Estimating primary production from continuous oxygen data in the
Schelde Estuary

Meire Alexander1, Tom Maris1, Tom Cox1,3 and Lieven Bervoets4

1 ECOBE, Universiteit Antwerpen, Campus Drie Elken, Universiteitsplein 1, B-2610 Wilrijk, Belgium
E-mail: Alexander.Meire@student.ua.ac.be

3 Netherlands Institute for Ecology (NIOO-KNAW), Centre for Estuarine and Marine Ecology,
Korringaweg 7, 4400 AC Yerseke, the Netherlands

4 EB&T, Universiteit Antwerpen, Middelheimcampus, Groenenborgerlaan 171, B-2020 Antwerpen,
Belgium

Industrial and agricultural pollution in the 20th century transformed the upper part of the Schelde
Estuary into a hostile environment. Fortunately, due to waste water treatment, this trend has been
reversed and several species now recolonize their former habitat. In order to understand and
protect the oligohaline and freshwater reaches, long term monitoring campaigns started from the
mid 1990’s. Besides these monthly sampling campaigns, Universiteit Antwerpen installed a
continuous data logger for oxygen, temperature, pH, turbidity, salinity, conductivity and recently
NO3 and NH4. These continuous data could illuminate short term fluctuations in water quality such
as peak events that are missed with monthly sampling techniques. Furthermore, based on
continuous oxygen data, estimates of gross primary production (GPP) can be made. In estuarine
systems, oxygen data typically exhibit a complex wave function. We can split this wave function into
basic sine functions of different frequencies by performing a Fast Fourier Transform. The sine
function with a 24h periodicity will approximate GPP since GPP is the main process with a diurnal
periodicity. Compared to the labour intensive 14C-incorporation method, our approach avoids “bottle
effects” because oxygen levels reflect the real GPP.