

Reviewer #1

A hydrography upscaling method for scale invariant parametrization of distributed hydrological models

I agree with the authors that the paper has significantly improved.

My questions from the former review have been answered in a very good way.

The paper is addressing a relevant problem in hydrological modeling and presents an improved solution to the existing methods.

Furthermore the solution is available as open source python code.

I tested the code. It is working and it is a fine piece of open source software which include code, license information, documentation, testing, coverage, changelog.

Even if this is not part of the paper, I put my ranking of the scientific quality to excellent also because of this round software package.

I still think it would have been a benefit to test the method against the DDM30 network at 30arcmin, because this is used at the moment as reference in the global hydrological model intercomparison project. But I accept that this paper uses 2 other methods to test against on 0.5, 5 and 15 arcmin.

Thanks for your review and constructive feedback in both review rounds!

Small remarks:

100: While it might be possible to use your routine on the fly, meaning you have a high resolution dataset and convert all data to a lower resolution, it might be more convenient to do a preprocessing and store the low resolution before you run the hydrological model. This will save memory and time. And also your tool needs to keep at least part of high resolution of d8 in memory. I cannot see this as a real disadvantage (a real disadvantage is the DRT is not open source, and one is limited to certain resolutions and a WGS84 lat/lon projections – maybe this changed meanwhile)

Line 69 now reads: “While DTR has proven successful at automatically upscaling 30 arcsec flow direction data to coarser resolutions (Wu et al., 2012), it has not been applied to higher resolution data to the best of our knowledge and its code not open source available.

270: Not clear if or where there are data gaps in figure 2F

Line 229 now reads: “Note that this data contains gaps, see **Error! Reference source not found.F**, which shows that not all outlet pixels (grey squares) have a river width (green colors) in the underlying data. “

498/535ff It seem your approach show much better results in cases where rivers run parallel for some time (e.g. Rhine and Meuse). You point this out in 535ff but it seems your approach is giving better results for parallel rivers even with the D8 limitation. Maybe point this out that your approach is superior to the others.

Line 462 now reads: “Although much less compared to EAM and DMM, erroneous IHU upscaled flow directions are still found in [...]”