correlation coefficient

A measure of the degree of interrelationship which exists between two measured quantities, \( x \) and \( y \); the correlation coefficient \( (r) \) is defined by the following relation:

\[
r = \frac{\sum_{i=1}^{n} (x_i - \bar{x}) (y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}}
\]

where \( x_i \) and \( y_i \) are the measured values in the \( i \)th experiment of \( n \) total experiments, \( \bar{x} \) and \( \bar{y} \) are the arithmetic means of \( x_i \) and \( y_i \):

\[
\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}
\]

(similar expression for \( \bar{y} \)). The linear correlation coefficient indicates the degree to which two quantities are linearly related. If \( x = a \cdot y \) is followed then \( r = 1 \), and departures from this relationship decrease \( r \); if interpretations of data based on the linear correlation coefficient are to be made, one should consult a book on statistics.

Source:
PAC, 1990, 62, 2167 (Glossary of atmospheric chemistry terms (Recommendations 1990)) on page 2182