Earth Sciences
2018; 7(2): 58-63
http://www.sciencepublishinggroup.com/j/earth
doi: 10.11648/j.earth.20180702.13
ISSN: 2328-5974 (Print); ISSN: 2328-5982 (Online)

Research on Paleogeography Recovery of "Impact Point" Based on “Collisions Aggregation Effect”

Liu Chenming, Yang Demin

Resource Exploration Institute, Yunnan Land and Resources Vocational College, Kunming, China

Email address:
xiao6yu2000@aliyun.com (Liu Chenming)

To cite this article:
Liu Chenming, Yang Demin. Research on Paleogeography Recovery of "Impact Point" Based on “Collisions Aggregation Effect”. *Earth Sciences*. Vol. 7, No. 2, 2018, pp. 58-63. doi: 10.11648/j.earth.20180702.13

Received: January 21, 2018; **Accepted**: February 3, 2018; **Published**: March 5, 2018

Abstract: In 2015 and 2018, the author put forward the new hypothesis of the origin to the Emeishan LIP based on the “Collisions Aggregation Effect” of a Meteorite Impact. Under the guidance of this hypothesis, the author and his team collected a large number of domestic and international researches on Emeishan LIP and paleogeography, it is concluded that: 1. The main eruptive period of ELIP is at the P/Tr boundary period, about 257Ma. Its main distribution is located at 4°S, 152°E or 4°S, 110°E, located in YZ Block of the Southwest China, and is the marine facies eruption. 2. Based on the “Collisions Aggregation Effect”, the author proposed that the "impact point" is located in the 4°N, 28°W or 4°N, 70°W at the P/Tr boundary period, and is the marine sedimentary environment; 3. Combined with the "impact point" paleogeographic location, put forward located in the Atlantic Ocean of the northeastern Brazil or Colombia now; 4. The author believes that the"impact point" just in the oceans at the P/Tr boundary period, It is possible that the "impact point" of a meteorite is located exactly in the Panthalassic Ocean, resulting in an extensive regression, significant sea level declines, over 90% of marine life, and nearly 70% of the land extinction? 5. The authors will further study and analyze the evolution of the Panthalassic Ocean in the hope of gaining some ground from it, hoping to find evidence to verify the "impact point" and hope that interested researchers can join in to participate in the work.

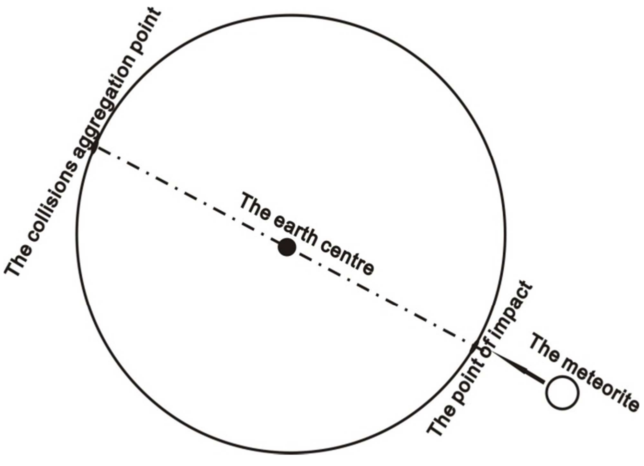
Keywords: ELIP, LIPs, Meteorite Impact, Basalt, Paleogeography, Collisions Aggregation Effect, Basalts

