

Comment on **essd-2022-91**

Anonymous Referee #3

Referee comment on "A database of radiogenic Sr–Nd isotopes at the "three poles"" by Zhiheng Du et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-91-RC3>, 2022

It's of great significance to compile the radiogenic isotope compositions data of Sr and Nd at the "three poles" for researchers to further understand and trace dust transportation. In this respect, the database is necessary and meet the demand of many readers. The following are some comments to improve this manuscript:

Main comments:

- I suggest to add a paragraph before Line 55 to explain why $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{143}\text{Nd}/^{144}\text{Nd}$ were chosen to trace dust sources. That means the tracing principle of radiogenic isotope compositions of Sr and Nd should be introduced here.
- There were a mass of Sr–Nd data measured in the "three poles" in different medium (e.g. rock, clay, sediments, dust...), why only data from sand, sediment, loess, aeolian deposits and snow/ice were compiled here? Were they all connect to Aeolian dust and easy to trace the sources? Is this manuscript only focus on "Cryospheric science"? There should be some words to explain these choice.
- Some conclusions in the manuscript needs more robust evidence : L. 362–364: "As shown in Fig. 6, the lowest ϵNd values were observed along the ice-free periphery of the GrIS and SV; therefore, these ice-free regions are potential dust sources for natural dust in the Arctic Ocean." Do same/similar values of dust mean the same sources? It's better for the authors to give some robust evidence from modern or ancient atmosphere circulation pattern to explain the transport pathway.
- As the author mentioned in L.212–219, there exist "grain size effect" and "acid leaching method effect" that influence the Sr isotopic composition data, maybe there is also "altitude effect" on the glaciers, then the questions arise : How to avoid above "effects" when compare different data obtained from different grain sizes, different leaching methods or different altitudes?
- I recommend to reorganize table.2,3,4 with two comparison columns of "sink" and "source" radiogenic isotope compositions data of Sr and Nd. That needs more data from potential source areas to be collected in the database.

Minor comments:

- L.99: "and much is still known about the cycle in the SH"¼□the "known" should be "unknown"?
- L.161-162: "with the unit of at revolutions per minute (rpm)", a word was missed here.
- L.194 and L.197: $^{144}\text{Nd}/^{146}\text{Nd}$ should be " $^{143}\text{Nd}/^{144}\text{Nd}$ "?
- L.244-245: "with $\epsilon\text{Nd}(0)$ values from 0.712349 to 0.73211 and $^{87}\text{Sr}/^{86}\text{Sr}$ values from -15.7 244 to -7.0"? The position of " $\epsilon\text{Nd}(0)$ " and " $^{87}\text{Sr}/^{86}\text{Sr}$ " should be reversed.
- Fig. 6: "CAA" at X axis should be "MCAA".
- Table 3: "CAA" in the second column should be "MCAA"
- Fig. 6: What are the red and green rectangles mean?
- L. 279-280: "Sand samples from PSAs (East Asian and Saharan deserts) are also collected." I could not find any data from Saharan deserts either in the manuscript nor the database.
- Fig.7:"Surface snow or snowpit samples are represented by purple solid circles, ice core samples represent blue rectangles and samples represent red solid circles". Where is blue rectangles? What samples represent red solid circles?
- Fig.7: "The dust transport paths are marked with yellow arrows." Do the dust transport paths here connect to the dust "sinks" of the Antarctic ice sheet?
- Fig. 8: What did the letter "A, B, C, D" mean? Do they refer to the four regions described in L. 429-438?