

Seasonal studies at Blanes



General characteristics of Blanes Bay

- Typical Mediterranean waters: warm, salty and nutrient-poor
- Temperate system with irregular weather fluctuations
- Relatively oligotrophic coastal system (annual average chlorophyll of 0.57 $\mu\text{g l}^{-1}$)
- Relatively unaffected by human influence
- *Minves de gener*: winter period of high pressure and low sea level that allows a phytoplankton bloom (2-4 weeks)

Studies in Blanes

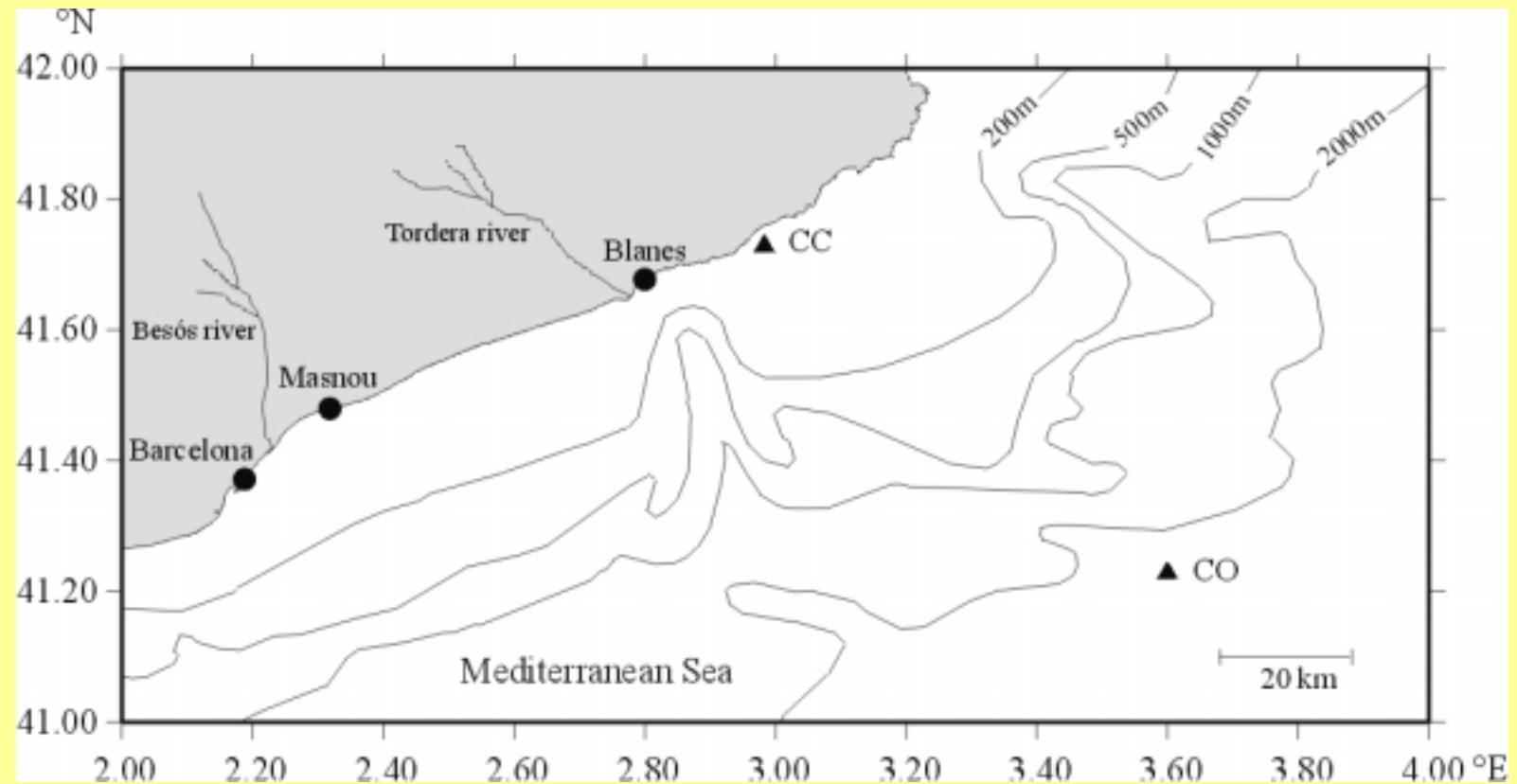
Seasonal studies

- 1992-1997. CEAB weekly sampling
- Dec 1997 - Dec 1998. ICM monthly sampling
- March 2001 - Jan 2003. ICM monthly sampling. PICODIV
- Jan 2003 - March 2004. ICM monthly sampling. BASICS

