

Model Quality Objectives (MQO); Long term (year) vs. short term (daily, hourly): working note - Delta Version 5.3

1. Introduction

The MQO for long term (year) and short (day or hour) term model applications differ by their degree of stringency. This is due to the accounting of compensating uncertainties in the yearly MQO which reduce the uncertainty levels and therefore lead to lower values for the MQO. One issue raised is the consistency of these two MQO when a model delivering high frequency output (i.e. hours) is also used to produce yearly averaged maps. Should the model then fulfill both MQO?

The purpose of this note is to describe some options available in the DELTA tool for testing these MQO consistency issues.

2. Revised uncertainty parameters

The short term (hourly and daily) and long (yearly) MQO are formulated as follows (see user's guide for more details):

$$MQO_{short} = \frac{RMSE}{\beta RMS_U} \quad \text{with} \quad RMS_U = ku_r^{RV} \sqrt{(1-\alpha^2)(\bar{O}^2 + \sigma_0^2) + \alpha^2 * RV^2}$$

$$MQO_{long} = \frac{|BIAS|}{\beta U(\bar{O})} \quad \text{with} \quad U(\bar{O}) = ku_r^{RV} \sqrt{\frac{(1-\alpha^2)}{N_p} \bar{O}^2 + \frac{\alpha^2 * RV^2}{N_{np}}}$$

with the following set of parameters:

	β	U_r^{RV}	RV	α	Np	Nnp
NO2	2.00	0.25	200 ug/m3	0.20	5.2	5.5
O3	2.00	0.18	120 ug/m3	0.79	11	3
PM10	2.00	0.28	50 ug/m3	0.13	30	0.25
PM25	2.00	0.36	25 ug/m3	0.30	30	0.25

The red numbers in the table show the result from new estimates that are proposed for testing. These numbers can be changed in DELTA by modifying the "goals_criteria_oc.dat" file in the

configuration directory. For more details about changing the uncertainty parameters, please refer to section 6.1 of the DELTA user's guide.

3. Updated target diagram

To facilitate the testing of long and short term MQO in a simultaneous way, or in other words to test if hourly/daily outputs also fulfill the yearly MQO, a modified version of the target diagram has been implemented in DELTA 5.3. This target diagram reports both the hourly/daily and yearly MQI. Details can be found in the Delta User's guide.

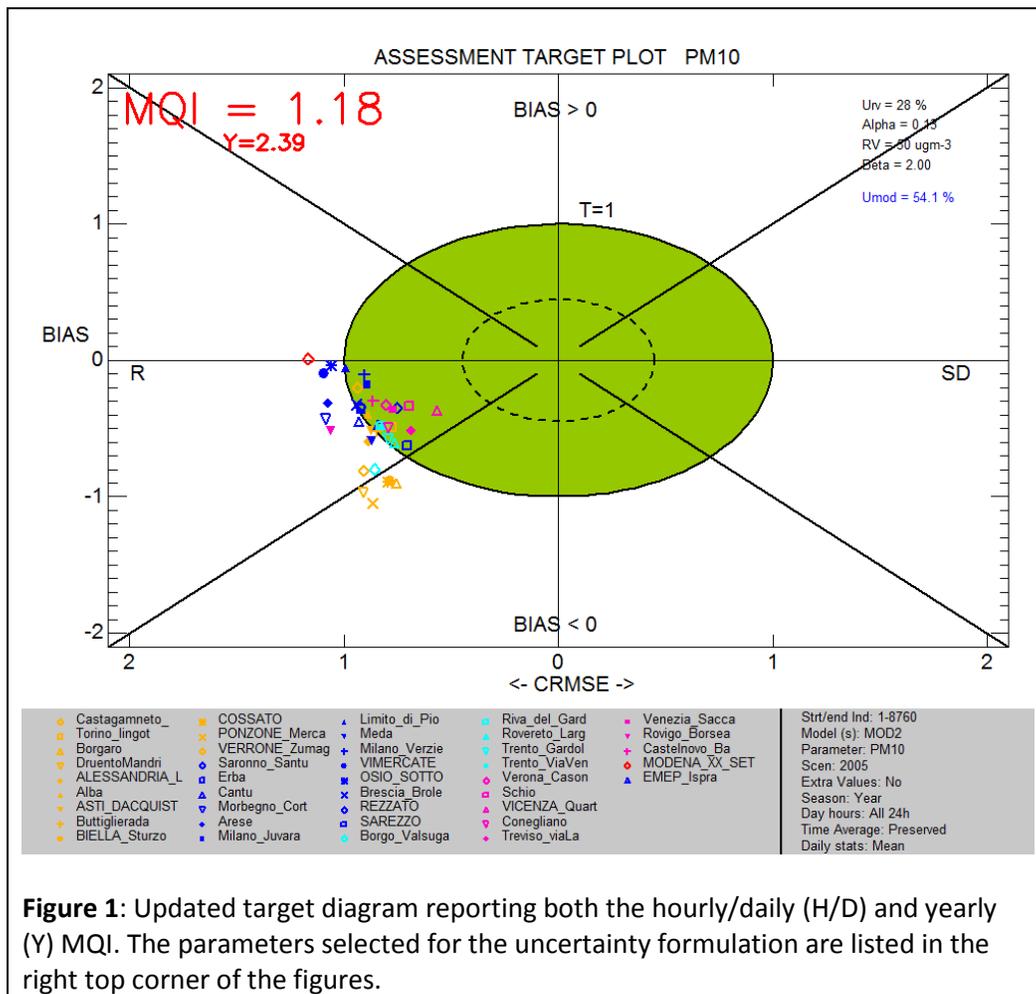


Figure 1: Updated target diagram reporting both the hourly/daily (H/D) and yearly (Y) MQI. The parameters selected for the uncertainty formulation are listed in the right top corner of the figures.