. It is left unexplained by the text itself why Meru is north of everywhere, but two commentators offer interpretations.

Viṣṇucitti explains the northness of Meru in this way:

उदयेन पूवर्िदकतमयेनापरािदक्। अत एवोयतं भावतं पश्यतां वामदिक्षणभागे िथतवासवेषामुतरतो मेरोलोकालोकाचलच दिक्षणः स्यात।

The direction of east is [determined] by [the place of the sun’s] rising and the direction of west is [determined] by [the place of its] setting. Therefore, because they lie on the left and the right side [respectively] of those watching the sun rise, Meru is to the north of everyone and the Lokāloka mountain range is to the south.

Śrīdharasvāmin offers the following explanation:

अयं भावः। मेरुं पदिक्षणीकुवर्तं सूयं येयत पश्यित सैव तेषां पाची। तेषां च वामभागेएव मेरुः। अतः सवेषां सवर्दा मेरुरुतर एव दिक्षणभागेच लोकालोकाचलः। तमादुतरयां िदिश सदा राितः। दिक्षणयां च िदनिमित।

This is the gist: Wherever they see [the rising of] the sun, which is circling Meru to the right, that is east for them. And Meru is on their left side. Therefore, Meru is always north of everyone and the Lokāloka mountain range is to the south. Consequently it is always night in the northern quarter and day in the southern.

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94 See Viṣṇupurāṇa 2.2.31–33 (Śarmā 1985: 80v) and Bhāgavatapurāṇa 5.16.28–29 (K. Śāstrī 1966: 342) for a description of the city.

95 See Viṣṇucitti’s commentary on Viṣṇupurāṇa 2.8.18–19 (Śarmā 1985: 98r).

96 See Śrīdharasvāmin’s commentary on Viṣṇupurāṇa 2.8.20 (Śarmā 1985: 98r).
In other words, Meru is located to the north because it is always on the left side of a person facing the rising sun. Similarly, Lokāloka is to the south because it is on their right side. The same reason is given in the Devībhāgavatapurāṇa, as we saw above.

When it is day for an observer, then, since Brahmā’s court blocks sunlight, it is night in the northern quarter, that is, the region on the opposite side of Meru from the observer. This is essentially an explanation of why the sun cannot be seen at night. The reason, according to the Viṣṇupurāṇa, is that Meru blocks the sun’s light.

**MERU AS THE CAUSE OF NIGHT**

The idea that Meru is the cause of night for the inhabitants of the earth is cited and refuted by some Siddhāntic astronomers. As summarized by the astronomers, the idea is that night occurs in a location when the sun is on the other side of Meru and therefore covered by the mountain. According to Lalla:

97 तमसा मेरुभुवा िवभावरी
[Some say that] night is [caused] by the darkness produced by Meru.

Lalla refutes this idea by offering an objection: If night for the human beings on the earth is caused by Meru covering the sun, then how does night occur for the gods, who live on Meru?

98 As we have already seen, Bhāskara II objects to the notion that night is caused by Meru covering the sun by asking why in that case human beings cannot see Meru. After all, Meru is said to be of immense size in the Purāṇas.

**SUMMARY AND CONCLUSIONS ON THE SECOND STATEMENT**

If taken at face value, the statement sarvato meruḥ saumyadiśi naturally makes us think of Meru as the North Pole, and thus of the earth as spherical in shape. However, a close examination of the context in the Viṣṇupurāṇa shows that the statement does not imply a spherical earth. The Viṣṇupurāṇa employs two distinct usages of the cardinal directions. Jñānarāja, however, interprets sarvato meruḥ saumyadiśi with reference to only one of them, the one used in the Siddhāntas. Additionally, the statement in the Viṣṇupurāṇa is based on a premise explicitly rejected by the Siddhāntic tradition, namely, that Meru is the cause of night. As such, Jñānarāja’s interpretation of the statement as implying a spherical earth is not supported by the Viṣṇupurāṇa itself, nor by the traditional commentaries on...
the text. Jñānarāja presents a novel interpretation of the statement sarvato meruḥ saumyadiśi. His interpretation serves his attempt to integrate the Siddhāntic and Purāṇic traditions, but it is not consistent with the Purāṇic material.

