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| --- | --- | --- |
| **Measures** | **g(t) compared to f(t)** | **h(t) compared to f(t)** |
| MAE: Mean absolute error | 43.77 t | 60.91 t |
| MSE: Mean square error | 2487.36 t | 5426.77 t |
| RMSE: Root mean square error | 49.87 t | 73.67 t |
| MAE/Mean | 10.15 % | 13.16 % |
| Bias () | 0.06 | 0.36 |
| Unequal variation () | 0.00091 | 0.36 |
| Unequal covariation () | 0.94 | 0.28 |

R-squared is theme coefficient of determination, measuring the fraction of the variance in the data ‘explained’ by the model.

r is the correlation coefficient, which measures the degree to which two series covary.

MAE (mean absolute error), MAPE (mean absolute error as a percent of the mean), MAE/Mean and (R)MSE ((root) mean square error) all provide measures of the average error between the simulated and actual series. MAE weights all errors linearly; RMSE weights large errors much more heavily than small ones. Both measure the error in the same units as the variable itself.

MAPE should not be used since the data series includes points close to zero. In this case, MAE/Mean provides a more robust dimensionless measure.

# f(t)

...

# g(t)

Since the unequal covariation is very high (0.94) and the bias (0.06) and unequal variation (0.00091) are very low, the formula g(t) captures the mean and trends in the data very well. However, this does imply a possible systemic error when phasing is important for the purpose of the model and if the model is driven by historical data. The error can be characterized as unsystematic if the model is driven by random noise. Cases like these can indicate a fairly constant phase shift of a cyclical mode otherwise reproduced well. More likely, a large indicates the presence of noise or cyclical modes in the data series not captured by the model. When is large, the majority of the error is unsystematic; a model should not be faulted for failing to match the random component in the data.

Large errors and large bias or unequal variation fractions indicate systematic error and should lead to questions about the assumptions of the model. Therefore a model with high and low and is an ideal model, minimizing systemic errors and matching the behaviour of the real system very well.