Response to Reviewer 2#

1. A single dust weather event is insufficient to characterize the accuracy and stability of different products in identifying dust storms. It is recommended that the authors expand the study's temporal scope to include dust event cases across multiple seasons, analyzing the impact of seasonal surface changes, such as vegetation cover, soil moisture, and surface temperature, on the accuracy and stability of dust identification by different remote sensing products, (e.g., the high-dust storm period in spring season versus the low-dust storm period in other seasons), thereby evaluating their cross-seasonal stability and adaptability.

Response：In East Asia, dust storm weather mainly occurs in the spring. Based on your suggestion to increase research on multiple dust storm events, we compiled data on dust storm incidents that occurred from April 2015 to 2019 from the National Climate Center of the China Meteorological Administration: http://ncc-cma.net/cn/. We evaluated the performance of various satellite products for these 64 events.

2. In the manuscript, there is an issue with the citation format, for example, on the line 86 of page 3, "which can distinguish dust from complex atmospheric environments. (Liu et al., 2008).", and line 88 of page 3, aerosol-cloud interaction and climate effects, etc. (Gui et al., 2022; Jia et al., 2018; Wang et al., 2023).", and etc.

Response：Thank you for pointing out the issues. We have carefully revised the references in the text.

3. It is recommended that the authors overlay these satellite remote sensing product data with PM10 concentration data from ground observation stations spatially (e.g., displaying satellite dust distribution and PM10 concentration points simultaneously on an image) to more intuitively demonstrate the consistency between product detection results and ground observations, thereby enhancing the readability of figures and the clarity of result interpretation, specifically between Fig. 2 and Fig. 3.

Response：We adjusted the drawing of the Figures and overlaid the PM10 values with the satellite products (Figure 3/5/7/9/11).

4. It mentioned that "when the DST judgment result was dust, the IDDI result may not be dust, which was more obvious over desert areas" on line 377-378, how to explain this situation, and the results in Fig. 2 on March 16, IDDI exhibited this difference compared to DST over the North China Plain. How can this

36   phenomenon be explained?

37 Response：The imprecise statement has been amended in the article.

38 5. Lines 421-423 state, "it was found that DB is significantly better than DTB in
39   describing the details of dust weather." How can this statement be explained, and
40   it is recommended to provide a detailed explanation?

41 Response：In the latest manuscript, we no longer make a comparison between DT and
42   DTB; we have only selected the DT product.

43 6. How was the POCD for all products in Figure 12(a) calculated from March 13 to
44   20? Was it an average of daily results or another method? Referring to Figure 6,
45   the average POCD for MODIS over the whole dust weather process cannot reach
46   91%.

47 Response：In the latest manuscript, for the 64 DEs, each POCD value represents the
48   total value during each DE process. In the original manuscript, the POCD in
49   Figure 6 was the daily average, while Figure 12 represented the total value for
50   the entire dust storm event. Since the daily values of DD, DN, and ND vary, this
51   caused the daily average in Figure 6 to appear inconsistent with the total POCD.

52

53