4 THE EARTH RESEMBLING A MIRROR

The third statement given by Jñānarāja is, like the first statement, a single Sanskrit compound word:

आदशर्तलोपमा

Resembling the surface of a mirror.

As discussed above, a line of Siddhāntic astronomers, starting with Bhāskara I, have cited this mirror simile, understanding it to mean that the earth is flat. Jñānarāja, who holds that the statement is Purāṇic, argues that this is a false understanding. Prior to Jñānarāja, the only astronomer to identify the Purāṇas as the source of the statement was Bhāskara II. However, the same identification is given by the Islamic scholar Al-Bīrūnī.

**BHĀGAVATAPURĀṆA** 5.20.35

Jñānarāja does not say where the statement ādarśatalopamā occurs in the Purāṇic texts, and Cintāmaṇi is similarly silent in his commentary. However, the statement is found in the Bhāgavatapurāṇa:

यावान्मानसोतरमेवोऽतरं तावती भूिमः का्चायदशर्तलोपमा यां पलिहतः पदाथोक्षिप्तः पदाथोत्पलिहते तमसवृस्तपिरहृतासीत ्

As greatasthe distance between [the] Mānasottara [mountain range] and [the mountain] Meru, so great is [the span of] another region, which is made of gold and resembles the surface of a mirror. Nothing whatsoever which is sent into it is recovered again. Therefore it is shunned by all living beings.

There are two interpretations of the passage. Some understand it to refer to two separate regions of the bhūmaṇḍala, while others understand it to refer to one region only. For example, Śrīdharasvāmin follows the first interpretation and Viśvanātha Cakravartin the second. See K. Śāstrī 1966: 458, 462. The translation above follows the second interpretation.
Golden Land is not the entire bhūmaṇḍala, but rather a region extremely far away from the area inhabited by human beings.

The Bhāgavatapurāṇa passage raises two difficulties:

1. The passage does not compare the earth to a mirror.
2. The point of the comparison to a mirror does not appear to be that the Golden Land is flat.

Regarding the first difficulty, it is hard to imagine why anyone would take Bhāgavatapurāṇa 5.20.35 as evidence of a flat earth in Purānic cosmography. However, there are some things to consider:

1. The antagonists in Jñānarāja’s argument misinterpret ādarśatalopamā as bhūr ādarśatalopamā sakalā. In other words, they misunderstand, or worse, misrepresent, the statement to apply to the entire earth. The word bhūmi, translated above as “region,” has the more common meaning of “the earth.” The context makes it clear that bhūmi does not mean “the earth” in Bhāgavatapurāṇa 5.20.35. Though it seems unlikely, perhaps a careless reading of the passage could lead someone to think that the earth is compared to a mirror (bhūmiḥ ādarśatalopamā).\(^\text{102}\)

2. Even if the passage is Jñānarāja’s source for the mirror simile in the Purāṇas, it is questionable whether it is also his predecessors’ source. As we have seen, Bhāskara I’s commentary on the Āryabhaṭīya, the first known attestation of the mirror simile in a Sanskrit astronomical text, predates Jñānarāja’s Siddhāntasundara by close to nine centuries. It is entirely possible that Bhāskara I is referring to a different passage (or to an oral tradition rather than a literary passage).\(^\text{103}\) Many of the astronomers who cite the mirror simile may have done so merely on the authority of their predecessors, without a specific passage in mind.

3. Bhāskara II identifies the Purāṇas as the source of the mirror simile. It is possible that Jñānarāja accepted the Purānic provenance on the authority of Bhāskara II, then looked for a Purānic reference, finding Bhāgavatapurāṇa 5.20.35.

4. The Marīci on Siddhāntaśiromāṇi 2.3.11, the verse in which Bhāskara II mentions the mirror simile, cites Bhāgavatapurāṇa 5.20.35.\(^\text{104}\) As such,

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\(^\text{102}\) Of course, Jñānarāja’s own interpretation of the statement, that the earth locally appears to be flat (Jñānarāja simply repeats an old Siddhāntic argument against the earth being flat), makes no reference to the Golden Land. If Bhāgavatapurāṇa 5.20.35 was used to argue that the earth is flat in Purānic cosmography, the argument could easily be refuted by referencing the proper context of the passage.

