This paper investigates the sensitivity of tropical vegetation to rainfall variations. This is a critical subject that has implication regarding the impact of futur climatic changes in the region. As such this paper deserves attention. I. Ssemmanda et al compare downcore pollen data from lake Chibwera with information on modern pollen extracted from top core sediment collected from different lakes in the region.
Their results are discussed with respect of lake levels variations. They conclude that « historical rainfall variation (or variability) are exerting relatively modest effects on local tree cover, mostly the abundance of *Acacia* and *Ficus* ».

I found the subject of this paper new and of real interest. The use of pollen data to address the question is also well appropriate. In Uganda, preserved natural vegetation (forests reserves) and numerous lakes allow the investigation of past vegetation changes for the last few hundred years. Some other available pollen records from the tropics are documenting the historical period, but at lower resolution. Therefore this attempt is certainly valuable.

The high resolution pollen study of a ca 250 yrs core is exceptional for Africa and certainly deserves publication. This pollen study is part of a wider multidisciplinary project that aims to address the impact of the 18th century drought (end of LIA?) across equatorial East Africa. This core has been studied in previous publications (Gelorini et al.; Bessems et al; Vershuren et al.) that also discuss its dating.

In order to interpret the vegetation response to rainfall variations, the author provides modern pollen rain data from top cores collected from different lakes in the region. This is a useful methodological approach for the interpretation of fossil pollen data.

From the point of view of a pollen specialist, the study is correctly done, and publication justified.

However addressing the sensitivity of tropical vegetation to rainfall is a very difficult issue. In fact there are two distinct questions treated in this paper. I would like them to be more clearly expressed:

1) **Methodological question**:

How pollen sedimentation from lakes surrounded by different ecosystems reflect modern vegetation determined by climatic conditions (or in equilibrium with..), here mainly rainfall amount and distribution. In the 1970s and 80 many studies addressed this difficult issue. Although the authors do not seem to know this litterature (impact of pollen recycling, of lake size, lake depth, lake vegetation catchment etc…), I consider useful the presentation of the results on modern pollen from the 8 lakes presented in fig. 3. But I would request complementary information to be added:

- information on the method of collecting such modern samples: top core? or other method? How many years are averaged by such modern samples.
- add a table of the list of modern samples (10 with Chibwera) including geographical coordinates, elevation, and mean annual rainfall at each location if different.
- Show their location on a good geographical map with topography.

Although I know the Lake George area, I do not understand the presentation of the modern samples. I am confused with the description of vegetation types. When dealing with modern samples, I think that the description of the vegetation should be

related to description by botanists or ecologists, and the term "biome" reserved for modelling vegetation. Fig. 3 is presented according to vegetation types, but it is not clear if these vegetation types reflect a climatic gradient linked to the altitudinal gradient of the Rift escarpment, to different rainfall, or to human impact such as for lake Kanyamukali. I agree that the pollen assemblages show significant changes reflecting changes of tree cover densities according to surrounding vegetation. Can you clarify the causes of these changes by a clearer presentation of the modern context. I do not understand how description p 1681 (l 1-20) relate to the forest/grassland gradient of fig 3. It does not correspond to the definition of an ecotone. (I suggest to avoid this word which has a specific botanical definition).
Graph fig3: in order to make the pollen changes clearer, I would add a separate synthetic graph showing total Arboreal Pollen AP versus non arboreal and aquatic pollen.
I am surprised to see no Cyperaceae in fig.3 Can you explain why they are not present around the lakes today ?
In East Africa *Euclea* is a common component of evergreen bushland rather than of savanna.
I have not seen the adjective "pristine" used by botanists ???. you mean "not obviously disturbed". You should be more precise about the terminology and nomenclature of botanical terms. Use wooded savannah and not woodland savanna. Plant functional types definitions are not relevant here.
p1685, explain how the names of the forests mentioned here relate to the lakes listed in fig 3. I do not understand the top of this page and discussion on *Eucalyptus.* The greatest pollen % is shown in lake Kanyamukali, a normal figure regarding abundant cultivated land surrounding that lake. What do you mean by the sentence "highlights mosaic distribution…"
Is the ref Duffin and Bunting really appropriate? There are trees which produce a lot of pollen? And trees from SAfr are not the same as the species in Uganda.
Grass pollen may come from savanna grasses and also from local grasses growing on beach or flat shore surrounding the lakes. This should be mentioned, and perhaps discussed regarding the occurrence of flat or steep shores.
Avoid expressions such as "calibration sites" not appropriate here, replace "elevated percentages" by higher or significant. Try to be consistent or add a value to these adjectives since 10% is not high. What is a "robust appearance", a robust presence, solid occurrences, (these are not scientific precise terms), an "erratic distribution"? etc… p 1686 mention of plant functional types and biomes are out of subject here. It would have been interesting to investigate a comparison of modern pollen rain data with modern lacustrine pollen data collected in the same area or in the same vegetation type.

