To the
Editor-in-Chief
of Minerals (MDPI)

Dear Editor,

As attached file to the present, you will find the revised version of the manuscript "*Post-spreading basalts from the Nanyue seamount: implications for the involvement of crustal- and plume-type components in the genesis of the South China Sea mantle*", by Zheng et al. We are grateful to both reviewers for their constructive criticism and insightful comments. We reviewed our paper taking into account all their suggestions. As you will find out we made significant changes (marked with red color) to the following sections: Abstract, Introduction, Geological background, Sampling strategy, Petrography, Analytical methods and Discussion.

A list with our reply to the reviewers' queries, along with all the corrections we made, is given below.

Response to Reviewer 2 Comments

Comment 1: Line 94: Insert a period after "[e.g., 16, 18]".

Response 1: We inserted the period.

Comment 2: In Figure 1b, should text "Northwest sub-basin" move to lower right? Because "Northwest sub-basin" is a part of the ocean basin (light-blue color in Figure 1b, I guess). Furthermore, it is easy for readers to understand altitude or water depth if you put a color scale as a legend.

Response 2: We moved the label "Northwest sub-basin" to the right to fall on the oceanic part of the basin. We also added a vertical scale to show the altitude in the continental regions around the SCs and the depth of water within the SCS.

Comment 3: In figure 1b, I can't find the Spartly Islands and Changlong, Longnan, Longbei, and Zhongnan seamounts. Detailed bathymetric map of the Southwest sub-basin helps the readers to understand the location and relationship of seamounts and seamount chain. Is "Changlong" the name of a seamount, seamount chain, or both? Is "Spartly" typo of Spratly?

Response 3: We added the names of the Changlong, Longnan, Longbei, and Zhongnan seamounts on the map illustrated on figure 1b. We made the necessary correction to the name Spratly Islands. The name Changlong corresponds to a volcanic seamount and a seamount chain at the same time. It is one of the biggest seamounts in the southwest sub-basin of the SCS and the seamount chain that crosses the investigated sub-basin was named after the homonymous intraplate volcano. We do not think that adding an extra map would benefit the paper. The addition of an altimetry-bathymetry scale and the names of the volcanic seamounts that were

missing to the map illustrated in figure 1b allow the reader to have access to the information he/she needs to understand the physiographic and geological characteristics of the study area.

Comment 4: The authors mention that "A total of 8 rock specimens were taken from different sites of the flanks of the Nanyue seamount". How many sites was dredging performed? Were all 8 rocks specimens taken from eight different sites?

Response 4: Our samples were taken from two sites. A relatively shallow site located at a depth of ~1020 m below the surface of water and another one located at a depth of ~1270 m below the surface of the sea. Both sites represent lava breakout sites and are located on the flanks of the investigated seamount. We took 4 basalt samples from the shallowest site and 4 basalt samples from the deepest site. We note that each site occupies an area of a few m^2.

Comment 5: In the following section, the authors describe microscopic (petrographic) descriptions for six fresh volcanic rocks. Were described six rocks recovered from the same dredging site? If not, because there is a possibility that they represent different magmatic activities, the authors should describe for each sample. If the rocks were from the same dredging site, the authors must change sentence at line 155-156.

Response 5: We describe in detail the macroscopic and microscopic features of the basalt specimens we collected from the two sampling sites on the flanks of the Nanyue seamount. We describe them as they form a single group of rocks. However, we note any significant structural, mineralogical and or microtextural differences among the studied samples whenever they occur. These differences give us a hint about the origin of the investigated basalts. Though the investigated basalts do not show any remarkable compositional or isotopic differences they have a different age. So, we will agree with the reviewer that basalts from each site might represent different lava flows.

Comment 6: Are these samples free from olivine phenocryst? Further, how many samples did the authors examine modal analyses?

Response 6: Our detailed petrographic examination showed that the investigated basalts are deprived of olivine crystals. The modal amounts of every mineral constituent in the Nanyue basalts were calculated using visual estimation methods.

Comment 7: Are there any reason why four samples were chosen? The authors mention "2 volcanic rock samples … were excluded from further examination" at Line 157. Because the total number of sample is 8, the author examined 6 samples. The authors should mention a reason or criterion to choose four samples from 6 examined samples. Were the four samples taken from different dredging sites or the same site?

Response 7: We chose to analyze two representative samples from the deepest site. We noticed that one sample presented a different microstructure. So, we chose to analyze two samples with different structures from the deepest site. We had only two unaltered basalt samples from the shallowest site. The truth is that the analyzed samples from the shallowest site did not show any noteworthy petrographic differences.

Comment 8: Because trace element profiles of Hainan basalt show wide distributions, it is difficult to mention "resembles" simply.

Response 8: We agree with the reviewer. Therefore, we replaced the term “resembles” with the term “follows”.

