Hydrol. Earth Syst. Sci. Discuss., 10, C4260–C4269, 2013
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Ambiguities in the classification of Cochin Estuary, West Coast of India" *by* A. Shivaprasad et al.

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Anonymous Referee #1 General comments Comment: (1) This manuscript describes a study which uses a new and comprehensive data set in order to develop a new classification for Cochin Estuary, W-India. In its present state, the manuscript is very difficult to read and the structure requires significant improvement. Hence I recommend careful major revision of the paper. What is primarily missing is a clear introduction of the clear objectives of each section, which methods and data have been used for the analysis and for which reason and how the different investigations are linked. Below I list some suggestions which may help to clarify the structure of the paper (more details: see also specific comments):

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REPLY: Thank you for your critical comments. It is true that major revision of the paper would allow wider reader insight into the prevailing mechanisms in Cochin estuary .We have put in the time and effort needed to make a better paper based on your valuable comments and have resubmitted along the lines suggested. The presentation has been made straightforward and simple. We hope that all these changes made in the light of your comments fulfil the requirements to make the manuscript acceptable for publication in HESS. Comment: (2) Introduction:

- Add summary and discussion of existing nomenclatures for Cochin Estuary and methods they are based on to this section (= most of the content of section 6) - Add more detailed outline about applied methods and data to objectives paragraph (P 3597, L 24 - P 3598, L 1) - P 3597, L 24- P 3598, L 5: This paragraph would be better suited for the abstract than the current one. The content of P 3598, L 1-5 fits better into the conclusions section. For the objective be more specific about the methods that will be presented and in which way they are combined in order to develop a new classification. You can also briefly itemize the different steps that will be presented in the following analysis.

REPLY: Added summary and discussion of existing nomenclatures for Cochin Estuary (= most of the content of section 6).Now the objectives are more specific. Differents steps that presented in the analysis are itemized in the modified version of the manuscript. Comment: (3) Section 2: Rename this section into "Materials and Methods“ section. This can be subdivided into a "data“ section including a description of all data sets and measurement techniques“ (without interpretation) and a "data analyses“ section describing the theory of the statistical approach etc. All interpretation of data should be moved to the results and discussion section. Statistical Analysis: Again: here only describe the pure theory and move all interpretation to the results and discussion section. Also here: make sure that the order of the different steps is well organized.

REPLY: The section is renamed and subdivided. Interpretation of data moved to the

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results and discussion section Statistical Analysis: order of the different steps is well organized.

Comment: (4) Section 6: - Move P 3613, L 21 - P 3614, L 18 to introduction - Add P 3614, L18 – 24 to conclusions The manuscript urgently requires comprehensive language revision. Hence, language Corrections have not been done by the reviewer.

REPLY: The above mentioned changes are made, and incorporated in the new manuscript

Specific comments: Comment: (5) Title of the article: "Ambiguities“ does not really represent the content of the manuscript. Suggestion: "Development of a new classification for Cochin Estuary, West Cost of India“

REPLY: The title is changed to "Development of a new classification for Cochin Estuary, West Cost of India“.It is incorporated in the new manuscript

Comment: (6) P 3596, L 7-8: Be more specific: Summarize briefly which data, methods and analyses have been used.

REPLY: Sentences are dropped and the whole paragraph is rewritten.

Comment: (7) P 3569, L 9-11: Sentences too weak for an abstract. Remove them from the abstract and add a summary of existing nomenclatures to the introduction. This statement also needs to be substantiated in a later section of the paper.

REPLY: Sentences are dropped and the whole paragraph is rewritten.Summary of existing nomenclature is added in this section. The devolopmment of new nomenclature is substantiated later in the section 6 in the new manuscript Comment: (8) P 3596, L 26: suggestion: replace "irrelevant“ by "not applicable“

REPLY: replaced the word "irrelevant“ by "not applicable“ Comment: (9) P 3596, L 7: Please correct reference: Dyer, 1995. REPLY: The reference is added in the reference section Dyer, K.R., 1995. Sediment transport processes in estuaries. In: G.M.E.

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Perillo (ed.). Comment: (10) P 3597, L 8-9: replace "... have a special flavour that is derived from occurece of monsoon and they are referred as ...“ by "... are influenced by monsoon rainfall and, hence, are referred to as ...“ REPLY: As suggested by you, the sentence is restructured Comment: (11) P 3597, L 14: Replace last sentence by "This way, an estuary can be categorized appropriately.“ REPLY: As suggested by you, the sentence is restructured in the new manuscript Comment: (12) P 3597, L 21-23: These two sentences require clarification: What exactly is the "peculiar“behaviour of the estuary, which are the existing names (or better: classifications) for the estuary and what are they based on? Please refer to the relevant literature. I think, a large part of this information is currently provided in section 6. REPLY: As suggested by you, we have completely modified and restructured the introduction part. It is true that large part of this information in section 6 and it is moved to introduction part Comment: (13) P 3597, L 24: suggestion: replace "coin“ by "find“ or "establish“ REPLY: We have found the word “establish” more appropriate and hence is replaced in the new version of the manuscript. Comment: (14) P 3597, L 28: I would classify river runoff as a hydrological factor. REPLY: Yes you are true ,the sentence is modified in the manuscript

