



## Reconstructed Fine Mass

Data collected from the IMPROVE program are used to calculate aerosol particle mass and visibility. IMPROVE Reconstructed Fine Mass (RCFM) is the sum of ammonium sulfate, ammonium nitrate, organic mass, elemental carbon, soil, and sea salt. The algorithm for RCFM has the following form and concentrations in  $\mu\text{g m}^{-3}$ :

$$[\text{RCFM}] = \text{ammonium sulfate} + \text{ammonium nitrate} + \text{organic mass} + \text{elemental carbon} + \text{fine soil} + \text{sea salt}$$

Each of these components is derived from IMPROVE measurements, with concentrations designating square brackets, where:

$$\text{Ammonium Nitrate} = 1.29 * [\text{NO}_3^-];$$

$$\text{Ammonium Sulfate} = 4.125 * [\text{S}];$$

$$\text{Fine Soil} = 2.2 * [\text{Al}] + 2.49 * [\text{Si}] + 1.63 * [\text{Ca}] + 2.42 * [\text{Fe}] + 1.94 * [\text{Ti}];$$

$$\text{Organic Mass by Carbon} = 1.8 * ([\text{OC1}] + [\text{OC2}] + [\text{OC3}] + [\text{OC4}] + [\text{OP}]);$$

$$\text{Elemental} = [\text{EC1}] + [\text{EC2}] + [\text{EC3}] - [\text{OP}];$$

$$\text{Sea Salt} = 1.8 * [\text{Cl}^-];$$

In these calculations, OC1, OC2, OC3, and OC4 designate organic carbon fractions; EC1, EC2 and EC3 designate elemental carbon fractions; and OP designates pyrolyzed organic carbon; all are determined from IMPROVE measurements.

Key assumptions on which this model is based include:

- All aerosol sulfur is in the form of  $(\text{NH}_4)_2\text{SO}_4$ ;
- All aerosol nitrate is in the form of  $\text{NH}_4\text{NO}_3$ ;
- All Al, Ca, Si, Fe, and Ti are of crustal source;
- All crustal material is made up of the same basic oxides;
- The A, B, and C modules all have cut points of  $2.5 \mu\text{m}$ .