

marine
scientist

No.9 4Q 2004



**Independent status
encourages
cutting-edge science**



IMAREST
publications

Evidence suggests ancient Indians were aware of a submarine volcanic structure in the Arabian Sea, off the country's NW offshore region, and deduced a little, at least, about its physical features and hydrothermal system. Ancient manuscripts contain

Research of medieval and ancient Indian manuscripts dating as far back as 1500 BC has unearthed extraordinary descriptions of a submerged volcanic edifice and associated hydrothermal vents. Moreover, the location is precisely where geophysicists would point to today: India's northwestern continental margin.

Sanjay C Patel* reveals the results of his research

Who really discovered deep-sea volcanoes?

descriptions pertaining to its submarine location, volcanism, 'plumbing', dynamics, chemistry and appearance.

A single parallel description might be discarded as a fluke coincidence, but 17 parallel descriptions become much harder to ignore (see Panel).

The descriptions of a 'Submarine Fire' and 'Volcano' located in oceanic waters unearthed in this research should not be disregarded because they have been found in what were previously interpreted to be purely 'mythological' texts. The large number of real patterns and parallels to be found in these texts

*Sanjay C Patel (Sachu Vishwamurtidas) is a researcher studying historical texts written by Indian medieval scholars, at the Akshardham Applied Research for Social harmony in Gujarat, India.

are clear and obvious and suggests the existence of authentic discoveries that must later have been mixed with mythology, or vice-versa.

The task, now, is to untangle and separate the two — the original discovery from the mingled mythology — to reveal what *was* known about the world and its oceans by the ancients.

If, indeed, these ancients were describing submarine volcanic structures, the repercussions for history could be vast.

Remarkable history

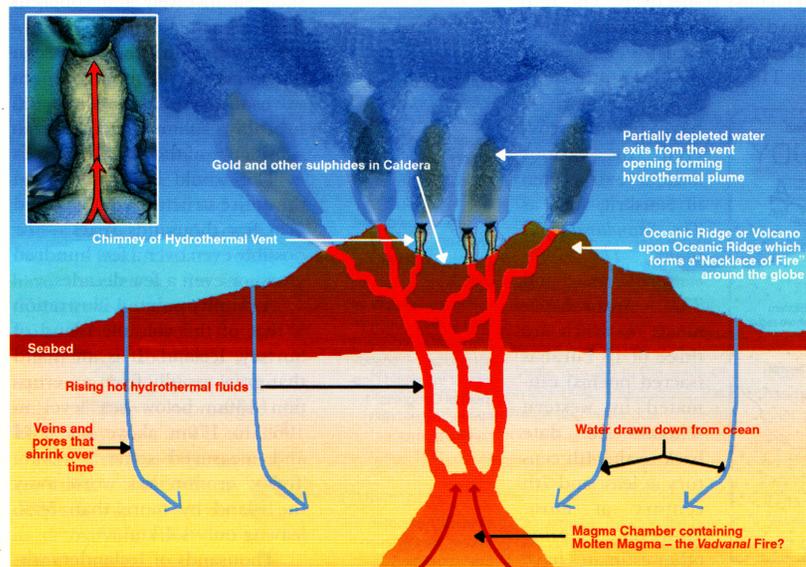
In 1971, Clive Lister of The University of Washington and

