

Reply to the Comments:

UAV survey method to Monitoring and analysing geological hazards: The Case study of mud volcano of Villaggio Santa Barbara, Caltanissetta (Sicily).

Fabio Brighenti, Francesco Carnemolla, Danilo Messina, and Giorgio De Guidi

lines 11-12 please reword - this does not currently make sense.

Reply: The sentence was reworded.

line 13 "of natural hazards"

Reply: We deleted the article.

lines 13-15 change "The use of Unmanned Aerial Vehicles (UAVs) in contexts of natural hazard presents three main steps for risk assessment and monitoring: pre-post event data acquisition, emergency support and monitoring." to "The use of Unmanned Aerial Vehicles (UAVs) in relation to observation of natural hazards, encompasses three main stages: pre-post event data acquisition, monitoring and risk assessment."

Reply: The sentence has been reworded according to your suggestions

line 16 "to infrastructure within a range ..."

Reply: We changed this sentence according to your suggestions

line 17 change "clues of" to "precursors to" also change "are the uplift and the development of structural features with dimensions ranged from centimetre to decimetre." to "are uplift and the development of structural features with dimensions ranging from centimetres to decimetres."

Reply: We changed this sentence according to your suggestions

line 18 change to "Here we present a methodology for monitoring deformation processes that may be precursory to paroxysmal events at the Santa Barbara mud volcano. This methodology is based on i) the data collection, ii) the Structure from Motion (SfM) processing chain and iii) the M3C2-PM algorithm for the comparison between point clouds and uncertainty analysis with a statistical approach. The objective of this methodology is to detect precursory activity by monitoring deformation processes with centimetre scale precision and a temporal frequency of 1 - 2 months."

Reply: We changed these sentences according to your suggestions

line 25 - "has allowed the generation of"

Reply: We changed these sentences according to your suggestions

line 38 - for 3D reconstruction

Reply: We deleted the word

line 43 - change "is spreading" to "is becoming more widely used"

Reply: The sentence has been reworded according to suggestions

line 46 - important to study catastrophic natural events

Reply: The word has been deleted

line 46 - remove subsidence as an example - this alone is not a catastrophic event

Reply: We are agree with you and we deleted the word "subsidence"

line 48 - change allow to acquire to "enable the acquisition of"

Reply: We modified the sentece according to your suggestion.

line 78 - change to "At several mud volcanoes (e.g. Ayaz-Akhtarma and Khara Zira Island mud volcanoes in Indonesia), certain geomorphic/structural features have been observed within the year preceding a paroxysmal event (Antonelli et al., 2014; Madonia et al., 2011)."

Reply: We modified the sentece according to your suggestion.

line 95 - reword - this does not make sense – do you mean they extend outside the mapped limits of the volcano?

Reply: we mean that the fractures and the shear lineaments were observed outside the volcano area. We mean as volcano area the area covered by the mud erupted during the eruption of 2008.

line 97 - in 2002 and 2008

Reply: we changed the word.

line 140 - reduced to approximately 4 cm

Reply: we changed the sentece according to your suggestion.

In section 2.4 remove unnecessary paragraph indents and reword the repeated use of "After that, after this etc" - for example to following this ...

Reply: the section 2.4 was rewritten in order to make this section more fluently.

line 230 - The next step ...

Reply: We added the article

line 234 - reword "the best is ..." this is not very scientific.

Reply: we reword the sentence.

line 243 "Once the ..." and "in order to determine the changes between them"

Reply: We modified the sentence according to your suggestion

line 315 - is to detect significant deformation ...

Reply: We changed the word.

line 316 - this deformation

Reply: we corrected the sentece.

lines 324-325 – reword

Reply: the sentence was reworded

line 360 - The first is ...

Reply: we deleted the word.

line 383 - reword first sentence

Reply: the sentence was deleted because is a repetition after is better explained.

line 386 - small area ... or in a larger region ...

Reply: We followed the first suggestion. For the second we decided to write "larger portion" because we are considering not a region but a portion of the mud volcano area.

line 391 - This monitoring technique is a useful tool ...

Reply: We changed the word

line 395 - uplift can occur ...

Reply: We changed the word.

line 397 - In hazard management ...

Reply: We changed the word.

line 403 - development of ...

Reply: We changed the word.

line 416 - and ii) ...

Reply: We added the conjunction.