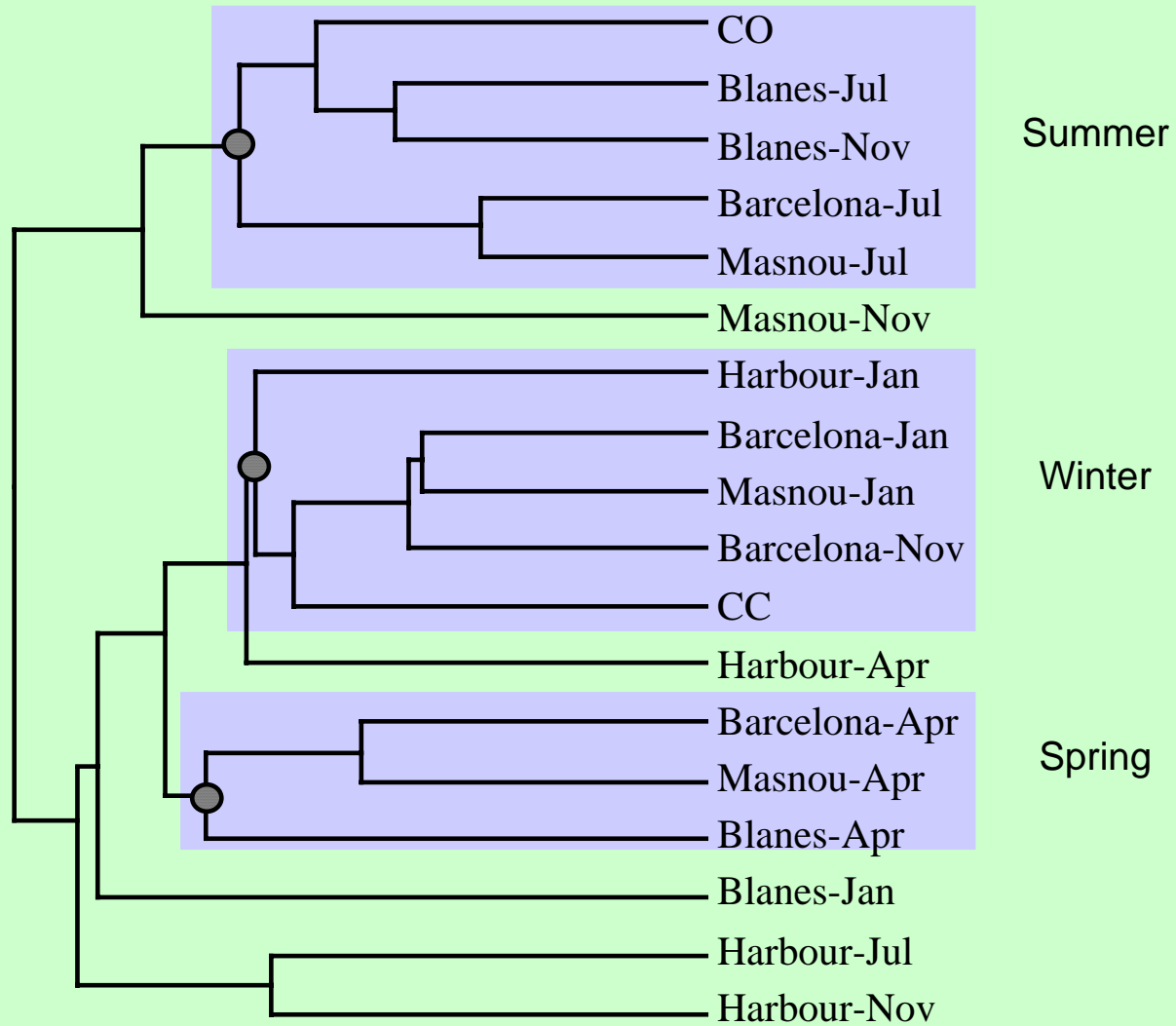
Related experiments

- 1997-1998. Mesocosm experiments - MESOMED I and II
- Feb 1999, 2000. Cruises HIVERN in the Catalan Sea
- June 2000. Cruise ARO along the continental slope