Comment: (15) P 3598, L 8-9: Please clarify what is meant by "one of the three Ramsar sites in Kerala (November 2002)“ REPLY: The sentence is modified as per your suggestion Comment: (16) P 3599, L 9: Add one sentence about which kinds of data are used in the complete study (runoff data, temperature and salinity data from transect, CTD and velocity data at 5 stations). Clearly distinguish between the three different data sets. The description as it is now is quite confusing. REPLY: The suggested sentences are added in the beginning of data and methodology section to avoid the confusion Comment: (17)P 3599, L 10: What is meant by "Viz“? REPLY: The word is dropped in the new manuscript Comment: (18) P 3599, L 13: Again: runoff is hydrology REPLY:It is modified as hydrology in the new manuscript Comment: (19) P 3599, L 13-21: This is interpretation and should be moved to the "Results“ section. REPLY: moved to the "Results“ section of new manusript

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Comment: (20) P 3599, L 22: What is the programme "Ecosystem Modelling“? Either explain or remove. REPLY: Sentences are dropped

Comment: (21) P 3600, L 1: As far as I understand, CTD profiles were measured at fixed locations (boat stopped). Hence, remove speed of boat to avoid confusion. REPLY: Removed speed of boat and the sentence is rewritten

Comment: (22) P 3600, L 22: Very weak sentence: What exactly are the objectives of the statistical analysis? Please specify. REPLY: The sentences are modified to mention the exact objective of the statistical analysis Comment: (23) P. 3600, L 25: Here, first the theory for the prediction of the plynomial is required. As far as I understand, the time series analysis (Holt-Winters; Fig. 2b) is required prior to the prediction of the polynomial (Fig. 2a). Please adjust. REPLY: Statistical analyses were done to substantiate the credibility of the runoff data for the year 2008-2009 which is used for the present study. For this purpose, the data of average monthly runoff for 1978-2001 and 1985-1989 was obtained by calculating the arithmetic means of daily runoff data. Utilizing these past sets of data, monthly total runoff for the year 2008-2009 was predicted using the best polynomial fitted for the average monthly runoff of past data sets among a set of different polynomials. Then the river runoff was analyzed for time series components using the two data sets for the periods: 1978 – 2001 and 1985-1989 and to determine the type of variations which influences the river runoff of 2008-2009.We found the current order is appropriate. Comment: (24) P 3601, L 8: The model is called Holt-Winters (please add reference) REPLY: Added the flowing reference and text also modified . Pillai, R.S.N. and Bagavathy, V.: Statistics theory and practice.published by S.chands company Ltd, 868pp,2009. Comment: (25) P 3603, L 7-19: Does this section refer to Fig 2a? REPLY:Yes it refer to figure 2a and we have now mentioned in the text. Comment: (26) P. 3604, L 26, Fig 2b : I do not even see an approximate period of 12 month in the cyclical variation in Fig 2b. REPLY:We accept that because this cyclical variation in the figure 2b gives the cyclical effect of variations other than that explained by the trend effect. This cyclical variation is irregular as obtained in the figure indicating

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that the cycles of period 12 as could be seen in the figure of original data and figure of trend calculated. Comment: (27) P 3605, L 15: Remove sentence. REPLY:Removed the sentence in the modified version of the manuscript Comment: (28) P 3605, L 15-16: This should be Figs 3 and 4. For clarity, I suggest to merge both figures into one continued figure (3 a-l). REPLY: We have found the clarity of the figures to lose by merging. As the figures were clear for the companion paper titled “seasonal stratification in cochin estuary” (HESS), we hope that these will also be of the same clarity if accepted for publication. Comment: (29) P 3605, L 17: I would prefer having ISM spelled out. REPLY: Yes, it is spelled out in new manuscript Comment: (30) P 3605, L 21-23: I suggest to write "...could be attributed to the greater measurement depts at inlet 2.“ since only the measurement point at inlet 1 is at a shallower location. REPLY: We have completely modified and restructured the sentence in the new manuscript Comment: (31) P 3605, L 24: Add sentence: "These conditions remained stable until September 2008 (Fig. 3b-d)“. REPLY: Added the sentence Comment: (32) P 3606, L 8: Remove section number REPLY: The section number is removed. Comment: (33) P 3606, L 9: This should be figure 5 REPLY: Yes you are true; it is figure 5.Modified in the new version

