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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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This paper investigates the relationship between soil properties (grain size, hence permeability) and thermal flux in a detailed survey of the phreatic explosion crater, Stefanos, on the volcano of Nisyros, Greece. The hypothesis (that the nature of sediments accumulating within the crater in particular the permeability of these sediments exerts a control on gas, heat fluxes) seems reasonable, and leads to the prediction that there could be a long-term coupled evolution of surface manifestations of heat loss (fumaroles, etc) and sediment accumulation, meaning that with time craters may develop an approximately concentric pattern of degassing structures that are controlled by sediment influx, and not by a deeper (concentric) pattern of fractures. This new hypothesis is readily testable in other volcanic contexts, and will be of interest to a wider audience.

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The paper is thorough, generally easy to understand and well presented, and needs little modification before being published formally.

General comments 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? 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. 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.

Technical comments Page 2007, lines 5ff – other examples include Yellowstone and Campi Flegrei, at a larger scale? Page 2007, line 6 ‘evolutive stage’ – not quite clear what this means? Line 20 for ‘accomplish’ do you mean ‘influence’? Line 25 for ‘dubitably’ do you mean ‘severally’? 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) Page 2008 line 14 – see also the paper by Caliro et al 2005 here; Page 2008 line 20 ‘plan view’ Page 2010 line 19 missing words ‘inferred to reflect instabilities’? Lines 26-27 – sentence is not very clear? Page 2014 rephrase ‘Samples were oven dried at 70 C, to avoid melting of sulphur crystals, before weighing’. Next line ‘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.

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

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

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5, C766–C767, 2013

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