Participant 14 DCF-Unive

Model Description

Model name	MG-IBM
State variables	*Mytilus Galloprovincialis* somatic weight and gonadic dry weight.
Sites at which tested	Pirano and Strunjan, Slovenia
n, number of independent observation used in the test	14

Model Performance

r^2, % of variance	0.81	p, on null hypothesis	$< 10^{-5}$ (F=51.3)
$\hat{\beta}_0$, regression intercept	0.12	$se_{\hat{\beta}_0}$	0.13
$t = (\hat{\beta}_0 - 0) / se_{\hat{\beta}_0}$	0.88	p	0.39
$\hat{\beta}_1$, regression slope	0.75	$se_{\hat{\beta}_1}$	0.1
$t = (\hat{\beta}_1 - 1) / se_{\hat{\beta}_1}$	-2.5	p	0.028

Model Conclusion

Model explaint a significant part of variance in observations	YES (F=51.3, $p < 10^{-5}$)
Model reliability class	2. Good: the intercept is not significantly different from zero; the slope is significantly different from one; r^2 is significantly greater than zero.

Comments

The model was calibrated using the data collected at the Chioggia (Italy) ECASA study site from July 2006 to May 2007. The evolution of the forcing functions is shown in Fig. 1. Data collected at sites A, E and G were averaged and then linearly interpolated, except for Chlorophyll a, in the period August 2006-November 2006. In this case, a straightforward linear interpolation would have led to emphasize the importance of the Chlorophyll a data collected in September 2006, which were 5 times higher than the average. Therefore, is was assumed that this peak was not representative of the September average conditions and Chlorophyll a was first interpolated on the basis of August and November data. Subsequently, the September datum was taken into account by adding a spike, obtained by: 1) considering the interpolated values ten days before and after the September campaign as they were "real" data ; 2) linearly interpolating Chlorophyll a concentration in this 20 days taking into account the September datum. This data set was used for calibrating the fraction of assimilated energy which is used for producing gonadic tissue. The trajectory thus obtained is displayed in Fig. 1b.

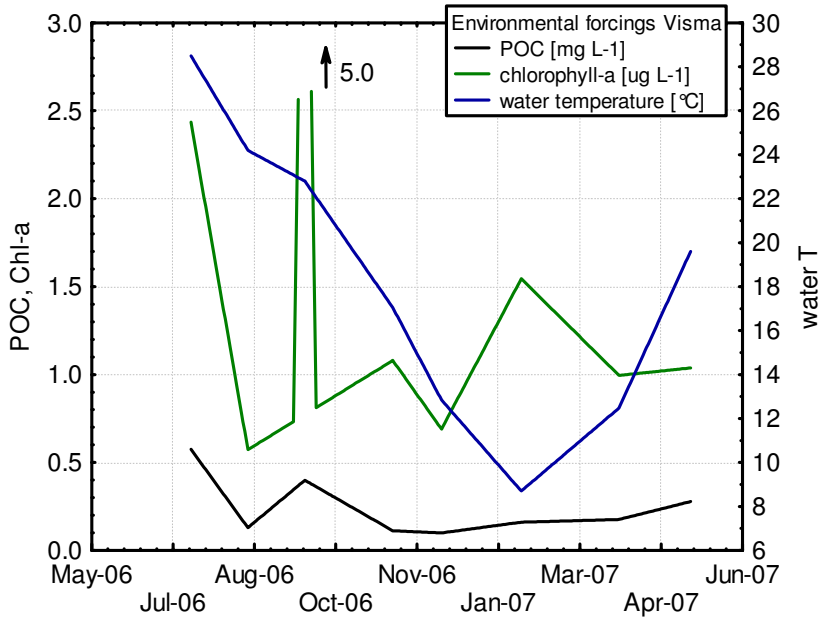

Fig. 1a. Evolution of the forcing functions at the Chioggia study site.