1. Introduction

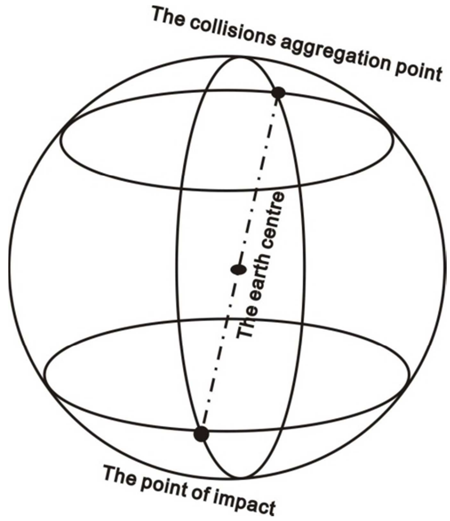
Emeishan basalts (ELIP) are one of the most widely known large igneous provinces (LIPs) in the Asian continent. It is located in the handover zone of three provinces in southwestern China (Yunnan, Sichuan and Guizhou) and is named after Emeishan in Sichuan Province. Many scholars have done some researches on the causes of the ELIP and made some achievements. Emeishan Large Igneous Province (ELIP) are a reflection of the earth's dynamical and magmatic activity on the surface of the earth's crust. Its kinetic process and mechanism are complex and are still not clear so far. Therefore, it has been controversial since it was originally proposed by Zhao Ya-zeng. In the 1980s and 1990s, it was mainly regarded as the origin of the rift [1-3], then with the deepening of the research and the rise of the new theory, it was proposed as a "mantle plume" [4-6]. In 2015 and 2018, the author proposed for the first time in geology a creative hypotheses based on the "Collisions Aggregation Effect" of a meteorite impact [7-8]. At present, the main cause of formation (mantle plume) is based on the basis of stratigraphy, petrology and petrochemistry, and there is no direct or indirect evidence. And for the genesis of the "mantle plume", some scholars also put forward different opinions on whether the formation process has a "mantle plume effect" [9], and even questioned the thought that the "mantle plume" would cause extensive and drastic crustal uplift [10]. This paper is based on the hypothesis that the origin of the ELIP because of the "Collisions Aggregation Effect" put forward by author in 2015 and 2018, which is mainly based on the "Collisions Aggregation Effect" of "impact point" paleogeography restoration research, and some of the research results formed this paper. Through the work of the author and his research team, this paper considers that at the P/Tr boundary, about 257 Ma [11-12], [13-14], 4°N, 28°W or 4°N, W70° a violent asteroid impact event occurred and caused a "Collisions Aggregation Effect", resulting in the formation of the Emeishan Igneous Province (ELIP) at the "collisions aggregation point" (China's Sichuan, Yunnan, Guizhou province junction). In this paper, the possible present geographical location of the "impact point" is first proposed and an important step is taken for further exploration and verification of the genesis hypothesis of the "Collisions Aggregation Effect". It is also provide new ideas for the study of the causes of the global large igneous provinces (LIPs), but also open up a new directions for the innovation of geology.

2. The "Collisions Aggregation Effect" of a Meteorite Impact

In 2015 and 2018, the authors believe that the violent celestial impact could cause the "Collisions Aggregation Effect" and form a large igneous province at the "collisions aggregation point" [7-8]. Figure 1a shows the "Collisions Aggregation Effect" of a meteorite impact, which shows that the destruction of the two points "impact point and collisions aggregation point " at the crust caused by a violent impact of a meteorite [7-8], [15] and the two points with the Earth's center should be in a straight line with the characteristics. Due to the violent impact of celestial bodies, the authors propose that not only the "impact point" may cause violent internal motions and magmatic activity [15], but also the "collisions aggregation point " may cause violent magmatic activities and eventually form large igneous provinces [7-8]. In the Figure 1b, the author believes that the geographical location of the two points " impact point and collisions aggregation point " should have the point-symmetric position characteristics of the Earth's center, namely: the latitude symmetry, the longitude constant features.



a. Diagram of the "Collisions Aggregation Effect" of a meteorite impact



b. The geographical location of the two point

Figure 1. *The model of the "Collisions Aggregation Effect" of a meteorite impact.*