Blanes is representative of Catalan coast

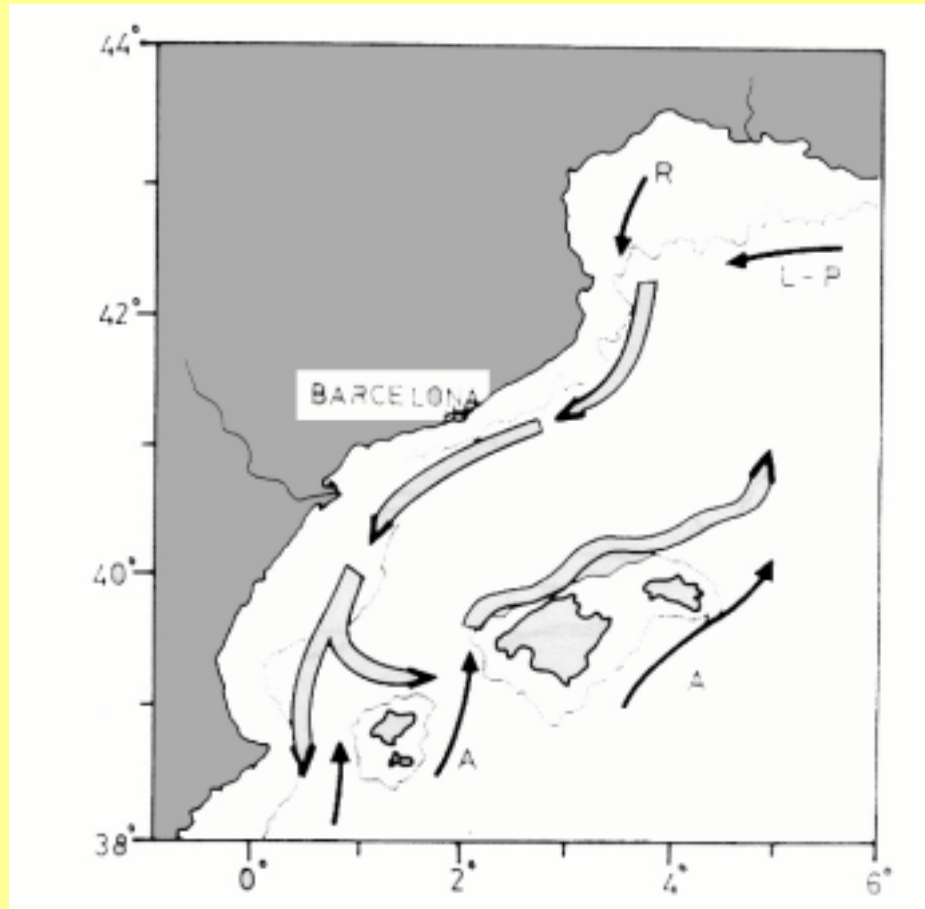


DGGE for bacteria

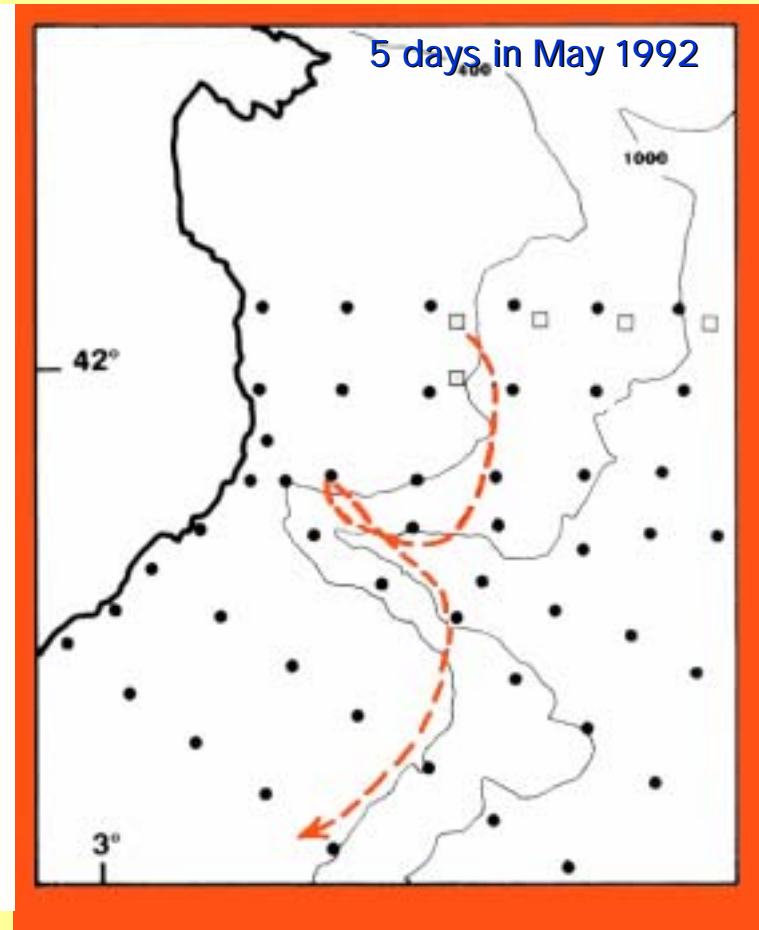


1.0

General circulation



Surface drifter



- Separated from oceanic waters by a southwest current associated with a front in the continental slope (10-20 miles offshore)
- Episodic intrusions of oceanic waters caused by the Blanes canyon

