

Interactive comment on “Climate change will increase potential hydropower production in six Arctic Council member countries based on probabilistic hydrological projections” by Elena Shevnina et al.

Anonymous Referee #1

Received and published: 20 October 2018

Shevnina et al. present an analysis of climate change impacts on hydropower production in member countries of the Arctic Council. An unusual statistical approach is applied, where moments of precipitation (computed from climate model projections) are used to project the distribution of annual river flow, which is then assumed to scale linearly with potential hydropower production. I recommend that the paper is rejected, for the following reasons:

1. Various methodological problems, including:

C1

- Very confusing method, with no validation to demonstrate correct capture of annual flow or hydropower variability. There are country-level annual hydropower generation data available through EIA that ought to be used to check for correct representation of generation.
- No proof offered to show that the MARCS model simulates statistical moments of annual runoff correctly.
- No apparent filtering for catchments or reaches of river that are actually developed for hydropower already or are suitable for hydropower plants.
- No analysis or discussion as to whether the climate models used are able to provide any useful information on extreme precipitation conditions.

2. The study is behind the curve. A study published six years ago is taken to be "state-of-the-art" (line 83). In fact, there are now dozens of studies in the literature that examine hydropower production under future climate conditions, including monthly simulations of individual plants at global and regional scales. You need to build from the most up-to-date work in the field to demonstrate your contribution. If your method offers something that can't be achieved with the existing tools, then you need to demonstrate the advantages and performance.

3. Very little in the way of new knowledge in the conclusions. There are various published studies that show wetter climate and increased hydropower generation in northern latitudes.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-473>, 2018.

C2