

General comments

There is clearly a great effort behind this manuscript, but I feel the authors should focus on the refinement of the methodology in view of producing something that can be more easily updated to account for the dynamicity of the agricultural sector. The authors generate a spatial distribution of the agricultural GDP circa 2010 but this information can hardly be useful for analysis of the risks that the agricultural production face more than a decade later given that the authors themselves highlight the dynamicity of the sector. Besides, the analysis of the exposure to drought falls short to describe the adaptive capacity that characterize many agricultural systems. The authors indicate that the results of the analysis are suitable for global, continental and regional analysis but not for local analyses and one may wonder if in the end this effort is worth doing, also considering that this information cannot be easily validated and that is not suitable to inform local planning. There are some methodological issues that would require in my view some attention: for instance the spatial analysis of the agricultural GDP that is done for the wood products; collinearity of input data. The paper does not contain a quantification of the uncertainties and does not mention the fact that agricultural GDP cannot capture well agricultural production in the informal or secondary economy. A more consolidated discussion of the limitations of this product would greatly benefit the strength of this paper.

Overall, I would welcome the publication after a revision that addresses these main points: 1) Strengthen the methodology or justify better some of the technical choices that were made; 2) Provide some quantification of the uncertainties. 3) Add some discussion on how the ever-growing release of new and better inputs data (crop maps; livestock distribution; dynamic land cover maps; more spatially-disaggregate and recent statistics) may be integrated into this product to reduce or even better to keep up with the temporal mismatch in agricultural production. Finally, one suggestion: the linkages between drought and agricultural production are less important for fisheries and wood production than for crop and livestock whereas the water crowing index is more associated with the distribution of the population, which is itself quite outdated in this analysis. My suggestion would be to remove or shorten the discussion on the exposure to drought. I understand that it was used as an example of application but in my opinion doesn't really bring much value to the discussion.

Detailed comments

Lines 8-9: please check this sentence, is there something missing?

Lines 15-16: no need I think to discuss the limitations of administrative values versus spatially distributed variables.

Line 19: I suggest using agricultural aspects instead of agricultural issues.

Line 24: global food exposed population: is this the overall population in low and middle-income countries?

Line 24: 600 million people are in low and middle-income countries or everywhere?

Line 42: night light detection instead of luminosity?

Line 57: nighttime lights detection is clearly associated with income distribution not necessarily with the economic and processing activities which in fact happen mostly during the day

Line 59: *"night light data may not capture the agricultural activity as it requires areas to emit light."* This is not very clear.

Line 143-144: forest production is not related to forest loss. In fact I would say the opposite. In forest managed systems, trees are cut but that not necessarily reflects in a forest loss and land cover change as implied in this assumption. Land cover and land cover change maps can provide information on deforestation but hardly on forest production. One possible solution can be to spatialize country statistics of forestry

production by maps of tree cover instead (but please see the following comment). Statistics can be derived from the FAOSTAT database [Forestry production and trade](http://www.fao.org/forestry/production-and-trade) which contains data on the production and trade in roundwood and in primary wood and paper products for all countries and territories in the world, collected through the Joint Forest Sector Questionnaire (JFSQ) (<http://www.fao.org/forestry/statistics/80572/en/>). More detailed information on wood products, including definitions, can be found at <http://www.fao.org/forestry/statistics/80572/en/>

Line 144-145: Also, related to forest, I wonder why you're using a different land cover than the CCI already used for the water bodies. Also, please note that a new version of the MODIS land cover has been available for several years now. MODIS 5 is discontinued. In the MODIS 6 the spurious detection of land cover change were reduced compared to V5 but not entirely removed.

Lines 190-194: is this a pro-rata adjustment which is made to agricultural priors within each country or is it a proportional adjustment based on the weight of each component? It would be useful to see a table that quantifies the implications of this adjustment such as in percentage of the total. Also, production data of the crops in SPAM are stratified by the farming system. Production in two of these farming systems (rainfed low input and rainfed subsistence farming) is mostly for home consumption. One of the limitations of the agricultural GDP is that it may poorly capture production that is not exchanged on the market. And this is valid for the artisanal fisheries which may escape official (e.g. in several West African countries) but also for livestock in pastoral systems. Wonder if there are implications with regards to the spatial distribution of the GDP in countries where low-input farming systems prevail. For instance, would it still be possible to identify hotspots of more intensive production in areas with prevailing low input systems which would be useful to target interventions? In SSA countries, it is not uncommon that agricultural GDP benefits the urban population (which owns fishing vessels and herds while living in the cities). This will not be captured by the system.

Line 247: The Water Crowding Index is not only linked to agricultural production and for instance (temporary) water scarcity has less direct impact on wood products and fisheries. It's rather associated with the distribution of the population regardless of the economic activities.

Line 255: it's unclear why night lights are used in this context.

Lines: 268-269 I think the authors refer here to specialized agricultural production. Suggest rephrasing.

Line 270: I suggest rephrasing: *it requires areas to emit light* – not that clear.

Paragraph 3.2: I'd call it Uncertainties and limitations

Paragraph 3.2.2 there is collinearity between inputs (e.g. GLW and SPAM). Additionally, these modelled data all contain agroecological information and climate variables which are also implicit in the response variable (exposure to drought).

Figure 8: would one get different results doing the same analysis at country level.

Lines 336-337: given the large uncertainties and difficulties in the validation and if the results are currently suitable for applications at global, continental or regional level wouldn't it be more efficient to stick to the old and good country values?