

We thank the anonymous Referee #2 for carefully reading our paper and for providing some helpful comments. However, we consider our paper an “essential source of information” for hazard assessment purposes and not just a “potential source of information”. Our results, although limited to the first ejected material, are highly relevant for risk assessment and risk managements in cases like the reactivation of the Cotopaxi volcano. The rapid response in characterizing the volcanic ash, almost in real time, may be used to inform authorities about the possible eruptive scenarios.

By other hand, we are always thankful for the one who recommend citations to use for our manuscript, but honestly the papers of Cioni et al., 1992 in JVGR, which the Anonymous Referee #2 is mentioning, it is not even close to be a classical paper to refer about how to analyze ash samples. This study has more self-citations than to others. Even more, the paper has not been cited more than 25 times, so we consider far away from being a “classical” paper to refer to. Furthermore, classic ways to separate different fractions of ashes or fragments of ashes or any other fine-grained particles have been described in Clauer, and Chaudhuri, (2012), of which techniques have been widely used by the first author of our study, although they were not needed in this case. Other studies of ash separation for environmental purposes (Campbell et al., 1978), or volcanic ones (Shoji et al., 1994; Riley et al., 2003) are classic studies in which ash fractions were separated for a variety of purposes but none of them claimed Cioni et al., 1992 or 2008 to be a “standard methodology” or for the reasons the Anonymous Referee #2 is mentioning. In fact there is no real standard methodology, which one should follow and we are completely disagree with Anonymous Referee #2 in some of his/her interactive comments about our manuscript. We have 1) used a clear and clean way to collect the ash samples as described in the manuscript and 2) the smaller fragments are equally important and must to be analyzed too. In fact, a little later the Anonymous Referee #2 is mentioning a paper by Cashman and Hoblitt, Geology, 2004 where small portion of very fine-grained material was overseen but have been fundamental in the evaluation of the state of the volcano. Saying so, the Anonymous Referee #2 is contradicting himself, as one cannot use two different methodologies simultaneously. He states that “the vol.% of juvenile fragments are usually very low and can be easily misinterpreted”. Well that’s the main reason why we do not separate the fine ashes and with the ability of our described microscopes, we were able to observe, describe and evaluate particles down to the nanoscale.

Regarding the EDS measurements, the analytical conditions and error are described in the manuscript. The limit of detection of our setup is 0.2 % vol, therefore, we are confident that the chemical analysis provided in this work is reliable and robust.

The short comment of Anonymous Referee #2 about our manuscript ends abruptly with the statement of our conclusion to be an over-interpretation of our data towards the volcanic state of the Cotopaxi volcano. Well, the initial ash material has been interpreted to be of hydrothermal origin and there is no doubt about that. History of Cotopaxi volcano always demonstrated that there are frequent non-violent explosions and non-frequent catastrophic scenarios. Therefore, right from the beginning there has not been any misinterpretation of our initial statement. History and time gave us the reason. Nowadays, five months ago since the initial eruption of the 14th of August, all samples as well as the seismic signals did not give any indication of juvenile magma at all. Nonetheless, for the knowledge of Anonymous Referee #2, the monitoring staff of Cotopaxi volcano, namely the IGEPN, did not use our data or similar results, which has led to an absolutely wrong interpretation of the behavior of the volcano, where pyroclastic flows and lahars were announced just one day after the initial explosions. Therefore, studies and objective interpretations of ash particles are fundamental in the evaluation of volcanic scenarios and potential risks and our manuscript contributes undeniably in exactly this form.

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