

Comment on **essd-2021-156**

Anonymous Referee #2

Referee comment on "Fusing MODIS and AVHRR products to generate a global 1-km continuous NDVI time series covering four decades" by Xiaobin Guan et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-156-RC2>, 2021

Guan et al. generated a new NDVI dataset, STFLNDVI, by merging the data of MODIS NDVI and AVHRR GIMMS 3g. MODIS NDVI product has good data quality and a high spatial resolution but it is available since the year 2000. AVHRR GIMMS 3g product has been provided since 1982 but it has a relatively coarse spatial resolution (1/12 degree) and relatively poor data quality. The authors then performed the temporal filtering, normalization, and spatial-temporal fusing, making a new NDVI dataset of STFLNDVI with 1-km spatial resolution, covering the period of 1982-2015. Furthermore, the authors checked the temporal consistency, spatial stability, and spatial consistency of the new product during the overlapping periods of MODIS, ANUS NDVI data. This draft was well-written, but I still have some comments on the algorithms used in this analysis, and I think the novelty is insufficient for a paper in ESD.

Major comments:

- Doubt on the reliability of the spatial variations at fine resolution. The original AVHRR product at coarse resolution can not provide any spatial variations within 1/12 x 1/12 pixels. The authors claimed that this newly generated NDVI product at 1-km resolution has the information of spatial variations within 1/12 x 1/12 resolution. Such spatial variations for every year are derived from the reference year (2014) of MODIS data. This means that, for STFLNDVI, the spatial variations within 1/12 x 1/12 resolution have no temporal change. This is not realistic, and I think the "high resolution" of STFLNDVI seems like a "pseudo high resolution".
- Doubt on the reliability of the short-term temporal variations. When doing the normalization (section 3.1.2), the authors just used a linear model to make the multi-year mean value and trend of AVHRR data as same as MODIS data (as shown in Fig 3). The interannual variability or temporal variations within the year of STFLNDVI are from the AVHRR data without any correction. The short-term temporal variations of AVHRR aren't always consistent with those of MODIS data, for example in the regions around the equator. Merging two datasets may lead to some artificial variations.

Specific comments

Ln 36-37: The logic should be "NDVI can not only ...vegetation coverage and growth status, which is associated with ...". And it would be better to use "associated with" rather than "correlated with"

Ln 295: freely downloaded => downloaded for free

Ln 300: I don't understand why the authors show the mean NDVI of the year 1990 here? How about the other years?

Ln 336: Why r in Europe (forest) and South of China (forest) is relatively low (Fig 4a)?

Fig 5, Ln 357: It would be better to give the statistics of r and bias for each climatic biome in Fig 5. The patterns in Fig 4 show low consistency in some regions, but this information has been hidden in global statistics.

Fig 7, Ln 392: As shown in Fig 3, the mean difference between fusion results and MODIS is less than 0.1. In Fig 7, the bins of colorbar are 0.2 or 0.1. It is possible that patterns of fusion results and MODIS have some differences, but these differences can't be shown because of colorbar setting. Could you please check this?

Fig 8 and 9: Colorbars are missing!