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Interactive comment on "The Land Surface, Snow and Soil moisture Model Intercomparison Program (LS3MIP): aims, set-up and expected outcome" *by* Bart van den Hurk et al.

Anonymous Referee #3

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The paper documents the LS3MIP program, an important experimental protocols to enhance the understanding of the land surface feedback in the climate system from 1850/1900 to 2100 and involving the Earth System Models (ESM) participating to CMIP6.

The authors provide context and a good rationale for the proposal together with an excellent bibliography of 95 paper that spans over the period 1999-2016.

The list of experiments and participating models (Table 1 and 2) offer an overview which is useful to a newby in the field that will want to study the LS3MIP output. The protocol of data exchance is clear and summarised in 4 tables in the annex which report the most commonly exchanged land surface variables with their unit and format.

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Discussion paper

The availability of both land forced and land-coupled experiments permit to address a number of scientific questions including the sensitivity to meteorological forcing (thanks to 4 different forcing covering at least 1900-2014).

The experimental protocol builds upon previously successful coordinated multi-model comparison (such as the GLACE series) and improves the temporal consistency and extent, both key aspects likely to increase significance and generality of the results.

Sinergies with other projects such as LUMIP, C4MIP, GeoMIP, ESMSnowMIP, demonstrate awareness and further underline the good timing and design of the proposed experimental protocol.

While results are limited to 2 Figures concerning the forcing quality (measured against insitu FLUXNET data) and consistency (measured as inter-dataset similarity), the amount of information and the importance of the initiative are valuable contributions to GMD and deserve to be published within short delays to provide reference and documentation for the program.

Minor comments:

Data volume estimates for the requested ESM model output are currently missing and it is recommended to add the information for instance in table 1. This is easy to compute if the cost of 1-year of output (mandatory/extra) is made available. The information can be very helpful to plan storage of the output and runs throughput.

Links to other projects such as the PRIMAVERA-H2020 https://www.primavera-h2020.eu or CRESCENDO-H2020 is also worth mentioning.

There is no mention to the reproducibility of the results and whether the data repository will facilitate for instance re-run the Land experiment series with another model at a later stage.

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