Biogeosciences Discuss., 10, C1085–C1089, 2013
www.biogeosciences-discuss.net/10/C1085/2013/

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

Anonymous Referee #2

Received and published: 19 April 2013

I've completed my second review of "Origin of the Hawaiian rainforest ecosystem and its evolution in long-term primary succession" and have found the MS to be a solid review and synthesis of several decades of research on Hawaii's most important ecosystem system and most important tree species. This paper should be of broad interest to past and present students and scholars of the Hawaiian Rain Forest, and to the readership of Biogeosciences. My biggest concern with the paper is that much of the content and many key ideas do not come with citations. Whole sections might have just one citation. Some sections have no citations. As a result, the reader cannot easily distinguish opinions based on scientific evidence, on casual observation or on speculation. I would also encourage the authors to consider earthquakes as a possible additional

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

cause for cohort senescence. In my experience, senescence can happen in various aged stands – with both young and old trees going through die back. On Hawaii Island, but on other islands as well, we can get fairly severe earthquakes that would certainly affect the root systems of these trees. Because ohia is very sensitive to root damage, I can well imagine the periodic quakes could cause larger dieback events – especially closest to the epicenter where the earthquake would be strongest or in areas of greatest shifting of soil/rock. Below, I also have provided detailed comments that I think will improve the readability of the paper and the quality of the synthesized science.

ABSTRACT. I enjoyed the overview, but feel that the abstract could give an overview to the goals of the paper, rather than simply launching into the paper and assuming the reader will figure it out. I would disagree that the structure of the Hawaiian Rainforest is simple. While this may be the case during early stages of primary succession, the structure of forests with 80

1 Origin and evolution of Hawaii's rainforest

This section should be proceeded by an introductory statement on why the topic is important, what the purpose of the paper is, and what objectives will be addressed by the paper. What would also be valuable is better description of terms – especially "the Hawaiian Rain Forest" as Life Zone and HI Heritage GAP mapping identify many types of rainforest across Hawaii.

Section 1 (or Section 2 Origin and evolution of Hawaii's rainforest), provides a nice overview, but statements regarding Hawaiian Rainforests ancient origin and the fast arrival (4 yr) of seed plants are missing citations. Also it is unclear what is meant by natural invasion taking many millennia – if the Islands are millions of years old, I would assume that natural invasions took place across that period.

2 Early primary succession

The single statement here "Three distinct transition stages in early rainforest succes-

BGD

10, C1085–C1089, 2013

sion can be recognized" could be enhanced to provide a stronger overview of the following Section 2 subsections.

2.1 Stereocaulon lichen stage

Why so-called kipuka. In Hawaii, they are indeed called kipuka. The first paragraph makes many statements but there are no citations. If this reflects new research, then methods should be provided. Again, what Hawaiian rainforests are talking about here? All primary succession? I don't see much of the listed species at lower elevations of Puna.

2.2 Dicranopteris fern stage

How can Juvenile and Advanced be used back to back to describe the same forest? What do these terms mean? How can the fern "seal off" the lava? Citations are light here.

2.3 Cibotium tree-fern stage

The following statement is conjecture as data shows that canopy trees provide the majority of litter to the ground – not tree ferns. "The organic overlay gains in depth largely due to wilted tree fern fronds being added."

There is little that is typical about this early stage Hawaiian histosol from a soil science perspective. It would be good to clearly define what is meant here. There are no citations for this section.

3 Cohort forest structure

Is the simple nature of Hawaiian succession after disturbance different from other primary or secondary succession forests? What is the point here. And which Hawaiian rain forest is being discussed? The images for Fig 4-6 show one type but hardly all types of Hawaiian Rainforests. Ohia can life to many hundreds of years – possibly the earths oldest living angiosperm – so what is meant by the statement that Hawaii lacks

BGD

10, C1085–C1089, 2013

a late successional species? Even koa can live a very long time, and other species of pritchardia and pisonia are rain forest dominants that are long-lived and late successional.

Again, no citations in this section.

4 Canopy dieback

I am not a big fan of the word “killer” and its repeated use in the paper. Maybe for a general audience magazine, but not a journal.

Sections 5 to 8 would seem to be something to group under the same heading of stand dynamics.

6 Climatic perturbations

Not sure the following is actually saying: “During the first 50 yr this second analysis showed 2/9=22

9 Soil and geomorphic aging

Citations for the first paragraph?

10 State transitions in the Hawaiian rainforest ecosystem

This section appears to largely repeat earlier content, and also lacks citations. I’m not clear what is meant by state transitions, and if repeating earlier content, why not describe disturbance / sensence as causing transitions. The final set of numbered points along the succession sequence seems to be a bit of a conclusion. Would be nice to link the numbers/stages to soil ages for a given climate.

11 Epilogue

Pre-adapted twice in the same paragraph. Guava is a serious gap filling invader across wet areas of all Hawaiian islands. Ohia rust may be having a major impact on seedling survivorship – some species (M . polymorpha) show genotypic variation, but seedlings

BGD

10, C1085–C1089, 2013

Interactive Comment

of other ohia species show complete susceptibility.

So far, I am aware of no evidence that the rust affects guava, so this is an odd statement. Conversely, the conclusion that Ohia will not be eliminated from Hawaii seems a bit naïve given that tests of ohia in Brazil show more virulent strains of the rust could be more severe – possibly wiping out ohia from Hawaii.

Not sure if I understand the following statement: That implies also that state transitions in ecosystems cannot be easily predicted. Nevertheless, they can be identified after they have occurred and thus provide knowledge for future expectancies. Seems after such a sweeping review/synthesis, the final words should be more compelling.

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