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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Assessing the large-scale plant-water relations using remote sensing products in the humid subtropical Pearl River Basin in south China" *by* Hailong Wang et al.

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RC2: General comments: 1. The Pearl River Basin is in relatively humid region. Beside water, other factors may also influence the vegetation growth. It is suggested to show the landcover change in the studied period and analyze the relationship between vegetation growth and temperature or egergy to identify the vegetation-water relation more clearly. AC: Thank you for the suggestion. It is a good one and in fact we thought about this analysis, because it is realized that the controling factors of vegetation growth can be divided into two groups – the demand (including radiation, vapor pressure deficit, and temperature, etc) and the supply groups (soil moisture, groundwater,

and water storage, etc). The supply factor was represented by precipitation and total water storage here, and the demand effect was integrated in potential evaporation and embedded in the aridity index. In this sense, we discussed both the hydroclimate and water impacts on vegetation. We made the argument more clearly at the end of Methods section (Line 156-160). RC2: 2. Lag effect between vegetation growth and water availability are analyzed at monthly scale. In my opinion, it is necessary to show how P, TWS, NDVI and GPP for the 12 months in a year for better discussion about the lag effect. AC: We agree that a monthly climatological mean of these variables would help much with the lag effect analysis. We also gave this calculation and analysis in Figure 10, and results in Figure 11 were based on the climatological means which we failed to mention in the relevant text. Please refer to Line 236 in the revised version. RC2: 3. I understand when using remote sensing products, uncertainty issue is always a concern need to be addressed. However, this is not the scientific target of this paper. To keep the readers' attention to the key scientific question trying to answer, it is suggested to remove the "uncertainties in the datasets and results" section and describe how you quantify the uncertainty of remote sensing data in the Methodology section. AC: Thanks for the suggestion. Indeed, when using remote sensing for hydrologic studies, the data uncertainty/accuracy is often concerned. Considering that the other anonymous reviewer also cared about this, we still keep this subsection in the revised manuscript and expand it for a detailed justification. A few supplementary figures are also provided for comparisons of different remote sensing products. Relevant text in Data and methods and Discussion has been improved (Line 130-139 and 261-275). RC2: Specific comments: Line 77: Please give more information about the importance of Pearl River Basin and it's connection with research progress described in the previous paragraph. AC: This issue is also suggested by another reviewer. A short paragraph has been added, please refer to Line 73-80 in the revised manuscript, and the Study area section in 2.1 has been edited accordingly as well. Because more information about previous relevant studies were to be mentioned in the Study area and Discussion sections, we only talked about the basin in general

here to avoid the abrupt shift in to the Pearl River Basin in this part of Introduction. RC2: Line 120: It is suggested to decide the assumption being made behind the lag effect analysis AC: We have changed the sentence 'Furthermore, a lag effect analysis ...' to 'Furthermore, to investigate the causal role of vegetation growth to water storage changes (or the vice versa), we carried out lag effect analysis between vegetation parameters and hydroclimate variables'. RC2: Line 195: The basin is in subtropical region. So please confirm whether October to March is non-growing seasons. AC: Growing season months have been given in Method session (Line 138). Because it can vary from year to year for each type of vegetation cover, we use the conventional definition in this study, i.e. from April to October. Precise quantification of growing season length can be done with NDVI/LAI time series but won't be necessary for this study. RC2: Line 252-253: A landcover change analysis for the study period may make the explanation here more persuasive. AC: Please refer to the response to General comment point 1, and response to the 4th comment by Prof. Zhang. In addition, we think the possible changes in planting structure would also alter the trend of greenness and productivity in these agricultural areas. RC2: Line 254: I'm a little bit confused about "water storage increase in this hotspot region has resulted in the intensification of agricultural activities". More explanation is needed. AC: We have rephrased this sentence as 'The changes of TWS, NDVI and GPP jointly imply that the water storage increase in this hotspot region, which may be induced by increased precipitation, corresponds to the intensification of agricultural activities and boosted the food production since the early 2000s.' A study by Tong et al., (2018) was used to partly support our finding here. RC2: Figure 9: It is hard to read as many elements are overlapped together. Please find a clearer way to describe the information contained in this figure. AC: We have separated Figure 10a in 2 subplots, and adjusted the colors and transparency of the bands to show them as clearly as possible.

Please also note the supplement to this comment:
https://hess.copernicus.org/preprints/hess-2020-242/hess-2020-242-AC3-

supplement.pdf

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