We would like to thank the anonymous referee for his/her careful review of the manuscript and for providing these comments and suggestions to which we respond in detail below.

Reviewer's comment	**Reply**
Over the past two decades, there has been an impressive amount of research on ENSO activity in the Eastern Pacific and its impact on precipitation in the arid western coast of South America. These studies by e.g. Takahashi and Martinez (2019), Carréric et al. (2020) have related ENSO regimes with SST anomalies in the tropical Pacific Ocean, and proposed two new indices to describe the ENSO regimes: the "E and C index". Given the strong focus of the study by Foucher et al. on sedimentation rates-sources and ENSO regimes, a revision of the introduction is necessary to account for recent findings on ENSO events. The use of one index (i.e. "E index") instead of the two indices ("E and C") merits to be clarified and eventually revised. When revising the manuscript, it is recommended to use internationally agreed abbreviations for specific ENSO events like "extreme El Niño events" or "eastern Pacific ENSO" instead of introducing new abbreviations like EENE, CENE (L55-60).	If we have the opportunity to revise this manuscript, we will detail the use of E and C indices in the introduction and we will homogenize the document in order to meet the international standards. In this manuscript, it was likely more appropriate to focus on the C index, which is strongly correlated with precipitation in the Piura-Catamayo region. This choice will be further detailed in the revised version.
The arid western coast of Peru has been home to agriculture-based societies for several millennia, and they have profoundly modified the landscape. There exist several studies on legacy sediments, for example, in the Chicama Valley that showed how farmers adapted the local environment through e.g. irrigation and farming infrastructure (see e.g. Caramanica, 2022). In the study, Foucher et al. highlight "management phase…soil disturbance which may exacerbate the transport of sediment to lower river sections… (L65-66)", but it is not clear if they refer to recent farming activities or also account for legacy of historical occupations.	Although historical management may have consequences on current sediment connectivity, we refer mainly to contemporary management modes in the current research. These recent mechanization developments and modern farming operations are responsible for the accelerated sediment transfer and the increased connectivity observed in the current research. Nevertheless, we found the Reviewer comment very valuable and we will introduce this concept of historical occupation when revising the introduction.
In the manuscript, the authors refer to the "sedimentary cascade", "sediment sources", 'sediment dynamics', "soil and water resources' and 'accelerated soil erosion". The authors intermix these terms in the introduction, without clear demarcation of the study. It is therefore not clear if they will "…estimating…sedimentation rates…sediment sources…" (L82-83) or if they will analyse "…the sedimentary cascade… (L85). The study by	We thank the Reviewer for pointing out the comprehension difficulties related to the use of these different terms. We will take this remark into account to homogenize the terminology if we have the opportunity to submit a revised version of the manuscript.

Mettier et al. (2009) on sediment sources in the region might be useful, as it contains several illustrations of the channel systems.	
the Catamayo-Chira basins are probably amongst the ones that are most studied in the region. The current description of the study area is very much focused on the land cover map of 2016, and some qualitative statements on recent deforestation. Please have a look at Oñate-Valdivieso (2010) for a quantitative assessment of land cover change, Arteaga-Marín (2022) for soil erosion estimates and Morera et al. (2017) and Rosas et al. (2023) for an overview of spatial variation in sediment yields along western Andes.	We thank the Reviewer for these suggestions of additional references. We will incorporate them in the revised version of the manuscript.
This concerns the sampling procedure. For example, it is not entirely clear where the sediment core was taken (with respect to the sediment body in the reservoir), and how representative the core was for deriving reservoir sedimentation rates. What about reworking/remobilisation of sediments in the reservoir? Also, the source sampling is not clearly described. It is unclear where the samples were taken with respect to geology, land cover, and topography. Also, why did the authors target soil samples when the material that is transported in the stream is also sourced from deeper via deep-seated landsliding, bank erosion and gullies?	The core was collected in the deltaic part of the reservoir (for technical reasons) but also to record more directly the deposits associated with floods. We do not extrapolate these results to the entire reservoir but we use instead the bathymetric data collected annually to estimate the filling rates of the reservoir. These specific aspects will be further explained in the revised version of the manuscript. For the sampling of sediment sources we have not given sufficient detail, as also pointed out by Reviewer 2. We will add this information in the revised version. Indeed, the source samples were collected according to the geology of the catchment (two main units), which itself controls the vegetation. Dry forest develops on sedimentary rocks while wet forest/grasslands/agriculture are found on the Andean volcanic rocks. The aim here was not to distinguish the surface and sub-surface sources of sediment but instead to identify the main geological source. Samples were collected in areas exposed to surface erosion without visible landside or deep gully erosion process.
The rationale behind the establishment of the core chronology is not clear. By directly correlating core characteristics with ENSO variability for the age-depth model, the study already imposes a relationship between sediment characteristics and ENSO events, and hence sedimentation rates. The FRN data are not helpful as independent control, but the uncertainty on the age-depth model should be reported and accordingly discussed as this has an impact on the following results.	Since this sedimentary record is depleted in fallout radionuclides (such as potential sediment source samples; the measured values will be provided in the revised version), we had to find an alternative method to date this core. We understand the reviewer's concern about the occurrence of a potential bias in the dating and will discuss this further into details in the revised version. Although this age model is not perfect, we were able to validate it through the identification of

