

Interactive comment on “The Ensemble Framework For Flash Flood Forecasting (EF5) v1.2: Description and Case Study” by Zachary L. Flamig et al.

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GENERAL COMMENTS:

This paper provides a pragmatic look at three models which can provide nation-wide flash flood model guidance in the EF5 framework. While there are certainly theoretical limitations with the modeling approaches, it is commendable that the authors and developers have forged ahead with this approach to make it available to operational forecasters. The description of the modeling framework, parameter estimation, and analysis is an important contribution to the literature. The bulk, high-level results show that additional work is needed to develop recommendations to forecasters on whether

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to rely more on the CREST or SAC models. Additional work to determine where to invest in model enhancements would also be beneficial.

SPECIFIC COMMENTS:

Somewhere there should be mention of the National Water Model and how the EF5 differs (e.g. temporal scale) and thus provides forecast information not available from the NWM.

I have some concern about applying the SAC-SMA model at increasingly smaller grid scales, particularly if the same a-priori parameters are used. I've seen 'good' results from 4 km² and 16 km² gridded SMA applications but there was also considerable improvement from calibration at these scales. There is definitely a scale dependency in the SAC-SMA model (. (Finnerty, B.D., Smith, M.B., Seo, D.-J., Koren, V., Moglen, G.E., 1997. Space-time sensitivity of the Sacramento model to radar-gauge precipitation inputs. *Journal of Hydrology*, Vol. 203, 21-38.). Also, the gridded SAC-SMA implementation assumes baseflow is an independent process by grid cell (no cell-to-cell soil water exchange). This assumption becomes less plausible at smaller grid cells. However, I still think that your application at about a 1 km² scale is still worthy of evaluation in this context.

At the top of p.13 the authors state that the subsurface discharge is routed through linear reservoirs rather than using kinematic wave. That sounds like a reasonable assumption, but I did not see an explanation in the paper as to how the linear reservoir parameters are estimated.

P.14 – Why not derive a grid of PCTIM from the NLCD like you did with the comparable CREST parameter?

p. 19 – I would recommend using Snow17 if this analysis will be redone at any point in the future. The authors note 'As such, results in these regions should be used with caution when frozen precipitation processes are active.' I would not be surprised if ex-

cluding the Snow model also has some impacts on the relative performanc of SAC and CREST in the Northwest, North Central and North Eastern US. Without snow retention, simulated spring runoff could be sharper than what really occurs or there could be winter-time simulated events that don't really occur. Also, not modeling the effects of frozen ground in the North Central US could result in springtime under-simulations of events. Due to structural differences, the CREST and SAC-SMA would likely react relatively differently to changed rain-plus-melt series compared to how they react in your current study. I believe the last version of the HL-RDHM I saw was delivered with a-priori estimates of the major Snow17 parameters and provides guidance on estimating the additional parameters needed for a basic simulation.

TECHNICAL CORRECTIONS:

p2, line 10: 'high resolution forward hydrologic simulation'– take out the word 'forward'

p3, line 26: Add comma 'Given the evidence above,'

p3, line 32: Add comma 'resolution, necessitating'

p4, line 27: 'TRMM, and TMPA. . .'

p4, line 27: "While . . ." This is not a sentence. Could delete "While" or just delete the sentence altogether.

p.5, Delete the sentence "For completeness the base classes for the routing and snow components are included below."

p.5, third from last line, should say '. . .takes fast and slow components. . .'

p6, line 22: I suggest 'followed' rather than 'proceeded'

p6, line 24: is a 'derivative of'

p6, line 26: Wang et al. (2011) documented the first version of CREST. . .

p8, line 12: should be "coarser" instead of "courser"

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p10, line 2: is 'classified' as

p 12, line 3: No need for () around Ponce, 1991

p.22, line 15: Should say "...as model resolutions are increasing the need for validating observations also increases."

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