

Response to referee #2's comments

The authors express their gratitude to the time the reviewer took. Below please find a point by point reply to the specific comments. **Changes made to the manuscript are highlighted in yellow.**

General comments:

The paper is well written and well organized. The topic is relatively new, because although both the idea behind this study (scanning soil gas emissions) and the method used (hard-target differential absorption LIDAR) is now novel, its application to the scanning of diffuse soil CO₂ degassing in order to produce 2-D maps of diffuse CO₂ degassing is a new concept that opens a wide range of potential applications both for volcano monitoring and more generally for the study of natural degassing from soils. The measurement method is sound and easily applicable to a large number of volcanic areas. The main drawbacks of the techniques used are objectively listed and their possible solutions offered. The results are in line with previous works and underline the great potential of the proposed approach.

Specific comments:

There is not much to say, just I would like to see some more general citations in line 3 of page 2 of manuscript. I gave an example directly on the text (see attached file).

Technical corrections: I indicated some technical corrections directly on the text (see attached file), also listed below:

Page 2, line 25: “-2” has to be formatted as superscript; Page 3, line5: add “(Fig. 1)” before the first full stop; Page 3, line5: “
See Reply to technical corrections marked in the text

Scarpati et al., 1999” to be corrected to “Scarpati et al., 1993”;
See Reply to technical corrections marked in the text

Page 6, line 5: some parts (highlighted in yellow in the manuscript) are set as superscript, whereas they should be set as normal text;
See Reply to technical corrections marked in the text

Page 9, line 32: probably, “extend” should be corrected to “extent”;

See Reply to technical corrections marked in the text

Page 10, line 10: “principle” in my opinion should be replaced by “main”;

See Reply to technical corrections marked in the text

Page 11, line 11: the citation to “d’Auria L. 2015” is not in the text and should probably be either deleted from the references list or added to the text;

See Reply to technical corrections marked in the text

Figure 1c: the meaning of the red numbers in the figure should be explained in the figure caption;

See Reply to technical corrections marked in the text

Caption to

Figure 3, line 4: add “The range of measurement in each profile is indicated by the red dashed line” after the third sentence;

See Reply to technical corrections marked in the text

Figure 5c: I see numbers that I interpreted as line numbers wrongly placed inside the plot. They should be deleted when editing the final document.

See Reply to technical corrections marked in the text

Reply to technical corrections marked in the text (supplement)

I believe the comments in the supplement (technical corrections directly on the text) are exactly the same we already addressed in the entry revision, but here they are again:

P2, 13: a more general citation would be opportune here (e.g., Baubron, J.C., Allard, P., Sabroux, J.C., Tedesco, D., Toutain, J.P., 1991. Soil gas emanations as precursory indicators of volcanic eruptions. J. Geol. Soc. London 148, 571-576.)

Reply: Thank you for the hint. We have added Baubron et al. as reference.

p2, 124: please format this text as superscript

Reply: obsolete, has been removed

p3, 15: “(CF) Add “Fig. 1”

Reply: Reference to Fig. 1 has been added

p3,15: wrong year in Reference.

Reply: corrected year of reference to 1993

p6, 16: all parts highlighted in yellow in this line should be formatted as normal text in line with the rest.

Reply: All part of the line are now at the same line.

p9, 132: Extendu

Reply: Extend changed to extent

p10, 110: replace principle with main

Reply: “principle” changed to “main“

p11, 111: Citation d’Auria not found in text

Reply: citation was there, at p9, 112: “(Chiodini et al., 2010; d’Auria, 2015).”

P16, Fig. 1 caption, Indicate what are the red numbers in figure c

Reply: We have added a description in the caption: and the numbered locations of the LICOR measurements.

P18, Fig. 3 Caption Add: “The range of measurement in each profile is indicated by the red dashed line.”

Reply: We have added in the caption: For each profile and heading ranges are indicated by the red dashed line.

P20, Fig 5. I presume these are lines numbers that should be set in the right place when editing the final document.

Reply: This was a text wrapping issue. They are at their right place now.