RC1：It is well known that the quality of commonly used AQUA MODIS global fire products inevitably decrease gradually after a long-term running. It is very glad to see that Chen et al. made a robust global fire products with similar spatiotemporal resolution to AQUA MODIS products, which guarantees the continuity of research based on MODIS data. Overall, this manuscript is well-structured and presents sufficient details. The verification of FY-3D fire product was conducted from different perspectives. The figures were presented with good quality. Nevertheless, the following several technique issues can be considered by the authors before I recommend its final acceptance for publication in ESSD:

To Referee 1:

Thanks so much for your encouragement and valuable comments. We have revised the manuscript according to your general and detailed comment. Please feel free to contact us if additional revisions are required.

1 What is the major difference between the algorithm of fire identification for FY-3D and MODIS fire products? Although briefly introduced, more detailed explanation should be added. This can give readers and users a better picture of the quality and advantage of FY-3D fire products.

R: This is a good point and thanks for pointing it out. The principle for identifying fires based on FY-3D and MODIS is generally the same. As explained in the manuscript, FY-3D fire products fully considered the advantage of MODIS fire products and made some further improvement as follows:

(1) Auxiliary parameters：Since the sole use of vegetation index is limited to reflect combustible materials, climatic boundaries and geographical environment data, which had a strong influence on vegetation types and growth, were added to FY-3D fire identification.

Fire identification: FY-3D adopts the adaptive threshold and reduces the limitations caused by fixed thresholds of MODIS and VIIRS algorithms. Meanwhile, FY employs a re-identification index according to geographical latitude, underlying surface types, as well as the influence by cloud, water bodies and bare land and the comprehensive consideration of multiple influencing factors increases the accuracy of fire identification; Thirdly, since the far-infrared channel plays an important role in fire identification and FY-3D has a high resolution of 250 m in the far-infrared channel, The precision of fire identification is improved.

Fire re-identification: FY-3D fire products can be used for both global climate change research and such practical implementations as forest and grassland fire prevention with a higher requirement for precision. Based on the initially identified fire spots,

FY-3D employed the re-identification index to further remove fire spots at cloud edges, cloud gaps, water body edges, and conventional heat sources and on bare land and highly reflective underlying surfaces.

This part was concluded in the discussion part.

2 There is a difference of observation time between FY-3D and MODIS fire products. Will this cause potential errors when employing both FY-3D and MODIS products? e.g. the first part of time series based on MODIS product and the latter part based on FY-3D products?

R: Thanks for your comment. This is a good point. Yes, for the same period, different observation time may lead to some difference for the identified fires and the influence of different observation time on the difference of observed fires varied across different FRP. As introduced in the manuscript, the larger FRP (or denser vegetation cover), the longer fire existed, the better consistence between two fire products. Currently, the temporal difference of observation time between MODIS and FY-3D was the smallest and notably smaller than that between MODIS and other fire products. Therefore, the relative small difference between MODIS and FY-3D exerted a very limited influence on the consistence of two fire products, and FY-3D fire products were so far the best continuity for current MODIS products.

3 There are two middle-infrared band (3.8um and 4.05um). What is the difference between the two bands? And what is major advantage (e.g. detecting specific fires?) for the two bands? What is the band used for FY-3D fire products?

R: This is a good comments. Actually, both middle-infrared band (3.8um and 4.05um) were sensitive to strong heat signals. Their difference lied in their performance under different temperature and radiation conditions. 3.8um was more close to the wavelength of solar radiation, and had better reflection under solar radiation. As a comparison, 4.05um was more easily to miss weak fires. Therefore, current FY-3D fire products were produced based on 3.8um band for better fire identification. In the future, we would consider the comprehensive use of both bands for improved fire products. Thanks so much for your comment. Relevant description has been added to the revised manuscript.

4 The position accuracy for FY-3D and MODIS fire products were both 0.01°. Why the range for matching them was set as 0.02°?

R: This is a good point. After projection and resampling, the theoretically optimal resolution was 0.01°. However, there were some bias for satellite positioning and most fires were sub-pixel information, the error tolerance is required. If the resolution was set as 0.01°, the positioning error would cause the same fire pixel recognized as two different fire pixels in FY-3D and MODIS fire products. In this case, we considered a buffer for a pixel and set the range of matching as 0.02°.

5. On page 16, the equation for position matching suggested 0.03°, why in the text was 0.02? Is it a typo or something to explain?

R: We are sorry for this typo. This should be 0.02°. Thanks for pointing it out.

6. Page 1 Line 36: Wild fires can significantly affected the formation of cloud and precipitation, which can be mentioned as well. The authors can refer to the following literatures: (a) doi: 10.1029/2021GL094224; (b) doi: 10.1029/2019JD032136¼

R: Thanks for pointing this out. These references have been added.

7. Page 1 Line 36: Some important references can be added to better support "remarkably deteriorated air quality", such as http://dx.doi.org/10.1080/01431161.2010.485213

R: Thanks for pointing this out. This reference has been added.