

# Continental Scale hydro model inter-comparison for SWOT Teleconference summary 2017 01 12

by Rodrigo Paiva and Cédric H. David

## In attendance

Rodrigo Paiva,  
Kostas Andreadis,  
Cedric David,  
Hyungjun Kim,  
George Allen,  
Vincent Fortin,  
Dai Yamazaki,

## Meeting minutes

Cedric: Augusto is unable to present today.

Kostas: presented preliminary results of LISFLOOD in the Arkansas River Basin as a first step before the Mississippi. LISFLOOD description: Inertial hydrodynamic model, subgrid formulation. Input requirements: 1 km spatial resolution, HydroSHEDS widths and depths from Kostas's database; Initial conditions: fill up to 80% of bankfull depth. No calibration. Preprocessing: Resample DEM to 1 km resolution, Generate river network, smooth bank heights to avoid numerical instabilities. Reduced river network. Boundary inflows: NLDAS-2 surface and baseflow runoff. VIC routing for upstream parts.

Cedric: What is the difference between bank height and depth?

Kostas: Bankfull elevation is the DEM elevation. Depths from hydroSHEDS are used to burn the DEM.

Cedric: Does the VIC routing use Muskingum Cunge as on your slide or the Unit Hydrograph method of Lohmann (1996)?

Kostas: there are two existing approaches to river routing with VIC, in various existing codes. I will check it. [*→ Further check revealed that the unit hydrograph method was used*].

Kostas: Simulation time: 30 h using OMP 16 threads. Results: Water depths. High depths at some points may generate underestimated in channel discharge compared to in situ discharge because water is flowing through floodplains.

Cedric: Have you looked at mean discharge to check mass conservation?

Kostas. Yes, water is conserved, but some water is slowed down by flowing outside of the main channel.

Rodrigo: How does the smoothing impact these errors?

Kostas: It is important, but wrong river widths may also be the cause of errors.

Cedric: Rodrigo and Dai also had to test different depths and widths (95% estimate), the larger estimates leading to better results. You may want to try that.

Kostas: it's likely that the same is true here.

Kostas: Also see blog post for more details: <https://kandread.github.io/posts/Setting-up-the-LISFLOOD-FP-Arkansas-simulation/>. Next steps: Use 95th percentile of widths and depths. Test different channel shapes (rectangular, parabolic??). Develop data assimilation algorithms for Level-4 products.

Cedric: Arkansas is usually hard to simulate. So why starting with the Arkansas?

Kostas: Good question. Mostly because my other project focuses on this. The Arkansas has less reservoirs than some other areas of the Mississippi Basin.

Cedric: Channel shape. We should use rectangular for consistency between models.

Cedric: Do you have any thoughts on why the H95 and W95 seem to work better in all simulations?

Kostas: The database is global, but looking at NARwidth and USGS reports it looks like for Arkansas H95 and W95 is closer to the real values.

Rodrigo: What would happen with model performance if you do not use VICs routing an instead a denser river network. That is, using LISFLOOD throughout a greater part of the basin.

Kostas: Computational time will increase but I feel that results would be similar.

Dai: Are these simulations comparable to the other ones?

Kostas: Yes.

Rodrigo: LISFLOOD will be able to simulate dynamic floodplain while MGB and CaMa-FLOOD account only for floodplain storage.

Cedric: The inter-comparison will be good to elucidate what physical processes are of importance.

Kostas: how do we share outputs among the time?

Cedric: There is a file on the website explaining how to share results as csv files. But how should we share flood maps?

Rodrigo: Let's choose maximum flooding over the period of simulation, and a few dates showing high and low flows. Let's use Raster files (e.g. ASCII ArcGIS).

Kostas: It could be other formats as well.

Cedric: should we start writing the paper and doing analyses or wait for other model simulations from other groups?

Kostas: We should have direct comparisons and start draft for June Toulouse Meeting.

Rodrigo: Agreed

Dai: Agreed. Let's start looking at discharge time series at the 14 gauging locations.

Cedric: How about we all share the Q time series at the 14 gauges before the telecon next month? We'll try then to do some synthesis for the following March call.

Cedric: Japan meeting. If we have 4 people, it is worth doing the meeting. Confirmed now are: Aaron, Hyungjun, Dai, Cedric (will forecast with JPL), Kostas (will forecast as well). Rodrigo, can you check to see if you might be able to find travel funds?

Rodrigo: Sure, but you shouldn't plan based on my potential attendance as it is unlikely.

Cedric: We already have 5 people. Cedric, Dai, Aaron, Hyungjun and Kostas. Let's proceed.

### **Action items**

Cedric, Ed, Dai, Rodrigo, Kostas: prepare table with model outputs of the same format as [http://rapid-hub.org/docs/SWOT\\_ST\\_WG\\_Example\\_Outputs.csv](http://rapid-hub.org/docs/SWOT_ST_WG_Example_Outputs.csv) and based upon [http://rapid-hub.org/docs/SWOT\\_ST\\_WG\\_Obs\\_Table.csv](http://rapid-hub.org/docs/SWOT_ST_WG_Obs_Table.csv).

Cedric: next phone call ~ Tuesday February 07.