Particulate matter generated by heating/cooking plants in traditional homes of Mt. Everest region in central southern Himalaya (Nepal)

P. Fermo[1], A. Piazzalunga[1], R. Gonzalez[1], D. Comunian[1], G. Tartari[2], F. Salerno[2], G. Viviano[2], P. Ielpo[3,4], S. Di Sabatino[5], S. Bhochhibhoya[6], R.K. Maskey [6]

[1]Department of Chemistry, University of Milan , 20133, Milan, Italy
[2] Water Research Institute, National Research Council, 20861, Brugherio, Italy
[3] Water Research Institute, National Research Council, 70132, Bari, Italy
[4] Institute of Atmospheric sciences and Climate, National Research Council, 73100, Lecce, Italy
[5] DiSTeBA Department, University of Salento, 73100, Lecce, Italy
[6]Department of Civil and Geomatics Engineering, Kathmandu University, Dhulikhel Kavre, Nepal

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Presenting author email: paola.fermo@unimi.it

Atmospheric aerosol affect Earth's radiative budget and atmospheric air quality and represents a risks to human health. Recent studies have demonstrated that in the Himalayan region aerosol components such as soot, sulfates, organics, dust, contribute to the formation of "Atmospheric Brown Clouds (ABC)" and important sources in this region are represented by combustion of biofuels used in cooking and heating, agricultural residue burning and forest fires (Vadrevu et al., 2012).

In particular Black Carbon (BC) emitted from biomass burning can significantly alter the radiative balance by absorbing solar radiation and causing atmospheric heating, while BC deposited on snow and ice can significantly reduce the surface albedo, hasten melt, and trigger albedo feedback (Lau et al., 2008).

Although the importance of biomass burning in the Himalayan region is well recognized, precise data are lacking and only recently efforts have been made to assess the contribution of this source to aerosol (Vadrevu et al., 2012).

In the traditional households of Mt. Everest region, fuelwood, kerosene and animal dung constitute the main energy sources used for cooking, space heating and lighting. The kitchens are equipped mainly with open fireplaces for cooking lacking of a chimney and contributing to PM emission (Salerno et al., 2010).

Aim of the present study is to characterize the chemical composition of particulate matter (PM) generated indoor from the combustion of different fuels and to assess how this source can affects outdoor PM composition.

For this purpose Sagarmatha (Everest) National Park and Buffer Zone (SNPBZ) in Nepal is the main case study, due to the abundance of information available about the local socio-ecological system. A preliminary sampling campaign has been carried out during June 2012 in order to collect PM depositions inside traditional households located in four villages (Phakding, Namche Bazar, Tukla, Pangboche).

For each village three homes equipped with traditional stoves have been selected. The kind of fuel (different types of wood, kerosene, yak dung) burnt in each open fireplaces was also known. Outdoor PM depositions have been also collected in the vicinity of each house.

PM samples have been characterized from the chemical point of view as concerns major ions, OC (Organic Carbon), EC (Elemental Carbon), levoglucosan, TOC (Total Organic Carbon) and PAHs. In fact since it has been demonstrated that wood burning contribute to PAHs emission, these specific substances will be analyze. PAHs are also of great interest as regards indoors pollution since this class of compounds, is recognized as carcinogen by IARC.

The estimation of wood burning contribution to PM can be achieved through the quantification of a specific tracer, i.e. levoglucosan (Piazzalunga et al., 2011).

The macro-tracer approach will be applied using weighed emission factors selected taking into account the kind of wood burnt in SNPBZ.

On the base of all the compositional data acquired it'll be investigated the reliability to apply the receptor models to the data set for the source apportionment study.

These preliminary results will be helpful in order to program a more complete campaign during which PM2.5 samples will be collected both indoor and outdoor.

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