Clim. Past Discuss., doi:10.5194/cp-2016-112, 2016

Pearce et al.

The 3.6 ka Aniakchak tephra in the Arctic Ocean: a constraint on the Holocene radiocarbon reservoir age in the Chukchi Sea

Minor comments

Page	Line	Comment
1	23	We cannot be sure that the broad peak of Aniakchak ash does not extend higher than 550 cm
3	19	Worth adding a reference to Coulter et al (2012) - finding of two Aniakchak cryptotephra layers in the NGRIP ice core, not included into Abbott&Davies (2012). Please see a full reference below.
3	30 and further on	Abbott&Davies (2012) are giving an age of 3641±3 a b2k (Table 1). I understand your maths but it is better to provide original age followed by BP estimate in brackets. Or even to explain that you convert the published a b2k age to BP. Could you please include the ^{14}C-derived age estimates for Aniakchak from Davies et al (2016) so that a reader could see them in the text?
6	3	Please let us know what standards you used for monitoring of EMP measurements, and show analytical precision of your measurements, for example, put 2σ error bars on the geochemical bi-plots
7	4	No surprise that the minimum size of your glass shards is 25 µm - you put them through a 25 µm mesh. I guess it is better to give only average and maximum sizes
7	11-12	"All measurements with total oxide percentages over 94% were included, and were normalized to 100% (Table 2, Figure 3)." - this phrase will be more appropriate in section 2.4
7	28-30	Please indicate that you are including only high-Si points from Kaufman et al (2012) and Davies et al (2016); in the sites considered in these papers Aniakchak glasses comprise both andesitic and rhyolitic populations with occasional dacitic glasses
8	8	"Although several smaller eruptions of the Aniakchak occurred in the Holocene (Neal et al., 2000), they have not been associated with any tephra deposits" I would suggest a newer book on Aniakchak eruptive history Bacon, C. R., Neal, C. A., Miller, T. P., McGimsey, R. G., & Nye, C. J. (2014). Postglacial eruptive history, geochemistry, and recent seismicity of Aniakchak volcano, Alaska Peninsula (No. 1810). US Geological Survey. https://pubs.er.usgs.gov/publication/pp1810 Both pre- and post-caldera II tephras have been reported by these authors.
8	28	major increase at 715 (and not at 711.5) cm in p. 7 line 8

9	1	We cannot be sure that the first occurrence of Aniakchak tephra is at 711.5 cm - this is the lowermost analyzed level and the first major increase in glass concentration, however, we just do not know whether similar glass compositions occur below this level.
9	3	Why 15 cm and not 10 - as it has been stated earlier?

Table 2 - I think this table is not necessary in the text: it is hardly readable and, in addition, all data points are shown in the bi-plots and are given in the supplement.

Table 2 and EMO data in the Supplement: It might be better to list major oxides according to their valence (in reverse order from 4 to 1) with minor P_2O_5 at the very end as it is accepted in most geochemical publications

SiO_2 TiO_2 Al_2O_3 FeO MnO MgO CaO Na_2O K_2O P_2O_5

Figures

Fig. 1. Red labels, especially Mt. Logan, are not easily readable. Probably it is better to put them in black font leaving red symbols? or to underlie at least Mt. Logan with a white rectangle and put it farther north on the mainland?

Fig. 2. Is it possible to add contrast to glass shards images?

Fig. 3. Reference points are not well discerned - maybe it is better to color them in different colors?

References not included into the ms under consideration

Bacon, C. R., Neal, C. A., Miller, T. P., McGimsey, R. G., & Nye, C. J. (2014). Postglacial eruptive history, geochemistry, and recent seismicity of Aniakchak volcano, Alaska Peninsula (No. 1810). US Geological Survey. https://pubs.er.usgs.gov/publication/pp1810

Bourne A.J., Davies S.M., Abbott P.M., Rasmussen S.O., Steffensen J.P., Svensson A. Revisiting the Faroe Marine Ash Zone III in two Greenland ice cores: implications for marine-ice correlations. J. Quat. Sci., 28 (2013), pp. 641–646

Davies, S. M., Abbott, P. M., Meara, R. H., Pearce, N. J., Austin, W. E., Chapman, M. R., ... & Farmer, E. J. (2014). A North Atlantic tephrostratigraphical framework for 130–60 ka b2k: new tephra discoveries, marine-based correlations, and future challenges. Quaternary Science Reviews, 106, 101-121.

Griggs, A. J., Davies, S. M., Abbott, P. M., Rasmussen, T. L., & Palmer, A. P. (2014). Optimising the use of marine tephrochronology in the North Atlantic: a detailed investigation of the Faroe Marine Ash Zones II, III and IV. Quaternary Science Reviews, 106, 122-139.

Rilehle et al (1999) Data on Holocene Tephra (Volcanic Ash) Deposits in the Alaska Peninsula and Lower Cook Inlet Region of the Aleutian Volcanic Arc, Alaska http://kiska.giseis.alaska.edu/dbases/akpen_tephra/akpen_tephra.html

Waythomas, C. F., & Neal, C. A. (1998). Tsunami generation by pyroclastic flow during the 3500-year BP caldera-forming eruption of Aniakchak Volcano, Alaska. Bulletin of Volcanology, 60(2), 110-124.