During an interdisciplinary biogeochemical study carried out in early June 2006 a huge coccolithophorid bloom, characterized by HR patches located at the continental margin of the Bay of Biscay was sampled. Low nutrient levels and a thermal stratification down to 40-60 m depth were observed. Sea surface temperatures ranged from 13°C to 15°C during the cruise.

Rates of primary production and calcification (Fig. 1) were lower within the HR patch than outside, which probably indicates a later stage of the bloom. The intense calcification has also reduced the surface seawater total alkalinity by up to 26 µmol kg⁻¹ (see Suykens et al. Poster session PS007). Pelagic respiration rates were in the same range or exceeded those of primary production, which increased at stations 1bs and 4bs revisited one week later. The investigated area was however a net sink for atmospheric CO₂ due to phytoplankton activity, as shown by the negative air-sea CO₂ flux in Fig. 1.

Outs results provide an original dataset on TEP within a natural population of the coccolithophore Emiliania huxleyi, during its exponential and calcifying growth phases. Two methods were used to characterize the TEP in this study. TEPmicro refers to the microscopic enumeration and size distribution of particles while TEPcalc corresponds to colorimetric measurements calibrated with gum Xanthan. TEPcalc could reach values exceeding 2000 µgEq C⁻¹ in surface at St 2 and St 1bs, corresponding to the higher range of concentrations observed during oceanic blooms. The study of the size spectrum of TEPmicro indicated that the TEP (0.1-1 ppm volume fraction) were small and equally distributed over the depths analyzed. When converted into carbon units and compared to POC (Fig. 3) the two approaches give similar results and TEP-C could contribute to 1-5 % of the POC. Discrepancies may reflect either changes in chemical composition of TEP (polysaccharides, non-TEP inclusions), or changes in the intrinsic structure of TEP (aggregation). The potential for particle aggregation can be observed at depth at St 7, where TEPmicro-C:POC increased independently from TEPcalc-C. In contrast, the individual cells, coated with highly stainable polysaccharides, probably contribute to the bulk TEPmicro-C in surface at St 2.

Analysis of the pigment composition by HPLC indicated that St 1, St 2 and St 3 were dominated by coccolithophores (diagnostic pigment 19'-hexanoyloxyfucoxanthin, Hex-fuco). The stations within the HR patch were diatom-dominated (Rhiphotonon spp.). The particle-associated and free-living bacterial fractions showed a clear distinction in their community structure (Fig. 4). Both the free-living and particle-associated bacterial communities displayed a different structure inside or outside the HR patch, but this distinction was more pronounced in the particle-associated fraction.

We hypothesize that the observed differences are mostly due to the chemical properties of the aggregates produced by coccolithophores and that the bacterial community plays an important role in the formation of marine snow and the export of C during a coccolithophorid bloom in the continental margin environment.

The C:N ratio in particulate organic matter (Fig. 2) was significantly different from the Redfield ratio, suggesting a decoupling between dissolved nutrients dynamics and carbon cycling towards carbon excess production in surface.