

# Giant collision - The Jupiter in the recent past

A Paramashivam

(Dated : May 18, 2013)

This paper hypothesis a planet sized object collided with the Jupiter few hundred years ago which could possibly created the Great Red spot and the moon Io. This paper analysis Jupiter's diameter predicted by ancient Indian astronomical text Surya-siddhanta with modern values, Jupiter's moon Io and Jupiter's the Great Red spot for a big collision evidences.

## Keywords

Astronomy – Surya-siddhanta – Jupiter - The Great RedSpot – Moon IO

### I. Introduction

The Indian astronomical text Surya-siddhanta estimates the visible(naked eye) planets diameter. When comparing the Surya-siddhanta planetary diameters with modern standers it gives the results mentioned in Table - I. <sup>1</sup> Surya-siddhanta planetary diameter predictions surprisingly matching with the modern accepted values of Mercury and Saturn with less than one percentage error. But its prediction for the planets Venus and Jupiter are almost half of corresponding modern values. The planetary diameter comparison given in table – I.

Table – I (Diameter in Miles)

Planet	Modern Diameter	Surya-siddhantaDiameter	% Error
Mercury	3032	3008	-1
Venus	7523	4011	-47
Mars	4218	3772	-11
Jupiter	88748	41624	-53
Saturn	74580	73882	-1

The following alternatives could explain the planetary diameter change mentioned in Table - I.

1. Since Mercury and Saturn's diameter were calculated with less than 1% error, Surya-siddhanta planetary diameter calculations are correct.
2. Since Venus and Jupiter's diameter were approximately 50% wrong, Surya-siddhanta planetary diameter calculations were wrong.
3. Planets diameter were changed during the period between Surya-siddhanta and modern science.

For the purpose of this paper , let us take the last possibility “change in planets diameter” with the planet Jupiter and investigate further for any evidence.

### II. Change in Planets Diameter

The ancient Indian astronomical text Surya-siddhanta dates back thousands of years which means the predictions were made thousands of years ago. It may be possible that Jupiter's diameter was 41624 miles when it was calculated in ancient times and possibly increased after some time. Two readings taken in different time intervals gives different values indicates that the planets diameter was possibly changed. Here we have records for Jupiter's diameter change.

When two planet size objects collides and merge into a single object it size increases for two reasons, first by adding the two volumes, second collision produces more heat which causes mater to expand therefor in both causes the volume increases. When volume increases diameter also increase. Though the planets diameter change was not clear it is possible that a big collision may changed the planets diameter, but it requires further strong proofs. Birth of a new moon, Impacted area or crater, planets temperature and atmosphere of the planet can provide enough evidence for a big collision.

### **III. Birth of a new moon Io**

When two planet size objects collides a new moon can form from the debris ejected by the large collision. Earth's moon was thought to be formed in this way. If a new moon was formed by a large collision it would be in a lava form at its initial stage and by slowly losing the heat it becomes a rocky body. The new moon would be orbiting the planet closely at high speed, based on the tidal forces it may drift away slowly. This was exactly the same scenario for Earth's moon.

A young moon orbiting Jupiter is one of the vital evidence to prove that a big collision occurred in the recent past. We have one such young moon called Io orbiting Jupiter, Io is the innermost of the four Galilean moons of the planet Jupiter. With over 400 active volcanoes, Io is the most geologically active object in the Solar System. The lava flows on Io produce large surface changes. Numerous extensive lava flows, several more than 500 km in length, also mark the surface.<sup>2 3 4 5</sup>

Volcanic activity on Io was thought to be the outcome of tidal heating. Orbital velocity is one of the key element associated with tidal heating. Though Io has the highest orbital velocity (17.334 km/s) compared with other Galilean moons, it is approximately one third of planet Mercury's orbital velocity (47.36 km/s). The temperature of the lava on Io was estimated between 900 degrees Celsius to 1700 degrees Celsius, This temperature is approximately 3 times the hottest surface temperature on Mercury, the planet closest to the Sun. Comparing the orbit velocity and temperature of Io with Mercury indicates that tidal heating alone can not be responsible for the volcanic activity on Io.<sup>6</sup>

If Io was a captured rocky moon then this tidal effect could possibly break the moon into several pieces but can not melt it from its core. Io's orbital direction around Jupiter and the closest orbital path also suggest that it was not a captured moon. Io has a density of 3.5275 g/cm<sup>3</sup>, the highest of any moon in the Solar System; significantly higher than the other Galilean satellites and higher than the Earth's moon. Io's high density indicates that Io must be created by a large collision. Io's close orbit around Jupiter and high volcanic activity are the clear evidences to prove its young age.

