

Continental Scale hydro model inter-comparison for SWOT Teleconference summary 2017 04 17

by Cédric H. David

In attendance

Dai Yamazaki,
Daiki Ikeshima
Guy Schumann,
Colby Fisher,
George Allen,
Cedric David.

Meeting minutes

Daiki: presented his work on global assimilation of SWOT simulated data into CaMa-FLOOD. Resolution of simulation was 0.25 degrees globally. Assimilation was performed on water height. Two experiments were run: -25% runoff simulation, and different year simulations between simulation and “truth” (1990 and 1991). The goal is evaluation of the effectiveness of SWOT before launch. Downstream locations benefit greatly from assimilation of upstream measurements.

Cedric: How did you account for measurement error?

Daiki: We applied a random Gaussian noise of 5 cm.

Cedric: You talk about an assimilation index (AI), is this something that is widely used in assimilation work or is it something that you guys put together?

Daiki: We put this index together ourselves, and we compute errors from daily data.

Cedric: it looks like your sampling suggests that some equatorial rivers will be observed only once per orbit cycle. My understanding is that it should be at least twice. How did you do you sub-sampling?

Daiki: I am working with rivers that are at least 50 m in width and only kept grid cells that were at least covered 50% by a SWOT swath. This perhaps has an influence on those rivers.

Colby: Looking at your overlay map it appears that you may have more than one orbit cycle.

Daiki: Yes indeed, we plotted 21 days, which is a little more than the 20.8 days orbit.

Colby: One thing to note is that the end of the orbit cycle on the AVISO website was faulty in the past, I had shared this with Sylvain who ended up fixing it and updating it on the AVISO website.

George: Daiki, the assimilation seems to clearly improve the downstream elements from upstream assimilation. Would that be at all possible to do the other way around, i.e. improving the upstream from downstream measurements?

Daiki: This might be achieved with a different type of Kalman Filtering.

Cedric: Colby, isn't that exactly what Ming Pan's "inverse routing" is about?

Colby: that's correct, and some of my current work is looking into this.

Guy: SWOT will see the actual position of rivers, more so than the modeled position of rivers. Do you think this might be an issue?

Dai: Actually, since the resolution of CaMa-FLOOD is on the order of 25 km and we average the SWOT-like data on that scale so I don't suspect that this would be an issue.

Cedric: let's take a moment to talk about short latency products. My take on this is that if anyone is going to use SWOT data in near-real time, they need access to these data before the flood wave has come and gone. For the Mississippi River Basin, this is roughly two weeks.

Guy: Agreed. For the Zambezi River, the travel time is 5 days. If we don't have data sooner, we could only use SWOT data for reanalysis, less so for near real time forecast.

Dai: yes, or we can use SWOT data to improve model parameters by the means of data assimilation or calibration, and then do better forecast with the models.

Guy: That's true. But that takes away from SWOT applications.

Cedric: What do you think would be a good recommended short latency to ensure applications?

Guy: not sure, if we were to use a model to estimate this globally, we might need to go with Dai's.

Dai: we could start looking into this. My guesstimate is that 2 days latency would be valuable to be able to capture those basins such as the Zambezi.

Cedric: We could also develop a map of residence time based on existing slope/width/height datasets along with some computation of wave celerity and current SWOT orbits. This would allow us to put together a first guess, which is infinitely better than nothing.

Guy: I'm not sure people should put great trust in my prior database but there is an estimate of Manning velocity in there.

George: Why not also use gauge observations to compute travel time?

Cedric: Great suggestion. We could use the lagged cross correlation to do that where gauges exist. Perhaps do that for validation of a global dataset.

Cedric: Quick update on the Japan meeting. Aaron, Dai, Hyungjun and I are confirmed. Ed is on the fence. Even if it's only a few of us, we'll do a writing marathon for our joint paper.

Action items

Add Daiki to mailing list (Cedric)

Add analysis tools to GitHub site (Cedric)

Discuss potential for other assessment metrics. For example, show variability of streamflow for river reaches captured by SWOT (sample shown as 10% largest rivers).

Next presentation by Colby on running VIC's routing scheme for our experimental design. Likely mid May.