

Interactive comment on “A remote sensing-based dataset to characterize the ecosystem functioning and functional diversity of a Biosphere Reserve: Sierra Nevada (SE Spain)” by Beatriz P. Cazorla et al.

Anonymous Referee #1

Received and published: 23 March 2020

General comments:

The authors provide a valuable compilation of remote sensing based indicators that are used to characterize the ecosystem condition of a test site in south-eastern Spain (Sierra Nevada). The indicators are computed from time series of Enhanced Vegetation Index (EVI) data from 16-day MODIS maximum value composite (MVC) data. The framework for the assessment of ecosystem functioning and functional diversity builds on a set of temporal metrics that are computed on an inter-annual, annual or seasonal level as well as on metrics that capture the spatial heterogeneity

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of the derived metrics. These metrics are used as proxies for ecosystem functional attributes (EFAs). The analysis of the temporal variability of the EFAs yielded the ecosystem functional types (EFTs) and the spatio-temporal heterogeneity of EFTs resulted in the characterization of ecosystem functional diversity. The main rationale behind this framework is that ecosystem primary production can be assessed from satellite vegetation indices and that primary production is the key indicator of ecosystem functioning. Overall, the proposed framework for computing EFTs and functional diversity from satellite time series is comprehensible and well documented. The translation of temporal metrics of vegetation indices into functional attributes and type of ecosystems is well-founded and presents a prototype for large-scale ecosystem assessment and monitoring. The description of the datasets is appropriate and the data are available, structured and labelled logically. However, there are a few specific issues that need to be addressed before the manuscript can be accepted for publication:

Specific comments:

1. The authors do not provide any information about the processing of the MODIS13Q1.006 time series to annual and inter-annual image stacks. Here, the most important point that has to be considered is the masking of valid pixels (clouds, aerosols, snow / ice, etc.) based on the quality assessment (QA) layer (VI Quality) of the MODIS dataset. The clarification on this issue is crucial has a direct impact on a number of the more technical comments below.
2. If no masking has been carried out, the whole results section has to be revised.
3. The study area is rather small (2000 km²) and the landscape in the area shows small-scaled patterns of land-use patches. Why did you use coarse scale satellite data for your analysis and not the archive of available medium resolution satellite data (e.g. Landsat) for your work? This is more a general question, I do not really expect that you redo the full work, however, you could add a conclusive remark at the end of your work.

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Technical comments:

Line 126: explain EVI and add reference

Line 130: linked site is not available

Line 130/131: the doi is not related to GEE. Please adjust accordingly either the link or the description.

Line 131/132: EVI between 0 and 1000 – in tables you use scaling from 0-1; what about negative values? The full data range is from -1 to +1.

Line 135/136: How did you identify these 3 metrics? There are a number of additional phenological metrics available that are known to represent meaningful features of ecosystem productivity (e.g. start / end, length of season). What is "biologically meaningful" in the context of your research?

Line 139/140: How did you define the growing season?

Line 147/148: I doubt that you will have EVI_{max} in the winter period after clearing your EVI data for snow/ice, clouds, etc.

Line 161: "relative extension" - what do you mean, here? Share of area of EFT_i within a defined area (moving window)?

Line 162: "compared to the most abundant EFT" – in a defined area / window?

Line 218: "altitudinal patterns"- What about topographical patterns (aspect, slope)?

Line 219 ff.: I cannot find any map of those bioclimatic belts for the study area. Hence, I am not able to follow the description of results. Please add a figure.

Line 235: "maximum greenness in winter" – see comment above, how would you explain a greenness peak in wintertime?

Line 254: "interannual variability ranged from 1 to 17 different EFTs over the 18-year period" - what is the contribution of data uncertainty / data quality in this context, e.g. the missing QA-masking on one side and the very low EVI values on the other hand?

Line 359: "geospatial data Sierra Nevada Park" – Where do you show these data?

Line 366: "Sierra Nevada Biosphere Reserve (SE Spain)" – show in map!

Figure 1: It would be helpful for the interpretation of the EFA and EFT data to have a map of vegetation types rather than a simple snapshot from the ISS without any

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information on content and scale.

Figure 3: the mean EVI is NOT the "area under curve"! This would rather be the cumulative EVI.

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2019-198>, 2020.

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