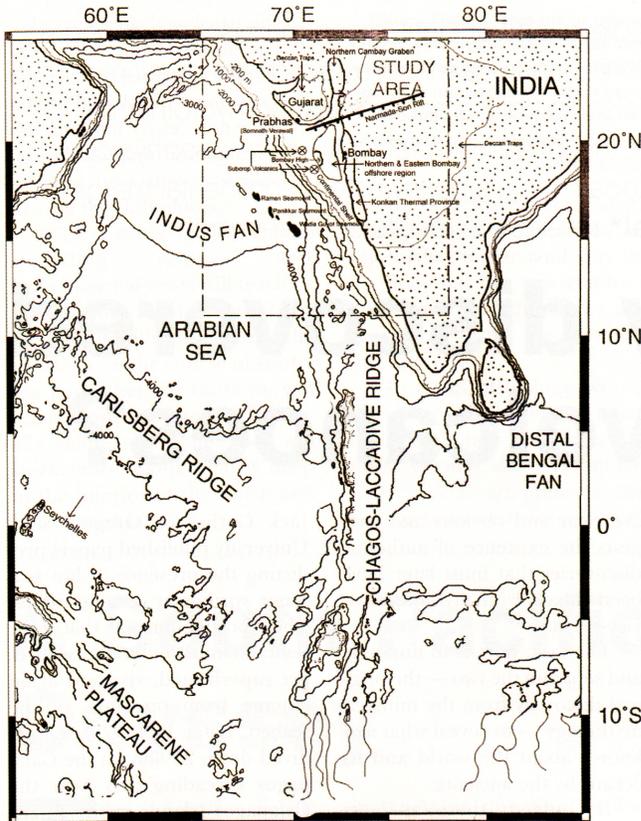
Jack Corliss of Oregon State University published papers predicting the presence of hot seawater springs at oceanic ridges. Their postulation was that some seawater must enter the seabed, get superheated, rise and again emerge from openings in the seabed. Later, in 1977, scientists dived down 2500m on the Galapagos spreading axis near the Galapagos Islands in the Pacific Ocean, in the submersible *Alvin*. They discovered warm hydrothermal solutions gushing out from the seafloor.

Later discoveries revealed that vents can also occur in much shallower waters on the tops of rising submarine volcanoes such as around the hot spot islands of Iceland and the Azores. They have also been found at the Kurile Islands, Russia. It must be assumed that such springs exist, and have existed, above all the oceanic hot spots around the world.¹ This includes India's northwestern continental margin — which has had a remarkable history of volcanism — maybe more than any other place on earth.

Indeed, medieval and ancient scholars in India have described in detail what appears to be a deepsea structure they called the 1) *Vadvanal* 2) *Vadava* 3) *Jvalamukh* 4) *Jvalamala* and 5) *Agni*. The first two words unequivocally mean 'Submarine Fire' (Sir M Monier-Williams,

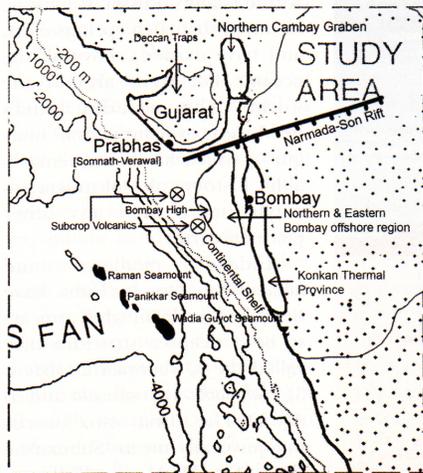
Schematic representation of deep sea hydrothermal processes





Map of Indian Continental Margin, Arabian Sea and Indian Ocean indicating the study area (see enlargement)

Enlarged map of study area along India's Western Continental Margin



Sanskrit-English Dictionary, Revised edition, Oxford University Press, 1989). The third and fourth words clearly mean 'Volcano' (Monier-Williams) and 'Chain of Fire' (Monier-Williams) respectively. The fifth word also clearly means 'Fire' (Monier-Williams).

The above descriptions — and many more — have been discovered in various ancient texts written in Sanskrit, such as *The Skandamahapurānam*, *The Brahmamahapurānam* and *The Sivamahapurānam* — which are three of 18 Puranas (sacred poems) estimated by western scholars to date back to the 4th century at least and 7th century at most. However, some other estimates have

