E-5

MAYNORD

GAINES REPLY TO COMMENTS/REVIEW

Replies Sent 8/28/02

Review of Evaluation Report, 24 August 02, Maynord

1. Title- Change title to "Micromodel Capabilities and Limitations" This is more descriptive of this effort. I can not think of any applications we have added. From my perspective, we have eliminated some. Done, unless Dave has objections. The orignial evaluation called out this name.

2A. Remove Ettema and Smith. Done

2B. At the beginning we need to define similarity as the comparison of model and prototype and similarity criteria as the rules, laws, or parameters that help us achieve good similarity. Noted. I will attempt to address this up front. I also intend to present para. about the process versus mechanics issues.

3. Page 1-4- sentence "Due to .." Suggest saying Numerical models have not provided the river engineer with predictions of the general three-dimensional bed response of the river. Change noted and para. rewritten

4. Page 1-7- "Once MVS successively used ..." Successively seems to be a strange word here. If this word was intended to be successfully, this is a conclusion that is the purpose of this evaluation and must be removed. Word should be successful. Although this is a conclusion, it is not directly part of the current study purpose. The definition of successful stems from improvements noted in the prototype and involves the entire river engineering process (e.g. the design team and implementation of the designs in the field). The evaluation does not encompass looking at the design process. Wording changed to "MVS had claims of success in using"

5. Page 1-8- remove 1st pp of 1.3 This IS a true statement pending, in part, the outcome of the present evaluation. It is not a big deal so will be striken.

6. Page 2-2- 2nd full pp. Remove last two sentences. These do not add anything. Deleted - Dave had similar request

7. Page 2-4- last sentence of page- change physical models to physical sediment models. do not find physical models

8. Page 2-5- last sentence- what is meant by remaining properties? add: properties of Froude number, sediment mobility, Reynolds number, and roughness characteristics

9. Page 2-6- last pp of 2.3- This is a repeat of last pp on Page 2-4. I don't agree with statement that equlibrium approach in MM is like regime theory. Statement here suggests that MM can be thought of under the general scheme of regime theory. The micromodel equilibrium approach is consistent with Blench's suggestion on pg 244 og Graf.

10. Page 2-7- section 2.3.3 seems to overly complicate the division of rational versus empirical and does not add anything. Complicated, maybe, but there is a hybrid between the rational and empirical approaches. Zwamborn is one such example.

11. Sec 2.4 should be a concluding pp of 2.3- noted, change para. to sub sect 2.3.4

12. Sec 2.5 2nd pp page 2-9- "Conditions in ...". I think we are specifically talking about bathymetry in this pp because bathymetry comparisons are the issue. Let's be specific and say bathymetry. Discussion here not limited entirely to bathymetry, because discharge also continually changes which results in changes in Froude number, boundary stresses, etc.

13. Sec 2.5-2nd pp, Next to last sentence on page, somehow we need to convey to the reader that when we omit factors from our model, such as the variations in discharge hydrograph from year to year by using a generic hydrograph, the data appears more variable than if discharge variations are part of the model procedure. Omit sentence "This variability ...". Change to "Even with the

most rigorous sediment model, variability in the prototype bathymetry data causes problems with comparing model and prototype. The problem becomes more acute when parameters that cause variability in the bathymetry are not included in the modeling process. For example, the micromodel does not simulate hydrograph variability that may be~~is a~~ major cause of variability in the prototype bathymetry data." noted wording changed

14. Sec 2.5- last sentence of 2nd pp- This is a conclusion that needs to be located later and supported with data. removed opinion

15. Sec 2.5.2- 1st pp- sentence "Since 1995..." remove word successfully. strike note earlier comment where wording context changed to MVS considered successful

16. Sec 2.5.2- The Davinroy isovel stuff is not basic methodology. This is more appropriately a proponents case study. Will move these sentences

17. 2.5.3- 3rd pp- insert simulates the "banks" of the river, not the bed. correction made

18. 2.5.3.1- 3rd pp- sentence "Modeling clay .." This makes it sound like a routine thing. It appears to me this is only used if the model can not be calibrated with a vertical bank. noted, wording clarified

