

"A mosaic of phytoplankton responses across Patagonia, the SE Pacific and SW Atlantic Ocean to ash deposition and trace metal release from the Calbuco 2015 volcanic eruption" by Vergara-Jara et al. (Second review)

Vergara-Jara and co-workers' present study is based on collected samples of ash fallout from the 2015 Calbuco volcano emission. Their leaching experiments were performed on two different sets of samples: (i) South Atlantic seawater (bulk ash leaching for trace metals (Fe, Cd, Pb, Ni, Cu, Co, Mn) and Fe(II), and (ii) DI water and Aysen fjord water (size-fractionated ash samples; $<63 \mu\text{m}$ and $250\text{-}1000 \mu\text{m}$) for total alkalinity (Aysen fjord, DI water) and major ions (DI water). In brief, the authors did a multitude of different leaching methods in the present work and looking at the present work one more time, I feel that the study is not that focussed. I firmly believe that the present study would have benefitted from a more focussed approach from the authors regarding their leaching experiments.

One of the critical aspects that I am still not entirely convinced with is some of the parameters/protocols used for leaching experiments conducted in the present work. Different leaching experiments were done on a different set of water samples (S. Atlantic seawater, brackish water from the Aysen fjord, DI water), making the results non-comparable, especially with previous such studies (Jones and Gislason, 2008). The study was also largely focused on (biased towards) explaining the results of the trace metal leaching experiments done on S. Atlantic seawater. Although the authors performed their leaching experiments on different ash size fractions ($<63 \mu\text{m}$ and $250\text{-}1000 \mu\text{m}$) on brackish water and DI water, they could not extract any major conclusions out of these experiments. Also, the discussion section primarily focussed on the results of leaching experiments done with the S. Atlantic seawater. So, considering all this, I am not entirely sure why the authors performed these different ash size-fractionated ($<63 \mu\text{m}$ and $250\text{-}1000 \mu\text{m}$) leaching experiments on a different set of samples (brackish water from the Aysen fjord, DI water).

When last reviewed, I had some concerns on how (and why) the authors defined different ash size fractions: $<63 \mu\text{m}$ (fine fraction) and $250\text{-}1000 \mu\text{m}$ (coarse fraction) for their leaching experiments. Although the authors have tried to justify that they have used different ash size fractions "following the recommendations of Witham et al., 2005", I, specifically, did not find any such recommendations on these particular size fractions by Witham et al., 2005. Further, in connections with their leaching experiments with the DI water, even though the authors have claimed that "DI experiments provides additional opportunity for comparison with similar studies (e.g., Jones and Gislason, 2008)", the authors have not utilized this opportunity by discussing these comparisons. The results from the earlier study of Jones and Gislason, 2008 have been simply provided in Table 2, without discussing whether the similarities are valid or not. Additionally, (i) the leaching experiments performed by Jones and Gislason, 2008 were on a different ash-size fraction ($45\text{-}125 \mu\text{m}$), and (ii) the leaching experiments of Jones and Gislason, 2008 were conducted in Teflon single pass plug flow-through reactors (different from the present work). In light of these points, I do not think that authors' comparisons on their DI leaching experiments with earlier results of Jones and Gislason, 2008 would be valid. In fact, for making their comparisons to be validated against an earlier study (Frogner et al., 2001), Jones and Gislason, 2008 used the same experimental methods (I am quoting it here: "To allow direct comparisons with previous work, we have attempted to apply the same methods as used in Frogner et al. (2001)" from Jones and Gislason, 2008). So, at least, if the authors of the present work have performed their leaching experiments with DI water with an intension to compare their results with previous findings, they should discuss any similarities (or, discrepancies) in these comparisons in more details

i.e. to answer: why do they expect their results to be any similar or different from previous studies? What about different size fractions used (in contrast to Jones and Gislason, 2008)? What about differences in leaching experiments?

I also have major concerns regarding the processing of the S. Atlantic seawater used for trace metal leach experiments. The authors have not mentioned whether the S. Atlantic seawater sample was filtered or unfiltered. Besides, the authors' protocols for seawater processing deviated significantly from Jones and Gislason, 2008, wherein much more robust protocols for seawater processing were followed. Upon collection, Jones and Gislason, 2008 processed their seawater samples by filtering (through 0.2 μm filter; to remove particular matter) and subsequent irradiation with UV light (to kill the remaining biota) before storing the samples in the dark. Such robust seawater preservation methods (before leaching experiments) were found to be missing in the present study.

Regarding the trace metal leaching the protocols with the collected ash, the authors added pre-weighed ash into 100 ml of S. Atlantic seawater and gently mixed the suspension for 10 minutes. How did the authors decide on this particular mixing time (10 minutes)? Did the authors change the suspension mixing durations to see the impact of ash-interaction with seawater for a reduced or prolonged interaction duration?

I am also not sure why some of the parameters were changes during the manuscript. E.g., although the coarser size fraction was defined as 250-1000 μm fraction in the earlier part of the manuscript (section 2.3, Table 1), the same coarser fraction is defined as >1.0 mm later in the manuscript (section 3.3, Fig. 5).

In view of the above considerations, I think that a significant amount of work is needed on the manuscript before making it suitable for publication with the "Ocean Science."