Locally robust Fc-factors for Utah coal

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Large U.S. power plants use continuous emissions monitors to measure SO₂, NOₓ, and CO₂ concentrations in flue gas from coal combustion. Fc-factors (ft³ CO₂/million Btu) are used with these measurements to estimate boiler heat input and calculate emission rates (such as lbs SO₂/million Btu). Although Fc-factors can be calculated from coal quality analyses

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\text{ft}^3 \text{ CO}_2 \text{ in flue gas} \times 321 \times \frac{1000 \times \% C_{coal}}{Btu/lb_{coal}} \text{ in million Btu in boiler}
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by coal rank. These default factors tend to underestimate heat input from U.S. bituminous coal and overestimate heat input from U.S. subbituminous coal.

Fc-factors calculated for bituminous coal produced from three Utah coal mines showed relatively narrow, normally-distributed populations centered at 1766 (±17), 1796 (±19), and 1822 (±29) ft³ CO₂/million Btu. The t-statistics for these populations (α = 0.05) indicate that the mine-specific Fc-factors are significantly different than the default Fc-factor for bituminous rank coal (1800 ft³ CO₂/million Btu). Mott-Spooner difference values for the coal samples showed an unexpected variation with the sample collection date, consistent with laboratory instrument maintenance. Regardless of the cause, resolution of this temporal variation should provide even more uniform and robust mine-specific Fc-factors. Calculation of locally robust Fc-factors might enable more accurate estimates of SO₂, NOₓ, and CO₂ emissions from coal-fired power plants.