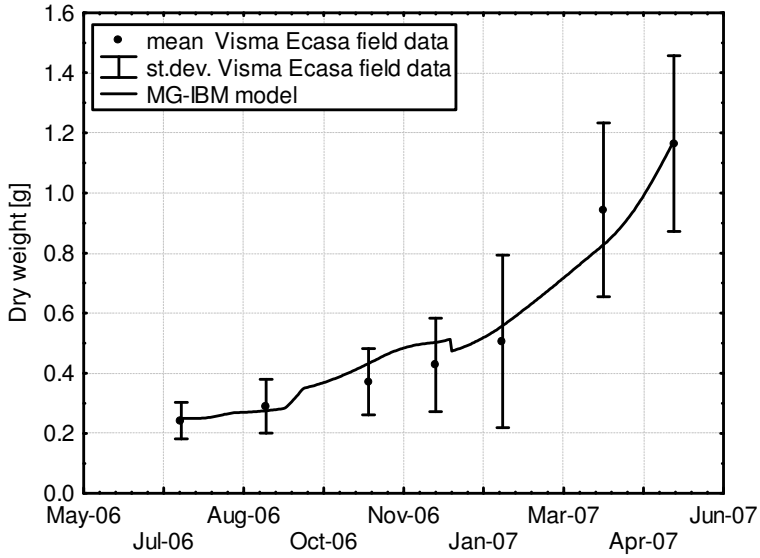

Fig. 1b. Model calibration: observed (dots) and predicted (continuos line) *Mytilus galloprovincialis* dry weight, .

The model was validated against data collected at Pirano and Strunjan, Slovenia. The source of the data is a PhD Thesis (Tusnik, 1985), which was kindly made available by the ECASA participant Marine Biology Laboratory of Pirano, Slovenia. Water temperature, Chlorophyll a, POC and mussel biometric parameters were monitored fairly regularly at the two sites from December 1978 to December 1979. The sites turned out to be characterized by quite different POC and Chla a concentrations in summertime, as one can see from Fig. 2a and Fig 3a, which present the evolution of the forcing functions. For validation purposes, data were pooled, in order to increase the robustness of the statistical analysis.

The results of the validation are presented in detail in and Fig. 2b abd 3b, which show the model trajectories and the observations at Pirano and Strunjan respectively. The model shows a decrease of the dry weight at Strunjan between July and September 1979, due to the very low POC concentrations, observed both in Strunjan and Pirano. However, such low values does not seem to be consistent with the Chla a data, at least in Pirano, where concentrations higher than 20 µg/l where recorded in July. In fact, assuming Carbon/Chla = 50, the fraction of POC concentration due to phytoplanktonic cells should be at least 20µg/l x 50 = 1 mg/l, i.e. well above the values actually reported in (Tusnik, 1985)

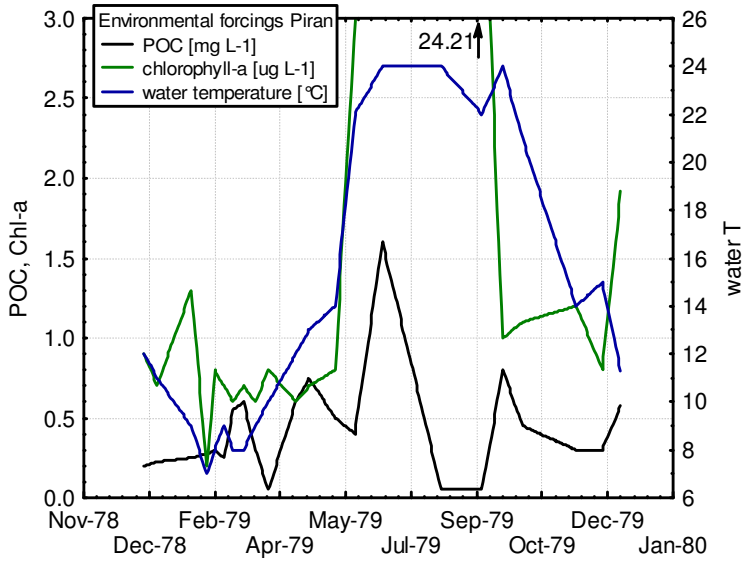

Fig. 2a. Evolution of the forcing functions at Pirano site.

