PHYTOPLANKTON COMMUNITY STRUCTURE AND SUCCESSION ALONG THE EASTERN PART OF THE NORTHERN ADRIATIC SEA

J. Godrijan [1]*, D. Maric [1], M. A. Pfannkuchen [1], T. Đakovac [1], D. Degobbis [1] and R. Precali [1]
[1] Centre for Marine Research, Rudjer Boškovic Institute, Rovinj, Croatia - jelena.godrijan@irb.hr

Abstract
Biological and hydrochemical properties were investigated monthly on seven stations in the coastal waters of the eastern part of the northern Adriatic Sea for the period 2008/2009. The characterization of phytoplankton community revealed apparent growth periods.
Keywords: Phytoplankton, Adriatic Sea, Coccolithophores, Diatoms, Dinoflagellates

Introduction
The phytoplankton abundance and seasonality in the eastern part of the northern Adriatic (NA) are well described, and directly depend upon input of nutrients (related to the annual regime of the Po River discharge), and distinct physical processes ([1], [2], [3]). The eastern part of the basin is characterised by a different hydrological regime thus showing exceptions to the described trends of phytoplankton succession.

Materials and Methods
The study was performed along the Istrian peninsula, eastern NA, one mile from the coast (Fig.1). Samplings were performed monthly during the 2008/09 period on seven stations. Water samples were collected with a 5-l Niskin bottle sampler at surface, 10m and 2m above the bottom. Subsamples for nutrient concentrations were analyzed by spectrophotometric methods [4]. Subsamples for phytoplankton community characterization were analyzed microscopically with the inverted microscope method [5] using a Zeiss Axiovert 200 model. A Total of 210 samples were analysed. For statistical analysis Systat 12 was used.

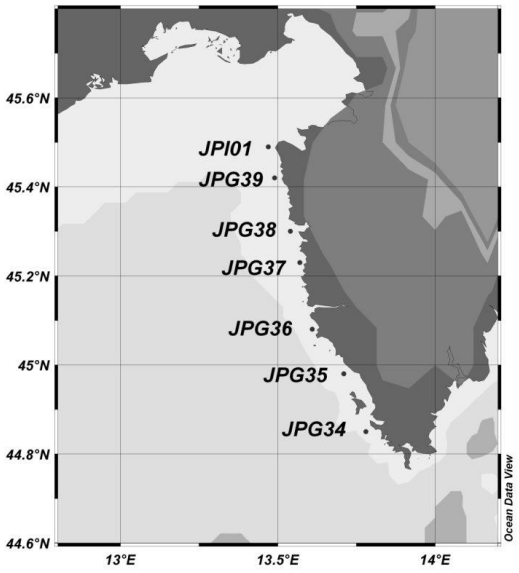

Fig. 1. Map of the investigated area

Results and Discussion
Recognisable microphytoplankton comprised 165 taxa; 97diatoms, 50 dinoflagellates, 16 coccolithophorids, and 2 silicoflagellates. A seasonal cycle was determined, together with several distinct periods which were characterized by high counts of major phytoplankton groups (Fig. 2).

Annual structure of phytoplankton succession was as follows:
January: coccolithophorids (up to 60%). The most dominant species at all stations was *Emiliania huxleyii* (max $4.4x10^5$ cells/l). An early bloom of *Skeletonema marinoi* (max $5.9x10^5$ cells/l - JPI01 surface) was observed on the two northernmost stations.

February-April: nanoplankton (up to 76% in April). Dominant species: *Emiliania huxleyii* and *Pseudo-nitzschia delicatissima* complex. In March a bloom of *Prorocentrum minimum* (max $1.9x10^4$ cells/l) occurred.

June-August: diatoms (up to 68%), coccolithophorids (up to 30%). A rich composition of dinoflagellates in both nano and micro fraction was observed. In July a diatom peak included *Chaetoceros sp.* (max $3.6x10^5$ cells/l), and *Pseudo-nitzschia delicatissima* complex (max $1.5x10^5$ cells/l).

September–November: diatoms (up to 80%). Dominant species were *Pseudo-nitzschia delicatissima* complex and *Chaetoceros sp.* complex. Through the whole profile *Chaetoceros socialis* prevailed in the bottom layer.

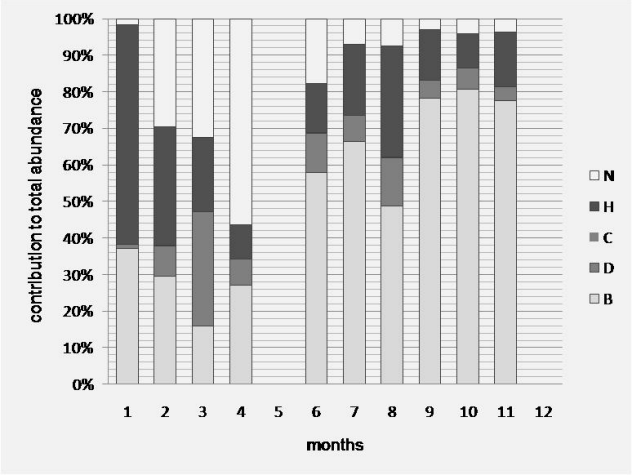

Fig. 2. Contribution of the major phytoplankton groups (N=nanoplankton, H=coccolithophorids, C=silicoflagellates, D= dinoflagellates, B= diatoms)

Although a monthly sampling strategy does not offer the best temporal resolutions to appreciate the actual annual cycle of phytoplankton, the seasonal blooms were apparent. The noted exceptions to the western part of NA [3] were: (i) a significant portion of coccolithophorids in the community throughout the whole investigated period, and (ii) absence of the diatom bloom usually noted in spring.

References
1 - Zavatarelli M., Baretta J.W., Baretta-Bekker J.G. and Pinardi N., 2000. The dynamics of the Adriatic Sea ecosystem. An idealized model study. *Deep-Sea Res I*, 47: 937-970.
2 - Gilmartin, M. and Revelante, N., 1980. Nutrient input and the summer nanoplankton bloom in the northern Adriatic Sea. *Mar. Ecol.*, 1(2): 169-180.
3 - Bernardi Aubry, F., Berton, A., Bastianini, M., Socal, G. and Acri, F., 2004. Phytoplankton succession in a coastal area of the NW Adriatic, over a 10-year sampling period (1990–1999). *Cont. Shelf Res.*, 24: 97–115.
4 - Strickland, J.D.H., Parsons, T.R., 1972. A practical handbook of seawater analyses. *Fish. Res. Bd. Can. Bull.*, 167: 1-310.
5 - Utermöhl, H., 1958. Zur Vervollkommung der quantitativen Phytoplankton Methodik, *Mitt. Int. Ver. Theor. Angew. Limnol.*, 9: 1–38.