

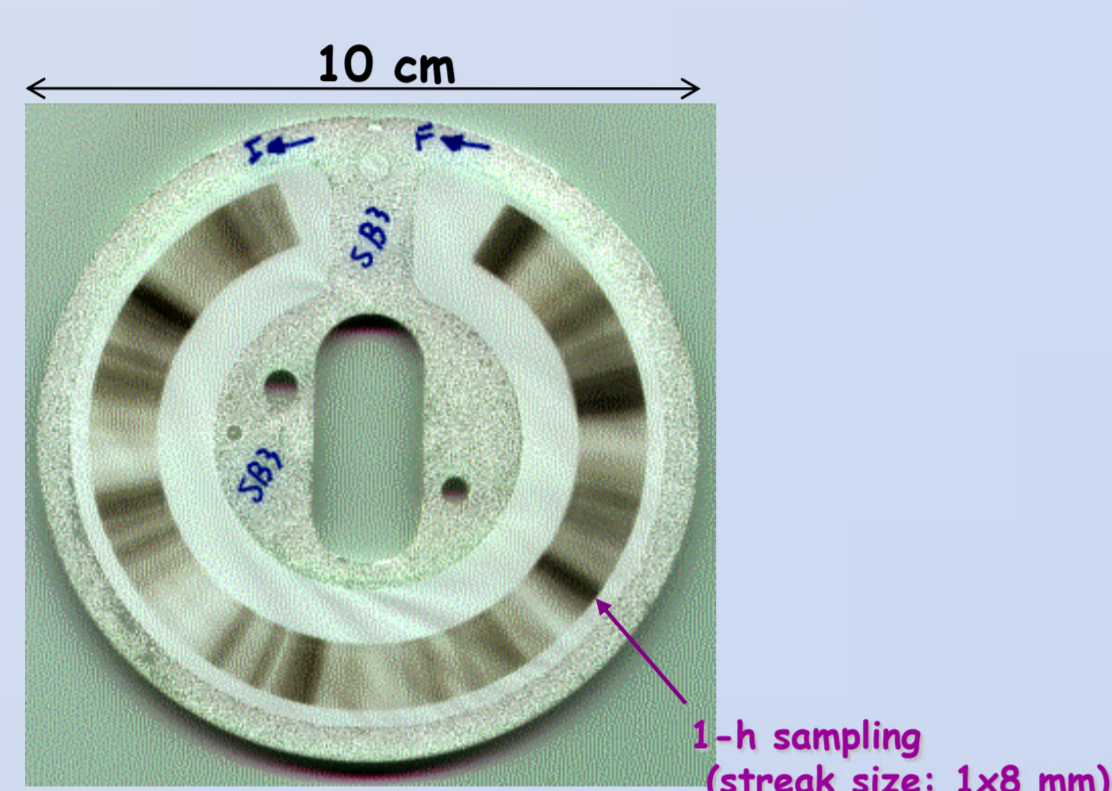
High-time resolved atmospheric aerosol characterisation for source apportionment studies