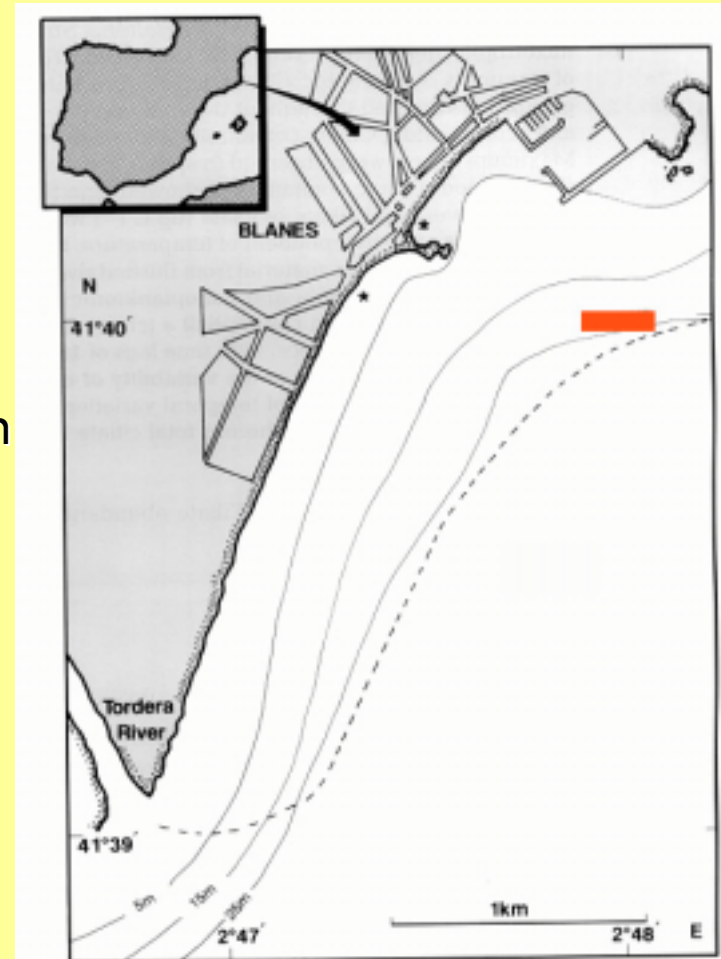
Blanes sampling during PI CODI V

Station 1 mile from Blanes harbor (around 20 m depth)