References

- 1 Rachel Carson, *The Sea Around Us*, Oxford University Press, 2003, xxxv
- 2 Smith, Noel W. (1990), *The evolution of psychophysical dualism in ancient India: from the Rig Veda to the Sutras*, *Mankind Quarterly*, 0025-2344, September 1, Vol. 31, Issue 1/2
- 3 R. Nigam (1988), "Was the large rectangular structure at Lothal (Harappan settlement) a 'dockyard' or an 'irrigation tank'?", *Marine Archeology of Indian Ocean Countries*, 20-21
4. G.C. Bhattacharya, G. P. S. Murthy, K. Srinivas, A.K. Chaubey, T. Sudhakar, R.R. Nair (1994), "Swath Bathymetric Investigation of the Seamounts Located in the Laxmi Basin, Eastern Arabian Sea", *Marine Geodesy*, 17, 169.
5. Sastri, V.N. (1981), *Observations on age of the Deccan Traps and related trap activity in India*. In: K.V. Subbarao and R.N. Sukheswala (Eds.), *Deccan Volcanism and Related Basalt Provinces in Other Parts of the World*, *Mem. Geol. Soc. India*, no.3, pp.296-299.
6. Negi, J.G., Agrawal, P.K. Singh, A.P. and Pandey, O.P. (1992), "Bombay gravity high and eruption of Deccan flood basalts (India) from a shallow secondary plume", *Tectonophysics*, 206: 341-350
7. O.P. Pandey and P.K. Agrawal (June 2001), "Nature of lithospheric deformation beneath the western continental margin of India", *Journal Geological Society of India*, 57, 499
8. Negi, J.G., Agrawal, P.K. Singh, A.P. and Pandey, O.P. (1992), (Ref. 6)
9. Pandey, Agrawal and Negi (1995), "Geothermal fields of India: a latest update", *Proceedings of the World Geothermal Congress*, 1, Florence, Italy, 18-31 May 1995, 163

Note: BCE denotes 'Before the Common Era,' same as BC.

put them between AD 500 and AD 1000. Other astonishing descriptions of the 'Submarine Fire' have been found recorded in Gujarati language such as in *The Vachanamritam* texts that date back to AD 1819-1829.

More surprisingly, references to the 'Submarine Fire' have also been found in even more ancient Indian epics (in Sanskrit) — *The Mahabharata* — which dates back to at least 300 BC, and *The Shri Valmiki Ramayana* — which dates back to a similar period, if not earlier. Most astonishingly, references to the 'Submarine Fire' can also be found in *The Rig Veda*, which dates back to 1500-1200 BC.²

A compilation of what the ancients described is detailed in the Panel.

Mind blowing

It is mind blowing to think that medieval and ancient scholars were aware of submarine volcanoes and hydrothermal processes in the deep oceans as far back as 1500 BC.

However, on the basis of the extraordinary evidence presented in this article it is most probable they must actually have seen such a structure several thousands of years ago, in the Arabian Sea, towering above sea-level. How else could they have given such an involved and coherent picture?

The structure they had seen must then have undergone sea wave and weather erosion and probably, submergence due to subsidence of the seabed beneath it. This would have submerged the entire structure over a period of a few thousands years — or possibly even over a few hundred years, or even a few decades.

A simple, pointed illustration is that of the volcanic island of Surtsey, Iceland. It is an island that grew rapidly from an eruption 130m below sea level in 1963 to 170m above sea level and measured some 2.7 km². Today, erosion has worn away the island by more than 50%, leaving only 1.4 km².

Thousands of Icelanders wit-

nessed the natural event with their own eyes. After the formation of the hot, lava island, various scientists have visited it regularly, since it lies only 33km south of the Icelandic coast. Another 55-60 volcanic islands in Surtsey's vicinity have been completely weathered away and already disappeared beneath the water surface.

Conclusion

The scientific research described shows that similar volcanic events ages ago must indeed have occurred near the northwestern continental margin of India — with the probable emergence of volcanic islands from beneath the sea and subsequent erosion of the islands by ocean waves together with subsidence of the seabed.

Other new discoveries have also revealed the expertise and passion for sea travel of ancient Indian mariners, as supported by the recent discovery³ of the legendary Lothal Naval Dockyard — probably the world's first — at the head of the Gulf of Khambhat (Cambay) (21 N; 74 E), dated 2500 BC, close to the south coast of Gujarat, along India's northwestern continental margin.

As the ancient descriptions suggest, Indians inhabiting the area must have witnessed the birth of a volcanic island and later its erosion and submergence — like Icelanders witnessed the birth and erosion of Surtsey. India's ancient mariners (and scholars) could have travelled to the island (like scientists today to Surtsey from Iceland) from Lothal when it was above sea level and even later, when it was only slightly submerged. Thus, they were in a position to make first-hand the earliest recorded observations of deep-sea volcanic activity and its detoxifying effects on the ocean's waters.