\(^\text{103}\) While the date of the Bhāgavatapurāṇa is uncertain, the majority of the datings listed by Rocher (1986: 147–148) place the text after Bhāskara I.

\(^\text{104}\) See the Marīci on Siddhāntaśiromāṇi 2.3.11 (D. Apte 1943–52: 1.41).
at least after Jñānarāja, the tradition accepted this Bhāgavatapurāṇa passage as the Purāṇic source of the mirror simile. It seems likely that Bhāgavatapurāṇa 5.20.35 indeed is Jñānarāja’s source for the mirror simile.

When it comes to the second difficulty, we need to consider the tertium comparationis when a Sanskrit text compares something to a mirror. The mirrors of ancient and medieval India were made of metal. Different alloys were used to achieve a mirror that would not easily break as well as have a surface with good reflective properties. The polishing process to achieve a reflective surface was extensive, and a mirror would subsequently need regular cleaning to retain its reflective properties.

The earliest known comparison of an object to a mirror is found in the Kātyāyanaśrautasūtra from about 300 BCE, where the point of comparison is roundness. This is consistent with the archeological record, which shows that mirrors from ancient India were round or at least oval. In later texts, such as the Nāṭyaśāstra, the comparison seems to indicate both flatness and smoothness/glossiness. Considering that the metal mirrors used in ancient and medieval India had to be cleaned regularly to remain reflective, the comparison might also indicate that the object is spotlessly clean.

Neither roundness nor flatness seem to apply to the Golden Land. Since the Golden Land is made of gold, the point of its comparison to a mirror appears to be that it has reflective properties. Alternatively, it could indicate that the surface of the Golden Land is smooth and glossy.

The Golden Land has the peculiar property that objects placed in it are irretrievably lost, for which reason it is shunned by living beings. Why things are lost in the Golden Land is not clear, but the commentator Vīrarāghava offers an explanation:

…भूमि निहितः कधिन्त:पद्धः पुनापौल्ऩ्यते दर्पणोदरतुक्त्वत्तस्या इति भावः। न हि दर्पणोदरः निहितमात्यादितिन्तकीति।

The gist is that any object deposited in that region is not found again because of its [the region’s] likeness to the belly of a mirror. For beans and such placed on a mirror’s belly do not remain [there].

105 The production of glass mirrors backed with lead dates only to about 1500 CE in western India. See Kock and Sode 2002: 84.
106 See Kātyāyanaśrautasūtra 1.3.40–41 and the commentary thereon (Weber 1859: 63).
107 See S. Chatterjee et al. 2015.

108 See Nāṭyaśāstra 2.72–73 (Krishnamoorthy et al. 1992: 62).
109 Sṛidharasvāmin and other commentators explain that the gods are an exception to this. See K. Śāstrī 1966: 458.
110 See K. Śāstrī 1966: 460.
Virarāghava’s explanation implies that the “belly of a mirror” is convex, so that objects roll off it.\textsuperscript{111} Whatever Virarāghava imagines the shape of the Golden Land to be, it is not flat. If we follow Virarāghava’s explanation, flatness is not implied by the comparison of the Golden Land to a mirror.

\textit{Rāmāyaṇa} 4.45.12

Besides \textit{Bhāgavatapurāṇa} 5.20.35, there are no known passages in the extant Purāṇas in which the earth, or a portion of the earth, is compared to a mirror. But there is such a verse in the \textit{Rāmāyaṇa}.

The \textit{Rāmāyaṇa} does not belong to the category of Purāṇa, but it is a text that was informative, and often authoritative, for the followers of the Purāṇas. As such, it is reasonable to consider evidence from the \textit{Rāmāyaṇa} here, though it should be noted that there is no indication that Jñānarāja had the \textit{Rāmāyaṇa} in mind when he composed \textit{Siddhāntasundara} 1.1.27–28.

The context for the \textit{Rāmāyaṇa} verse is a story in which Sugrīva is chased across the sky by his brother Vālin, the king of Kiṣkindhā. Flying high in the sky, Sugrīva describes the earth below him as follows:\textsuperscript{112}

\begin{verse}
आदशर्तलसङ्काशा
ततो वै पृिथवी मया
अलातचक्रप्रतिमा
दृंटा गोष्टदवतदा
\end{verse}

Then I saw the earth, resembling the surface of a mirror and the circling of a torch, like [it was just] the hoof-print of a cow.