Collect around 50-100 liters from subsurface with a bucket

Temperature and Secchi depth measured in situ

Samples processed in the lab within the same day



Distribution of samples

Send to Warwick

Fixed sample for FISH of prokaryotes

Filter with biomass for gene cloning of prokaryotes

Send to Roscoff

Filters for FISH of eukaryotes

Aliquote of DNA extract for quantitative PCR

Send to Bremerhaven

Aliquote of DNA extract for probe array analysis

Send to Oslo

Samples for electron microscopy. Send the day after sampling

Receive from Roscoff and Bremerhaven

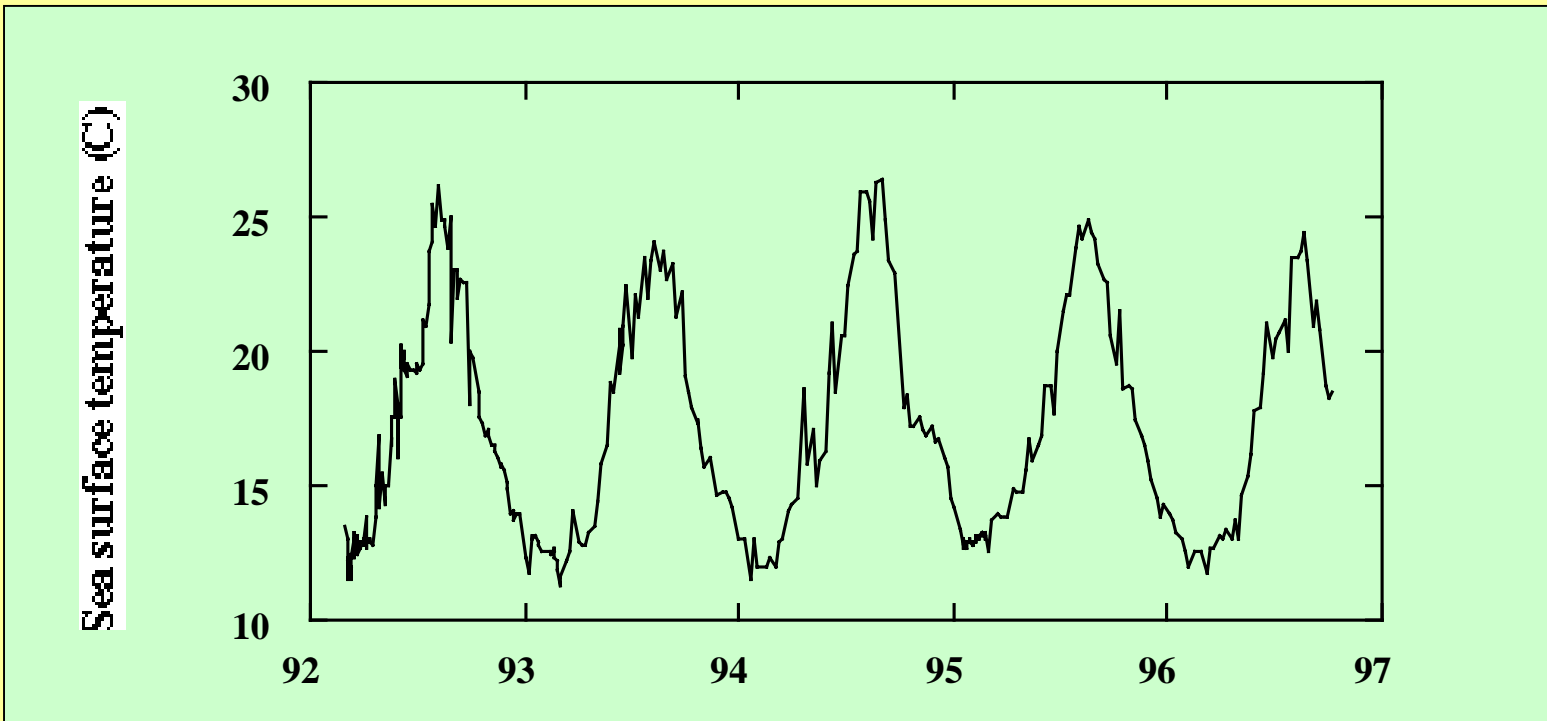
Samples for HPLC

Samples for DGGE

Temperature

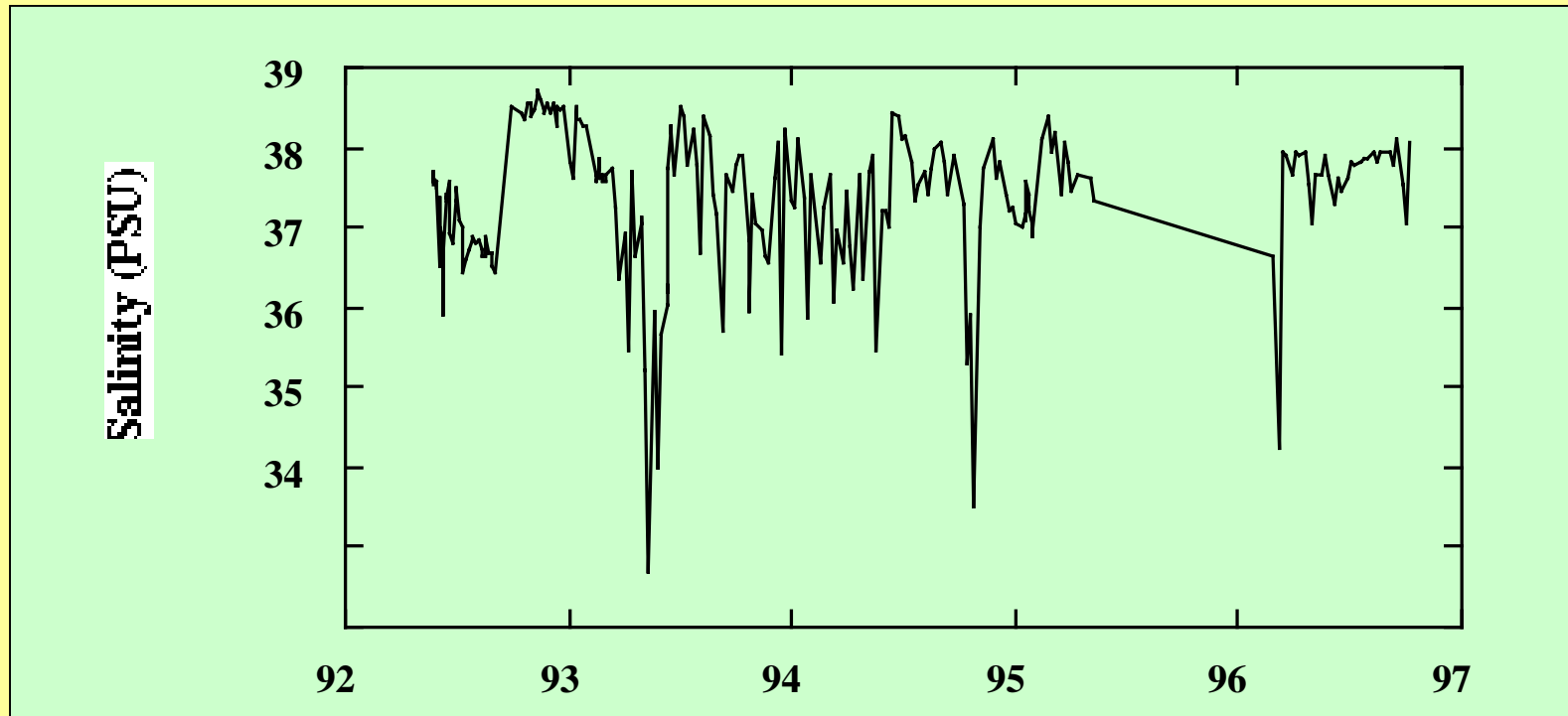
Minimum in late January to March (11-12°C), maximum in August-September (25-26°C)

