Lava Flows from Disruption of Crust at the Antipode of Large Meteorite Impacts

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It is proposed here that when seismic waves radiate out from large meteorite impacts on a planet they converge at the antipode and disrupt the crust so severely that large lava fields are created. Some examples are given for Earth.

1. Introduction

It has been proposed by David Weber [1] that the concentration of seismic waves from a meteorite impact at the antipode (opposite side of a sphere) on the earth could be the cause of many of the massive lava floods of the past. Schultz and Gault [2] proposed antipodal disruption on the moon by impacts. Hughes, et al [3] believes antipode effects are more violent in a liquid planet. Antipodal disruption was proposed as possible by Watts et al [4], and Boslough et al [5], wrote of simulations of that process. The strong correlation of the bulges and associated volcanoes on Mars and Mercury with large impact craters on the opposite side makes this hypothesis very credible [6]. Two impacts on Mars have no antipode disruption. However, there is disruption half way between the two antipode spots, so it is conceivable that the two meteorites struck simultaneously.

Most of the known large craters on the Earth are terrestrial [7]. This is no doubt because sediments and ocean plate motion have obliterated evidence of craters under the oceans. So the large lava flows remote from ridges and trenches that are not discussed here could all have antipode of meteorite origins as well.

2. Examples of Large Lava Flows

The Sudbury crater is in southern Ontario, Canada, 46 degrees north by 81 degrees west. It was impacted about 1,850 million years ago. It is 250 kilometers wide. The antipode for that crater would be near the volcanism on the island of Tasmania just south of Australia provided the seismic waves move a little slower under the Pacific Ocean as has been proposed.

The Morokweng crater at 26 degrees south by 23 degrees east in South Africa is 145 million years old. The antipode for that crater would be the main islands of Hawaii. It is impossible to tell when the Hawaiian Islands initiated, because an enormous mound of volcanic lava has since covered the first eruptions. However, it is probable that the chain of islands trending about northwest happened about the same time, when it could be that a cold Pacific Ocean floor under some initial tension ripped open from the shock of impact antipode disruption. These northern islands are at least 80 million years old. The initial lava flows must have been much older. The 2 billion years old Vredefort crater antipode is 4 degrees east of the Morokweng crater antipode. It is possible that one reason for the enormous mass of the Hawaiin Islands is that they formed almost on top of a very ancient eruption.

Beaverhead crater in Idaho at 44 degrees 15 minutes north 113 degrees west is 600 million years old or possibly 900 million years old [3]. The antipode for it is near the Kerguelan Islands in the Indian Ocean. The Kerguelan Islands are on a large plateau which is thought to have formed from eruptions 110 million years ago [8]. It does not seem possible that it could have remained volcanically active for over 500 million years. So an ancient volcanism must have been reinstituted when the Indian Ocean floor was placed under tension by cooling if this is an antipode phenomenon. One of the islands is still sporadically active in the present era.

An Antarctic crater, 250 miles wide, has been discovered in Wilkes Land, at 120 degrees east and 70 degrees south. The antipode of this crater is near the lava flows at Echo Bay, Canada. Echo Bay is on the Great Bear Lake. Those volcanics are between 1,859 and 1,875 million years old [9]. The crater is thought to be 250 million years old, but I doubt that this date is known for sure, because the crater is under a mile of ice.

There is a patch of ocean floor east of Peru near the triple junction approximately antipodal to the Decca or Deccan lava flows in India that vaguely resembles an impact crater on Google's map provided a broken up comet hit it.

Objections may be raised to the antipode hypothesis on the grounds that the Western Hemisphere continents are drifting. However there is virtually no chance that North and South America are drifting away from Eurasia and at the same rate because of numerous unexplained anomalies [10]. These include no trench off of North America or in the eastern Atlantic Ocean, shallow earthquakes under even the longest ridge-ridge transform faults, continental type rocks far out in the Atlantic Ocean on the Rio Grande rise, movement of the Pacific plate north instead of east relative to North America, volcanoes and batholiths proposed as arising from a cold plate on the continent side of South American trenches, no transform fault north of North America or south of South America, no cracks parallel to the trench where the plate is alleged to bend, and odd, impossible gravity and heat loss changes across the trench bottoms, with both lower at the bottom than on either side. Also the absence of trenches to take most of the other ocean ridges is mysterious.

It is much more likely that the ridges are thin, six to ten kilometer thick plates being pushed out over an ancient sea floor by magma rising up under an upward pointing wedge of basalt at

the ridge center line [11]. A more likely explanation for the trenches in the northwestern Pacific Ocean is creation of thermal shock by frigid Arctic water flowing through a Bering Straits land bridge when it submerged early in the Cretaceous. The cold water would have flowed south and then be pinned against Asia by the Coriolis force. The South American trenches could have arisen from thermal shock by sinking of a barrier between South America and Antarctica to cold Antarctic Ocean water. If a wide and deep enough of a crack formed, cold water sinking into the crack could widen and deepen it clear on down to the asthenosphere. The earthquakes under the landward side forming the Benioff zone could be from hot and therefore light rocks from the mantle attempting to rise toward the now dramatically lighter trench by virtue of the massive amounts of water displacing the rock in the trench crack [12].

3. Conclusion

The chance that this many craters would happen to have lava flows at their antipodes by coincidence is very low. If you include the chance that several large meteorite impacts on Mars have bulges and volcanoes at the antipodes is [5] coincidence also, the odds become extremely low indeed.

There are several large terrestrial lava flows on the Earth the antipodes of which are in the ocean. It would be interesting to search for evidence of meteorite impacts there. It may prove to be impossible, though, because the ocean plate motions have probably obliterated the evidence since then. However, sedimentary deposits on nearby land may have tektites in them in some cases.

References

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