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Interactive comment on “The ring-shaped thermal field of Stefanos crater, Nisyros Island: a conceptual model” by M. Pantaleo and T. R. Walter

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Page 2014 line 4 – do you mean that the total mass collected was at least 100 x greater than the mass of the single largest particle?

REPLY: No, we mean that if the maximum grain-size is 2 mm then we collect 200 g (2 x 100). To avoid misunderstanding we decide to rephrase. Line 3-5 now read: “The representativeness of the bulk grain size distribution was ensured by collecting 1-2 kg of sample, depending on its cohesive or granular aspect defined in the field.” We also remove line 1-3: “Finally due to lack of instrumentation, we could not execute the laboratory analysis on-site and the weight of samples was limited for transport reasons. However” and line 18: “sieves with mesh openings of 2.0, 0.5, 0.25 and 0.064 mm which”.

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Page 2023 – discussion of the sieving is rather longer than needed; the analysis here was limited (in terms of number of sieves used), but this is perfectly well justified in the text, and appropriate in the context of the paper, and this section can be shortened.

REPLY: We agree, to reduce unnecessary discussion on the sieving we remove line 19-21: “The number and type of sieves used allow us to determine the type of soil collected but do not allow a rigorous classification according to an established standard, e.g. unified soil classification system (ASTM-D2487-83, 1985). Otherwise we might have”.

Page 2026, section 5.3 - How do your conclusions compare to work (e.g. Caliro et al., 2005) mapping structural controls on carbon dioxide and thermal emissions in this crater? In their paper, they interpret some of the structure within the Stefanos crater as a fault/fracture (their Fig. 4), and this might be worth a comment.

REPLY: We add comments for comparison with previous work (Caliro et al., 2005). At PAGE 2027 line 16 reads: “At Nisyros caldera the elongation of the crater major axis, the structural data and the CO₂ flux measurements indicate that tectonics exert a strong control on fluid path (Caliro et al., 2005). Fractures are identified crosscutting the southern flank of the Stefanos crater (Caliro et al., 2005). Nevertheless these features did not seem to strongly affect the distribution of the CO₂ flux. Indeed the gas flux measured in 1999-2001, during the unrest, appeared almost homogeneously distributed on the crater (Caliro et al., 2005), which may result from the enhanced activity level. We observed that the wider thermal features lie parallel to the fracture direction but we do not recognize a well-defined linear thermal patterns, which actually may be overprinted by the lithological control (cf. 5.2). Nevertheless there are two more clues, i.e. the boiling ponds and the anomaly along the northern flank (p and g in fig. 3, 4, 7 respectively), suggesting the existence of fractures in the subsurface and their local influence on the thermal field (cf. 5.2).”

Page 2007, lines 5ff – other examples include Yellowstone and Campi Flegrei, at a larger scale?

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REPLY: Yes, we add some comments on permeability studies at Yellowstone. Line 15 reads: “At larger scale, the relation between porosity, permeability and fluid flow was studied at Yellowstone caldera (Dobson et al., 2003). Here results showed that sediments and non-welded tuffs have high permeability thanks to primary porosity, however rocks are even more permeable because of fractures and veins.”

Page 2007, line 6 ‘evolutive stage’ – not quite clear what this means?

REPLY: We mean that at ‘young’ edifices there are erosional and depositional processes which differ from processes occurring at ‘old’ edifices. In the first case it is common to observe slumps because of the gravitational slope instability, in the second case slope are in equilibrium and the evolution of the morphology proceed at lower rates.

Page 2007, Line 20 for ‘accomplish’ do you mean ‘influence’?

REPLY: We mean ‘realize’.

Page 2007, Line 25 for ‘dubitably’ do you mean ‘severally’?

REPLY: We change as alternatively.

Page 2007, lines 25ff – examples of chemical and thermal changes at a small field were also recently documented for the 2011-2012 unrest episode at Santorini (e.g. Tassi et al., 2013, Bull Volcanol,75:711, DOI 10.1007/s00445-013-0711-8; Parks et al., 2013, EPSL 377–378, 180–190)

REPLY: We agree that mentioning thermal and chemical changes at Santorini is relevant to show other effects related to permeability changes. With the new comment line 28 reads: “Examples of chemical and thermal changes at a small field were also recently documented for the 2011-2012 unrest episode at Santorini (Tassi et al., 2013, Parks et al., 2013).”

Page 2008 line 14 – see also the paper by Caliro et al 2005 here.

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REPLY: No, this reference actually indicates Lofos as major contributor

Page 2008 line 20 'plan view'.

REPLY: Accepted and change made

Page 2010 line 19 missing words 'inferred to reflect instabilities'?

REPLY: Accepted and change made

Page 2010 Lines 26-27 – sentence is not very clear?

REPLY: We suggest that permeability contrasts may occur at large (caldera) and small (crater) scale. In both cases they are due to lithological/depositional processes. Maybe it becomes clearer by adding a subject in the sentence: "Overall we observe that at caldera scale the lithologies determine the permeability contrasts, which are spatially distributed according to the stratigraphic conditions, and we suggest that similar contrasts may generate at crater scale because small scale lithological heterogeneities."

Page 2014 rephrase 'Samples were oven dried at 70 C, to avoid melting of sulphur crystals, before weighing'. Next line 'samples were wet sieved.'

REPLY: We agree, Rephrasing of line 9-12 read: "Each soil sample has been characterized by laboratory grain-size analysis. Samples were oven dried at 70 °C, to avoid melting of sulphur crystals, before weighing. Samples were wet sieved"

Page 2023 – I suspect that is not true that most volcanological grainsize work involves 'mechanical sieving', so I would delete this statement.

REPLY: Yes, that is right. We remove this statement.

References Caliro et al (2004): year should be 2005 [Page 2025, 2031]

REPLY: Accepted and changes made

Interactive comment on Solid Earth Discuss., 5, 2005, 2013.

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5, C874–C877, 2014

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