Comment 9: The authors describe that "the isotopic compositions of the investigated basalts straddle the fields of the Indian Ocean MORB and the Hainan Island OIB," but "straddle" is not suitable because in Figure 5 the field of the Hainan Island OIB overlaps with the Indian Ocean MORB.

Response 9: We will agree with the reviewer again. In the revised version of the paper we note that the isotopic compositions of the investigated rocks plot in the field of Indian MORB and in the overlapping area between the Indian MORB and the Hainan OIB.

Comment 10: At least in Figure 5b, the compositions of the investigating basalts are the same (or similar) compositions to the Hainan OIB.

Response 10: Yes, this is true. A detailed explanation for the absence of isotopic decoupling between Nd and Hf is provided in the discussion. We believe that the effect of the “DM end member” on the Hf-isotopic signature of the studied rocks was soon erased by magma mixing processes.

Comment 11: I guess that "they" in line 273 indicates basalts from the East and Northwest sub-basins. If so, who describes that "they are analogous to those of MORB from the central Southwest Indian ridge?" Janney et al. (2005), which the authors referred, did not mention the similarity between SCS basalts and SWIR MORB.

Response 11: We made the necessary linguistic corrections. We also replaced the reference Janney et al. with Meyzen et al. 2005.

Comment 12: Is “In the 207Pb/204Pb versus 87Sr/86Sr” typo of “206Pb/204Pb versus 87Sr/86Sr”?

Response 12: We could not find the mistake the reviewer is talking about.

Comment 13: Please add "(AP)" after "Data for abyssal peridotites."

Response 13: We did it.

Comment 14: Depth (or location) where samples were recovered should be described in section 3.1. Although the authors describe that “HD66-1 is from upper section and HD66-2 is from lower section”, which part did other samples come?

Response 14: A detailed description of the depth and the sites our samples were collected from is provided in section 3.1 in the revised version of the manuscript.

Comment 15: The authors discussed the possibility of crustal contamination based on Nb/Ta. But the following line 356-362, they also describe that Os-isotope data are not in favor of contamination in spite of Os-isotope is a typical "hallmark." Because the authors wrote "affected by crustal contamination to some extent," it is certain that the authors believe the possibility of crustal contamination. If so, the author should explain the reason why Os-isotope data don’t indicate the contamination, but Nb/Ta does.

Response 15: We think that the investigated basalts do not show any evidence of affection of their Os-isotopic compositions by crustal contamination. In fact, the basalt sample (HD66-2) with the lowest Os concentration (60.37 ppt) and the highest $^{187}Os/^{188}Os$ (0.1856), has the lowest $^{87}Sr/^{86}Sr$ (0.704222) and εNd (4.0) of all the investigated samples, which would not be the case if crustal contamination was responsible for its Os-isotopic composition. In addition, the lack of a co-variation between the Os content and other trace element contents or radiogenic isotopes (that can be affected by crustal contamination) implies that the Os-isotopic composition of the Nanyue basalts is most likely the original one.

Comment 16: Can mixing of (most likely less than 50%) EM-type components from the Hainan plume with the “DM end-member” explain the Hf-Nd isotope systematics (Figure 5b)? It looks like that “DM end-member” does not have any contributions for Hf isotope.

Response 16: Decoupling of Hf from Nd is a known process during mantle melting. However, the Nanyue basalts originate from melts that were not characterized by this kind of geochemical decoupling. As we explained in one of the previous comments (10) we believe that the impact of the “DM end-member” on the Hf-isotopic signature of the Nanyue basalts was soon erased by mixing of the “DM end-member” with OIB-type melts. This is evidenced by: i) the fact that the upper mantle below the SCS has been influenced by plume-type melts, ii) the zoning texture preserved in plagioclase, and iii) the existence of clinopyroxenes with partially resorbed boundaries.

Comment 17: Add "Sea" as "Indo-Australia and Philippine Sea plates."

Response 17: We did it.

Comment 18: Because 5.8 Ma seamount exists in the Northwest sub-basin (Figure 1b), the tendency of age which become younger from NW to SW sub-basin previously mentioned by ref. 34 “is not consistent” with this paper’s data.

Response 18: We agree with the reviewer. In the revised version of the paper we emphasize that our data are not consistent with the argument of the ageing of the seamounts from the south to the north. We also note that there is no direct relationship between the geochemistry and age of post-spreading volcanism in the Southwest sub-basin of the SCS.

Comment 19: The authors concluded in conclusion 3 that Nanyue basalts were from an Indian-type upper mantle source. But as they discussed in section 5.2 and concluded in conclusion 4, the basalts were from the mixing Pacific-type MORB mantle+LCC and the Hainan component. This mixed component is similar to “Indian-type source” but is not Indian-type source itself based on the authors' discussions. If so, conclusion 3 can be misleading.

Response 19: The term Indian-type upper mantle source in the third conclusion was replaced by the term upper mantle source with a Dupal-like isotopic anomaly.

Thank you very much for your time and consideration,
On behalf of all authors Dr. Li-Feng Zhong
Guangzhou, June 2018