Thermocline from May-June to September-October



Salinity

Range from 37‰(coastal waters) to 38.4‰ (open-sea waters), with episodic intrusions of lower salinity waters (down to 32‰) from the Rhone river plume or rainfall



Nutrients

Relatively low and highly variable

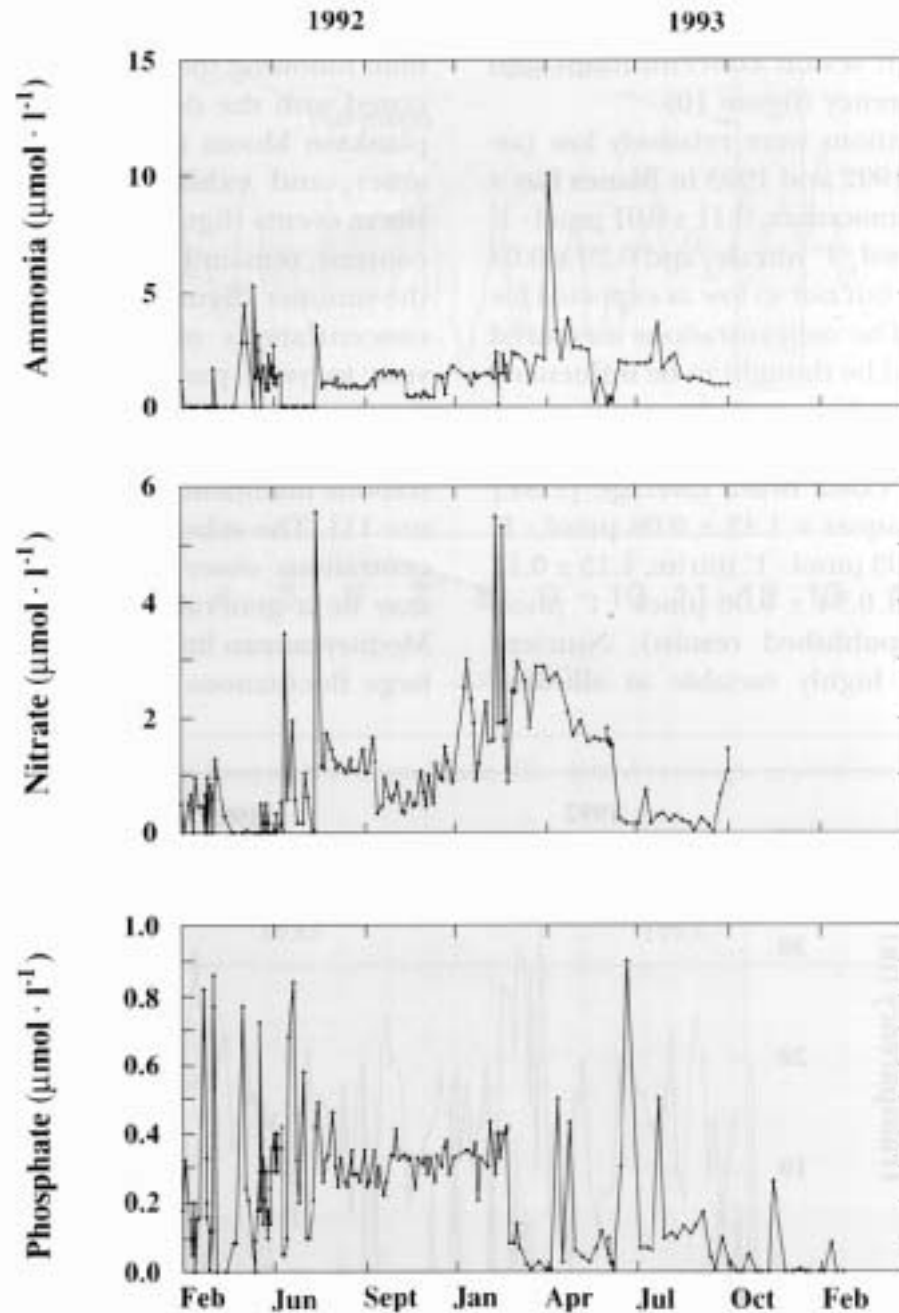
Two-year average
(in $\mu\text{mol l}^{-1}$):

