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Comment

# ***Interactive comment on “Investigating volcanic hazard in Cape Verde Islands through geophysical monitoring: network description and first results” by B. Faria and J. F. B. D. Fonseca***

**Anonymous Referee #1**

Received and published: 9 December 2013

After briefly review the geological settings of Cape Verde archipelago, Faria and Fonseca review what is known about the volcanic hazard, describe the setup of a new seismic network installed in 2010/2011 and discuss the first results from that network. Observations show that the activity is mostly limited to only few islands (Fogo, Brava and San Antao). However geological traces show that one cannot rule out (limited) volcanic hazards for other islands. These results suggest that it requires more monitoring and are an important contribution to raise the awareness of the population and the authorities. In that sense, the present manuscript deserves publication in NHESS.

The paper in its present form is well written and mostly easily understandable. I only

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have minor comments or suggestions listed here below:

- A table summarizing each type of hazard that must be considered for each island could be helpful, with additional information such as the age of the island, its population, the date of the last occurrence of these hazards (when known), a remark about the level of concern etc. . .

- As one of the objective is to contribute to the hazard assessment, it would have been informative to see some suggested criteria in the description of the various seismic events that would help to discriminate a “normal behavior” from what should be considered as a “crisis”

Some more specific minor suggestions:

- Page 4998, lines 1 and 15: authors announce the description of a “geophysical network” but only describe a “seismic network”. An additional tilt component is briefly mentioned but no setup is described, no results are shown and no results or contribution to the monitoring is discussed. - Page 5000, line 16: refer to Fig 2. - Page 5001, lines 1-5: can you map these numerous volcanic vents and rift arms on fig 2? - Page 5001, line 18: Discussing the orientation and feeding of eruptions at Fogo: why not citing the paper by Amelung and Day (GRL, 2002) about the 1995 eruption and orientation. It could also be cited for the mapping of the 1995 lava flow at the beginning of next page. - Page 5002, line 10: refer to Fig 4 and locate the summit plateau and peak if possible. - §2.2: Can't Brava and Fogo islands be considered as two emerging parts of the same edifice? Also is Brava related to the West rift direction mentioned on page 5001, line 4? - Page 5004, line 21: could you explain what does mean “fresh to very fresh”? - Page 5005, line 23: would it be more appropriate to describe the response all in seconds or hertz rather than a mixture of both ? - Page 5006, line 1 (same in page 5007, line 6): Fonseca et al 2013 not in references. Do you mean 2003 as Fonseca et al 2003 is not referred to in text. - Page 5006, line 5: More description about the automatic processing would be interesting. “Some. . .such as RSAM. . .” is not informative

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- Same page, line 7: missing verb ? [...]source location and spectral analysis “are” performed [...] - §3.1, page 5006, line 16: say here that it was installed in April 2011.  
- Page 5007, line 18: “hidden” to say that it is not in line of sight sounds weird - Page 5007, line 20-25: say where are the stations ? Can you locate them on a map?. Line 25 : typo “slope”. - Page 5008, line 10: can you describe a bit the characteristics of these 5 types of events (frequencies, durations etc...) ? - Page 5008, line 15: Fig 8 does not show the peak between September and November ? Why does Fig 8 start only in September 2011 while network was installed in April 2011? And why does it stop in May 2012 ? Longer duration would help to see that interesting seasonality. - Page 5011, lines 6-9: can you briefly say based on what argument these authors suggest the island uplift ? I do not have the paper in hand but can't the reference Ramalho et al. Nature Geoscience 2010 be appropriate (and easier to find than the PhD thesis)?  
- Page 5012, lines 14-19: you suggest a three steps sequence to be associated to magmatic intrusion in Santo Antao. But such a sequence is not visible for Brava where magmatic intrusion is also suspected. Why ? - Page 5015, line 19: typo “harmonic”

Some comments about figures: - Fig 1: Cape Verde barely visible in the large view map. Changing the color of ocean may help. - Fig 2: caption: Right/left are inverted. Is it possible to enlarge the fig to better see the features and add the 3 branch rift ? - Fig 4: can you locate the Fontainhas peak and summit plateau? - Fig 5: Color scale is confusing: ocean and low land are not distinguished. - Fig 6, 7: why no horizontal components ? Can you provide the reader with the most striking features of these plots that characterize that type of event? - Fig 8 and 13: what can be considered as normal background activity and what is considered as ‘abnormal’ or ‘crisis’? This could be interesting for hazard assessment. - Fig 9: Can you plot the depth either by color-coding the dots or by adding vertical cross NS and EW sections on the sides of the map ? What is the time period ? - Fig 10 and 12: can you add the topo contour lines on the islands? Can you also plot the depth and mention in the caption the time period during which these data have been acquired ? - Fig 11, 14 and 15: spectrograms and power spectra do not span the same frequency range. Some features like the c.a.

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10 hz signal in Fig 11 (below) spectrogram is not visible in the power spectra. Please specify the characteristics of spectrogram (length of moving windows, overlap and units of color scale in db). Is amplitude normalized? Adding the waveform on fig 14 might be informative? - Fig 13: be sure that font for axis are large enough for printing.

References: - Amelung, F., and S. Day (2002), InSAR observations of the 1995 Fogo, Cape Verde, eruption: Implications for the effects of collapse events upon island volcanoes, *Geophys. Res. Lett.*, 29, 47, doi:10.1029/2001GL013760. - Heleno, S., C. Frischknecht, N. d'Oreye, J. Lima, B. Faria, R. Wall, and F. Kervyn (2010), Seasonal tropospheric influence on SAR interferograms near the ITCZ-The case of Fogo Volcano and Mount Cameroon, *Journal of African Earth Sc.*, 58, 833–856. - Episodic swell growth inferred from variable uplift of the Cape Verde hot spot islands, Ramalho, R.; Helffrich, G.; Cosca, M.; Vance, D.; Hoffmann, D.; Schmidt, D.N. , *Nature Geoscience*, Volume 3, p.774-777, (2010)

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