

Interactive comment on “Improving confidence in deep drainage estimates, for arid and semi-arid areas using multiple linear regression with percent clay content and rainfall” by D. L. Wohling et al.

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Reply to reviewers comments for “Improving confidence in deep drainage estimates, for arid and semi-arid areas using multiple linear regression with percent clay content and rainfall” Wohling et al., Hydrol. Earth Syst. Sci. Discuss., 8, 4535–4557, 2011.

Interactive comment on “Improving confidence in deep drainage estimates, for arid and semi-arid areas using multiple linear regression with percent clay content and rainfall” by D. L. Wohling et al.

Anonymous Referee #2 Received and published: 17 November 2011

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1 General comments The paper aims to develop a generic relationship between drainage and annual average rainfall and average clay content of soil for two major vegetation types (annual, perennial) in Australia, and therefore addresses a relevant scientific question within the scope of HESS. The study is based on a database of field observations and previous research from across Australia. The authors determine the statistical significance of drainage relationships, the best metric of clay content regarding to soil depth, and provide uncertainty estimates by using multiple linear regression. The novel part of this study is to use both rainfall and clay content as predictors for drainage. The authors conclude that annual average rainfall and the clay content of the top 2m of soil are statistically significant predictors of drainage. This is well supported by the results and applied methods.

I recommend the paper for publication after minor revisions. I provide supplementary material, which includes some specific comments and technical corrections. Please consider those comments as suggestion provided by a reader who has limited experience in the field of deep drainage / ground water recharge. I avoided to make comments on issues already given by Cuan Petheram, since the authors already revised their paper according to their comments given in HESSD.

Specific comments The title appears a bit bumpy and is quite long. Possible suggestions: (1) Revising drainage-clay-rainfall relationships for Australia. (2) Drainage estimates for (semi)arid landscapes using clay content and rainfall.

Reply: Title changed to closely align with Reviewer 2's 2nd suggestion

Page 4536, Line 1 Why? This sentence sounds very direct and implies that the reader has a very strong background in water resource management. Given the shortness of the abstract, could the authors spend two more sentences to derive this statement?

Reply: The authors believe that the likely (intended) audience would have an understanding of use drainage within a groundwater resource context, and therefore wish to keep the sentence.

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Page 4536, Line 14 Should be written in present tense, because it refers to previously established knowledge

Reply: The authors deem the use of past tense to be suitable for the description of previous work.

Page 4538, Line 29 with in

Reply: This sentence had been amended following Reviewer 1 comments, i.e. within had been removed.

Page 4539, Line 11 Wasn't mentioned as an issue in the paragraphs above, and therefore, it is hard to understand what 'metric' refers to. Later in the paper it becomes clear that it refers to the depth averaging of the clay content.

Reply: Agree, added a sentence into the introduction

Page 4539, Line 14 '... of previous studies' OR 'Literature review on data collation' Otherwise it implies that the authors collected data solely by themselves.

Reply: Agree, changed to 'Data collation of previous studies'

Page 4542, Line 18 I assume, HESS uses a dot instead of x for multiplication sign

Reply: Replaced x with '.'

Page 4542, Line 20 The results section could provide the two equations for annual and trees/perennial vegetation, respectively, derived from MLR and given in table 1 and 2. For readers who quickly browse the paper targeting those statistical/empirical relationships it would be much easier to find them.

Reply: The authors disagree as we would prefer that by reading the paper thoroughly, the readers have a greater understanding of the method used to derive the relationship. The authors considered putting the two relationships in the abstract, but decided it was better suited to a table. The table also highlights the 95% prediction intervals which we

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believe are as important as the derived relationship.

Page 4543, Line 20 Is the word 'low' missing?

Reply: Agree, 'low' added following Reviewer 1 comments

Page 4544, Line 21-26 This hasn't been mentioned in the Introduction but would certainly be helpful to understand the 'best clay metric of the clay content' at page 4539, ln 11.

Reply: Agree, see earlier comment for Page 4539, Line 11

Page 4546, Line 5 'percent'

Reply: Changed from % to percent.

Page 4546, Line 10 '... i.e. percent clay content is elevated.' Could also a reference be provided?

Reply: Changed and reference added.

Page 4546, Line 14-16 A bit more discussion on the applicability of the derived relationships at landscapes with cracking soils such as those occurring in the Brigalow Belt in Central Queensland and Northern New South Wales would be helpful.

Reply: Data from the regions mentioned have been used to derive the relationships provided. If further information on cracking clays compared to non-cracking clays was available, then we would be in a position to provide comment.

Page 4547, Line 22-27 Split it into two sentences.

Reply: Changed to two sentences

Page 4547, Line 27 & Page 4548, Line 1 In my opinion this sentence better fits into the Discussion section.

Reply: It is the opinion of the authors that the sentence needs to be included in the

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conclusion as it sets up the following sentence.

Page 4548, Line 2 Isn't it just the clay content rather than the whole soil texture (including sand and silt contents as well which would be particularly important for soils with low clay content)?

Reply: Soil texture changed to percent clay content

Page 4553, Table 2 10³, ...

Reply: All data in table 2 has been checked and corrected.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 4535, 2011.

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