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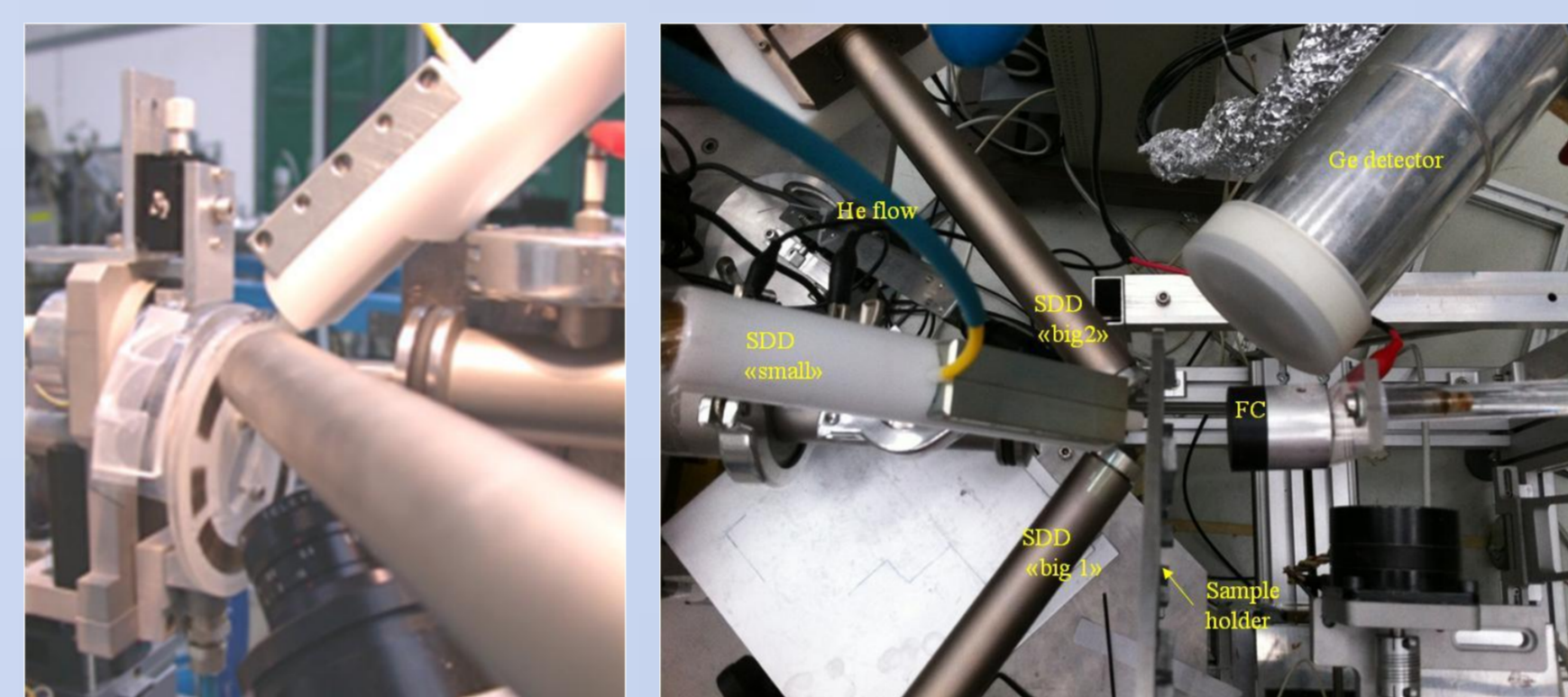
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Air quality studies on atmospheric aerosol are typically based on 24-h averaged data although most atmospheric processes (e.g. evolution of the mixing layer) and source emissions show a variability on time-scales of the order of a few hours. The availability of high-time resolution datasets improves both the understanding of atmospheric processes and the identification of individual sources with peculiar temporal patterns.