2) Interpretation of the historical Chibwera pollen sequence

The pollen data is correct. Fig 4 should be clearer by avoiding exaggerations of the *Acalypha, Phoenix, Euclea* and sedges curves. Use green color for these trees and blue for Cyperaceae. The vegetation changes are strongly expressed. But if the authors would like to make them clearer, I would suggest to present an additional synthetic diagram including the total AP , and showing the significant changes of the selected pollen markers discussed in the text. Among these are the markers of the regional vegetation *Celtis, Alchornea, Macaranga* as discussed in previous modern pollen rain studies from

soil samples in Uganda, markers of the local vegetation fluctuating according to lake level changes such as *Phoenix*, possibly or partly Chenopodiaceae, and markers of human impact.
In the abstract you said : "strong apparent expansion of true forest trees during wet episodes can be explained partly by enhanced pollen influx via upland streams". But nothing was said in the presentation of the geographical context showing a stream input. I understood that lake Chibwera is mostly related to the big lake George ground water aquifer? Are there any sedimentological analysis supporting such statement? The deposition rate of the sediment is fairly high? Any explanation for it? How far is the escarpment?. A topographic profile showing the situation of the lake versus the escarpment and forest location would be useful to discuss this point.

Mostly, I agree with the interpretation of the pollen diagram in wet versus dry phases. The local vegetation has changed in response to drying of the lake or fluctuating water levels. But the forest composition also show significant changes. There is replacement in the regional tree taxa as well as varying in their significant proportions. Stream input can change the proportion but not the taxonomical changes. Taxa such as for example in *Celtis, Allophyllus, Myrica* indicate significant variations in humidity coefficient, and most probably rainfall amount (see publications on pollen /meteorological data transfert function and results in Bonnefille, Chalie 2000 using a large calibration data set of 400 modern soil samples from East Africa).

Fig 2b is not appropriate and not discussed in the text. Instead it would be more useful to present the grass or arboreal curve of Chibwera core versus lake Victoria level changes or versus precipitation values for the studied area available for this historical period.

In conclusion, local and regional vegetation changes are well documented by the historical pollen record of lake Chibwera presented in this paper. If these changes are in phase with those documented from other proxies (Gelorini 2012), and with lake levels such as for lake Victoria, and with pollen record from other regions, then they reflect changes in climatic conditions already documented elsewhere (such as the good record from Lebamba in Gabon). The interest of this paper is to document such changes on a well dated sequence. Human impact is observed only from the last decades.

3) Missing points

By analysing a core at a decade resolution one should be aware that changes in the pollen content may reflect differential pollen production rather than vegetation changes, although the two may occur on the long term. This point should be raised.
It is said that 33 samples had been collected for pollen analysis but only 25 are plotted in fig.4 diagram at 5cm interval. Are the others sterile? Allowing the high sedimentation rate, each sample may represent pollen deposition over one year ? Anoxic condition may explain good preservation, and the shallow water the fact that there was no recycling of the pollen content inside bottom sediment.

Regarding the peat layer, how do you explain formation of the peat? Is organic composition, C/N of similar values as those as published from known peatbog from Central Africa (Bonnefille 1995). I have never observed formation of peatbog today in equatorial Africa at 900 m elevation. Is it organic clay or real peat? Was the soil acidic?

Page 1693: comparison between fig 2 and fig 4 is not obvious and should be more explained. From fig 3 the author could have extracted either a curve of AP or grasses that could be used as a rough proxy for rainfall variations or drought. It is not a "calibration", it is only a rough estimate. But if this works then the same curve for the fossil pollen record can be plotted versus the reconstructed lake Victoria level curve and showing sensitivity of the vegetation to a moisture index (not rainfall variation).

4) Figures

Fig 1 is poor and not informative

Even for someone knowing the area, I find very difficult to locate and understand the position of modern lakes samples according to the distribution of modern potential vegetation. There should be a better vegetation map done by botanists. All localities names listed in the text should be placed on this map and these only.

Introduction is too long and not focused to the subject, with points that should be moved to the discussion part

The tittle is not explicit: in the text, you qualified the present vegetation surrounding lake Chibwera as a woodland bushland transition. It is not a savanna, nor a grassland-forest ecotone, and you do not discuss historical rainfall variations. Some suggestions:

"Sensitivity of an *Acacia* bushland vegetation to historical climatic variation" or "Lake Chibwera 200 yrs pollen record" .

In conclusion: publish after modifications and redaction improved by more precision in the use of botanical and palynological concepts and words. Age model and raw pollen data should be provided as supplementary tables.