The verse uses two images to describe how the earth appears to Sugrīva:

1. \textit{ādarśatalasaṅkāśā}, “resembling the surface of a mirror.”
2. \textit{alātacakrapratimā}, “resembling the circling of a torch”\textsuperscript{113}

Lefeber notes that “[t]he images depend on the earth’s being viewed as a flat disc”.\textsuperscript{114} However, it is not clear from the verse or its context that that is the case. In fact, the two images need not mean more than that the earth is round in a general sense. The second image certainly indicates that Sugrīva perceives the

\begin{footnotes}
\item[111] In fact, ancient metal mirrors were often convex rather than flat. A convex mirror has less surface area, and therefore requires less metal to make. See Enoch 2006:776; 2007:1222. With a well-fed person in mind, the word “belly” (\textit{udara}) might invoke the image of a round and bulging object. As Shakespeare put it in \textit{As You Like It} (Act 2, Scene 7, line 154): “In fair round belly with good capon lin’d” (Shakespeare 1919:42).
\item[112] See \textit{Rāmāyaṇa} 4.45.12 (Mankad 1965:294).
\item[113] The image refers to the circle of fire or light one sees when someone moves a lit torch fast in a circular motion.
\item[114] Lefeber 2016: 319, n. 12.
\end{footnotes}
earth as round. Since roundness is a quality associated with mirrors in ancient and medieval India, the two images could reinforce each other in expressing the roundness of the earth. The verse therefore does not rule out that the earth has the shape of, say, an inverted bowl.

Furthermore, Lefeber’s summary of the commentaries on the verse does not indicate that the commentators understood the earth to be a flat disk. The commentators explain that the image of a circling torch is used because the earth is encircled by a mountain range or to indicate the high speed at which Sugrīva is moving, and the image of a mirror’s surface is used because Sugrīva can see clearly all of the objects on the earth below him.

In other words, the precise shape of the earth is not clear from the verse or from the commentators’ exposition of it. That the earth is a flat disk is a possibility, but other shapes are not ruled out.

SUMMARY AND CONCLUSIONS ON THE THIRD STATEMENT

The main problem with the third statement is that there is no extant Purānic passage that fits the argument in Siddhāntasundara 1.1.27–28. Jñānarāja’s Purānic source is almost certainly Bhāgavatapurāṇa 5.20.35, but the passage supports neither the interpretation attributed to Jñānarāja’s antagonists nor that of Jñānarāja himself. Jñānarāja understands the mirror simile to apply to only 1/100 of the earth’s surface, that is, the earth appears flat locally though it is in fact a sphere. But this is just an old Siddhāntic argument, first articulated by Lalla as an argument against the idea that the earth is flat. It does not apply to the context of Bhāgavatapurāṇa 5.20.35.

It is not unreasonable to think that a passage comparing the earth to a mirror, similar to the verse we saw in the Rāmāyaṇa, was at some point part of one of the Purāṇas (or can still be found in a manuscript somewhere). If so, Jñānarāja must not have known about it. Furthermore, even if so, we must consider what the tertium comparationis would be. As we have seen, the tertium comparationis need not be flatness, but could easily be roundness. In other words, if the mirror simile is found in the Purāṇas, it could simply convey that the earth is round, an old Purānic idea.

5 CONCLUSION

A S A SCHOLAR, Jñānarāja was primarily an astronomer. The significance of the Siddhāntasundara is evidenced by Cintāmaṇi’s extensive commentary on

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115 See Śiṣyadhīvṛddhidatantra 20.35 (B. Chatterjee 1961: 237).
116 Smoothness/glossiness would not apply to the earth, with its mountains and valleys.
and later astronomers’ engagement with the text.\textsuperscript{117} Though Jñānarāja engages with Purāṇic material in the \textit{Siddhāntasundara}, there is no evidence that he otherwise wrote about or interpreted the Purāṇas. Sūryadāsa writes that Jñānarāja wrote three other works besides the \textit{Siddhāntasundara}—on horoscopy (\textit{jātaka}), rhetoric (\textit{sāhitya}), and the art of singing (\textit{gītaśāstra}).\textsuperscript{118} These works are no longer extant, but the topics do not indicate that they deal with the Purāṇas, at least not directly.