Compilation of the descriptions of a volcanic submarine fire given in various ancient texts

Submarine location of fire

1. The fire is located in the ocean ("agnim samudra vaasasam" — *The Rig Veda, Book 8, Hymn 102/4*).
2. The fire was elongated and arose from the ocean ("uddyanityat yan samudrat" — *The Yajur Veda, Taittiriya Samhita, Hymn 4/6/7*).
3. The fire is not just submarine, but submerged in the ocean ("adhrashyaha sagare krutaha" — *The Skandamahapurana, Chapter 29 Verse 93*), ie, it had once grown above sea level, but then submerged or disappeared later due to subsidence of the seabed, or erosion by waves, or sinking under its own weight, or all three.

Volcanism

4. The (submerged) submarine fire is clearly stated to be a gentle volcano ("saumya jvalamukham" — *The Sivamahapurana, Chapter 20 Verse 7*), and not a fiery ("abhidipitaha" — *The Sivamahapurana, Chapter 20 Verse 21*) one, like when it was above sea level.
5. The fire did not exist at just one spot, but is described as a chain of fire ("jvalamala" — *The Sivamahapurana, Chapter 20 Verse 21*), somewhat spread out like a coalesced, volcanic ridge.
6. It is a structure that vomits ("udgiraad" — *The Mahabharata, Pratham Khandh, Verse 22*) fire. The verb 'vomit' is extremely appropriate for emerging liquid magma under hydrostatic pressure.
7. The structure has a fire chamber ("agnikundam" — *The Skandamahapurana, Chapter 29 Verse 93*), like all volcanic structures.
8. The fire is identified to be primordial ("aditaha" — *The Brahmamahapurana, Verse 201*), ie, from the earliest origins of the earth.

Plumbing

9. The object is accurately described — amazingly — to be a structure that has TWO other types of openings related to its plumbing: From where it takes in water and another from where it ejects water! The process by which the water enters the object is accurately described as being drawn in ("pibate" — *The Skandamahapurana, Chapter 29, Verse 96*), rather than merely percolated into.
10. The process by which the water leaves the object is also accurately described as being ejected ("kadhi nakhe chhe" — *The Vachanamritam, Vartal section, sermon No. 3*), rather than just exiting.
11. The openings through which the structure draws in water are accurately described to be the size of a pinpoint mouth ("suchi vaktraha" — *The Skandamahapurana, Chapter 29, Verse 96*), ie, minute pores in the basalt seabed or in the flanks of the oceanic structure.
12. The oceanic structure is accurately described as drinking water very slowly ("shanaihi, shanaihi" — *The Brahmamahapurana, Verse 211*).
13. The openings through which water is drawn into the structure are accurately described to shrink ("krutam ghatika puranam" — *The Skandamahapurana, Chapter 29, Verse 95 - 96*) to the width of a needle-hole or the neck of an hourglass ie, the constriction of capillaries and veins due to precipitation of minerals from the seawater and sedimentation from above.

Chemistry

14. The progression of the seawater through the hot oceanic structure is also accurately described — amazingly — to remove certain salts and pollutants

("pani mithu thai chhe" — *The Vachanamritam, Vartal section, sermon No. 3*) from the water, making it depleted to some extent, as is known to happen when magnesium salts, amongst others, react with the hot rocks in the seabed and when the vent plumes react with the cold seawater above.

Appearance

15. The oceanic structure is described as having an enormous body ("mahakayaha" — *The Skandamahapurana, Chapter 29, Verse 96* and "evo moto chhe" — *The Vachanamritam, Gadhada section 1, sermon No. 72*), as volcanic edifices usually are.
16. The oceanic structure is described as appearing golden and glittery ("shaata" — *The Skandamahapurana, Chapter 29, Verse 95*), ie, covered with shiny metal sulphides and pyrites.

