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Interactive comment on "Microbial and metabolic profiling reveal strong influence of water table and land-use patterns on classification of degraded tropical peatlands" *by* S. Mishra et al.

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General comments

This is an interesting study on an area of critical concern in the context of land degradation, biodiversity loss and greenhouse gas emissions. While molecular (DNA) profiling has been extensively used, it is useful to see metabolic profiling used in parallel so as to judge their relative utility. It would have been very informative to have had comparative sites within the indigenous peat swamp forest. The nMDS patterns are presented rather repeatedly and the number could be reduced. I was surprised that pH was not included among the "geochemical data"; pH has often been shown to have a major in-

fluence on microbial community structure. Possibly "dissolved inorganic carbon" could be a surrogate for pH.

Specific comments

P14011 L16 "Bacterial and metabolic profiles. . .most diverse" – this was shown for the 16S rDNA data (Table 1) but not for the metabolic profiles.

P14012 LL2-4 This description really applies to coastal tropical peatlands. In other regions peatlands are often found in mountainous terrain, not inundated but sustained by high rainfall.

P14013 LL3-4 It is not clear what the difference is between "forest biomass" and "biomass".

P14013 L14 I would say "In most ecosystems".

P14013 L19ff The logic here needs changing, e.g. "While geochemical conditions affect microbial communities, they, in turn, affect their environment. Therefore, it is important to study microbial community composition".

P14015 L17ff Unfortunately these 5 classes do not map onto the 5 land-uses mentioned earlier, which is a bit confusing. It seems you have split the industrial plantation into two but missed out the pristine forest. It is a real pity that pristine forest was not included in the sampling; it would have enabled you to judge how far the microbiology had moved from the original land-use in all the various subsequent land-uses.

P14016 L5 Muriate of Potash is Potassium chloride, so something is wrong here. Also I am surprised that having applied NPK, a further K source is added. In the oil palm plantations, rock phosphate is the common source of P. These details should be checked.

P14021 L1As far as I can see in Figure 2B, the degraded land symbols (downward pointing triangles) are all within the oxic zone grouping.

P14021 L3ff There are no indicators of variability on the indices in Table 1 so it is

difficult to judge whether these differences are significant or not.

P14023 L13 It is perhaps surprising to see a large influence of nitrate in the anoxic zones. Normally we might expect nitrate to disappear rapidly in zones already depleted of oxygen. The actual levels of nitrate are not given but any comment? Perhaps, as Fig. 2 indicates, the "anoxic" zones are not truly anoxic.

P14024 L5 It needs to be recognised here and elsewhere in the discussion (L23) that the metabolic profiling does not look exclusively at bacterial metabolites. Some can equally come from fungi and other microbes. In fact, do we know the relative importance of bacteria and fungi in these soils?

P14025 L11 Tropical peatlands are wetlands themselves so you need to be more specific about the ones referred to here.

P14027 L10ff To be fair, you only looked at the oil palm plantations and settlement sites; Stenotrophomonas sp. may well have been found elsewhere. One conclusion could be that the monoculture of oil palm is good in that it sponsors this organism, but I don't think you are trying to say that. Perhaps you need to refer back to Table 1.

P14039 Fig. 2. It is not clear what "n" is – the number of pairs or the total number? Also, it is not fully explained why so many of the BWT points are found within the AWT grouping (in addition to those in the low water subgroup).

P14040 Fig 3(B) The legend states "from above (oxic zones) and below (anoxic zones)" but in the figure itself it only mentions the former. There a discrepancy here; is something missing? Where are the anoxic points?

P14042 Fig. 5 I am not convinced that 5A needs to be given. It is essentially a repeat of what has already been given in Fig. 2B except it shows only the anoxic zone values and gives a mirror image (which is immaterial). What is slightly curious is that the relative position of the arrowed point has changed somewhat; I am not sure how that is explained. I would recommend only presenting 5B (with the flooded site arrowed

and possibly indicating those oil palm sites that are not really anoxic also). P14023 LL20-22 then needs to be deleted. It is less than convincing that the TRF patterns are separated on the basis of "habitat" while the metabolic profiles are separated on the basis of land-use. The separation of the flooded site is only one case.