19. 2.5.3.1- Add sentence stating that the tailgate is a fixed free overfall. Added

20. 2.5.3.2- After "Existing prototype river ...." Explain how structures are initially set when vertical scale and datum are unknown. Done

21. 2.5.3.2- Last sentence- where have you varied sediment size based on the bed material in the stream? There is no set procedure for sizing model sediment. However, some models have utilized a larger or smaller sediment (even a mix of several gradations) depending on past experience with models of a particular river and scale. For instance, the White R. models (Augusta & Clarendon) used a very fine material, the Kate-Aubrey models used a mix of several size materials, the Richardson Ldg. model used a different mix, the New Madrid model used a smaller single size material, ...). Statement has been added to convey this to reader.

22. 2.5.3.3- "Through the use of ....., the hydraulic processes of a river..." Replace "the hydraulic processes..." with "a range of flows can be introduced into the model." Done

23A. 2.5.3.3- "The moving water and sediment ..." I have heard Andy say there are no bedforms in the model. Do we mean bed morphology or bathymetry? change to bed morphology

23B. 2.5.3.3- I thought equilibrium was survey A about equal to Survey B. The equilibrium concept in micromodeling refers to a bed condition that has achieved a stable bed condition - one that does not change appreciably between cycles and that sediment in ~ sediment out over the hydrograph cycle.

24. 2.5.3.4- 4th pp- I thought this was morphological similarity- 4th para is talking about verticale scale

25. 2.5.3.4- 7th pp- last sentence- remove flow and velocity- that is in next pp. ??

26. Sec 2.6- item 1)- 25 inches should be 2.5 inches. Done

27. Sec 2.6- item 10)- "One of the most important ...." This is a conclusion and can be put in proponents section if desired. will be moved

28. Sec 2.7- move stuff from Franco to Comparison report or to proponents section. Franco report effort is presented in similar manner to how the Gaines, Gordon, & Maynord comparison is presented -- except Franco's conclusions are shown here. Franco's conclusions can be moved to an opinion section if desired.

29. Sec 2.7.2- Change first sentence to "Gaines, Gordon, and Maynord (2002) describe comparisons of the verification phase only of thirty previous model study results using

morphology similarity. These comparisons do not address the predictive capability of the models." Change made to specify.

30. Sec 2.7.2- end of 1st pp- where do we provide case study? The comparison report uses the Kate-Aubrey case study to show the methodology. Reference added to GGM(2002).

31. Sec 3.1- 4th pp- "Limits for model ..." The word "allowable" implies that prototype variability somehow gives us a choice. To a certain extent prototype variability does give us a choice -- what Prototype Froude number, slope, discharge(s)… will be used. Granted, the choice may be restricted, but there is some flexibility that results of prototype variability. Prototype variability makes it difficult to define the level of agreement of model and prototype. Change allowable to acceptable -- make dependent somewhat dependent. section rewritten to better convey intended content. If we can not come to some agreement on this issue, we need to omit this pp and put in proponents section. As I stated before there is a big difference between modeling approaches where variation in discharge hydrograph is an input to a model and those where all hydrographs are considered the same. Variability appears much larger in models that do not consider hydrograph variation. Don't understand the last part of this - variability should be less for models without hydrograph variation.

32. Sec 3.1- last pp, last sentence- where is this relationship? Strike

33. Sec 3.2- I feel much of 3.2 should be omitted. I don't object to all of it but I'm not sure what it adds. Individual comments on 3.2 are as follows: Dave doesn't like some of this section either, particularly Ettema's figures. I'll consider omitting some of this, but not all.

a. I think we should reference pertinent conclusions from the ettema report. Conclusions shown in Chapter 5

B. The equations on 3-9 are not used by any of us as far as I can see. Noted, but this section simply defines important variables. Ettema's work and some of my discussions will relate to these variables. That is why they and Ettema's figures are there.

C. The discussion of distortion effects does not address the likelihood that distortion effects are most significant in bends. Feel free to add para on significance. Does your conclusions regarding VXB front model go into this? Statements about equivalency of coal bed slope and vertical scale/shift in the MM do not agree with Pokrefke comments. Strike -- use of rails not consistent with my previous understanding. However, it should be noted that adjustment of the rails to increase depth on lower end of model and to decrease depth on upper end of model (to achieve desired sediment mobility throughout) results in different vertical scales (expressed by the flow depth) being used in the models.