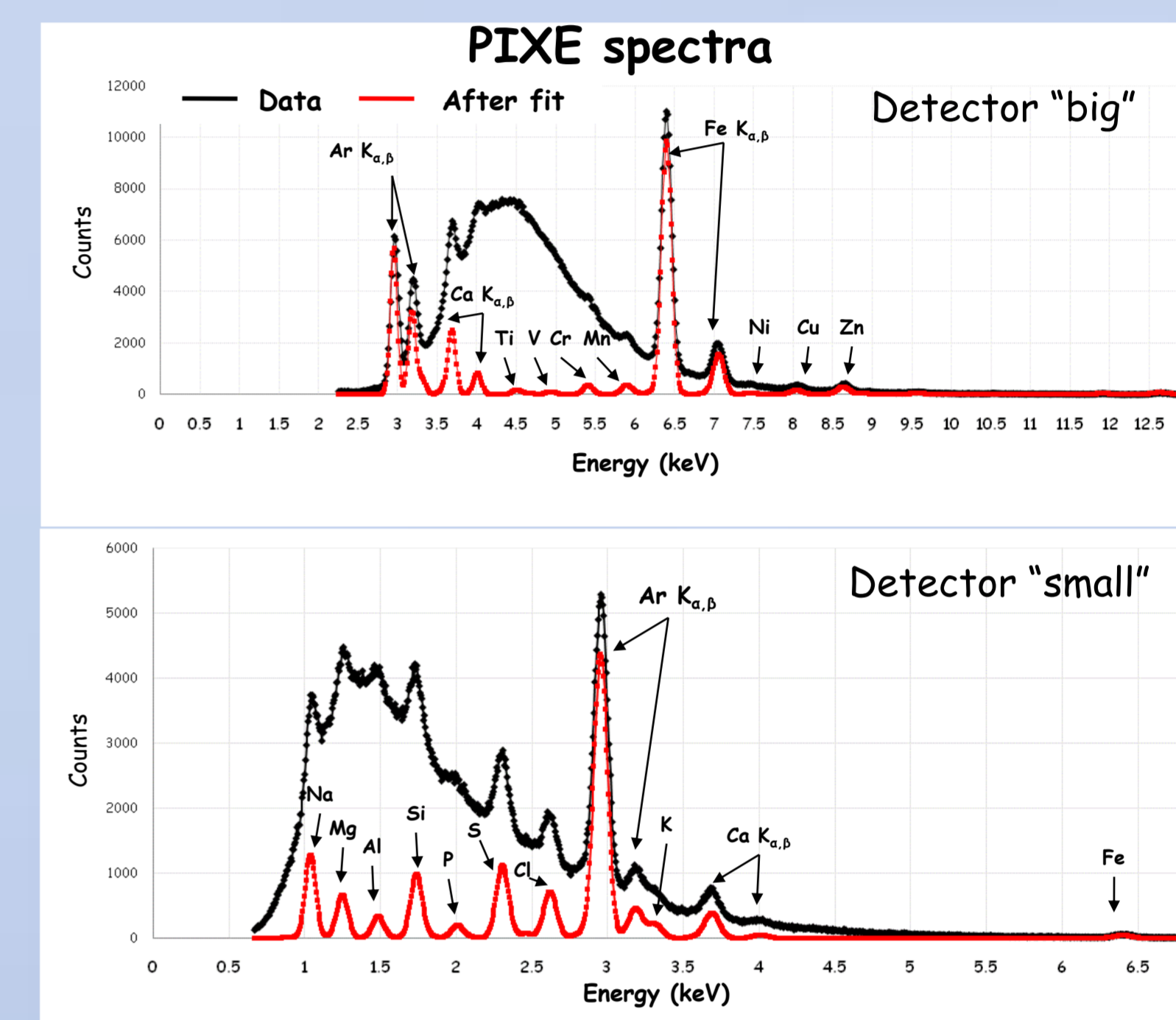
Experimental & modelling approach



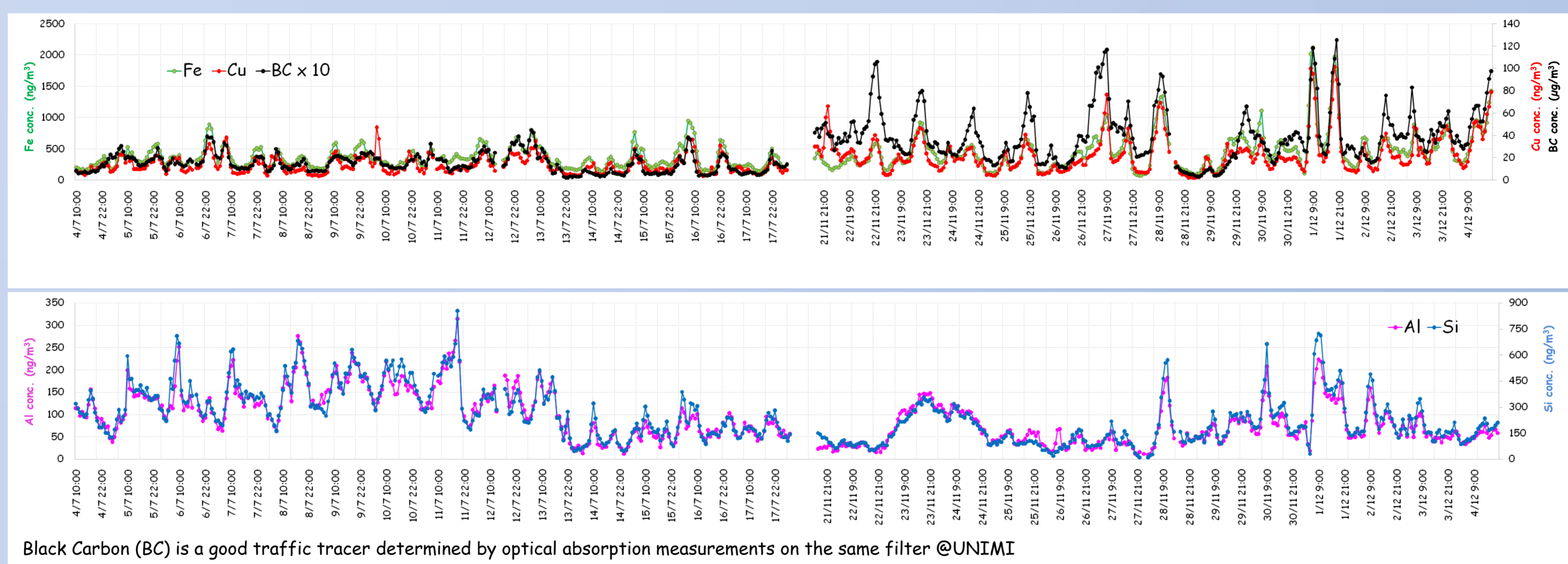
Streaker sampler:
collects both the fine (<2.5 μm) and coarse aerosol fraction (2.5-10 μm) with 1-h resolution



