Introduction and scope

Transparent Exopolymer Particles (TEP) are a subclass of organic particles formed by acidic polysaccharides, with particular relevance in aggregate formation and carbon fluxes in the ocean. They are formed by spontaneous assembly of dissolved precursors released by organisms. The formation and persistence of TEP in the sea are dependent on both physico-chemical (e.g. turbulence, temperature, pH, radiation) and biological (microbial activity and composition, physiological conditions) factors.

We aim to elucidate which are the main drivers on the distribution and dynamics of TEP in the North Western Mediterranean Sea. We present here out first results of TEP distributions, short-term and seasonal dynamics.

TEP Analysis

Alcian Blue Staining + Spectrophotometry (Passow and Alldredge 1995*)

Filtration (250-500mL) → Alcian Blue Staining (0.02%, pH2.5) → Extraction (H₂SO₄ 80%) → Absorbance 787nm

TEP Geographical Distribution

NEMO Cruise: May-June 2012

Surface TEP concentrations showed horizontal variability along the Catalan coast, with highest values near Barcelona

TEP maxima were located shallower than the deep chlorophyll maxima (between 40 and 60m) and coincided with O₂ maxima (25m)

Although TEP decreased with depth, slight increases were detected near the bottom coincident with increases in turbidity

Short Term Dynamics

SummerII Cruise: 48h cycle, 4h resolution

No obvious recurrent pattern was observed

TEP maxima were located at the O₂ max (30m)

BUT

TEP dynamics related to bacterial production

Seasonal Dynamics

Blanes Bay Microbial Observatory

Surface samples for TEP concentrations taken on a monthly basis

Significantly higher TEP concentrations are observed in summer, suggesting TEP dynamics to be related to heterotrophic processes and DOC accumulation

Ongoing and future Research

- Spatial and temporal distributions of TEP will be compared with other environmental and biological variables to explore their potential drivers
- Formation-decomposition of TEP by bacterioplankton under contrasting nutrient regimes is being studied using microcosm incubations
- Complementary methodologies for TEP and microgel analysis are being tested in the laboratory to complete the picture of the marine gel phase in the NW Mediterranean

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