D. I did not follow the pp on "Two parameters..." Noted.

E. The pp on slope distortion, last sentence. This may be true regarding sediment mobility but other distortion effects, such as channel shape, are different. This para talks about sediment mobility. other distortion effects resulting from slope distortion are not part of this para.

F. I did not understand the last two sentences of the last pp of 3.2.2. Strike last 2 sentences

34. Sec 3.2.4- This section presents the 4 categories of study types we are evaluating and the title should reflect that. Under consideratin, current presentation of this being modified.

35. Sec 3.2.4- 3rd sentence needs to be omitted or put in proponents section. Inconsequential - delete

36. The 4 categories I developed reflect first what I perceive to be the study types used in previous MM. The consequence of the model being wrong helps differentiate them but was not the basis on which I developed them. Categories under consideration, current presentation being modified on this section.

37. Omit info on risk analysis. We have not explored this enough as a group. If we keep this in, then the references to "The definition of similarity criteria also depends on prototype variability." (Page 3-22) throughout the report must be placed in the proponents section. If you are not comfortable with risk approach, will delete. However, any reference to consequences of model being wrong will also be deleted. - this is also a risk approach and there is too much disagreement over this issue.

38. Omit last pp of 3.2. deleted

39. Omit scale ratio analysis. Suggestion noted

40. 3.4.2.2- Roughness- How do you conclude that reduced particle density provides some reduction in the requirement to have similarity of roughness? This is stated incorrectly. I will work on rewording this to present correct interpretation. Will provide rewrite tomorrow.

41. Sec 4.1 2nd pp- "The opposing views ..." Change to The opposing views arise primarily from comparison of model and prototype and the extreme deviations in similarity criteria that exist in the MM. change noted, but also included interpretation of model results.

42. Sec 4.1- omit 3rd pp- This does not add anything. Inconsequential -- deleted

43. Sec 4.3- Since this is labeled Proponents Viewpoints and will have to be clearly understood that it only represents their viewpoint, it will be the repository of all things that we can not agree on that the proponents want to say. My list of reasons to limit application of the MM will have at the top of the list- model/prototype comparison. If the proponents want to say that my reasons are similtude criteria, so be it. Noted

44. Sec 5.1 and 5.2- These don't seem like findings. Change title back to Conclusions If worth presenting, this should have been presented earlier. These serve as an introduction to the conclusions. I think it important to include here because most won't ever read much beyond the conclusions and recommendations. This is important here because there will be differing opinions expressed by each of us. Therefore this is not a "traditional" conclusions section where the reader can be lead directly to the specific bullet items.

45. Sec 5.3 Where is ettemas statement about thalweg being fixed? Ettema's conclusions are quoted verbatim. There was no mention of thalweg being fixed in the summary or conclusions chapters in Ettema's Apr 2002 draft.

46. Sec 5.4- I am skipping this until we talk about the proposed table.

47. Sec 6.1 and 6.2- Put protocol and data requirements in an appendix. I see these a recommendations. They are an important part of meeting the general goals (#1) stated in Sect 1.3.

48. Sec 6.3- recommendations:

a. Develop loose bed model with width of 1-3 ft that eliminates extreme distortions in MM This is your opinion. I would suggest use of a model with reduced distortions, particularly Froude, vertical scale and the slope, but would not specify a width.

b. Require correspondence of Q and stage. I would agree that it would be desirable to first have Q related to the Prototype. Stage would also be desirable, but what defines correspondence? Is it having scaled Q by Froude criterion and stage matching prototype or is there flexibility in the Q scale?

C.Omit ripple factor statements. The ripple factor is used by Zwamborn in evaluation of the friction criterion. If we seek to improve friction similarity, why would this need to be omitted?

D. PAGE 6-10-What is native model units? values at model scale without conversion to prototype coordinates using the H and V scales.

E. Next to last pp- Remove additional confidence can be gained. reworded