We really appreciate the reviewers for the valuable and constructive comments, which are very useful for the improvement of the manuscript. We have replied the reviewers' comments point-to-point in below. The reviewers' comments are cited in black, while the responses are in blue. All the line number are referred to the revised manuscript.

(1) What's the purpose of comparison between ground measurements and satellite retrieval hereïij§In line 396 of section 4, the authors said "In order to validate the ship-based MAX-DOAS measurements…", however, satellite retrieval of trace gases have considerable uncertainties.

R: The unsuitable expression may lead to the confusion. The comparison between ship-based measurements and satellite retrieval can validate with each other. The ground-based data were commonly compared with satellite products in previous studies, however, the satellite products over marine areas were rarely validated by ground-based methods. In this study, the comparison between ship-based measurements and satellite data are aiming to provide validation of spaced observation over marine areas. We have re-phrased the sentence. Please refer to Line 418 to 420.

(2) Line 267, 10 km radius of location of ship-based measurements is selected to match with satellite pixel, but the satellite pixel especially the OMPS is much larger than this scope, how realize it?

R: The size of OMPS pixel is about 50 × 50 km^2, which is indeed too large for the comparison. In this study, the OMPS satellite products were firstly gridded in a high spatial resolution of 0.05°×0.05°, as described in Line 299 of the manuscript. For the typical cruising speed of 5 m/s, the travel distance is about 18 km within one hour (13:00-14:00 LT cover the satellites overpass time). To keep the consistency of temporal and spatial coverages, the area with the center of central longitude and latitude of ship-based measurements between 13:00 and 14:00 LT and radius of 10 km was chosen to average the satellite results.

(3) The current data analysis did not well support the authors' conclusion robustly.

Daily satellite observation can provide regional view of the distribution of gaseous pollutants, why the authors only show monthly data? How did the daily satellite data compare with of daily values of in the track of ship-based measurements? To reveal the transport and air pollution over sea, typical daily case is suggested.

R: Considering the ship-based measurements were carried out for almost a whole month from 2 to 29 June 2017 and satellite data are occasionally absent for some days, we presented the monthly averaged satellite results to reveal the general spatial distributions during the ship-based measurements. For the daily comparison, we presented the time series and correlation analysis of the satellite data and ship-based measurements in Figure 6 to 8 of the manuscript. High correlation coefficient R of 0.83, 0.76 and 0.69 were reported for NO_2, SO_2, and HCHO, respectively.

To follow the suggestion, some typical daily cases of NO_2 VCDs observed by these two instruments were shown in Figure R1. These two measurements and wind filed (black arrow) were overlapping plotted together, where the trajectories of ship-based measurements were indicated with the white lines and the central position of ship-based measurement during 13:00 to 14:00 LT were marked by black points.

It can be observed that these two data sets were highly consistent in the spatial distributions. Combining with the wind direction information, the air masses came from clean sea areas on 2 and 16 June, whereas originated from polluted inland areas on 7 and 27 June. Therefore, the observed NO_2 VCDs are substantially lower on 2 and 16 June compared to measurements on 7 and 27 June. Under the cleaner air masses from sea area, the hot spots of NO_2 pollution on 2 and 16 June are mainly located in the inland areas and some oceanic areas with strong ship emissions, which is blamed to local emissions. When the wind came from the polluted continental area, the NO_2 pollution spread from inland to the sea areas close to the coastal line on 7 and 27 June. It suggests that the air quality over sea areas were significantly influenced by pollutants transported from inland areas and even for the sea areas far from the coastal line.

The discussion about the daily case of air pollution transports was also added in the manuscript. Please refer to Line 312 to 330.