Figure S1 There seems to be a discrepancy between the points (13) enclosed as Low water table dominated group here and those (8) labelled as Low water table in Fig 3B (all Medium peat depth). Figure 2B similarly has only 8 values in the oxic low water table group. Which is correct?

Figure S2 I am a bit confused here. You give values for LWT anoxic zones in B). However, from the methods, and reflected in Table 3, for the LWT sites you sampled above the water table at 20-30cm and 50 cm, both above the water table at 80 cm and hence both oxic. It is not clear which sites and depths were sampled. Also it would be useful to emphasize in the legend that these results refer to the settlements (HWT) and oil palm (LWT) sites only.

Table S1 (Also in Fig. 4) We have significance values given for "all" canonical axes. However, is this correct? As I understand it significance values are assigned to each canonical axes and the significance of canonical axis 2 would be less than that of canonical axis 1.

Technical corrections P14012 L6 Replace "world's" with "the world's". P14012 L8 Replace "tropical" with "the tropical". P14012 L11 Replace "deeper" with "a deeper". P14012 L17 Replace "decrease" with "decreases". Also delete "in many cases" (in every case where the water table has been reduced, some peat will be newly exposed to oxidation). P14013 L22ff Delete "Hence," since the choice of molecular profiling, as such, does not follow from the preceding argument. I'm not sure that the following list of references is all that helpful; there are whole journals devoted to molecular profiling. P14014 L17 Replace "microbial" with "molecular". P14014 L20 Replace "molecular" with "microbial". P14014 L24 Sometimes you use "settlements" and sometimes "set-

tlement"; it would be good to be consistent. P14014 L26 Replace "influences" with "the influence of". P14014 L28 Replace "in" with "in the". Replace "of the" with "of". P14015 L11 Replace "from" with "from the". P14016 L10 Replace "transect" with "a transect". Replace "location" with "locations". P14016 L14 Replace "OX-N" with "an OX-N". P14016 L23 Replace "ZR" with "a ZR". P14017 L2 Replace "at" with "at the". P14017 L3 Replace "and" with "and the". P14017 L5 Replace "of" with "at". P14017 L6 Replace "at" with "for". P14017 L9 Replace "instructins" with "instructions". P14017 L21 Replace "gram" with "grams". P14018 L2 Replace "ion" with "an ion". P14018 L10 Replace "with" with "with an". P14019 L10 Replace "using" with "using a". P14019 L23 Clarify that this was for Settlements only. P14020 L6 Replace "MEGA 5" with "MEGA5". P14020 L9 Replace "Vector" with "the vector". P14020 L11 Replace "301" with "302"? P14020 L13 Replace "Genbank" with "GenBank". P14023 L15 Replace "a major" with "some". Not convincing from the length of the sodium and chloride arrows that "a major influence" is warranted. P14024 L16 Replace "scale" with "scales". P14025 L24 Replace "depth" with "depths". P14025 L28 Replace "sequester" with "dissipate". Nitrogen is lost from the system, not gained. P14026 L9 Delete "agricultural soil" P14026 L11 Replace "utility" with "role". P14026 L17 Replace "peat" with "the peat". P14026 L21 Replace "loss" with "loss from tropical peatlands". P14027 L5 Replace "burnt" with "burning". P14029 L19 In the text you use 2a and 2b while the figures have 2A and 2B (Same for Figs 3 and 4). P14040 Fig. 3. The format should follow the other figures, i.e. B) should be larger and on the right of A). Some colour in B) might be helpful. P14041 Fig. 4. The colour of the oil palm plantations appears to have changed; can it be the same as that in Fig. 2? Where it states "Environmental and geochemical data", strictly these are all geochemical data; there aren't any environmental data. P14042 Fig. 5. The meaning of the arrow should be indicated here in the legend. Figure S1 Replace "New age of drainage (<10 years)" with "Drainage <10 years". Replace "Old age of drainage (>10 years)" with "Drainage >10 years". The original expressions are a little strange. See also Table 3 and legend to Fig 1.

Interactive comment on Biogeosciences Discuss., 10, 14009, 2013.