

Interactive comment on “Dataset of Georeferenced Dams in South America (DDSA)” by Bolivar Eduardo Paredes-Beltran et al.

Anonymous Referee #1

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The manuscript 'Dataset of Georeferenced Dams in South America (DDSA)' presents a very important compilation of georeferenced dams in South America (SA). Since most global databases do not include many important dams in SA, it is indeed paramount that regional initiatives as the one presented here be developed to foster water management in the continent. I thus support the publication of this manuscript in ESSD, after some revisions as highlighted below, and for this I suggest major revisions.

Firstly, a section with perspectives for future developments of large scale datasets of dams in SA could be included. For example, this dataset provides mainly information on the location of the dams. However, other data are also fundamental to foster water management across the continent, e.g., availability of dam outflows (i.e. discharge time series). For instance, Brazil's ONS (Operador Nacional do Sistema) provides daily

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discharge data and reservoir storage for most reservoirs in the national interconnected system (<https://www.ana.gov.br/sar/sin>). These data were used for example for a national scale assessment by Passaia et al 2020 (Impact of large reservoirs on simulated discharges of Brazilian rivers; Brazilian Journal of Water Resources). Another information relates to time series of energy generation, and some SA countries also make it available online (e.g., Brazil, Colombia). I think a paragraph could be included to discuss which kind of information would be interesting for improving water management related to reservoirs in SA (and which datasets already exist and are not included in DDSA). This could push the international hydrology community somehow to develop new initiatives of data sharing.

Future dams (i.e. proposed dams or dams under construction) are also neither included nor discussed in the text. I think it should be included somehow (at least a paragraph about it). For instance, ANEEL (Brazilian energy agency) has an available shapefile of the status of dams in the country (in operation, proposed, at inventory phase, etc). The FHReD dataset also provides proposed dams worldwide, which includes many in SA (<http://globaldamwatch.org/fhred/>).

The authors could consider presenting an updated map of the degree of regulation index (DoR; basically the total storage of upstream reservoirs divided by the average discharge at a given river reach) which is a simple one yet powerful to understand reservoir regulation at large drainage networks. This is easy to do, since the authors already have the Hydrosheds ID for each dam location. This would be a kind of updating for SA of the free-flowing rivers map published recently (Grill et al 2019 Nature).

The interpretation of the hydrological data and the outcomes of the dataset in the Results section is too simplistic. For example, in the section 3.1 Dams and Reservoirs there is only a comparison with GRanD and AQUASTAST databases. However, given the large amount of data available, more interesting figures as histograms with number of dams implemented per year and per country should be included. Regional analyses could also be performed, e.g., higher dams are mainly located in which countries, in

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which type of environment? Although I recognize that this is mainly a paper describing the dataset itself, some additional analyses could be included and would certainly improve the overall quality of the manuscript. In section 3.2 Hydrological Information, the authors focus on describing extreme values of PET, Precipitation, temperature and other variables at individual sites (e.g., 'The highest potential evapotranspiration record is documented for the catchment of the "Pilões" dam in Brazil with 1,713.32 millimetres per year'). However, for a continental scale dataset as this one, I think that regional analyses would be much more interesting, e.g., how many dams are located in regions with high aridity index (PET/P)? Similarly, in section '3.3 Additional Information', there is only a simple phrase on how Yaciretá dam is associated to the highest upstream population and equipped areas of irrigation. A more thorough analysis describing the distribution of dams at different levels of population pressure across the continent could be included.

The authors could consider analyzing upstream population divided by the dam drainage area, this would put some weight on the large upstream population for dams located in downstream reaches as Yaciretá dam in the Paraná river.

Why is 'equipped areas of irrigation' considered an 'additional information'? For me it is a hydrological information.

More information on the data used (section 2.2) should be provided. For example, some information is missing, as the unity of catchment irrigation area (this is only presented in figure 3, and it not presented in the main manuscript or in the provided data in Zenodo).

The authors use the catchments of each dam to estimate some properties (upstream population, etc). The catchment polygons are presented in Figures 2 and 3. I think a shapefile with the polygons should also be provided in the Zenodo dataset, what is very useful for users to extract other interesting information, and it would be in the context of other initiatives of hydrological datasets as CAMELS-Chile (Alvarez-Garreton et al

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2018 HESS) and CAMELS-Brazil (Chagas et al 2020 ESSD).

Finally, some text clarifications are still required in some parts. Some paragraphs are also too long and must be reduced or splitted. I provide some minor suggestions below.

Minor suggestions:

Line 9 Split into two sentences: 'In general, its relevance relies on facilitating the management of water resources for anthropogenic purposes. However, dams could also generate many potential adverse impacts related to safety, ecology or biodiversity.'

L.18 'dams' catchments'

L.23 'contribute to the development...'

L.33 'assess'

L.49 'La Plata' instead of 'El Plata'

L.52 'which reports' instead of 'and reports'

L.54 '...America it only reports...'

L.72 check: '5,283,000'

L.74 'Paraná' with acute accent

L.81 '...the continent, there exist humid...'

L.84 'found' instead of 'find'

L.85 '...Chile, which are blocked due to the Andes mountains, which causes low precipitation...'

L.88 'and it is located'

L.89 'for example the "El Niño",...'

L.89-90 this whole phrase is confusing, please re-phrase. Besides, it is too simplistic

to state that ENSO 'increases precipitation at the northwest area', since it affects in very different ways different regions of South America. Please improve this description here.

L.96 'The GRanD' - 'The' should be in lowercase.

L.112 a reference for HydroSHEDS should be included (Lehner et al), not only the dataset website

L.119 a reference for CRU should be included (New et al)

L.127 a reference for GRDC should be included

L.135 a reference for GRUMP should be included

L.135 'for each of dams' catchments...'

L.141 'catchment were extracted'

L.180 'reservoirs' catchments' instead of 'reservoir's catchments': please check this throughout the whole text. The 'catchments' refer to all 'reservoirs', and not just to one reservoir and stated in the current form 'reservoir's catchments'

L.195 'performed' instead of 'calculated'

L.195 which statistical analysis was performed? or was it just a long term average for each month?

L.225 '...of the data was concluded, ...'

L.225-226 phrase too long, please reduce it or split into two phrases.

L.228 'GRanD' instead of 'GrAND' - please check throughout the text

L.240 '14,855,192'

L.240 please split phrase in two: '...kilometres. The largest catchments... '

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L.242 'Our results highlight the great influence and importance of the Amazon rainforest in the continent since most of the highest records': I don't understand the relevance of this phrase for the context of a database of dams.

L.248 this runoff value of 2961 mm/year for Billings catchment is certainly a model error, since it does not rain that much in this catchment to have this runoff. The high precipitation rates occur more in the mountains close to São Paulo. You can check it in the Brazilian precipitation maps by the Brazilian Geological Survey (CPRM): <<http://www.cprm.gov.br/publique/Hidrologia/Mapas-e-Publicacoes/Atlas-Pluviometrico-do-Brasil-1351.html>> The runoff model uncertainty should be discussed here. I honestly

L.450 I don't understand why Figure 3 has figures e) and f), and not a) and b), since it is a figure by itself, and not a continuation of Fig 2.

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