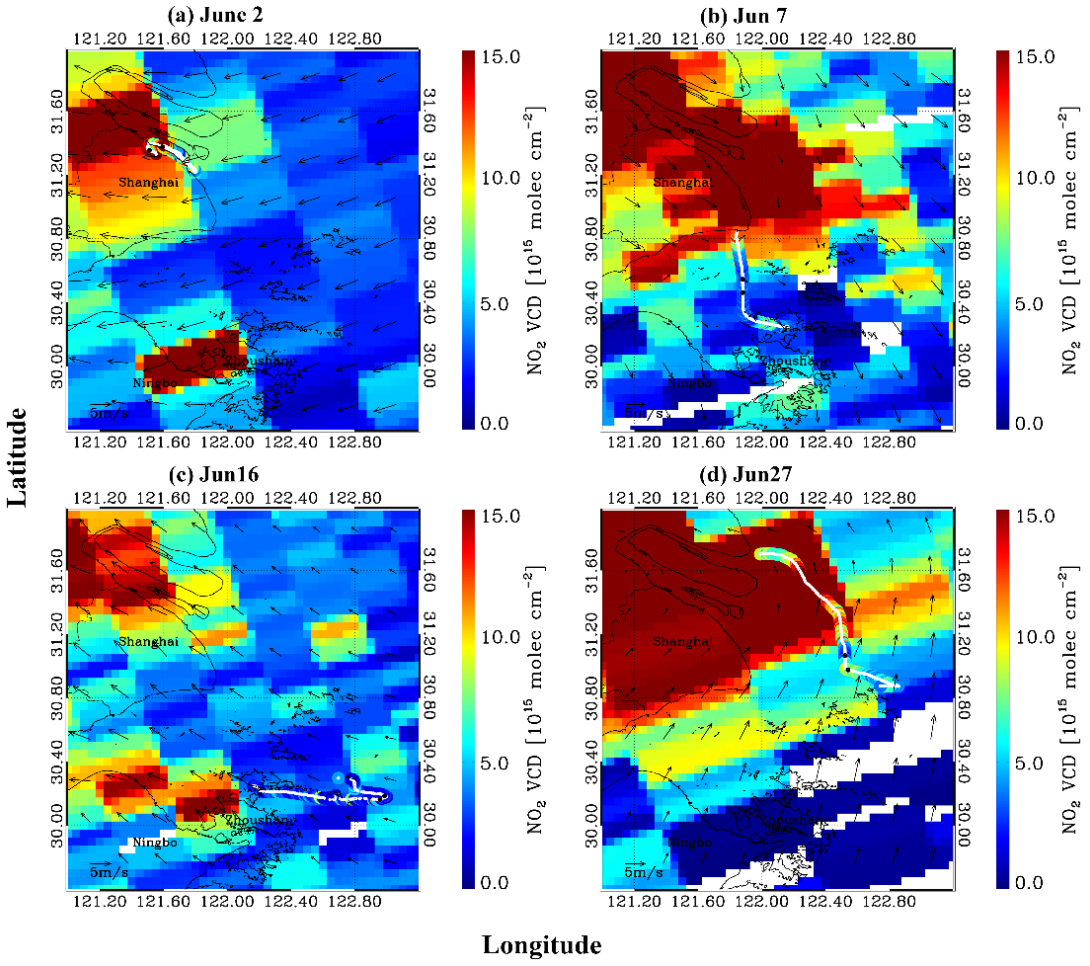

Figure R1. Comparison of OMI and ship-based measured NO_2 VCDs on (a) 2, (b)7, (c) 16, and (d) 27 June. The ship-based measurements were plotted overlap in the base map of OMI products, and the wind field were indicated with black arrows.

(4) It is important for the authors to clarify and emphasize what's new in their work and what's their new finding?

R: The novelty of this study were highlighted in the introduction and conclusion parts of the manuscript. It can be briefly summarized as: the ship-based MAX-DOAS measurements were first performed in the Eastern China Sea (ECS) area, and the typical trace gases spatial distribution were characterized. Meanwhile, the ship-based measurements are compared with satellite productions which is useful to validate the satellite retrieval in marine areas. The spatial distribution of these pollutant gaseous suggests that the air quality of the marine boundary layer in the ECS are mainly impacted by the air masses originated from the polluted inland areas and the local ship

emissions. We also reported the vertical structure of NO_2, SO_2, and HCHO in the ECS area. High concentration pollutants were identified in the sea areas of important ports and channels, which is related to the shipping emissions. Combining with the on board O_3 lidar instrument, we have discussed the O_3 formation process over marine areas. This study provided further understanding of the main air pollutants in the marine boundary layer of the ECS area.