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Biogeosciences
Discussions

Interactive comment on "Origin of the Hawaiian rainforest ecosystem and its evolution in long-term primary succession" *by* D. Mueller-Dombois and H. J. Boehmer

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Critic point 1: "Whole sections might have just one citation" Our answer: Yes, we certainly can add more, but why? Explanation: Yes, we did not emphasize more citations, because our article is based on a new 2013 book OHIA LEHUA RAINFOREST now available via Amazon.com. In that book is Appendix C pp.239-264, which contains an annotated bibliography of the Research History from 1964-2013. We can add citations from that. But let us know where you feel additional references are needed, or where you think we should have added references you think we forgot to include. We can also add the above explanation to the introduction.

Critic point 2: "I would also encourage authors to consider earthquakes as possible cause for cohort senescence." Our answer: A good point. But we have considered earthquakes already during our field research, also discussed the point with volcanologist Jack Lockwood, and found no correlation. Still, we have left that point open. See in our new book, page 130 in the block statement summarizing the cohort senescence theory under symbol p= environmental perturbations (droughts, floods, and vibrations of substrate from seismic activity). After we found no correlation to any epicenter of earthquakes from 1965-1995, we left it open and instead concentrated on climatic perturbations as a hypothesis (see page 133 in our new book). Seismic vibrations may still be involved in the dieback syndrome, but it takes a new serious study with a good hypothesis to find evidence for it.

Critic point 3: Abstract should give an overview to the goals of the paper Our answer: We can start the abstract with an initial sentence as follows: This paper addresses the question of transition stages in the Hawaiian rainforest ecosystem with emphasis on their initial developments. (Then continue as written with): Born among volcanoes. . .etc.

Critic point 4: Referee 2 likes to see an introductory statement emphasizing why the topic of Origin & Evolution is important. And what the purpose of the paper is. Our answer: This is an invited paper addressing the issue of transition stages in ecosystems. Referee 2 may not have noted the theme or the topic of this special issue. Referee 2s point is now addressed with a new introductory sentence. See critic point 3 above. (Or even a modification of title as Referee 1 suggested)

Critic point 5: Better description of terms suggested such as Hawaiian Rainforest Life Zone. Our answer: Hawaiian RF Life zone is not a good term. It is a climatic concept of Holdridge, which does not apply here. The term Life Zone would also apply to areas in rainforest climate converted to pastures, plantations of exotic species, housing areas etc., and that is not the case here.

Critic point 6: “HI Heritage GAP mapping identified many types of rainforest” Our answer: Yes, that is correct. But rainforest typology is not the issue here. Certainly, ecology is a science that can deal with different perspectives and scales. Comment: As an example, when Peter Vitousek writes about Hawai‘i as a model ecosystem, nobody asks: how can you treat Hawai‘i as one ecosystem? There are many ecosystems, e.g. rainforest, dry forest, alpine, lowland, etc.

Critic point 7: “How can Juvenile and Advanced be used back to back to describe the same forest?” Our answer: You are right. The Juvenile forest is in a different nearby location on a younger substrate than the Advanced forest, which grows on older substrate in close neighborhood. There are two different forest segments, but they are members of the same rainforest.

Critic point 8: “How can the fern seal off the lava?” Our answer: Perhaps, we should use a better term, such as ..the fern covers the lava..(as illustrated by photo 3)

Critic point 9: Climatic perturbations. “Not sure the following.. During the first 50 yrs this second analysis showed 2/9=22”%. Yes, correct. There are two extreme events marked by asterisks out of the 9 drought years on Fig. 1.

Critic point 10: Cibotium tree-fern stage “There is little that is typical about this early stage Hawaiian histosol from soil science perspective” Our answer: But we disagree. Look up definition of Histosol Online giving 16 inches (40 cm) organic overlay for histosol (e.g. Olaa Forest Tract); Citation: Burton, P.J. & Mueller-Dombois, D. 1984 can be added here.

Critic point 11: Ohia can live to many hundreds of years possibly the earth‘s oldest living angiosperm: “What is meant by Hawai‘i lacks late successional species?” Our answer: Age of tree does not define what a late-successional tree is. The term late–successional refers to trees that enter the process of succession by their shade-tolerance and than later overtop the early successional trees. Such trees have unfortunately be introduced to Hawai‘i, but there were no such trees in the native Hawaiian

flora. (See explanations of terminology in our new Ohia Lehua Rainforest book ‘A Climax Forest vs. Old-Growth Forests‘ p.13/14 vs. Succession p. 95. We need to cite that book here again.)

Critic point 12: “I am not a big fan of the word ‘killer‘ and its repeated use in this paper” Our answer: Regarding the term ‘killer disease‘ we are just citing a term that was commonly used in the public discussion (e.g. in newspaper articles) on Ohia dieback during the 1970′s and 1980′s. We now use that term ‘killer tree‘ to clarify the effect of the introduced trees that overtop Ohia lehua, i.e. our native Hawaiian pioneer tree, now growing in some successional situations where that sort of thing is going on. We can use another term such as ‘alien tree with the floristic potential to grow taller and thereby shading-out‘ native Ohia trees. But we thought that even scientists would like catchy terms sometimes, because such terms are easier to remember.

Critic point 13: Soil and geomorphic aging. Referee 2 wants citation for first paragragh. Here it is: Mueller-Dombois, D. 2006. Long-term rain forest succession and landscape change in Hawai‘i: The ‘Maui Forest Trouble‘ revisited. Journal of Vegetation Science 17:685-692.

Critic point 14: About the recently introduced alien rust fungus Puccinia psidii. Referee 2 is expressing worry. ‘So far, I am aware of no evidence that rust affects guava, so this is an odd statement‘ says Referee 2. Note guava is Psidium guajava & P. cattleianum) Our answer: We share Referee 2s sentiment, but we don‘t want to overblow it. We merely say that the spread of Puccinia psidii to strawberry guava could be a victory for conservation management in Hawai‘i. We did not state that the rust affects guava. So far it did not.

Critic point 15: Referee 2 says our conclusion that Ohia will not be eliminated from Hawai‘i seems a bit naïve. Yes, perhaps. Our answer: But our statement is actually more qualified saying that Ohia will not be eliminated as long as volcanism is part of the Hawaiian geology. Comment: A bit of optimism here does not hurt in view of the

generally voiced pessimism [including that of Referee 2] about the future of the native Hawaiian rainforest. If we understand its ecology, we can do a lot by taking action in form of appropriate silvicultural measures.

Finally, a small point: Referee 2 remarks under Epilogue 2nd paragragh use of preadapted twice. Let‘s use it once only: Tree species pre-adapted to Hawai‘i. . ..Falcataria moluccana and Casuarina equisetifolia became quickly established on Hawai‘i‘s new volcanic habitats in the lowlands.

Interactive comment on Biogeosciences Discuss., 10, 2415, 2013.