Comment: (34) P 3606, last paragraph: Again: I would prefer having ISM and NEM spelled out. REPLY: According to your suggestions, we have spelled out the following for better understanding. Comment: (35) P 3607, L14-25, Fig 6: Figure 6 only contains values for stations B and E for the dry period. What about the other periods? Please explain. REPLY: The figure 6 was re drawn and attached to the reply Comment: (36) P3608, L 1: The title of the section is somewhat cumbersome and should be related tothe analysis presented, e.g., "Evaluation of runoff dynamics“ REPLY: This sub title is modified, now it is related to the analysis presented in the new manuscript Comment: (37) P 3608, eq 11 and 12: Please define nR and nT . REPLY: It is already defind by Vijith et al., 2009. These parameters follow from the two distinguishing characteristics of runoff into the estuaries. First, the monsoonal estuaries experience total annual runoff that is many times estuarine volume. Second, there is a high “peakiness” or seasonal-

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ity in the runoff. Comment: (38) P 3608, L 16-17: As far as I understand the equation, it implies that the total volume of the estuary is exchanged 42 times/year. However, this does not necessarily mean that it turns fresh that often. REPLY: Yes you are true that the total volume of the estuary is exchanged 42 times/year . We have modified the sentence as per your suggestion. Comment: (39) P 3608, eq 12: This equation is not required as it is not used in Fig. 7. Alternative: Plot nT instead of discharge in Fig 7a. REPLY: We used eq(12) to find out that the steady runoff maintained even during peak dry period in section 3.4.2.Hence it is required. Comment: (40) P 3609, eq 14: TT should be ZT . The definition of nominator and denominator is somewhat cumbersome. Do the authors mean maximum daily runoff devided by mean daily runoff for the sum of all rivers contributing to the estuary. Then one could place the reference to all rivers in the text related to the equation. REPLY: The equation was corrected in the new manuscript. Comment: (41) P 3609, L13-17: Please cite exact numbers. REPLY: Exact numbers are provided in the new manuscript Comment: (42) P 3609, L 19-22: If I understand the figure correctly, the ZR values of Tamar, Delaware and Thames are about an order of magnitude lower. I do not understand the discussion of the standard deviation at this place. Should it not better be the range in ZR? REPLY: Yes you are true. It is better being the range in ZR. Accordingly the text is modified in the new manuscript. Comment: (43) P 3610, L 20: Citation is Ketchum and Rawn (1951). REPLY: Citation is corrected as per your suggestion Comment: (44) P 3619, Table 1: F statistic not discussed in text. Either add discussion or remove from table. REPLY: It is removed from the table. New table is incorporated in the text Comment: (45) P 3620, Fig 1: please mark location of paddy fields in Fig 1a and improve quality of river 1b; indicate two parts (northern arm and southern arm) REPLY: Paddy field is marked figure 1b also improved. Also indicated two parts (northern arm and southern arm) Comment: (46) P 3621, Fig 2: a) caption: please add information on which method the polynomials are based on (reference to text/method); b) caption: what is meant by "spline smoothing“ (not explained in the text); b) please adjust time axis such that years can be separated more easily and the same months/year are indicated. REPLY:

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The methods are explained in the sections 2.1 and 3

Comment: (47) P 3622, 3623, Figs 3, 4: Caption: add that grey shaded area shows the bathymetry of the estuary. Add positions of river sections A-E (required for Fig. 6). Increase font of labels. Figure appears to be squeezed in vertical direction (maybe due to page layout of HESSD) REPLY: Figure appears to be squeezed in vertical direction due to page layout of HESSD. The same figure was clear in companion paper entitled “seasonal stratification in cochin estuary” in HESS. Positions of river sections are given in the top figure. Caption of figures 3 and 4 are modified. Comment: (48) P 3625, Fig 6: Insert Hansen and Rattray classes into figure and add definitions to figure caption. Add legend for shaded area and dashed line. REPLY: Inserted Hansen and Rattray classes in the figure. Comment: (49) P 3626, Fig 7: Figure caption not self explaining: Add captions for 7a, b, c. Adjust font size of figure legends. REPLY: Caption is modified as follows. Fig. 7 a)Mean monthly runoff to monsoonal estuaries(Vijith et al.,2009) b) Positions of each month of Cochin estuary on the (ZR, ZT) plane. c)comparison of ZR of major estuaries in the world with Cochin estuary Comment: (50) P 3627, Fig 8: Add y-axis label REPLY:It is not required.y-axis label.x-axis shows ratios of Kunsteady to Ksteady calculated as shown in equation (7) Comment: (51) P 3628, Fig 9: Increase fonts in graphs. Caption: What ist meant by "average“ salinity variations? This in not explained in the related section. REPLY: It is depth averaged mean salinity from the CTD profiles over a tidal cycle.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/10/C4260/2013/hessd-10-C4260-2013-supplement.pdf

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 3595, 2013.