PIXE-PIGE analysis:
@LABEC-INFN (Florence), equipped with a 3MV Tandem accelerator



Elemental concentrations from Na to Pb: spectra deconvolution by GUPIXWIN



Black Carbon (BC) is a good traffic tracer determined by optical absorption measurements on the same filter @UNIMI

Advanced receptor modelling for source apportionment

INPUT
Aerosol mass concentration and chemical speciation (x_{ij}) at a receptor site

$$x_{ij} = \sum_{k=1}^P g_{ik} f_{kj} + e_{ij}$$

Inverse problem solved by minimizing

$$Q = \sum_{i=1}^N \sum_{j=1}^M \left(\frac{e_{ij}}{s_{ij}} \right)^2$$

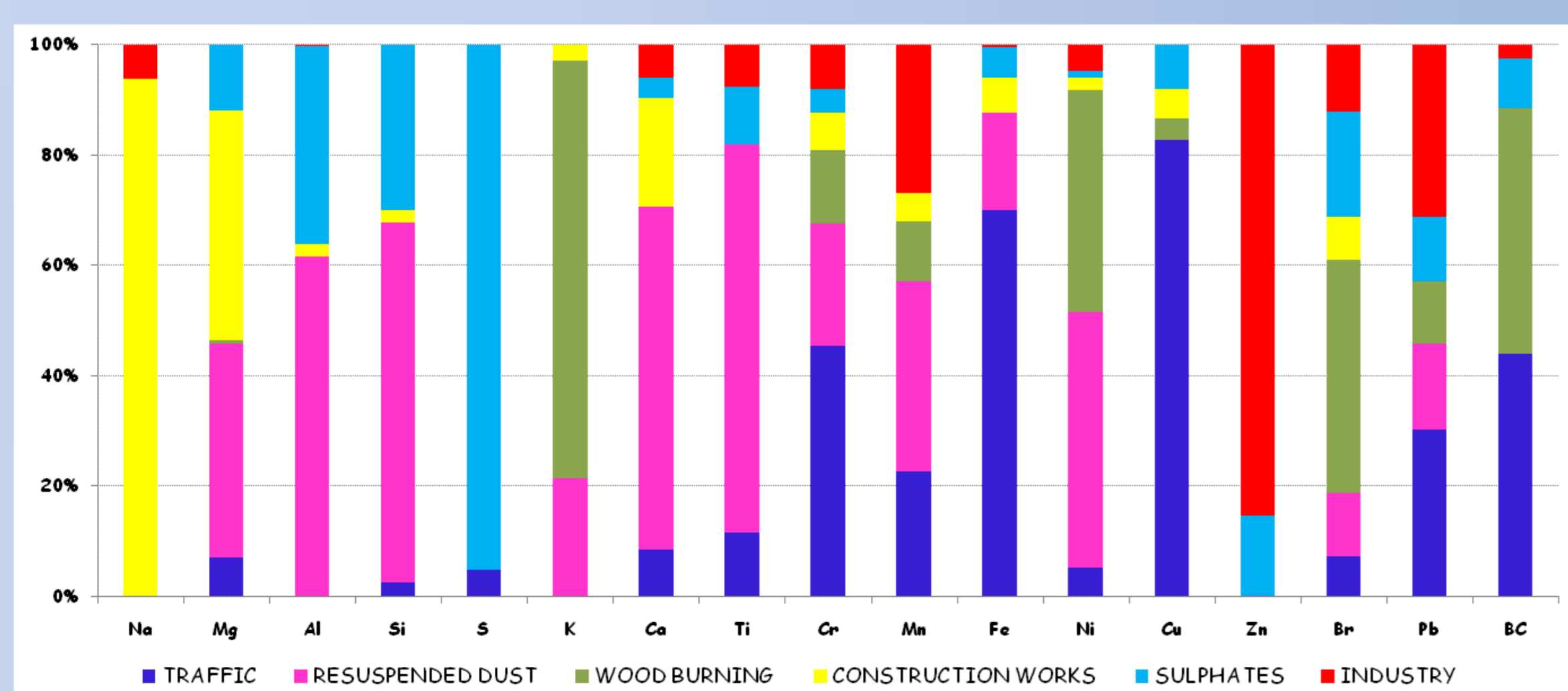
OUTPUT
1. Factors chemical profiles (f_{kj})
2. Factors temporal patterns (g_{ik})

Modelling residues (e_{ij})

Experimental uncertainties (s_{ij})



Source fingerprints



Hourly-resolved source contributions

