

COST Action TD1105 - European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

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On the importance of improved detection methods and monitoring strategies for particulate matter

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Introduction

It is generally accepted that air-borne particulates have a harmful effect on our health and significant correlations have been observed between adverse health effects (cancer, asthma, heart diseases) and the amount of particulate matter in the air.

It would thus seem in order to try to trace these health hazards through our air-monitoring actions.

Our regulative focus is however on the amount (mass) of particulates rather than on their nature or harmful effects.

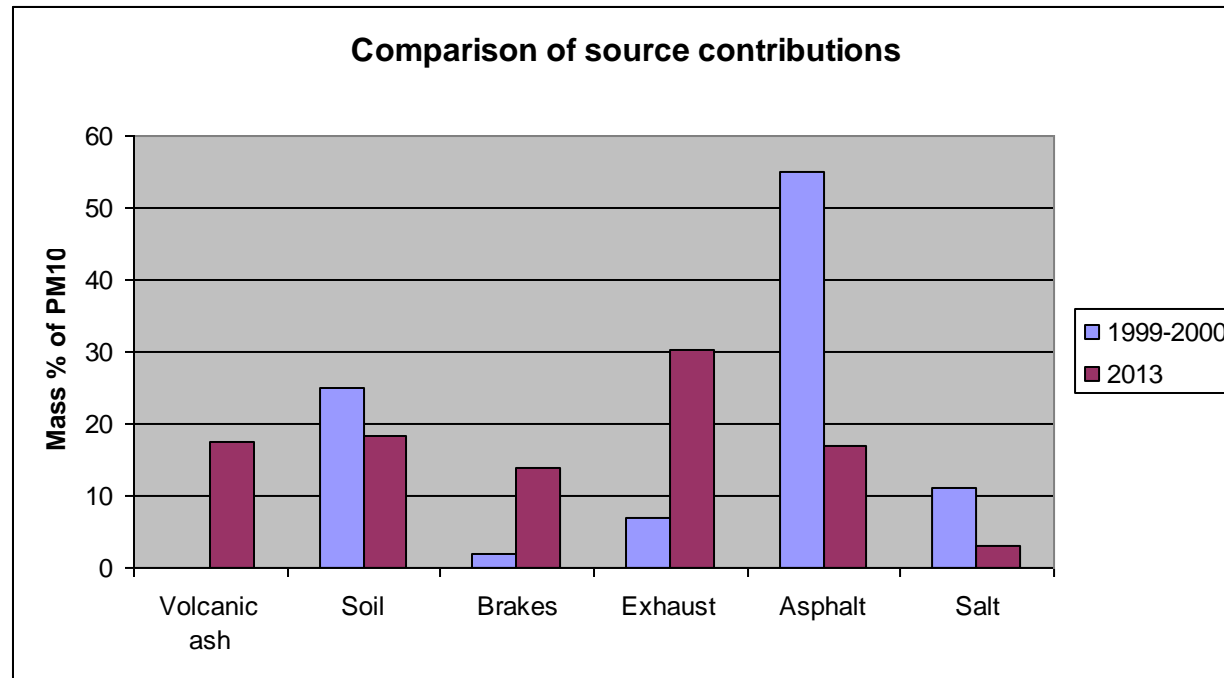


An example from Iceland - an alarming observation and the response to it

At around the “recent” millenium change, I calculated a model for the sources of dust in Reykjavík. This revealed a major contribution from asphalt (55% on average) and the problem was appointed to the excessive use of studded tires.

Respond: A massive expression of negative opinion (propaganda) against the use of studded tires and the import of much harder asphalt materials from Norway.

The PM trend in Iceland



The asphalt contribution has been dramatically improved, so our efforts are working ... or ?



PM trend continued

The soot or exhaust contribution has increased, but not enough to increase our overall PM load.

The total mass of PM has actually been decreasing through the last decade.

Our efforts are working, or ... ?



Monitoring PM

- PM has been linked with cancer
- We know that soot is a common constituent of PM, but often with a small contribution to the PM mass
- We know that soot contains polyaromatic hydrocarbons (PAH)
- We know that PAH are carcinogenic
- SOLUTION : We monitor the PM mass



Monitoring PM

- It is generally accepted that it would be more efficient, for monitoring the adverse health effects of air-borne particulate materials, to measure PM 2.5 rather than PM 10.
- We have commercially available instrumentation for collecting/measuring PM 2.5
- SOLUTION: We continue to monitor PM 10, for the most part.

Monitoring PM

- Asbestos was banned from brake linings long ago due the known risk of developing fibrosis when inhaling asbestos dust. This is very good, of course.
- Studded tires have tungsten carbide as a main constituent (over 90% by weight).
- Tungsten carbide is probably more efficient than asbestos in “creating” fibrosis.
- Studded tires are widely used in Northern and parts of Eastern Europe, respectively.
- SOLUTION ? : Tungsten is rarely measured in our monitoring systems for PM

Tungsten Carbide (WC)

Wikipedia :

The primary health risks associated with carbide relate to inhalation of dust, leading to fibrosis. [41] Cobalt–Tungsten Carbide is also reasonably anticipated to be a human carcinogen by the National Toxicology Program. [42]

41. Sprince, NL.; Chamberlin, RI.; Hales, CA.; Weber, AL.; Kazemi, H. (Oct 1984). "Respiratory disease in tungsten carbide production workers". *Chest* 86 (4): 549–57.

42. "12th Report on Carcinogens". National Toxicology Program. Retrieved 2011-06-24.



“Heavy” monitoring stations and in-laboratory air monitoring

In our COST TD1105 community we often discuss the importance of complementing full-blown measurement stations with sensors, the former being considered as the Rolls Royce of air monitoring.

It is of great importance to improve sensor technology for PM-detection.

It is however of equally great importance to improve both the laboratory-based and station-based monitoring of PM to be able to estimate and monitor real health hazards, rather than satisfying ourselves with merely complying with regulations.



Sink or float? - buoyancy of witches

Long ago it was a practice of social monitoring to throw people, mostly females, into deep water.

This was done to test their buoyancy directly and indirectly to test their witch-qualities.

A SOLUTION TO THE “PROBLEM” ?



THANK YOU !!