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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Assessment of atmospheric trace element concentrations by lichen-bag near an oil/gas pre-treatment plant in the Agri Valley (southern Italy)" *by* R. Caggiano et al.

Anonymous Referee #1

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General comments:

The manuscript is well written and structured, having an appropriate length and showing valuable results and conclusions. It is focusing on a highly relevant topic – assessment of air pollution impact on ecosystem and human health. The methodological approach that was implemented is well-known, but is used in a new design and in a larger temporal and spatial scale. I would recommend acceptance of the paper for publication to NHESS, with the following comments:

Specific comments:

Page 1, line 16 and page 4, line 15: Please, give more information about the control site Rifreddo forest (at least the distance and direction from the studied area).

Page 3, lines 7 and 22: In a view of the key role of the biondicators in the assessment of the ecosystem health/state I would propose to add “ecosystem” in the following paragraphs : “. . .in order to assess the potential health risks” and “. . .and the evaluation of impact on human health” as well.

Page 3, lines 14-19: The information of this paragraph is repeated in the “Materials and Methods” section. It would be better to highlight here the lack of air pollution data for the studied area (with intensive agricultural and industrial activities, and in the same time including protected habitats) and particularly, biomonitoring data in contrast to other areas of the country (Adamo et. al., 2003, 2007; Bargagli et. al., 1987). Thus, the importance of establishing a network of sites for biomonitoring of main pollutants at a large scale (59 sites) for assessment the atmospheric pollution will be fully clear.

Adamo, P., Giordano, S., Vingiani, S., Castaldo Cobianchi, R., Violante, P., 2003. Trace element accumulation by moss and lichen exposed in bags in the city of Naples (Italy). Environmental Pollution 122, 91–103.

Adamo, P., Giordano, S., Minganti, V., Modenesi, P., Monaci, F., Pittao, E., Tretiach, M., Bargagli, R., 2007. Lichen and moss bags as monitoring devices in urban areas. Part II: trace elements content in living and dead biomonitors and comparison with synthetic materials. Environmental Pollution 146 (2), 392-399.

Bargagli, R., Iosco, F. P., D’Amato, M.: 1987, ‘Lichen biomonitoring of metals in the San Rossore Park: Contrast with previous pine needle data’, Environ. Monit. and Assess. 9, 285–294.

Page 3, lines 27-30: What are the average annual temperature and precipitation in the area? Please, give more information about "protected habitats" in the area: what part

NHESSD

2, C2459–C2462, 2014

of Agri Valley is under protection status; the distance between COVA and the borders of the Lagronegrese National Park; main Natura 2000 habitats, etc.

Page 4, lines 12-22: Please, describe the criteria used for selection of the four lichen species (specific accumulation potential, abundance, etc.). The description of sampling procedure is missing too. As it is shown in the "Lichen-bag preparation" part, the samples of the four lichens are mixed – what are the proportions for each species? It would be better to highlight and argue why you use mixed/aggregated samples. Regarding the agreement that different lichens species react to different pollutants in different way, showing preferential element accumulation (Conti &, Cecchetti 2001) and in respect to the complex native conditions and the high diversity of the anthropogenic pollutants I find the presented new design of the well-known approach (using a mixture of representative lichens species for a long period and in a large scale) as original and even cost-effective. In combination with the used advantage statistical techniques the results could be used further for mapping of the "hot-spots" of main air pollutants not only for the urban ecosystems but also for other types of terrestrial ecosystems.

Conti M.E., Cecchetti G. Biological monitoring: lichens as bioindicators of air pollution asssessment – a review Environmental Pollution, 114 (2001), pp. 471–492.

Page 4, lines 25-25: You have to specify the selection criteria for the sampling points: ". . .taking the landscape characteristics into account". It is too vague.

Page 6. lines 3-7: Table 2 should be introduced before Figure 2 since the first is a methodical base used for the results obtained. It would be more consistent the part "3.1 Exposed to control ratio" of Results to be placed after the part "3.2. Trace elements after 6-12-month exposures".

Page 6, lines 12-13: ". . ..severe accumulation" (EC > 1.75) were the most occurring conditions with 13 and 11 cases, respectively". It is not clear.

Page 6. lines 22-24: Yurukova and Ganeva (1997) report a loss only for Ca in their

NHESSD

2, C2459–C2462, 2014

study, but not for Cu.

Page 6, lines 25-27: It's more correct to say that "the combination of the used lichen species are suitable for the biomonitoring investigation" since their individual accumulation capacity was not in the focus of the study.

The discussion of the results in the part 3.2 Trace elements after 6-12-month exposures is missing. I suggest some relevant articles:

Tretiacha, M., Adamo, P., ...et al. Lichen and moss bags as monitoring devices in urban areas. Part I: Influence of exposure on sample vitality. Environmental Pollution: 146, 2, 380–391 (2007).

Bari, A., Rosso, A., Minciardi, M.R., Troiani, F., Piervittori, R.: Analysis of heavy metals in atmospheric particulates in relation to their bioaccumulation in explanted Pseudevernia furfuraceathalli. Environ. Monit. and Assess.69, 205–220 (2001).

Suggestion for Technical corrections:

Capture of Table 3: insert the unit of concentrations.

Capture of Figure 1: Eight sampling sites at the color figure are in green and one is in yellow, but it is not explained the differences with the red ones.

Page 13, line 10: insert space between "andlichen-bags".

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 6531, 2014.