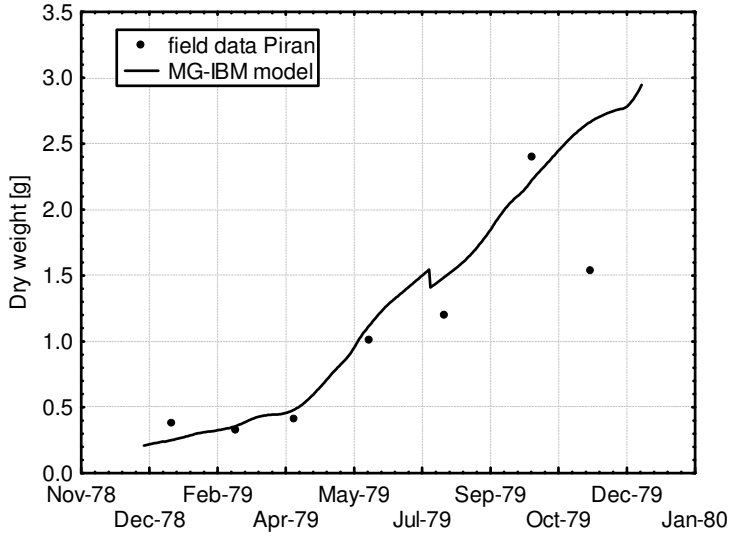

Fig. 2b. Model validation at Pirano site: observed (dots) and predicted (continuos line) *Mytilus galloprovincialis* dry weight.

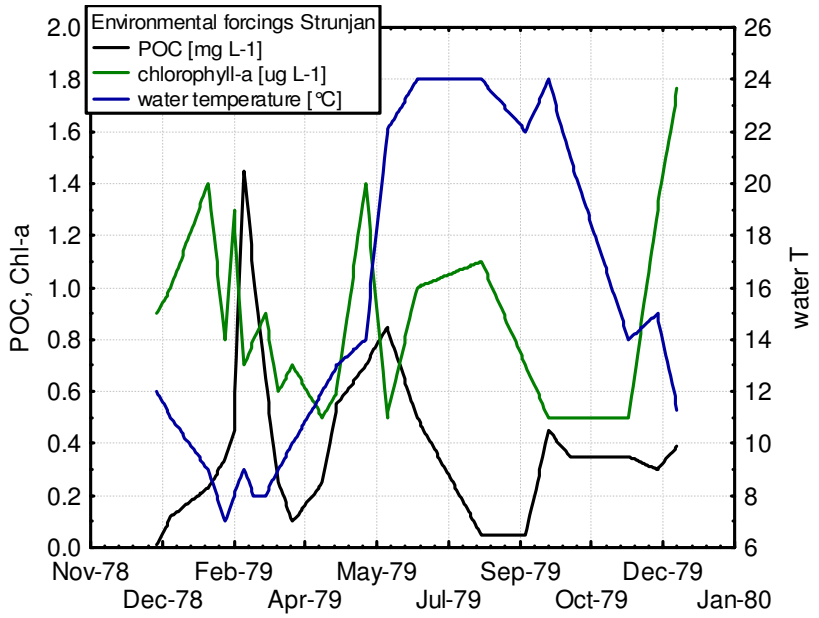

Fig. 2a. Evolution of the forcing functions at Strunjan site.

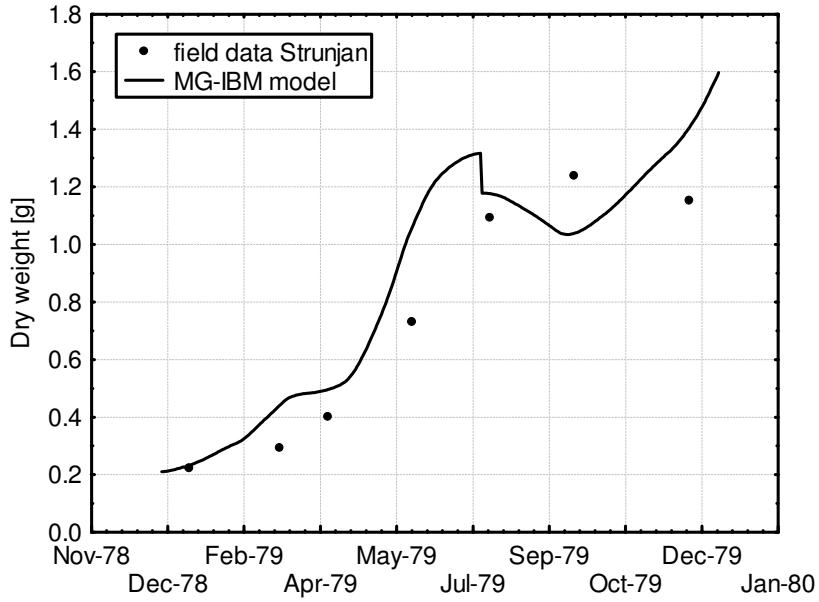

Fig. 2b. Model validation at Strunjan site: observed (dots) and predicted (continuos line) *Mytilus galloprovincialis* dry weight.