Location in the Arabian Sea, off India's Northwestern Continental Margin

17. The submerged volcano(es) and associated vents were close to India's northwestern continental margin, south of Prabhas, Gujarat ("Prabhase" — *The Brahmamahapurana, verse 210*, and "shrisomeshad dakshinataha" — *The Skandamahapurana, Chapter 29 Verse 97*). Indeed, there is enormous geophysical evidence to suggest their past existence in the area stated:
 - 1) Seamounts and guyots have been discovered south of Gujarat such as the Raman and Pannikar Seamounts and the Wadia Guyot.⁴
 - 2) Subcrop volcanics⁵ (volcanic structures now buried under deep sediments) have been discovered on the Arabian Sea bed, just south of Prabhas (today known as 'Somnath-Veraval'). The subcrop volcanics infer the presence of active hydrothermal vent systems there in the past. The area has also undergone significant subsidence which would account for the submerging of the volcano as described.
 - 3) The presence of melt accumulation has been indicated beneath a sheared and thinned out lithosphere. This is due to India's speedy journey northward after it split from Gondwanaland and collided with Eurasia. India's lithosphere has thus become exceedingly weak, faulted and fractured.⁶
 - 4) Volcanic up-warping of India's western continental margin has been shown to be due to the accumulated melt beneath the lithosphere.⁷
 - 5) The passing of western India over a massive plume in the mantle known as the Reunion Hotspot, 65 million years ago, caused massive basaltic, volcanic floods known as the Deccan Traps.
 - 6) The separation of Seychelles from India about the same time implies there existed a spreading ridge between the two landmasses — today identifiable as the Carlsberg Ridge.
 - 7) The volcanic (but aseismic) Chagos-Laccadive Ridge running far north, right up to the south coast of Gujarat, India.

It can be seen clearly that the seabed south of Gujarat has had a truly remarkable history of volcanism in the past and extending up to Bombay High, still has a high heat flow anomaly even today.⁸ Observed geothermal gradients in these areas are still high (36-78°C/km), indicating high crustal temperatures (eg, 890-1060°C at 30km). The entire Bombay offshore region is associated with moderate seismicity and in large sections, uplifting and vertical/lateral motions are still taking place.⁹

Additional References

* Topographical maps of India by G.C. Bhattacharya (1994) et al; Sastri, V.N. (1981); Negi, J.G. (1992) et al; and Pandey, O.P (1995) et al.

** Also published in: Sanjay C. Patel, *Deep-Sea Volcanoes and Their Associated Hydrothermal Vents*, Historical Notes, Indian National Science Academy (INSA), New Delhi, December 2004, 39.4 (2004), pp. 511-518; Sanjay C. Patel, *Who Were the Earliest Scholars of Submarine Volcanoes and Their Submerged Hydrothermal Vents?* 22nd International Congress of History of Science, Book of Abstracts, Beijing 24-30 July 2005, p. 355

IMPORTANT

Please read updates on following page.

Thank you

UPDATES

Timeframe of Volcanic Activity Given by Ancient Scholars

1. Some scientists say it is “impossible” for volcanic activity to have occurred around India 2500 BC. It could only have happened millions of years ago.¹

Originally, as you’ve seen in this paper, I provided a hypothesis which suggests the ancient parallels with modern discoveries have a physical explanation. That is, ancient Indian scholars or mariners from Lothal could have visited a volcano that might have arisen from the deep ocean near India (like Surtsey near Iceland) a few thousand years ago and studied any shallow hydrothermal vents around it that are usually submerged about 1.5 miles beneath the ocean surface and completely inaccessible. However, analysis by some geologists appears to undermine this explanation. They say it is “impossible.”

Here’s why:

1. Though India and the Indian Ocean had experienced remarkable volcanism millions of years ago, it is problematic to apply those prehistoric conditions – even anomalously – to the sea around India a few thousand years ago.
2. This is because, unlike Surtsey, India hasn’t been over a hotspot for millions of years. There is therefore no physical source for the tremendous volume of magma/lava needed to build an island like Surtsey reaching from the seabed to above sea level.
3. You can’t get lava from nothing and you can’t build the volcano without lava. Even by ‘special pleading’ or ‘anomalous occurrences.’²
4. Human beings didn’t exist millions of years ago when such volcanoes did climb above sea level in the Indian Ocean. So humans couldn’t have studied them back then.
5. Finally, humans 5000 years ago could not build an Alvin to dive to the seabed to study the vents.

