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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Oil/gas pre-treatment plants and air quality hazards: PM_1 measurements in Agri Valley (southern Italy)" *by* S. Trippetta et al.

Anonymous Referee #2

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General comments This work deals with the source apportionment of PM1 measurements in an area 2.5 km away from an oil/gas pre-treatment plant, an issue of high research interest. It is also appropriate to be included in the special issue 'New observing strategies for monitoring natural and technological hazards: the case-study of the Agri valley, Southern Italy'. The paper is generally well written and suggests an appropriate methodology, without though applying state of the art statistical techniques. Results are well presented through high quality figures/tables, but human health and environmental implications are not adequately discussed. Furthermore, some methodological issues limit the value of the article's results. Also, the title of the article could be considered misleading since its first words refer to the plant emissions, while measurement did not take place in the plant's surrounding. I would therefore recommend

several clarifications to be made to improve the paper.

Specific comments

1. Introduction 'Moreover, the results obtained, besides contributing to improve the knowledge of the PM1 composition, could be also useful to address other type of studies (e.g., epidemiological studies)':

Contribution of the article as discussed in the introduction is inappropriate as concerns the reference to the epidemiological studies. A sample of only 30 daily measurements distributed in a specific month may not be enough to support any epidemiological study. The authors should comment on the limitations of their study regarding the sample size, the period of time and seasonal distribution. Why this period/season was selected for such an analysis? Also, the European Directives establish specific air quality standards which further apply over differing periods of time because the observed health impacts associated with the various pollutants occur over different exposure times. I would also suggest a discussion for the need/proposal for long-term measurements so that an extensive study of the impact and the seasonal effect can be made. A reference to specific epidemiological studies regarding the PM1 concentration thresholds and their impact on human health could be useful for the reader to better understand the importance of the results from the hazardous point of view.

2. Introduction: 'PM1 can penetrate more deeply into the human respiratory and circulation systems carrying harmful chemical species inside the human body (Mohiuddinet al., 2014)':

The specific paper is not an epidemiological one and includes a one sentence comment, saying that 'respirable particles in the size range of PM2.5 and PM1 are particularly hazardous as they can be transported deep into the alveolar region of the lungs and the bloodstream' and does not compare between PMs. Please refer to specific epidemiological studies and outcomes. The same comment applies to the next reference, Dubey et al., 2012.

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3. Materials and methodologies/2.1 Study area 'Therefore, it could give rise to a wide range of environmental and especially human health impacts due to its presence in an area where several small towns (from 1700 to 5400 inhabitants) are settled'

Which are the environmental implications of the PM1 emissions? To complete the discussion the authors should refer to established impacts on the environment.

4. Weekday–weekend variation of the PM1 and trace element concentrations: 'As to S, the variation observed should be related to a change in the emissions of the COVA plant which is expected to be the main source of sulfur compounds'

Does the plant's operation differ between weekend and weekdays and if yes how this influences the analysis?

5. PCA:

PCA is an appropriate statistical technique. To my knowledge, though, Positive Matrix Factorization (PMF) is considered today the 'state of the art' technique for the specific analysis, because it manages to resolve the PCA limitations, as JRC reports (http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/7956/1/reqno_jrc52754_final_pdf_version%5B1%5D. However, in this case the sample of 30 measurements is not adequate for PMF. This confirms the methodological limitations mentioned before, which should be discussed in the article.

6. Conclusions:

Conclusions do not discuss the human health and environmental implications, as mentioned also in the previous specific comments of the present review. Argumentation for the significance/usefulness of the results, the originality of the paper, the specific contributions and the possible future plans related to the study are currently inadequate.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 2377, 2014.