3. The "Impact Point" Geographical Recovery

3.1. The Paleogeographic Restoration of the "Impact Point"

Combined with the research on ELIP both at home and abroad, the author generally determines the main eruption node of ELIP, which is about 257Ma [11-14] for the P/Tr boundary period. Based on the "Collisions Aggregation Effect", the author collected a large number of articles and data on global palaeo-geography and palaeo plate about the P/Tr boundary period. In Figure 2, Li [16] pointed out that the ELIP (point C in Figure 2, namely the "collisions aggregation point") is located in the southwest of the YZ Block during the P/Tr boundary period with paleogeographic location of 4°S, 152°E and marine eruption(Figure 3); But Hou [26] thought that the ELIP may be located at 4°S, 110°E during the P/Tr boundary. In conjunction with the "Collisions Aggregation Effect", in Figure 4a the author argues that a violent meteorite impact occurred at about 257Ma of the P/Tr boundary at 4°N, 28°W (namely the "impact point"), and caused a strong endogenic process and large igneous provinces (LIPs) in the "collisions aggregation point", and the ELIP is formed, while the "impact point" in Figure 4b may be located at 4°N, 70°W according to Hou [26]. In the subsequent period of <1Ma, a large amount of basaltic magma erupted violently, and when the corresponding magma pressure was released, the magmatic eruption ended. It should be pointed out that both Li [16] and Hou [26] think that the "impact point" was located in the Panthalassic Ocean at that time and the paleogeographic environment was marine sediment.

