



# Effect of metal speciation on the oxidative potential and cytotoxicity of airborne particles

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## PM<sub>2.5</sub> Collection and Analysis of Soluble Metals and Anions



Source: Visible Earth NASA

#### Sampling

Sampling site: Padova, Po Valley

- High load of pollutants
- Fog frequent phenomenon during fall/winter seasons

Sampling Time: 24 hr (2.3 m<sup>3</sup>/h)

Teflon Filters

Formation of metal-ligand complexes is an important phenomenon in deliquescent aerosol in the urban atmosphere [Scheinhardt *et al.* 2013].

#### ≻ <u>Analysis</u>

PM<sub>2.5</sub> samples dissolved in water and in solutions simulating fog/rain composition.

Characterization and quantification of soluble metals, organic and inorganic anions.



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## Identification of Potential Metal-Ligand Complexes in Atmospheric Aqueous

## Environments

• Organic ligand concentrations are significantly correlated with the soluble fraction of Fe and Cu



	Succinate	Malonate	Oxalate
Zn <sub>(water)</sub>	0.66	0.58	0.50
Zn <sub>(pH 4.5)</sub>	0.70	0.60	0.54
Fe (water)	<0.001	<0.001	<0.001
Fe (pH 4.5)	<0.001	<0.001	<0.001
Cu <sub>(water)</sub>	<0.05	<0.05	<0.05
Cu <sub>(pH 4.5)</sub>	<0.05	<0.05	<0.05

Pearson Correlation *p*-values

• Fe-Oxalate complexes account for nearly 75% of total soluble iron  $\rightarrow$  Fe solubility is mainly determined by the ligands contained in PM<sub>2.5</sub> samples Tapparo *et al.* 2020

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## Work in progress and future perspectives:

## Evaluation if metal speciation impacts on the adverse health effects of PM<sub>2.5</sub>

#### > Acellular *in vitro* tests -Glutathione Assay-

Measurement and comparison of the oxidative potential in:

- Equimolar standard solutions of free vs complexed iron/copper
- Extracts of PM<sub>2.5</sub> samples

#### > Cellular in vitro tests

Stabilized Epithelial Cell line exposed to solutions containing free vs complexed iron/copper and PM<sub>2.5</sub> samples:



- Evaluation of cell viability
  - Measurement of intracellular ROS production by
    - 2', 7'- dichlorofluorescin diacetate assay