This manuscript evaluates the change in the Quelccaya Ice Cap from 1985 to 2023, using satellite imagery. The year-to-year changes are described, and an evaluation is conducted as to the change in strong El Niño years. The analysis is interesting, particularly the discussion of the snow covered area rebound time after El Niño events.

Some clarification is needed before publication, particularly on the definition of El Niño years and some of the statistical analysis. Detailed comments are provided below.

Comments

Full manuscript: Could the authors clarify which El Niño years are chosen for which parts of the analysis in this manuscript, and why? The authors focus on the 1997-1998, 2015-2016 and 2023 events for much of the manuscript, but use more years for figure 5, for example. Some graphs (e.g. S4) are unclear in which ENSO years are used.

Line 86 and Table S1: The authors have picked the closest cloud-free images to September 1st in order to calculate the area of the ice cap accurately, however these images vary from June to October. Can the authors comment on the effect of this difference on their results?

Line 96: 1999 was a strong La Niña year, not an El Niño year (as the authors note in line 261). 2017 was a neutral year. Can the authors clarify the dates of the 16 and 18 images collected, and what the ONI index was for the rolling three month period covering those dates?

Line 126: Could the authors expand on the difference between the manual calculation of ELA and the automated calculation? Is the 3 % in this instance 3 % of the elevation above sea level? If so, this would be greater than the change in ELA between 1985 and 2022 that the authors calculate on line 143, and may require further consideration.

Line 142-146: The authors have calculated the loss of TA and SCA based on the first and last years of data only. Especially for SCA, the year-to-year variation is relatively high. I would suggest the authors calculate the loss through the average loss (which would then match with the loss calculated through linear regression), or take the average of the first few and last few years. This comment also holds for figure 2.

Line 154: Could the authors clarify why they have removed El Niño years to calculate the trend in AAR, but not comparative La Niña years? The analysis shown in figure S4, which clearly shows the difference between El Niño, La Niña and neutral years, may be more appropriate to determining the effects of El Niño events on the AAR.

Figure 5: The x-axis seems to be misaligned in this plot. For example, the lowest SCA occurred in 1998, along with the El Niño year. Both of these are plotted covering the tick mark for 1999.

Line 163: I agree with the other reviewer comment that it is necessary to apply a simple bias-correction to the ERA5 temperature, to account for the difference in elevation between the QIC and the ERA5 elevation, in order to determine the percentage of days above the freezing level height. I would also suggest that the authors' findings of an increase of 1.24 degrees in the dry season over 37 years is somewhat greater than the 0.1 degree/decade in the quoted references.

Line 187 and figures 2 and 3: These figures might be easier to interpret if they were plotted the total SCA in each elevation bin, rather than the percentage. For example, in figure 3 (lower), the

percentage of SCA in 2015 and 2017 is similar at low elevations, suggesting the SCA may be similar in both years, but they vary considerably at higher elevations. Total SCA would then match better with the text stating the change in SCA is 70% of its 2015 value.

Line 253: Lagos et al., 2008 record higher than average precipitation during El Niño events along the northern coast, but a mixed response in the Amazon and the Andes (including around the QIC).

Line 263: Could the authors explain how they have calculated the drop in correlation from 1998 to 2016? Are these correlations based on the yearly measurements and yearly ONI? If so, how is the correlation calculated for a single year? Similarly, how are the regressions calculated in line 266 (and what are the multiple variables used?).

Line 265 and 297: the authors state that anthropogenic warming is overwhelming natural climatic signals, but in this manuscript, the most severe El Niño effects seem larger than the overall reduction from anthropogenic warming (e.g. figure 5, 1998/1999)

Minor suggestions

Line 9: I would suggest rephrasing the first sentence to "Tropical glaciers in the central Andes are vital water resources….". As it stands, water resources are mentioned twice.

Line 30: Please defined what the modern rate is of (retreat, volume loss etc).

Line 30: 'further evidence of the QIC …' what's this further evidence of, is it retreat?

Line 32: 'since 7000 years ago' -> 'in the last 7000 years'

Line 42: 'southern wet outer tropics' 'wet' is perhaps a typo here?

Line 48: typo 'recording documenting'.

Line 114: Please define 'Ab'

Line 152: as the AAR is defined based on the SCA and TA, I think the correlation between these variables seems inevitable.