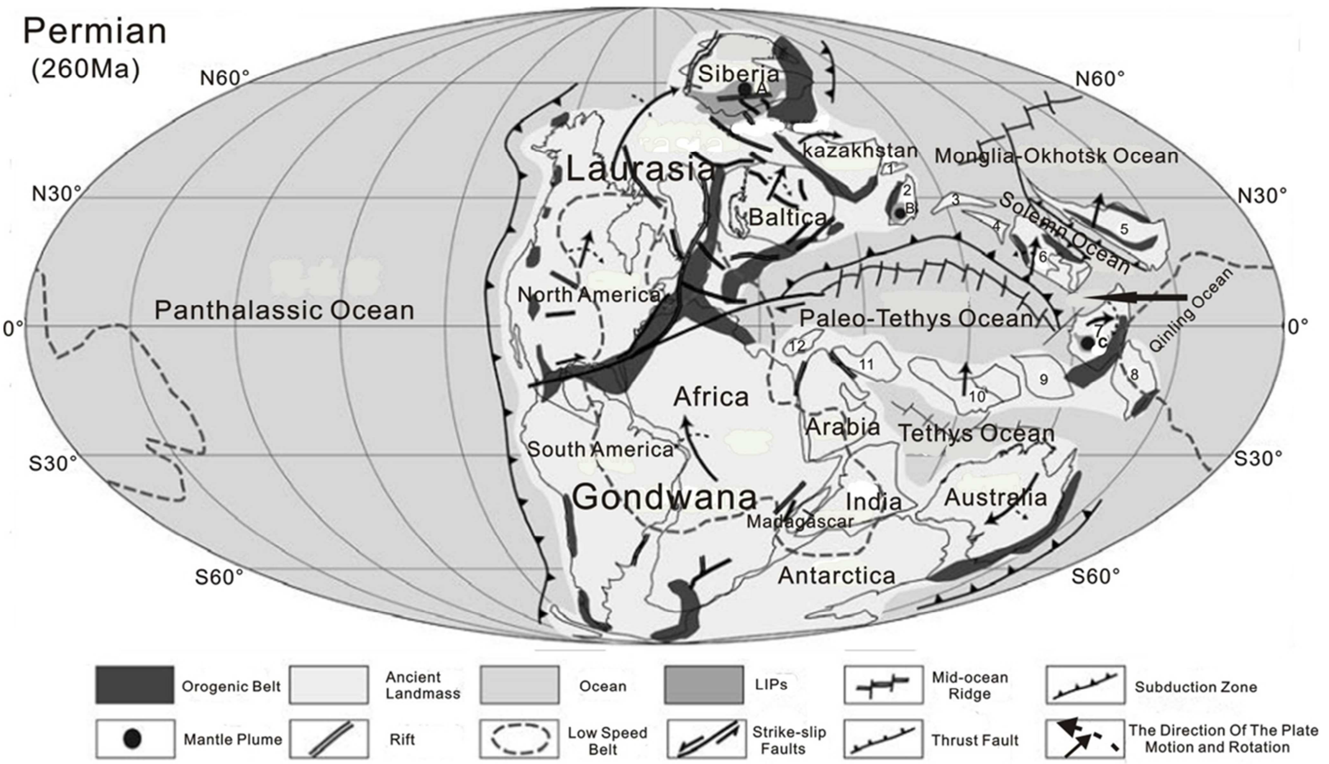


Figure 2. *Tectonic Framework of Pangea at about 260Ma [16-22].*

1-Junggar; 2-Tarim Block; 3-Qaidam Terrane; 4-Kunlun Terrane; 5-Amuria Block; 6-North China Block; 7-Yangtze(YZ) Block; 8-Kalimantan