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: Bankful 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 trough 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 CaMaFLOOD 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.