First, we would like to give our sincere thanks to Rolf Kilian, whose comments and suggestions helped to improve the manuscript significantly! Most of the comments, which he made directly to the manuscript in an attached pdf version, appeared clear to us and were worked in.

1. *"The abstract should be shortened and partly re-written. I have given some suggestions in a pdf version. The introduction chapter can be also improved and I gave also several suggestions for modification of in the PDF version."*

We shortened and re-wrote the abstract and the introduction as suggested.

2. *"The authors use very often the term "high resolution" throughout the manuscript. But what does this really mean with respect to time resolution of single proxies. This should be clarified."…*

The pollen proxy allows a time resolution at decadal to centennial level. XRF analyses (scanned at 2mm-steps) go down to sub-decadal level. We integrated this information to the abstract (as suggested by the reviewer) and to chapter 4.1.

…"Along the nearly 10 ka record only the periods between 5.2 to 3.6 ka and from 1.8 to 0.5 Ka (mainly the peat bearing sections) are precisely dated. The other poorly dated core sections are dominated by clastic sediments. From these core sections fifteen 14C ages have been removed with the argumentation that these ages represent reworked probably older organic material. It is possible to identify an reworked origin of his organic material or it is just a suggestion, because they appear within clastic sediment sections? However, the modelled ages are just interpolating the clastic sediment sections which are probably controlled by pronounced precipitation events. Some of these layers seems to be various centimeter thick and could have been deposited in hours to few days during flodd events. This could have produced abrupt changes in the sedimentation rates. In the lowermost core section there have been removed the 14C ages at around 5.9 and 7.6 ka from the age model, probably because they do fit not well into the interpolated curve. Or are there other reasons? I suggest a careful discussion of the type and role of the clastic sediment layers with respect to the interpolated sedimentation rates which gives the model ages for the core."

Rapid deposition and incision during the youngest part of the late Holocene are a frequently-observed feature in high-Andean valleys (LeBaron et al., 1979; Kulemeyer, 2005; Schittek, 2014). This highly variable period might have led to an increased geomorphodynamical activity. In combination with increased land-use pressure by the local population, this could result in a severe degradation and re-organization of high-Andean environments. At CLP, nearly 4m of sediment were deposited during the last 500 years. We described the effects of vegetation and soil degradation within the catchment of CLP, which led to rapid deposition and to the incision of the lower part of the peatland, in Schittek et al. (2012). A more detailed description of geomorphodynamical processes will be presented in the frame of the PhD thesis of MF.

A good indicator of re-worked material is the continuous presence of sand grains in samples analysed for macrofossils (Schittek; unpublished results). For macrofossil analyses, we investigated samples every 10cm and included the counting of sand grains within the 250µm fraction. The abundance of sand grains in the upper part of the core is significantly higher and more continuous than in any other part further down (excluding the alluvial event layers). A further indicator is the low abundance of *in situ*-macrofossils like the remains of chironomids and heleomycids in the upper core section.

Because of the difficulties we had with the upper core section (last 0.5 ka), we widely excluded it from the paleoenvironmental discussion. In the future, we will present short cores from undisturbed peat accumulations in the surroundings of CLP, which cover the last 0.5 ka.

Concerning the lower core section (5.9-7.6 ka), we believe that this is a continuous sediment accumulation. We compared the section with the time-corresponding section of a new, well-dated peat core from NW Argentina and found close similarities in the Si-, Ti-, As- and Mn/Fe-XRF-measured values. This will be published in the future and the CLP record is an important basis for further discussion. Macrofossil analyses within this section at CLP suggest an *in situ*-peatland vegetation dominated by *Plantago* and *Oxychloe,* which is typical for pioneer communities on wet sites influenced by frequent allochthonous sediment input. We discussed the interplay of peat accumulation and allochthonous sediment input and the resulting peatland stratigraphy in detail in Schittek et al. (2012). Unfortunately, we cannot offer a better age control on the lower section. Nonetheless, the data will serve for comparison with future investigations of that period in the area.

3. Peat decomposition can produce a strong relative enrichment of the metal concentrations in a peat. This aspect is not well discussed with respect to e.g. As, Fe enrichment in the profile. It is mentioned that the As peaks appeared during relatively dry periods when the fixation of As to organic matter can be enhanced. On the other hand it is well known (e.g. Biester et al. 2003 in EnST) that peat decomposition rates can increase strongly during drier periods which will cause also lower C/N ratios. How far are the peat sections with high As concentration related with low C/N ratios? Furthermore, As, Fe or other redox-sensitive metals can be transported by percolating water into the peat where it can be precipitated or fixed to organic matter (depending on the redox conditions) at different levels within the peat, but not necessarily at the surface of the peat. Therefore, the ages *discussed for peaks of such elements within the profile has to be considered with care.*

We think that we mentioned very well the role of natural organic matter (NOM) for the retention and release processes and cited relevant literature, which describes similar findings. Unfortunately, there is still little known about As dynamics in naturally-As-enriched peatland ecosystems, especially concerning Andean peats. We present our data to stimulate further research on that topic.