Plate; 9-Indo-Plate; 10-Malaysia Block; 11-Iranian Plate; 12-Turkey Plates; A-Siberian Mantle Plume; B-Tarim Mantle Plume; C-Emeishan Mantle Plume(ELIP)

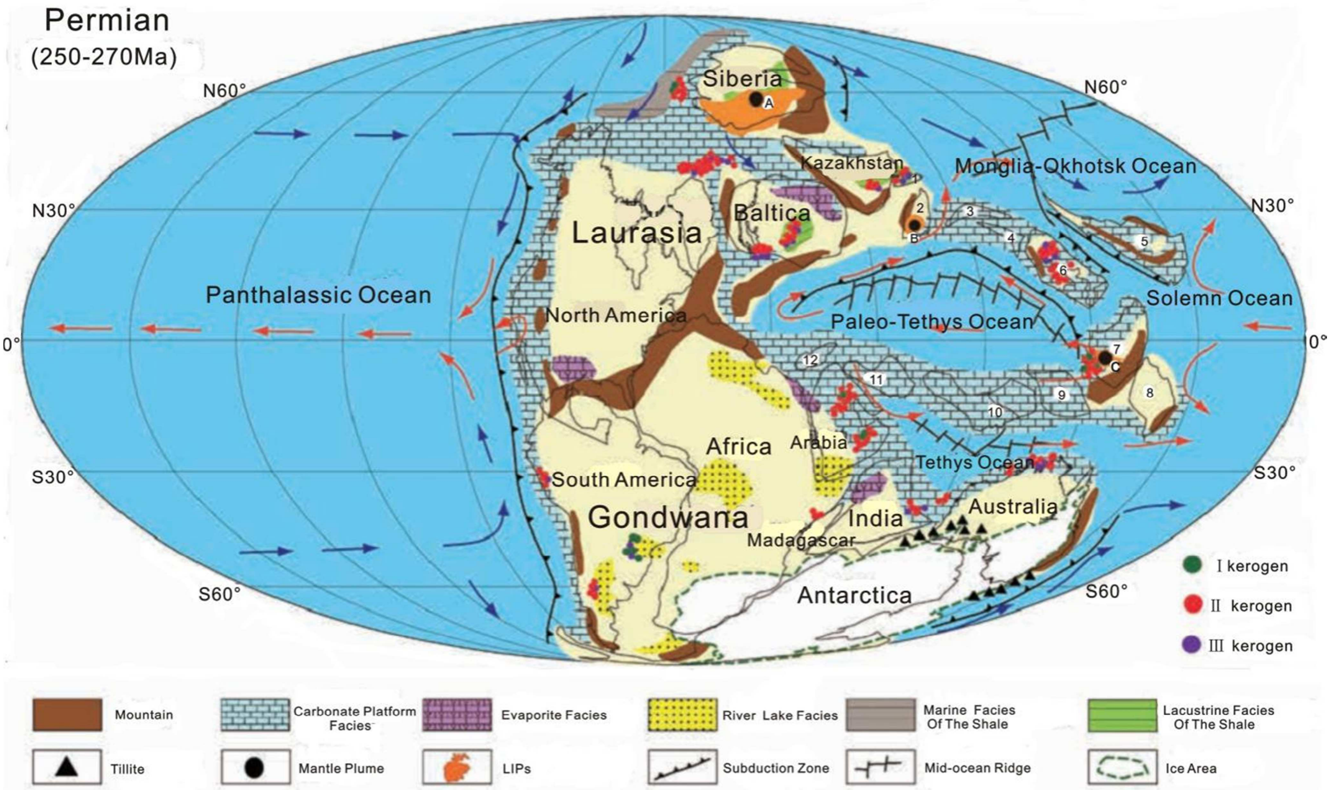
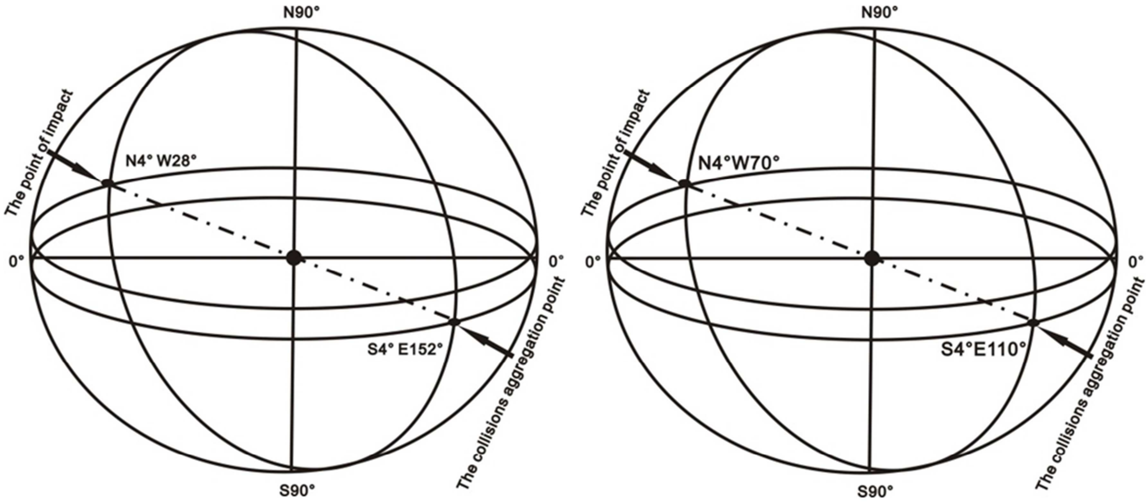


