

Seasonal and interannual variations of community metabolism rates of a *Posidonia oceanica* seagrass meadow

Champenois W. & A.V. Borges*

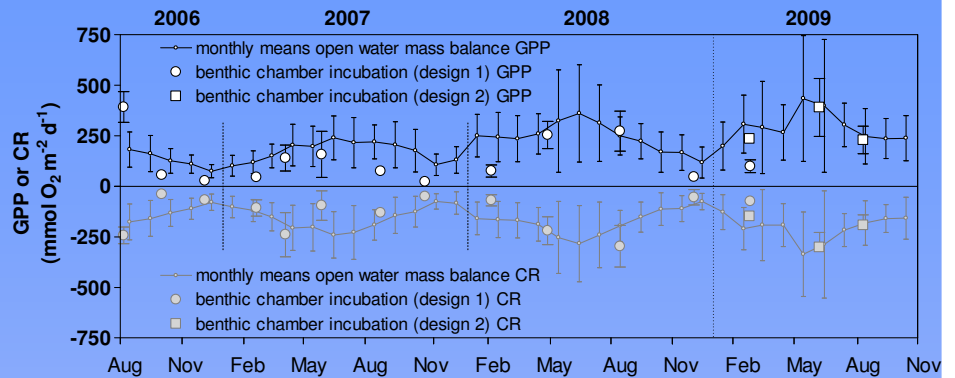
University of Liège (BE), *alberto.borges@ulg.ac.be

Since August 2006, a shallow mooring (10 m depth) has been maintained over a *Posidonia Oceanica* seagrass meadow for hourly measurements of oxygen (O_2) with optodes.

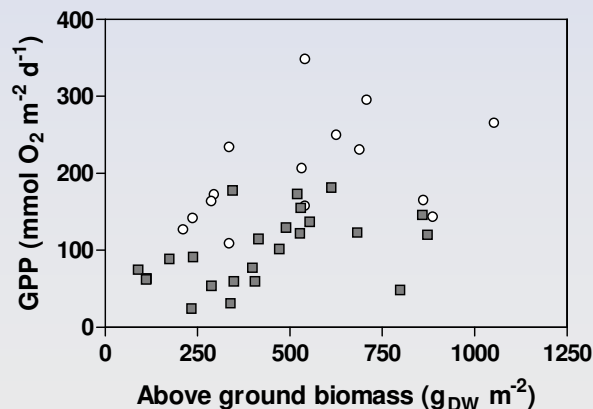
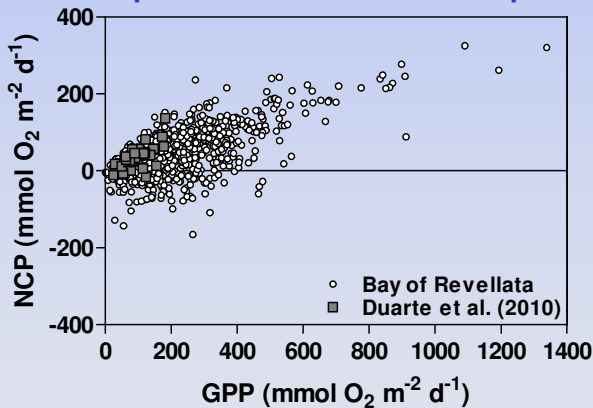
Based on temporal changes of the integrated $[O_2]$ we computed community respiration (CR), gross primary production (GPP) and net community production (NCP). The seasonal variations of GPP (and CR) followed those of the *Posidonia* meadow biomass. Maximum Chlorophyll-a values do not coincide with maximum GPP values suggesting in this ecosystem the dominance of benthic GPP.

GPP and CR estimated from the mass balance of O_2 measured with the optodes, agreed well with the discrete GPP and CR measurements from benthic O_2 incubations with chambers (in particular the larger chambers (10 L, squares, design 1) compared to the smaller chambers (5 L, circles, design 2)). This is related to accumulation of O_2 during day-time in small sized chambers leading to photorespiration and an under-estimation of GPP.

The net annual GPP and NCP values were lower for the 2006/2007 period than the other two periods (2007/2008, 2008/2009). The winter of 2006/2007 was milder than the other two winters, with higher water temperatures and lower wind speeds.



	mol O ₂ m ⁻² yr ⁻¹	CR	GPP	NCP
	Nov. 2006/ Nov. 2007	-58	61	4
	Nov. 2007/ Nov. 2008	-64	89	25
	Nov. 2008/ Nov. 2009	-67	96	29



The lower storm events in 2006/2007 lead to the accumulation of detritus (litter of dead *Posidonia* leaves) within the meadow (under 'normal' conditions, litter is exported during fall and winter from the meadow to depth). The accumulated litter fuelled CR throughout the 2006/2007 while probably reduced by shading the GPP from benthic macro- and micro-algae associated to the meadow.

There was a positive relationship of NCP versus GPP and GPP versus above ground biomass in agreement with the compilation by Duarte et al. (2010, GBC, doi:10.1029/2010GB003793). However, our high resolution data-set reveals extreme GPP events that cannot be captured by incubation based approaches (at best with a monthly resolution). Further for a given above ground biomass the GPP values derived in the Bay of Revellata seem higher than those reported by Duarte et al. (2010). This could be related to the under-estimation of GPP due to photorespiration in small sized benthic chambers.

The use of moorings with optodes could provide an affordable and easy tool to monitor the health or degradation of *P. oceanica* communities.