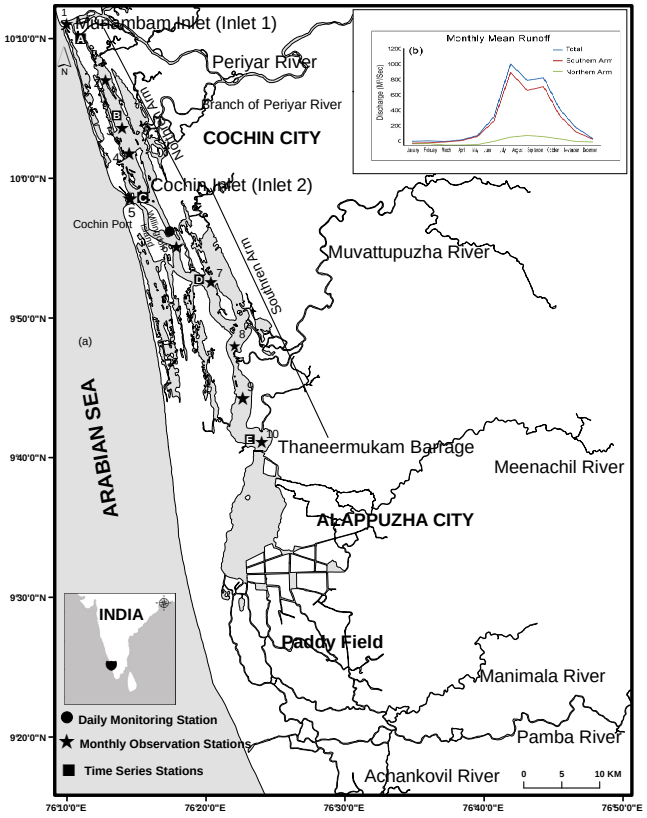

Fig. 1.

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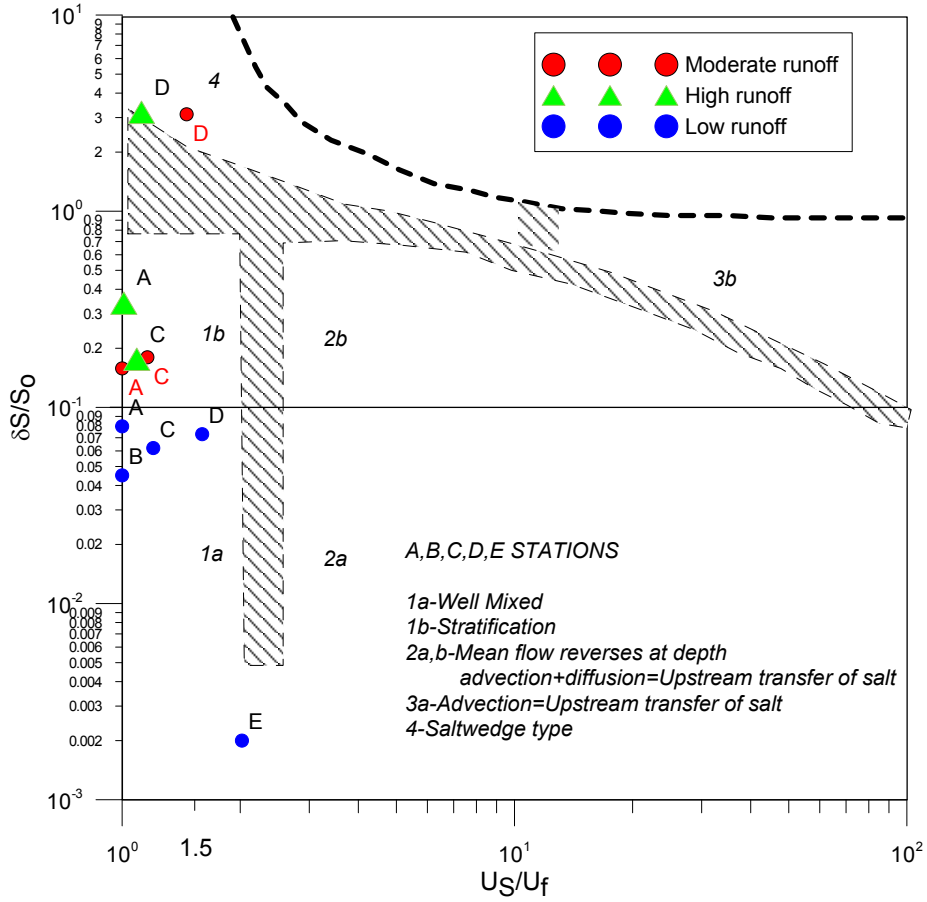

Fig. 2.

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