During the Belgica BSO2/11 cruise (22 April - 11 May 2002) in the northern Bay of Biscay, a slope transect covering transects across the continental margin from the La Chapelle Bank to the Goban Spur area were conducted. The sampling campaign was assisted in addition by remote sensing data from SeaWIFS to locate the coccolithophore blooms, as characterised by white, highly reflective regions as shown by ocean colour imagery. Experiments of $^{13}$C incorporation were carried out along the shelf break to determine the production rate of both organic and inorganic particulate carbon in the photic zone.

Chlorophyll-a concentrations increase in surface waters from less than 1 to more than 4 µg l$^{-1}$ as one moves from offshore (i.e. Station 7) towards the continental shelf (i.e. Station 5). Furthermore, there is a constant increase of Chl-a concentration from north (Station 16) to south (Station 2).

These concentrations are typical of those commonly observed during the spring phytoplankton bloom in this area.

The profiles of total alkalinity normalized to a salinity of 36 indicate a consumption by calcifying phytoplankton in surface waters. In the case of the offshore stations, the pattern of the vertical distribution is almost linear, denoting a minor effect of primary production on this parameter.

The large decrease observed in surface waters of station 16 indicate a late stage of the bloom, when all the coccoliths are spread, giving milky waters, whereas southern stations are in an early stage. This is rather due to a temporal effect of the sampling than a physiological delay due to low latitudes. $^{13}$C uptake vs. light intensity experiments have allowed the characterization of the photosynthetic properties of the phytoplankton. Organic carbon uptake is measured by acidification of the filters with Acetic Acid (0.01 M). The inorganic carbon uptake is obtained by differential scintillation counting between acidified filters and non-treated ones.

The parallelism of the two curves indicates that photosynthesis and calcification are intimately coupled.

Carbon fluxes in g C m$^{-2}$ d$^{-1}$ have been calculated by integrating the optimal primary production (with the simulated calcification rate).

Primary production and calcification rate are presented for the stations located on the shelf and represent the different stages of the bloom that we encountered during the cruise:

Station 5 was sampled at the beginning of the bloom. It's characterized by low levels of primary production, calcification as well as integrated Chl-a.

Station 8, 11, 14 and 16 were sampled during the middle stage and the end of the bloom, while the characteristic milky waters were observed, associated to a reduced Chl-a content (stations 14 and 16).