Figure 3. *Reconstruction of the Lithofacies in Permian (250-270Ma) [16], [23-25].*



a. Based on Li [16] paleogeographic data   b. Based on Hou [26] paleogeographic data

Figure 4. *The paleogeographic location recovery map based on the "Collisions Aggregation Effect".*

3.2. The "Impact Point" Geographically Restored Today

Based on the results of palaeogeographic restoration study of "impact point" in this paper 3.1, it is proposed that the "impact point" is located at 4°N, 28°W or 4°N, 70°W at the P/Tr boundary period. Based on the latest global geographic data, concludes that the "impact point" may be located in the present-day Atlantic Ocean of the northeastern Brazil, as shown in Figure 5 or in the Colombian territory shown in Figure 6.

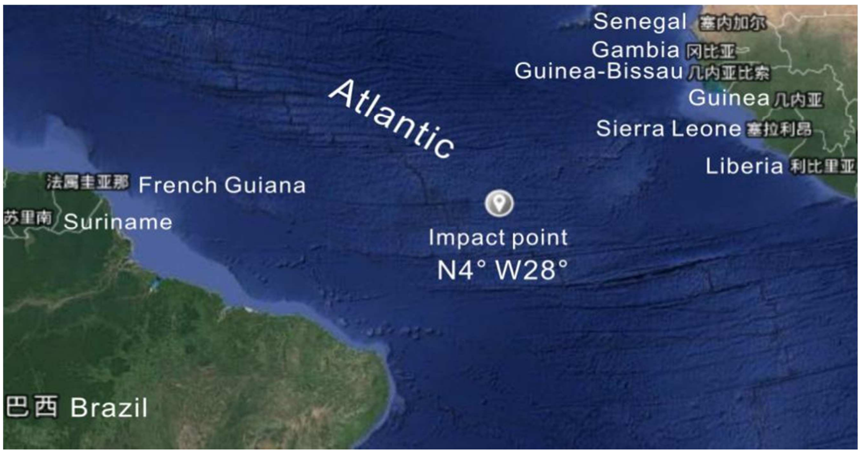


Figure 5. *The "impact point" of the current position (based on Google's latest map screenshot).*

Figure 6. *The "impact point" of the current position (based on Google's latest map screenshot).*

4. A discussion of the "Impact Point"

4.1. About the Paleogeographic Restoration of the "Impact Point"

Based on the "Collisions Aggregation Effect", the author concluded that the "impact point" may be located at 4°N, 28°W or 4°N, 70°W according to the research results of global palaeogeography and paleo-plate restoration about ELIP at the P/Tr period, and located in the Panthalassic Ocean at that time. But the author thinks the following points are also worth discussing:

(i). The global palaeogeography and paleo-plate data collected at home and abroad during the P/Tr boundary period are inconsistent and some even have large deviations [16], [26-27]. The authors can even find three different sets of data and results. In this article, the author chooses the latest data. Therefore, the result of palaeogeographic restoration of the final "impact point" is influential.

(ii). Considering the Earth as a standard sphere in the "Collisions Aggregation Effect", treating the "impact point" and "collisions aggregation point" as symmetrical points across the Earth's center is a hypothetical model, and therefore returns to the actual geology study about the "impact point" and "collisions aggregation point" position or characteristics, there will be some deviation.

(iii). Through the study, the authors conclude that the "impact point" located in the Panthalassic Ocean at the P/Tr boundary. The authors believe the following findings should be understood first: 1. Over 90% of marine life and nearly 70% of terrestrial species are extinct during the P/T boundary period, and the marine extinctions is one of the biggest since the Phanerozoic [28-29]; 2. Extensive and large-scale regression and significant sea-level declines occurred during the P/Tr boundary period [30-31]. So, The author believes that the "impact point" is located precisely in the Panthalassic Ocean at the P/Tr boundary period, with the above two results of the 1,2 described the fact that there is a causal relationship between the fact, that it is possible because of a meteorite "impact point " right in the ocean, causing extensive regression, significant sea level declines, over 90% of marine life and nearly 70% of terrestrial biological extinctions [32]?

4.2. About the "Impact Point" Verification

According to the author's research work, it is concluded that the "impact point" is located at the position of 4°N, 28°W or 4°N, 70°W at the P/Tr boundary period and is located in the Panthalassic Ocean, which poses a great challenge and difficult to the verification of the "impact point" in the next work. Combined with the fact that the plate is drifting and land-sea subduction, there is much evidence that may disappear.

5. Conclusion

Through the above research and analysis work, the author came to the following understanding:

(i). The main eruption period of the ELIP is about 257Ma at the P/Tr boundary, and its main distribution is located at 4°S, 152°E or 4°S, 110°E. It is located in the southwest of the YZ Block and erupts in the marine phase.

(ii). Based on the "Collisions Aggregation Effect", the authors conclude that the "impact point" paleo-geography is located in the 4°N, 28°W or 4°N, 70°W and in the Panthalassic Ocean at the P/Tr boundary period, and is a marine sedimentary environment.

(iii). Combined with the fact that the "impact point" is geographically located in the 4°N, 28°W or 4°N, 70°W at the P/T boundary period, and proposed that the "impact point" is presently located in the Atlantic Ocean of the northeastern Brazilian or in Colombia;

(iv). The author believes that the "impact point" is located precisely in the Panthalassic Ocean at the P/Tr boundary period, that it is possible because of a meteorite "impact point " right in the ocean, causing extensive regression, significant sea level declines, over 90% of marine life and nearly 70% of terrestrial biological extinctions?

