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To the editor, Mrs. Keely Mills,
To the reviewers, Mr. Jef Vandenberghe
And to an anonymous reviewer

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Response to reviewer and editor comments

Thank you very much indeed for thoroughly reviewing our contribution on sediment transport processes across the Tibetan Plateau. We are glad to read that both reviewers acknowledged the quality of the study. In the revised version of the manuscript, we considered all technical issues raised by the reviewers and tried to improve the overall readability of the manuscript.
Concerning the individual specific comments, we first would like to answer to the **scientific points of Jef Vandenberghe**: "Is it not possible that the secondary modes that often appear in different end-member distribution curves are deviations that are due to the calculation method of transferring laser diffraction patterns into grain-size distribution patterns (Fraunhofer), applied in the instrument?"
Reply: The secondary modes that appear in different end-member loadings are due to numerical reasons (e.g., due to the orthogonality constraint in the method and computer-related truncations) and not related to the Fraunhofer method. We used artificial grain size distribution with single modes and mixed them randomly. EMMA was able to exactly replicate the mode position but always introduced the secondary modes below the major modes (Dietze, E. and Dietze, M., in prep.). We applied the Fraunhofer model because it transfers laser diffraction patterns adequately into grain size distributions for the dominating sand and silt fractions. Hence, no secondary peaks are to be expected as result of this method in these grain size classes. To better understand a potential introduction of secondary peaks in the clay fractions independent of EMMA we would further need to estimate the optical properties of the individual sample to apply the Mie theory. Therefore, we need to know the mineralogical composition of the samples, which we do not know so far.
"Is it possible that your finest clay end-member (c. 1.7 µm) is a remote, very fine dust fall-out, next to your hypothesis of a fluvial reworked pedogenic weathered clay?"
Reply: In the revised version, we now included the interpretation of the finest clay end-member as being related to dust fall-out, although we do not think that this singularity plays an important role (see Chap. 5.4).
Concerning the **general comments of reviewer #2**: In the revised version we now hope to make much clearer that we are focusing on the common pattern in lacustrine grain size distributions across space and time. These patterns are related to common or at least

similar patterns in sediment transport processes that contribute to the dominant sedimentation on the high-elevated Tibetan Plateau. These can be linked to the regional atmospheric circulation patterns in general and to the new wind-shear data. However, we agree that atmospheric circulation and sediment transport processes are not stationary in space and time and many further factors than the ones discussed affect the relationships between grain size end-members and sediment transport processes. This is discussed in the limitation and conclusion chapter.
For a better understanding, we added some further details on the respective lake-catchment configurations that help to answer some of the technical queries. However, in order to study the specific local effects on the local grain size end-member distributions, e.g., steepness of the catchments, bedrock, weathering and soil properties, much more specific investigations of the large catchments and a different, more comprehensive research strategies would be needed. From this study we can just attribute special deviations from the mean pattern to be a result of local conditions. Common characteristics of the different catchments and regional climatic differences can be used to relate these to properties of Tibetan sedimentation processes that are typical for this landscape.
Changes of different contributions of the individual sediment transport processes in time (i.e., end-member scores) are not the focus of this paper and will rather be integrated and studied in greater detail in future multi-proxy palaeoenvironmental reconstructions.
Replies to some more specific comments of reviewer #2:
“Have you made any effort to run EMMA across sub-sections of the particle size data?”
Reply: For sub-sections of the cores, EMMA still yielded similar end-member modes if at least 30 samples were included. This was demonstrated by the two Taro Co cores and their combination. Hence, we included all of the available samples of a certain lake system to get statistically more robust results that can later be interpreted in time.
“The paper would also benefit substantially from a more comprehensive abstract. In its present form, the abstract fails to mention that contemporary wind shear stress data are included in the manuscript or indeed what is the purpose of these data.” … “Line 5: This is out of my knowledge area but is 10 m a standard height for taking wind measurements? This does not seem applicable to the generation of wind-driven currents and re-suspension. Line 7: Why the interval 2001-2011?”
We did not extend the abstract because we consider it already as being very long. However, the atmospheric data used to relate the observed sediment distributions to actual wind conditions is now mentioned in the abstract as requested and its purpose is more detailed in several sections of the revised version. To our knowledge this is the first study where actual wind-shear processes are discussed on the Tibetan Plateau, and we hope to provide new ideas for more detailed quantitative analyses in the future. The wind-speed data obtained from HAR is given at 10m above ground because this is the standard height for atmospheric model output. It is also the standard height for wind measurement at WMO compliant weather stations (WMO, 2008). Wind speed increases rapidly with height, especially over rough surfaces. Therefore the quantity we used to discuss aeolian transports is the wind shear velocity (or friction velocity) U^*, which is a surface quantity also provided by HAR and is representative of the average boundary conditions at each grid point.
Concerning the **technical comments of reviewer #2**, we changed all suggested corrections and addressed most of the technical queries directly in the text. On some comments we are answering below:
“I feel this section should be expanded slightly (2 - 3 sentences) to include stating the coring devices used at each lake as they do differ in terms of sediment recovery and clarifying the pre-treatment methods used. Also, what interval was used when sub-sampling the sediment cores?” … “how can you be sure your stratigraphic correlations between cores were of similar accuracy to your sub-sampling intervals?”

Reply: We now describe the pre-treatments in more detail, but we did not add the coring devices since information has already been published (Donggi Cona and Nam Co, Opitz et al., 2012; Kasper et al., 2012; see Tab. 2) for some of the cores and will soon be published for the remaining ones. Despite the importance of the comparison of different end-member contributions in time together with other proxy records, we assume that details on coring devices, sampling intervals and stratigraphic correlation between cores are not relevant for the interpretation of the grain size end-member loadings that are studied here (for the robustness of EMMA the number of samples that were used is much more important, see Tab. 3).
"Line 13: Were standardizations employed or the consistency of measurements tested between the two different Coulter machines?"
Reply: No, we did not test the specific consistency, because we assume that the two machines are comparable enough for our purpose. The measurement bias between the older LS 200 Beckman Coulter particle size analyser and the newer LS 13320 is negligible for the grain size classes between 400 nm and 2 mm as they have the same detector configuration. Only when applying the new PIDS technology (which is not implemented in Jena) some bias in the relative contributions will occur because finest classes would be measured more accurately (J. Stucki, Beckman Coulter Germany, pers. communication).
"I am not entirely clear where the contribution values have been derived from. Figure 4 is lacking units on the y-axis so perhaps this could be clarified further?"
Reply: The contributions represent the means of the explained variances of the end-members and rather refer to the end-member scores than to the loadings. Although we added units to Fig. 4 for completeness, the contributions cannot be derived from them as all the EM loadings are scaled to sum up to 100 Vol.-% to make them similar to normal grain size distributions (cf., Dietze et al., 2012). The individual explained variances of each end-member can be inferred from the legend in Fig. 2b as is referenced in the text. The individual variances were averaged for EMs with similar meaning.

Best regards,
Elisabeth Dietze

Additional reference not mentioned in the manuscript:
WMO, 2008: Guide to Meteorological Instruments and Methods of Observation, World Meteorological Organization Report WMO-No.8, 2008, available at:
http://www.wmo.int/pages/prog/gcos/documents/gruanmanuals/CIMO/CIMO_Guide-7th_Edition-2008.pdf