### **IV. Impacted area The Great Red Spot**

A big collision leaves a scar on the impacted planet's body. The visual impacted surface (crater) formation is determined by the physical properties of the planet after the collision. Though Lava flow can coverup the crater, the fallen body's gravitational and magnetically influence can be detected on the planets surface. There are few places like Bermuda Triangle and Mexico's Zone of Silence on planet Earth where gravitational or atmospheric disturbances that still remain unexplained. Electronic instruments malfunction, radio and television signals disturbances or unable to send signal, compass malfunction on these areas are some examples.

The Great Red-Spot on Jupiter is one such evidence to fit this scenario. The Great Red Spot is a well know feature of Jupiter that persistent anticyclonic storm which is larger than Earth. The Great Red Spot was know to be exists approximately 400 years on its position.<sup>7 8 9</sup> Few hypothesis were proposed to explain about this feature, like storm theory and volcano theory. Since such a big storm to stay in one place in a fast spinning planet is impossible some scientist suggest the energy need to drive such huge storm has to be some how connected to the Jupiter's surface. This might be the place where the big collision occurred in the recent past. The fallen objects gravitational and magnetic influence must be the culprit behind the Red Spot. However this can be proved by studying magnetic and gravitational effects on this Red-Spot region.

### **V. Jupiter's temperature and surface**

Jupiter is a gas giant primarily composed of hydrogen with a quarter of its mass being helium. Jupiter lacks a well-defined solid surface. Jupiter temperature and pressure increases steadily towards its core. Though the lack of solid surface and the temperature favor to prove a big collision, these conditions are matching with planet Saturn. Therefore temperature and surface of Jupiter is not enough to prove the collision occurred, however it can not deny the big collision.

## VI. Conclusion

Analyzing the available evidence diameter change, birth of a new moon and the great Red spot together we can come to one possible conclusion that a big collision occurred in Jupiter in recent past. We may not be able explain that a single collision doubled the planets diameter, but it could be possible that collided planet was most likely a gas giant and the heat released from the collision caused the gas to expand in volume. The collided planet came from outer orbit of saturn explains that it was most probably a frozen gas giant. The planet would be noticed by ancients astronomers if it was a inner planet, there were no missing planets in our ancient records.

## References

- 
- 1). Richard Thompson (1997), "[Planetary Diameters in the Surya-Siddhanta](#)", *Journal of Scientific Exploration* **11** (2): 193–200 [196]
  - 2). McEwen, A. S.; *et al.* (1998). "High-temperature silicate volcanism on Jupiter's moon Io". *Science* **281** (5373): 87–90. [1998Sci...281...87M](#). [10.1126/science.281.5373.87](#). [9651251](#).
  - 3). Radebaugh, D.; *et al.* (2001). "Paterae on Io: A new type of volcanic caldera?". *J. Geophys. Res.* **106** (E12): 33005–33020. [2001JGR...10633005R](#). [10.1029/2000JE001406](#).
  - 4). Douté, S.; *et al.* (2004). "Geology and activity around volcanoes on Io from the analysis of NIMS". *Icarus* **169** (1): 175–196. [2004Icar..169..175D](#). [10.1016/j.icarus.2004.02.001](#).
  - 5). Radebaugh, J.; *et al.* (2004). "Observations and temperatures of Io's Pele Patera from Cassini and Galileo spacecraft images". *Icarus* **169** (1): 65–79. [2004Icar..169...65R](#). [10.1016/j.icarus.2003.10.019](#).
  - 6). Keszthelyi, L.; *et al.* (2007). "New estimates for Io eruption temperatures: Implications for the interior". *Icarus* **192** (2): 491–502. [2007Icar..192..491K](#). [10.1016/j.icarus.2007.07.008](#).
  - 7). Denning, W. F. (1899). "Jupiter, early history of the great red spot on". *Monthly Notices of the Royal Astronomical Society* **59**: 574–584. [1899MNRAS...59..574D](#).
  - 8). Kyrala, A. (1982). "An explanation of the persistence of the Great Red Spot of Jupiter". *Moon and the Planets* **26** (1): 105–7. [1982M&P...26..105K](#). [10.1007/BF00941374](#).
  - 9). Sommeria, Jöel; Steven D. Meyers & Harry L. Swinney (February 25, 1988). "Laboratory simulation of Jupiter's Great Red Spot". *Nature* **331** (6158): 689–693. [1988Natur.331..689S](#). [10.1038/331689a0](#).