(v). The authors will further study and analyze the evolution of the Panthalassic Ocean in the hope that it will be rewarded with the hope of finding evidence to verify the "impact point" and hope that interested researchers can join in to participate in the work.

References

[1] ZHANG Yunxiang, LUO Yaonan, YANG Chongxi. 1988. The Panzhihua-Xichang rift valley [M]. Beijing: Geological Publishing House. (in Chinese).

[2] Cong Bolin. 1988. The formation and evolution of the Panzhihua-Xichang ancient rift valley [M]. Beijing: Science Press. (in Chinese).

[3] XIONG Shunhua, LI Jianlin. 1994. The characteristics about the basalt in the edge of continental rift of late Permian in the Emei mountain. Journal of Chengdu Institute of Geology [J]. 1: 43-57. (in Chinese with English abstract).

[4] Chung S L, Jahn B M. 1995. Plume—lithosphere interaction in generation of the Emeishan flood basalts at the Permian–Triassic boundary. Geology, 23: 889-892.

[5] XU Yigang, ZHONG Sunlin. 2001. The formation of Permian Emeishan large igneous province: evidence of the mantle plume activity and its melting conditions [J]. Geochemistry, 30 (1): 12-9. (in Chinese with English abstract).

[6] SONG Xieyan, HOU Zengqian et al. 2001. The petrochemical characteristics and time limit of the Emeishan large igneous province [J]. Acta Geologica Sinica, 75 (4): 498~506. (in Chinese with English abstract).

[7] LIU Chenming, YANG Demin, MA Shaochun.2015. New ideas on the genesis of Emeishan basalt-the effect of collision and coalescence caused by the collision of celestial objects [J]. Mineral Resources And Geology, 29(5):585-590. (in Chinese with English abstract).

[8] Liu Chenming.2018. The New Hypothesis of the Origin to the Emeishan LIP: Because of the “Collisions Aggregation Effect” of a Meteorite Impact [J]. Earth Sciences. Vol. 7, No. 1, pp. 34-41. doi: 10.11648/j.earth.20180701.16

[9] ZHANG Zhao Chong, WANG Fusheng, FAN Weiming et al. 2001. The Discussion of some problems in the study of Emeishan basalt [J]. Acta Petrologica Et Mineralogica, 20 (3): 239-246. (in Chinese with English abstract).

[10] GUO Zhaojie, ZHU Bei, CHEN Shi. 2015. Peperite: Constraints to a few key tectonic events in China [J]. Earth Science Frontiers, 22 (2): 174-186. (in Chinese with English abstract).

[11] Zhou Meifu, Malpas J, Song X Y, et al. 2002. A temporal link between the Emeishan large igneous province (SW China) and the end–Guadalupina mass extinction [J]. Earth and Planetary Scinece Letters. 196 (3-4): 113-122.

[12] Huang K N, Opdyke N D. 1998. Magnetostratigraphic investigations on an Emeishan basalt section in western Guizhou province, China [J]. Earth and Planetary Science Letters, 163 (1-4): 1-14.

[13] Guo F, Fan W M, Wang Y J. 2004. When did the Emeishan mantle plume activity start? Geochronological and geochemical evidence from ultramafic–mafic dikes in southwestern China [J]. International Geology Review, 46: 226-234.

[14] HE B, Xu Y G, Huang X L, et al. 2007. Age and duration of the Emeishan flood volcanism, SW China: Geochemistry and SHRIMP zircon U–Pb dating of silicic ignimbrites, post–volcanic Xuanwei Formation and clay tuff at the Chaotian section [J]. Earth and Planetary Scinece Letter, 255 (3-4): 306-323.

[15] Adrian P. Jones. 2005. Meteorite Impacts as Triggers to Large Igneous Provinces [J]. ELEMENTS, VOL. 1, pp. 277-281.

