Interactive comment on “Ship-borne lidar measurements showing the progression of the tropical reservoir of volcanic aerosol after the June 1991 Pinatubo eruption” by Juan-Carlos Antuña-Marrero et al.

Anonymous Referee #2

Received and published: 16 July 2020

The paper discusses a very old shipborne lidar data set on stratospheric Pinatubo aerosol observations. The data were collected on two Russian research vessels almost 30 years ago, in July-September 1991 and in January-February 1992. The measurements were published in two papers (in GRL 1993).

Why do we now need another paper on this? This question needs to be answered more clearly! I did not get the point.

Now, in this publication, all 48 out of 48 and 11 out of 20 lidar measurement sessions are re-analyzed. Ok! But the question remains!

Minor revisions are needed.

Details:

Abstract . . . formation of an associated cirrus cloud . . . . This hypothesis on the role of the volcanic particles on cirrus crystal nucleation . . . . is based on what? . . . . Are the ash particles favorable INPs? . . . or were the sulfuric acid particles responsible for ice nucleation? Sulfuric acid leads to homogeneous ice nucleation. All this remains speculative.

Table 1: Both lidars had a huge receiver mirror (110 cm diameter of the primary mirror). What motivated the Russians to have such big lidars on both ships . . . ? This is just a question! You do not have to answer that in the paper.

Lines 95-96: These personal notes sound strange in a paper . . . . I would avoid . . . . to mention Prof. Keckhut and . . . . PhD dissertation of the lead author . . . . Is that information really worthwhile to be mentioned?

Line 118: Did you use CIRA-86 atmospheric profiles here in the re-analysis? I hope not. You probably used ‘modern’ GDAS or ERA-Interim reanalysis data or ECMWF profiles, I hope?

Line 124: You did not use Russel et al., 1979, right? You used the Fernald (1984) procedure, I hope! Otherwise you have to repeat the re-analysis by using the Fernald (1984) approach.

Line 131: The question on the lidar ratio of 25 sr for 539 or 589 nm . . . Please have a look into the article of Jager and Deshler (correction paper, GRL 2003). I think, 25 sr is ok for the first phase after the eruption. And later on the lidar ratio increased with decreasing mean or effective size of the sulfuric acid droplets.

Jäger, H. and Deshler, T.: Lidar backscatter to extinction, massand area conversions
Figure 4 results. Are there other tropical lidar observations for comparison? Hawai
lidar observations, maybe?

Figure 4 top: . . . Heitgh . . .

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2020-81,
2020.