	sediment deposits associated with extreme events since 1982. The periods of high sediment accumulation in the core correspond to those periods identified by the bathymetric surveys, an independent method of validation.
the variability in sedimentation rates and sediment sourcing are interpreted in terms of climate and land use change. The link between climate variability and sedimentation rates and sources is somehow difficult to assess in the current version of the manuscript because of the lack of an independent age control on the core. Therefore, an uncertainty analysis might be useful. Also, land use is cited to be triggering sediment transport in the lower part of the basin, mainly as a result of agricultural activities and deforestation. It would be useful to link these observations with land use change maps or data, to verify the extent and the location of the land use changes. Although previous studies have shown how land use can accelerate soil erosion in the tropical Andes, it is not yet clear how this impact is noticeable at larger spatial scales (see e.g. Vanacker et al., 2022 or Tote et al., 2011).	We believe that a way to independently validate the age model is to compare the sediment core results with the bathymetric data (Fig. 2). The EENE or ENE events, especially those of 1982, 1997 and 2016, are well correlated both in the sedimentary archive and in the volume of sediment accumulated in the reservoir, estimated by bathymetric surveys. We thank the reviewer for his advice to add a map or data to support our message on land cover changes. This is a very good suggestion that we will take it into account in the revision of the manuscript.
Abstract: The abstract contains a number of specific terms that would need to be introduced and defined beforehand. This concerns – for example – the definition of « extreme el nino events » or « coastal el nino events » or « C and E index ». Also, please check if the use of abbreviations is necessary, and not overloading the text. Please check the language and writing style of the document, particularly the use of capitals for nouns like « Volcanic (L97) », « Economically Active Population (L103) » etc.	We thank the reviewer for this valuable comment. We will take it into account when revising the manuscript.
L1-3 : title sounds very dramatic « … threaten soil and water resources through hyper sedimentation ». Can you rephrase into a more objective statement, for example, indicating how much sedimentation rates increased during these events ?	This title is indeed dramatic, but in our opinion, it describes the situation quite well. Soil erosion is so extensive in the study area that soils/sediment are depleted in fallout radionuclides (which leads to problems for drawing an independent age model as the reviewer pointed out). After each El Niño event, farmers have to move thousands of m3 of soil to be able to cultivate again in the vicinity the river systems (the soil being transported away to the reservoir after flood events).

	The reservoir, one of the largest in the region, is vital for flood control during El Niño events, irrigation and for supplying food commodities, and this is threatened by this hyper-sedimentation (at the scale of the next two decades). If the Reviewer and Editor agree, we would like to keep this title.
Technical corrections	We thank the reviewer for highlighting multiple points for improvement in the manuscript. We find the comments in the "technical correction" section justified. We will take them individually into account if we have the opportunity to submit a revised version of our manuscript.