[16] Li Weibo, Li Jianghai, Wang Honghao, et al. Characteristics of the reconstruction of Permian paleoplate and lithofacies paleogeography [J]. Geology in China, 2015, 42(2): 685-694(in Chinese with English abstract).

[17] Scotese C R. 2002. Paleomap website: http://www.scotese.com.chris@scotese.com.

[18] Torsvik T H, Steinberger B, Cocks L B M, et al. 2008. Longitude:Linking Earth's ancient surface to its deep interior [J]. Earth and Planetary Science Letters, 276: 273-282.

[19] Golonka J. 2011. Chapter 6 Phanerozoic palaeoenvironment and palaeolithofacies maps of the Arctic region [C]//Spencer A M, Embry A, Gautier D L A, et al. Arctic Petroleum Geology, London Geological Society of London, 35: 79-129.

[20] Courtillot V, Davaille A, Besse J, et al. 2003. Three distinct types of hotspots in the Earth’ s mantle [J]. Earth and Planetary Science Letters, 205(3): 295-308.

[21] Nikishin A M, Zieglerb P A, Stephenson R A, et al. 1996. Late Precambrian to Triassic history of the East European Craton:dynamics of sedimentary basin evolution [J]. Tectonophysics, 268: 23-63.

[22] Kuzmin M I, Yarmolyuk V V, Kravchinsky V A. 2010. Phanerozoic hotspot traces and paleogeographic reconstructions of the Siberian continent based on interaction with the African large low shear velocity province [J]. Earth-Science Reviews, 102: 29-59.

[23] Golonka J, Ford D. 2000. Pangean (Late Carboniferous-Middle Jurassic) paleoenvironment and lithofacies [J]. Palaeogeography, Palaeoclimatology, Palaeoecology, 161: 1-34.

[24] IHS. 2009. Global basin database.

[25] Chumakov N M, Zharkov M A. 2002, Climate during Permian-Trias−sic Biosphere Reorganizations Article 1:Climate of the Early Permian [J]. Stratigraphy and Geological Correlation, 10(6): 586-602.

[26] HOU Fanghui, ZHANG Xunhua et al.2014. Paleogeographic reconstruction and tectonic evolution of major blocks in China since Paleozoic [J]. Marine Geology & Quaternary Geology, 34(6): 9-26. (in Chinese with English abstract).

[27] WAN Tianfeng, ZHU Hong.2007. Positions and Kinematics of Chinese Continental Blocks in Reconstruction of Global Paleo continents for Paleozoic and Triassic [J]. Geoscience, 21(1): 1-13. (in Chinese with English abstract).

[28] Erwin D H. 1994. The Permo-Triassic extinction [J]. Nature. 367,231-236.

[29] Erwin D H, Bowring S A, Jin Yugan. 2002. End-Permian mass extinction: a review. In: Koeberl C, MacLeod K G. Eds. Catastrophic events and mass extincions: Impacts and beyond [J]. Boulder, Colorado: Geological Society of America Special Paper. 356: 363-383.

[30] Jin Yugan, Zhang Jing, Shang Qinghua. 1994. Two phases of the end-Permian mass extinction. In: Embey A F, Beauchamp B, Glass D J. Eds. Pangea: Global Environments and Resources [J]. Canadian Society of Petroleum Geologists Memoir, 17: 813-822.

[31] Hallam A and Wignall PB. 1999. Mass extinctions and sea-level changes [J]. Earth-Science Reviews, 48: 217-250.

[32] Ouyang Ziyuan, Guan Yunbin. 1992. Systematic catastrophic consequences of giant impacts in the evolution of the earth [J]. Advance In Earth Sciences, 7(1): 22-27. (in Chinese with English abstract).

Biography

Liu Chenming (1984-), master, lecturer, mainly engaged in teaching and research work, research directions are: metallogenic regularity and metallogenic prediction, mineralogy, large igneous province (LIPs). The Papers from yunnan province bureau of geology and mineral resources of science and technology innovation fund, Fund number: 2016JJ02.