In general, Jñānarāja seems to have been a conservative and pious Hindu, who clearly was committed to the Purāṇas. We have seen that Jñānarāja acted as an apologist for the Purāṇas within the Siddhāntic tradition. He defended Purāṇic ideas to the point of rejecting tenets from the Siddhāntas, thereby asserting the relevance of the Purāṇas. He silently omitted ideas from the Purāṇas that would prove problematic in astronomy, such as the sun being closer to the earth than the moon is. More specifically, Jñānarāja sought an integration of two cosmographical systems—that of the Siddhāntas and that of the Purāṇas—which to educated observers at the time must have appeared to be mutually contradictory.

In our analysis of the three Purāṇic statements cited by Jñānarāja, we saw that Jñānarāja’s interpretation of the first two amounts to imposing a Siddhāntic understanding on the passages. The word \textit{bhūgola} is understood to mean that the earth is a sphere, a meaning taken from the Siddhāntas, and the northness of Meru is understood without reference to the ways in which the Purāṇas use the directions. Jñānarāja’s interpretation of the third statement, where Purāṇic evidence is lacking for the interpretation given by the astronomers, is a repetition of an old Siddhāntic argument.

Jñānarāja’s argument was effective. In today’s scholarly dictionaries, the entries on \textit{gola}, \textit{golaka}, and \textit{bhūgola} reflect his interpretation. The evidence from the \textit{Bhāgavatapurāṇa} and its commentaries should be taken into account when the meaning of \textit{bhūgola} is under discussion.

At the time of Jñānarāja, the \textit{Bhāgavatapurāṇa} was growing in popularity, and the number of commentaries was increasing fast. Given the \textit{Bhāgavatapurāṇa}'s popularity and reputation, it would not be surprising if the text, including its cosmography, caught the attention of some astronomers. If so, a plausible explanation for Jñānarāja’s attempt at a synthesis of the two cosmographies is that the popularity and reputation of the \textit{Bhāgavatapurāṇa} provided an impetus for reevaluating the Siddhāntic tradition’s relationship to Purāṇic cosmography.

As we have seen, the commentaries on the \textit{Bhāgavatapurāṇa} predating Jñānarāja agree on the interpretation of the word \textit{bhūgola} in the text. But despite a consensus among the commentators, there is enough ambiguity in the Purāṇas’ cosmographical accounts to allow for an intervention in the interpretation of the

\textsuperscript{117} See Minkowski 2004: 354–355. \textsuperscript{118} See Knudsen 2014:12.
texts. As such, the stage is set for Jñānarāja to argue that there are no contradic-
tions between the two cosmographies.

Another possible explanation is that the Siddhāntic astronomers, like other
groups, felt a need for unification among Hindus. Nicholson notes that Hindu
scholars working on philosophy were concerned about Islam: “Philosophical
authors writing in Sanskrit do not acknowledge Islam explicitly. But the per-
ceived threat of Islam motivated them to create a strictly defined category of
āstika philosophical systems, systems that professed belief in the authority of the
Veda.” Jñānarāja does not mention Islam in the Siddhāntasundara, but he lived
in an Islamic kingdom and must have been aware of Islam. While the astro-
nomers preceding Jñānarāja are not known to have engaged in the demonizing of
Muslims that was done by other Hindu groups, they could have shared similar
concerns. In other words, Jñānarāja could have been motivated by such concerns
to integrate the Hindu tradition of astronomy closely with Hindu religion as ex-
pressed in the Purāṇas.

Whatever his reasons might have been, Jñānarāja’s attempt at a reconcili-
ation between the cosmography of the Purāṇas and the cosmography of the
Siddhāntas had a significant impact. His successors in the Siddhāntic tradition
followed him and studied this cosmographical reconciliation. Later on, Purāṇic
commentators did the same.

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119 See Nicholson 2010: 200-201.
120 See Knudsen 2014: 1–12 for information about Jñānarāja and his native place. Regard-
ging Jñānarāja’s knowledge of Islamic astronomy, see Knudsen 2014: 31–35 and
Knudsen 2009.
121 See Talbot 1995.
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