So a scientific dilemma has arisen: scientists agree that the similarities between the ancient descriptions and deep-sea hydrothermal vents are rigorous and real. That’s why they published them.

Yet some scientists undermine the explanation.

But there is a bigger twist.

2. Ancient scholars *didn't* say the volcanic activity occurred around 2500 BC. They said it occurred previous to 118 million years ago!³

- The scholars did not say that the huge volcanic structure emerged from the ocean during their own lifetimes, perhaps around 5000 years ago corresponding to when Lothal was built.
- Instead, they said it occurred previous to 118 million years ago, soon after a coastal part of India itself was ablaze with volcanic fire.⁴
- The huge volcano that arose from the ocean was so fiery, they said, it appeared it might end all life. It later submerged and the planet was saved. There are millions of submarine volcanic edifices in the ocean, they said.⁵

Does this accord with modern science?

118 million years ago, say scientists, India was indeed on fire with volcanism.⁶

An area called the Rajmahal-Bengal-Sylhet Igneous Province on the northeastern coast of India began forming 118 million years ago from extensive volcanism associated with the Kerguelen hotspot and continued until about 115 million years ago.⁷ There was also massive volcanic activity in the ocean around that time. It was also associated with the Kerguelen hotspot, and additionally, with the separation of India from Antarctica-Australia which began about 130 million years ago.⁸ The hotspot created the Kerguelen Plateau and Broken Ridge which became largely 'subaerial' or above sea level.⁹ This was probably during times of peak lava flow 119-110 million years ago.¹⁰ The volcanic emissions were so vast and explosive, they seriously affected life in the region and probably globally.¹¹ The Plateau has now largely submerged.

Science gives a similar description and timeline to that given by the ancient scholars. It is truly remarkable.

SUMMARY

1. There are numerous similarities between ancient discoveries and the modern discovery of deep sea hydrothermal vents.
2. The similarities meet the highest standards of academic rigor – that's why they achieved publication in mainstream, professional, peer-reviewed, scientific journals.
3. Even the timeline of 118 million years ago is similar with science.
4. These agreements appear inexplicable by any physical model.
5. How could ancient scholars know or guess the timeline so precisely? Statistically, through sheer fantasy, they could have given any timeframe whatsoever from 1 year ago to infinite years ago. But they didn't. They stated 118 million. What are the chances of that? 1 in infinity.
6. How could ancient scholars know or guess the 17 descriptions of hydrothermal vents? And what are the chances of just dreaming them up, along with the correct timeline? Zero.

4. There are even more parallels with science.

You may naturally ask: *since the scholars knew about hydrothermal vents, did they also have valid knowledge of other things such as our planet, sun, universe, and their creation?*

Indeed, they did.

My research (reviewed by respected astrophysicists such as a writer for the acclaimed University of Cambridge Monograph Series (Cambridge Monographs on Mathematical Physics), Oxford University Press, and the science journal *The Scientific American*¹²) reveals the ancient scholars described our Earth, Universe, and its “Big Bang” creation in remarkable harmony with science.

How are such depictions by ancient scholars possible when they should have had no notion even of these modern discoveries?

5. The scholars were yogis. They were spiritual.

They sat meditatively on a mountain, beside a river, or in a forest. They were not mariners or explorers of the physical kind, but the spiritual kind.

They clearly stated that they connected to their deeper Self and the entire universe during their meditation. Knowledge of the universe sprung from *within* them. They proclaimed:

“Knowledge of subtle, obstructed, and far-away things arises from yoga.”

Yoga Sutra 3.24

The disciple asked:

“What you saw then in your consciousness
– was it seen by you while you were staying in one place or while moving about?”

The yogi replied:

“I was neither essentially stationed in one place, nor was I essentially mobile.
Thus I saw this within my own self here.”

Yoga Vasishtha 6.2.62.1-3

[I] can see infinite millions
of Cosmic Worlds
as easily as a drop of water in my palm.

The inability of physical models to explain their remarkable wisdom opens the door to a spiritual explanation, the one given by the yogis themselves.

