Review of "Last mile" challenges to in situ volcanic data transmission, by J. Fonseca et al.

Besides the topic of producing information for disaster risk reduction, this special issue proposes to examine how some key telecommunication and geomatic tools may provide support to stakeholders in charge of risk management in volcanic area. This paper examines the question of data transmission from a volcano located in relatively remote areas.

The authors first propose a model for data transmission, then propose and implement a solution for the particular case of the Fogo volcano (Cape-Verde). The discussion highlights some recommendations that, according to me, should be considered prior to the design of such infrastructure. I feel this paper is an important one for this special issue, that the lessons learnt have potential to be used widely. Finally, this paper can be placed in the context of the important efforts of the scientific community to implement GEOSS (Global Earth Observation System of Systems). This shows that besides the necessary efforts to make the different observing systems interoperable, there is a need to consider the "last mile" challenges in the overall Earth Observation infrastructure. The challenge here is the access and timely processing of data as important as those provided by seismometer. The points addressed by this paper are therefore important to meet the challenges for volcanic disaster risk reduction.

The authors already took account of the minor comments from two reviewers during the 1st phase of the review. I therefore only have minor comments.

General minor comment:

1. This paper is part of a special issue for volcanic risk management. The target audience is therefore expected to be scientists, engineers and authorities in charge of implementing solutions for disaster risk reduction, not necessarily familiar with information technologies. Therefore, I feel it is important to well define the acronyms (e.g. VPN : virtual private network…) and vocabulary (e.g. tunneling).
2. In several points of the paper, there is mention of security and integrity requirements, as well as the required technical solutions (e.g. tunneling, VPN…) (e.g.page 4049 4050). However, it is unclear to which extent these requirements are absolutely necessary for the particular case of the design of this system and/or if these requirements come from a user need or from other general rules in system design. This could be clarified e.g. through a short paragraph explaining how the network was designed for the particular case of Mt Fogo, with some emphasis on these security/integrity issues.

Specific minor comments :

Abstract :

- Line 1 : the focus of the topic of this paper seems rather crisis management than mitigation. As for the mitigation, measures to reduce risk usually focus on the reduction of structural and non-structural vulnerability, whereas the access to near-real time data becomes critical during crisis.

Therefore, suggest to change into : scientists often play a key role in volcanic risk management… »

Introduction

- Page 4039: Line 7 : in this special issue, we define the hazards as the hazard as "*the probability that adverse events reach a given intensity (i.e. destructive potential) over a given period of time*" (definition used in Neri et al., 2013, in this issue). Therefore, I suggest to rephrase into : their observations are an essential input for evaluating the significance of any crisis since they establish …"
- Page 4039: Line 12: suggest to add: "this is illustrated in the case of the 2010 eruption…"
- Page 4039: Line 21: suggest to rephrase: "Despite the critical role that scientists have in volcanic risk crisis management" (same reason as line 1, abstract)

Part 2 : a model for data transmission

- Page 4041, line 14 : for consistency of the vocabulary across the special issue, suggest to say « are the base data providers » instead of the « base information providers », since the RVL here will translate these data into information i.a. for decision support.
- Page 4042, line 14 : suggest to say : « a civil protection agency (or any other entity endorsing this role) », since there are examples of e.g. the army being involved in disaster crisis management.
- Page 4042, line 26 : suggest to say : « which focuses on ITC requirements for volcanic monitoring »

Part 3 : vulnerabilities of communication infrastructure in a remote volcanic region

- Page 4044, line 11 : it could be outlined here that these volcanoes correspond to very different types of hazards, societal context and risk management practices.

Part 4
- Page 4049 : I suggest to add some more explanations on why the « Man in the Middle attack » could be a real threat here since it is not obvious why a third party could be interested in intercepting information and/or modifying it in this way. (see also general comment n°2).
- Since one of the purpose of the communication network is to save funding, the details provided on the costs of the different ITC solutions on are relevant (page 4049), but I suggest to remind here why these details are important.
- Page 4051 : see comment on fig. 3.

Part 5 : Discussion
- Page 4052 : Line 9 : what means « self-healing » in this context ?
- Page 4053 :, line 4 : suggest to replace « may crash » by « may not provide the required quality of service »
- Page 4053, line 27/29 : could you just add one or two sentences to explain what this implies for the telecommunication infrastructure ? I understand this authentication protocol generate delays that makes it difficult to access to near real time monitoring (?). So that finally, for the particular case of geophysical data transmission needs from volcanic areas onward, two limitations of VSAT are(1) : they may not provide the required bandwidth ; (2) the existing protocols are not meeting some specific requirements of the application (?).

Conclusion : line 24 : « avoiding the caveat » or « avoiding the issue » (?)

Figure 3 : this figure describes not only the geometry of the Fogo volcano telemetry system, but also the types of links used (cable, wireless connections). This should be highlighted in the legend. In addition, there are different types of icons for each hub : this should be shown in a legend, particularly, making clear through an icon where are the satellite terminal located (Mt Amarello), page 4051

Figure 4 : is there any need for authorization to reproduce ?

Gonéri Le Cozannet, BRGM (French Geological Survey), 04/11/2013.