Hydrology and Earth System Sciences Discussions

Interactive Comment

Interactive comment on "Modelling groundwater-dependent vegetation patterns using ensemble learning" *by* J. Peters et al.

J. Peters et al.

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Interactive comment on 'Modelling groundwater-dependent vegetation patterns using ensemble learning'; by J. Peters et al.

Anonymous Referee #1

Received and published: 18 December 2007

In this paper, the authors investigated the applicability of the random forest model to explore the distribution of vegetation along an hydrological gradient. Groundwater, soil and management variables have been employed in the model. After an accurate analysis, the authors conclude that the model show to perform well vegetation patterns, although the accuracy is low for boundary areas.

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General comments: This topic is of great interest, in the last few years has been receiving considerable attention also by other similar journals. The vegetation patterns could even change profoundly under climate change scenarios, thus the applicability of these models could raise of importance. The manuscript is clear and well written, the English appropriate. The authors show a deep knowledge of the Modelling and variables data set are well incorporated in the model. I see no flaws in this study, thus I recommend to accept the paper.

However, although the model provides interesting results, its application in hydro-climatological and hydro-ecological modeling remains still potential, due to its limited model capacity to capture gradients that include different vegetation types with different ecological performance typical of more complex ecosystems.

REPLY: We fully agree, the random forest model (like most other distribution modeling techniques) is empirical and thus limited in applicability. Nevertheless, the authors do believe that the random forest model has potential to be trained and applied to more complex ecosystems.

Specific comments: Page 3690-3691. The paper shows some weakness in Methods. For example the vegetation description is poor, many information are missing and this is crucial as vegetation is the main subject in this paper:

a) mean height, density, mean diameter, age, leaf are index etc.

REPLY: These physiological variables have not been measured since the goal of this study was to model vegetation type distributions based on abiotical environmental variables. We agree that additional information would add value to the vegetation description, but even a literature check did not result in appropriate data.

b) further, not always the reader has a deep botanical knowledge, Latin names are not sufficient, so provide also the common names, at least of main species representing the seven vegetation types.

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REPLY: Table 1 now includes the English names of some characteristic plant species of the seven different vegetation types.

c) are plants herbaceous, trees, bushes, shrubs? Define the different groups vegetating in the experimental site.

REPLY: All vegetation types consist of herbaceous species, with the exception of Carici elongetae - Alnetum glutinosae, where a tree layer of Alnus glutinosa (L.) Gaertn. (Common Alder) is present. Additions (page 3690, line 21) are made to the text to clarify this.

Page 3690, lines 11-12. References are too many. Two are sufficient.

REPLY: Two references are kept (De Becker et al. (1999) and Joris and Feyen (2003)). Two references are deleted: De Becker and Huybrechts 2000 because it is written in Dutch and not easily accessible, and Bio et al. 2002 because it is not focused on the Doode Bemde exclusively.

Page 3690, lines 16-17. Mapping was restricted to a selection of 56 species; Which criteria did you use for selection? (i.e. number of plants, percentage of species etc.). How many species did you have in all in your experimental site?

REPLY: The Doode Bemde is a nature reserve in the valley of the river Dijle. Together with several other nature reserves along the course of the Dijle, the Doode Bemde has a long history of conservation and protection. Monitoring work of the flora of these reserves allowed for the identification of the groundwater-dependent (or phreatophytic) species growing in these ecosystems. Since the main interest is exactly this phreatophitic flora, all phreatophytes known to appear in the area (45 species in total) were included in the species mapping. The 11 additional species are species known to be characteristic non-phreatophytes in the area. During the years, monitoring of the flora resulted in a total of 442 different higher plant species and 91 moss species that occurred at least once at the Doode Bemde (source: De Becker and De Smedt (Tech-

nical report D/1994/4.181/1)). This relatively high number was an extra reason to use a synoptic plant species table to make a systematic inventory feasible.

Page 3691, line 11. Which kind of piezometer did you use?

REPLY: standpipe piezometers are used.

Figure 4. In legend of x axis: something is wrong with brackets direction.

REPLY: Brackets indicate whether value is included in or excluded from the interval. For example [0.1,0.2[is an interval comprising values ranging from 0.1 to 0.2. The value 0.2 itself, however, is not included (where the value of 0.1 is). These intervals assure no double inclusion of any probability value in any of the intervals.

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