Langner et al. (2012) mentioned that an enhanced As mobility during dry periods may be attributed to the fixation of dissolved NOM, concurrent to a higher humification degree of the peat. The results of the humification and CNS measurements of the CLP core and their relationship with As peaks will be published in the future. C/N ratios generally lower during drier periods, but N% is influenced by allochthonous input and should be taken with care. C% values (see Schittek et al., 2012) offer a more precise result and clearly show lower percentages during As peaks. A more detailed understanding of As retention and release processes can only be acquired by further contemporary geochemical and hydrological investigations and long-term observations at the site.

Concerning the transport of redox-sensitive metals by percolating water into deeper peat layers, we do not think that this would have happened to depths >50cm. An undisturbed cushion peatland is extremely well-protected by the cushion plants and the peat keeps water like a sponge. A significant lowering of the water-table would result from incision and the formation of deep gullies which drain the peat deposits. The core was taken from a section, which is permanently saturated and not influenced by the drainage of the gully. Further, diurnal freeze-thaw processes contribute to the saturation of the near-surface layers during daytime thaw (Schittek et al., 2012).

4. The general and over-regional climatic influences concerning the investigated site are well discussed. However, this region has a pronounced seasonal rain period. The clastic sedimentation seems to be controlled be strong precipitation events (besides general changes in the plant cover of surrounding hills). This more seasonal aspects of climate perturbations, their causes and relationship to atmospheric circulations should be better addressed in a revised version.

Once again, we point to Schittek et al., 2012: "The Cerro Llamoca sequence represents an exemplary record of long-term trajectories between periods of landscape stability and transitional phases of landscape destabilization. The long-time accumulation of peat represents periods of relative landscape stability under a presumably more humid and balanced climate regime with less-marked seasonal droughts. These prevailing conditions would sustain a dense grassland vegetation cover on the surrounding mountain slopes, which slows down overland water runoff downslope, promotes soil accumulation and keeps soil in place (Fig. 10a). Consequently, the expansion of the alluvial fan and overall allochthonous sediment input from the slopes were reduced.” We decided to add a comment on the effect of seasonality to the manuscript, where suggested by the referee.

5. The figures should be improved as suggested below, taken in mind that they have to be reduced in size. Often links to the figures are missing in the text. please check this.

Figures were improved as follows. Where appropriate, we linked the figures within the text.

Fig. 1: It would be better to move 1B and 1C to the left of 1A and then to change the labeling of 1B to 1A and 1A to 1 B. The reason is that the overview map is usually first referenced in the text. In 1 A the city names of LIMA, Ica, Arequipa Nazca and Arica are given within the dark colored areas. They can be moved into the lighter colored areas. “Arica” is plotted on the border line. All text in this figure is in relatively small font size (with exception of the distance scale). Lake Titicaca should be labeled beside the lake. It is sufficient to give the latitudes and longitudes only on one side of the figure 1 C. The labeling within this figure is to small! 1D: There could be given some elevations in this figure so that the morphology can be better estimated. In the Figure legend it should be mentioned that this photo is a “South to north view “, I guess that it is.

Order and indication were changed as suggested. Where possible, we took all the referee´s suggestions into account and improved the figure caption.

Fig 2: The age scale has marks each 400 years which means that 1000, 3000, 5000 years are not marked on this scale by marks. It is not labeled that this are calibrated years. In the lower left corner of the figure the “C” of “14C” has a rare font type.

We changed the marks to a 500 year interval; 1000, 3000, …, 7000, 9000 are indicated by a larger bar but not downwritten. The “C” of “14C” now has the same font type.

Fig. 3: The font size of the Ages and Depth at the vertical bar are too small. All font sizes are at the lower limit. It could be easier to read the graphics if either peat or the siliciclastic sections are marked with horizontal grey bares.

We enlarged the font sizes and corrected font types where necessary. Grey bars were included.

Fig. 4: Again most font sizes of text and numbers are to small!! There is given a "%" in the lowermost part of the figure. Is this wt.% or vol.%?

We enlarged the font sizes of text and numbers. Pollen results are given as percent of all counted pollen – not as wt.% or vol.%, therefore we kept %.

Fig. 5: Again most font sizes are too small and the text and numbers cannot be identified! It should be mentioned in the legend what does the vertical yellow underlying bars mean.

We enlarged the font sizes of text and numbers and improved the figure caption.