Chemical Fingerprint of Outdoor PM2.5 in Malta

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Intro: RESPIRA (EU Funded Italia- Malta 0713) indicated that living in Malta is a risk factor for asthma.

Aim: To determine the chemical profile of PM2.5 in Malta, and compare with reference values.

Methods: Using FAI pumps at 10/min/48hr, samples were collected on Teflon and Quartz filters from 6 schools and 46 homes in Malta. Total ICPMS measurement (Residual-extracted), X ray Fluorescence, and thermo-pollutants methods (TO) were used for analysis by CNR in Rome. Aerosol IQM60 counters were used for total PM2.5 mass. All data in ng/m3, Mean, (1st to 3rd quartile) of all 48 hour measurements.

Results: Higher than reference values: (TO): Elemental Carbon Mean 1513(620-1946), ng/m3. Organic Carbon 8480(3190-11490), Using ICPMS Fe 93(3.33-154.6), Vanadium 7.14(2.19-9.0), Ni 5.01(1.9-5.7), Cu 12.2(2.35-8.28),Zn 24.16(10.9-28.2). Lower than reference: S04++ 1.96(0.42-3.7), Mn 0.16(0.09-0.27), Pb 0.56(0.23-0.86), Ba 178(52.0-85.7), Arsenic 0.37(0.19-0.42), Sn (0.16-0.56), Cu 0.62(0.15-0.88), Sr 0.99(0.27-1.08), Rb 0.56(0.23-0.86). No difference: Pb5.54(1.76-5.4), Mn 2.57(1.03-4.56), Sr 1.84(1.03-4.04). Using XRF and higher: Ca Mean1241, Q1-Q3(466-1494), Al 127(63-178.6), Mg 44.25(25.9) K 244(109-349 ). Na 583(183-847) Cl 252 (64-393). Total PM2.5 in microg/m3 13(1.9-15.7).

Conclusion: Chemical fingerprint of PM2.5 probably reflects combustion of low sulphur crude oil product by cars and power plant, mixed with background soil and marine salt.

Reference values: 48,591 observations for 187 counties