Geophysical Research Abstracts
Vol. 14, EGU2012-13049-1, 2012
EGU General Assembly 2012

Magnetic properties of atmospheric particles

G. McIntosh (1,2), M Aranzaru Revuelta (3), J Pey (4), R Noriega Salmon (5), B Artinano Rodriguez de Torres (3), X Querol (4), and A Alastuey (4)

(1) Universidad Complutense de Madrid, Geofisica y Meteorologia, Madrid, Spain (gregc@fis.ucm.es), (2) Instituto de Geociencias UCM-CSIC, Madrid, Spain, (3) CIEMAT, Madrid, Spain, (4) IDAEA-CSIC, Barcelona, Spain, (5) Instituto de Ciencias de la Terra Jaume Almera, Barcelona, Spain

The magnetic and chemical properties of a series of size-fractioned atmospheric particle filter samples (PM10, PM2.5 and PM1) from Barcelona have been studied. These results have been compared with those obtained from dust and particle samples taken from potential geogenic and anthropogenic particle sources (North African dust, Spanish top soils and vehicle-derived particles) and from biomagnetic monitoring (tree leaves, needles and bark). The filter samples are dominated by magnetically soft properties. The ratio of anhysteretic to isothermal remanence increases and the isothermal remanence coercivity decreases, with decreasing size fraction. This is interpreted in terms of smaller average magnetic grain sizes and increased relative importance of superparamagnetic grains. Concentration-dependent magnetic parameters most closely correlate with the concentration of antimony, a tracer element commonly related to vehicle brake dust. The correlation decreases with decreasing size fraction, suggesting it is associated with larger magnetic grains.
The dust and vehicle-derived particles can be distinguished on the basis of different combinations of magnetic parameters. Applying these results to the filter samples supports the idea that brake wear particles make an important contribution to the magnetic signal of atmospheric particles, at least in urban settings. It can also be seen that the results obtained from biomagnetic monitoring closely mimic those obtained from filter samples, suggesting a similar control and highlighting their suitability for study in this field.