

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
<https://doi.org/10.5194/nhess-2022-178-RC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on nhess-2022-178

Anonymous Referee #1

Referee comment on "Analysis of the relationship between yield in cereals and remotely sensed fAPAR in the framework of monitoring drought impacts in Europe" by Carmelo Cammalleri et al., Nat. Hazards Earth Syst. Sci. Discuss.,
<https://doi.org/10.5194/nhess-2022-178-RC1>, 2022

General comments:

The paper evaluates the relationship between cereal yields and the Fraction of Absorbed Photosynthetically Active Radiation (fAPAR, a satellite derived product) in Europe with the aim of capturing the effects of droughts on crop production. The anomalies of fAPAR were plotted against the yearly yield deviations. The correlation between fAPAR and yield anomalies is positive between the period from March to October, which corresponds to the cereals growing season in Europe. Some negative correlations were observed between February and May; they are limited in length but their analysis could be interesting to assess if they can be considered valuable early warning information. The average growing period in Europe is characterized by a marked south to north gradient; the season has an early start in central Europe and in southern Mediterranean, while it has a late start in southern and Western Europe. An interesting result of the study is the good correlation between fAPAR anomalies and crop yield anomalies over the Mediterranean, while the correlation is limited in most of regions of Central Europe. fAPAR anomalies are found to be useful to distinguish between drought and no/drought years in the majority of situations in which yield anomalies are used as proxies for drought impacts on agriculture.

Overall, the paper represents a good contribution to the understanding of drought and its effects on crop yield. The method applied is valid and the results are appropriately discussed. The work is well structured, the figures quality is good and the number of figures and tables is appropriate.

Specific comments:

Line 32-33: Together with the two FAO reports of the 2015 and 2018 I suggest citing a most recent one: "The impact of disasters and crises on agriculture and food security:

2021" (FAO, 2021).

Line 48: I suggest citing a recent study (Monteleone et al., 2022) evaluating the effect of drought on different phenological stages of maize in Italy.

Line 94: Could you specify which crops Eurostat includes in the definition of "cereals"? Do you believe that the same results discussed in your study could have been obtained considering crops different from cereals?

Discussion: I suggest comparing the obtained results with the ones reported in (López-Lozano et al., 2015), who found a significant correlation between fAPAR and official yields ($R^2 > 0.6$) in water-limited yield agro-climatic conditions (e.g. the Black Sea region and the Mediterranean basin) for wheat, barley and grain maize.

Table 1: It could be useful to add a column where the drought impacts on agriculture described in the cited studies are briefly summarized.

Fig. 2: NUTS2 regions are quite difficult to visualize; I suggest to increase the size of the various panels and eventually having a sort of table with three columns and six rows instead of the actual figure in which there are six columns and three rows.

Technical corrections:

Line 177-179: The latter may occur when a strong vegetative growth IS observed early in the season during drought years, especially in 179 energy-limited conditions.

References

FAO. (2021). *The impact of disasters and crises on agriculture and food security: 2021*. Rome: FAO. doi:10.4060/cb3673en

López-Lozano, R., Duveiller, G., Seguini, L., Meroni, M., García-Condado, S., Hooker, J., ... Baruth, B. (2015). Towards regional grain yield forecasting with 1km-resolution EO biophysical products: Strengths and limitations at pan-European level. *Agricultural and Forest Meteorology*, 206, 12–32. doi:10.1016/j.agrformet.2015.02.021

Monteleone, B., Borzì, I., Bonaccorso, B., and Martina, M. (2022). Developing stage-specific drought vulnerability curves for maize: The case study of the Po River basin. *Agricultural Water Management*, 69(May), 107713. doi:10.1016/j.agwat.2022.107713