References

¹ Email correspondences with geologists and journal editors

² Ibid.

³ *Skanda Purana, Prabhasa Khanda*, 7.1.29:93-94 & 7.1.34:34-37

⁴ *Skanda Purana, Prabhasa Khanda*, 7.1.35.9-17

⁵ *Skanda Purana, Prabhasa Khanda*, 7.1.29.92-97ab

⁶ Jyotiranjana S. Ray, S. K. Pattanayak, and Kanchan Pande, *Rapid emplacement of the Kerguelen plume-related Sylhet Traps, eastern India: Evidence from 40Ar-39Ar geochronology*, abstract, Geophysical Research Letters, vol. 32, 20 May 2005. L10303, doi:10.1029/2005GL022586, 2005. <http://www.agu.org/pubs/crossref/2005/2005GL022586.shtml>.

⁷ Ibid.; Paul J Wallace, Frederick A Frey, Dominique Weis, Millard F. Coffin, *Journal of Petrology, Origin and Evolution of the Kerguelen Plateau, Broken Ridge and Kerguelen Archipelago*, Volume 43, Issue 7, July 2002, Pages 1105–1108, <https://doi.org/10.1093/petrology/43.7.1105>

⁸ Shyam Chanda, M. Radhakrishna, C. Subrahmanyam, *India-East Antarctica conjugate margins: rift-shear tectonic setting inferred from gravity and bathymetry data*, Earth and Planetary Science Letters 185 (2001) 225–236, 13 November 2000

⁹ Paul J Wallace, Frederick A Frey, Dominique Weis, Millard F. Coffin, *Journal of Petrology, Origin and Evolution of the Kerguelen Plateau, Broken Ridge and Kerguelen Archipelago*, Volume 43, Issue 7, July 2002, Pages 1105–1108, <https://doi.org/10.1093/petrology/43.7.1105>

¹⁰ Frey, F.A., Coffin, M.F., Wallace, P.J. and Weis, D. (2003) Leg 183 synthesis: Kerguelen Plateau-Broken Ridge – a large igneous province. In: Frey, F.A., Coffin, M.F., Wallace, P.J. and Quilty, P. (eds.) *Proc of the Ocean Drilling Program, Scientific Results. Vol. 183. Kerguelen Plateau-Broken Ridge: a large Igneous province: covering Leg 183 DV "Joides Resolution"*, Fremantle, Australia, to Fremantle, Australia, Sites 1135-1142, 7 Dec 1998-11 Feb 1999. (Proceedings of the Ocean Drilling Program Scientific Results, 183) College Station, TX, USA. Texas A & M University Ocean Drilling Program, 48pp.

¹¹ F.A. Frey, M.F. Coffin, P.J. Wallace, D. Weis, X. Zhao, S.W. Wise Jr., V. Wähnert, D.A.H Teagle, P.J. Saccocia, D.N. Reusch, M.S. Pringle, K.E. Nicolaysen, C.R. Neal, R.D. Müller, C.L. Moore, J.J. Mahoney, L. Keszthelyi, H. Inokuchi, M. Antretter, *Origin and evolution of a submarine large igneous province: the Kerguelen Plateau and Broken Ridge, southern Indian Ocean*, Earth and Planetary Science Letters, Volume 176, Issue 1, 28 February 2000, Pages 73-89, Elsevier, [https://doi.org/10.1016/S0012-821X\(99\)00315-5](https://doi.org/10.1016/S0012-821X(99)00315-5); Paul J Wallace, Frederick A Frey, Dominique Weis, Millard F. Coffin, *Journal of Petrology, Origin and Evolution of the Kerguelen Plateau, Broken Ridge and Kerguelen Archipelago*, Volume 43, Issue 7, July 2002, Pages 1105–1108, <https://doi.org/10.1093/petrology/43.7.1105>

¹² Prof. Pankaj S. Joshi, writer for the Cambridge University Monograph Series and contributor to The Scientific American journal, Department of Astronomy and Astrophysics, Tata Institute of Fundamental Research (TIFR), Homi Bhabha Road, Colaba – Mumbai 400005, India