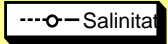
1.18 ammonium

0.11 nitrite

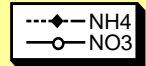
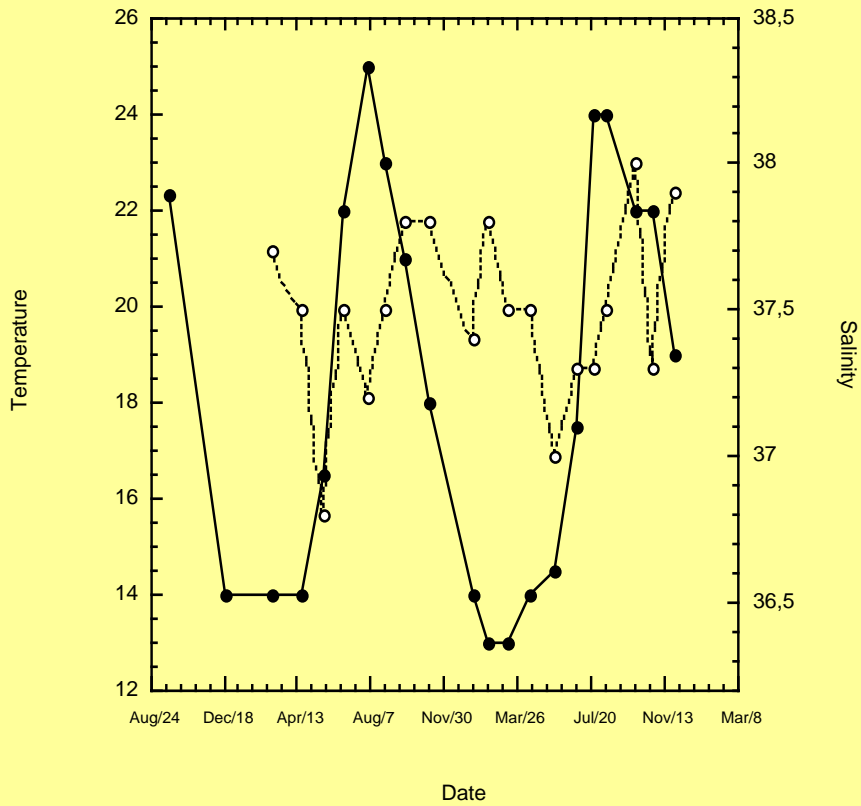
0.96 nitrate

0.29 phosphate

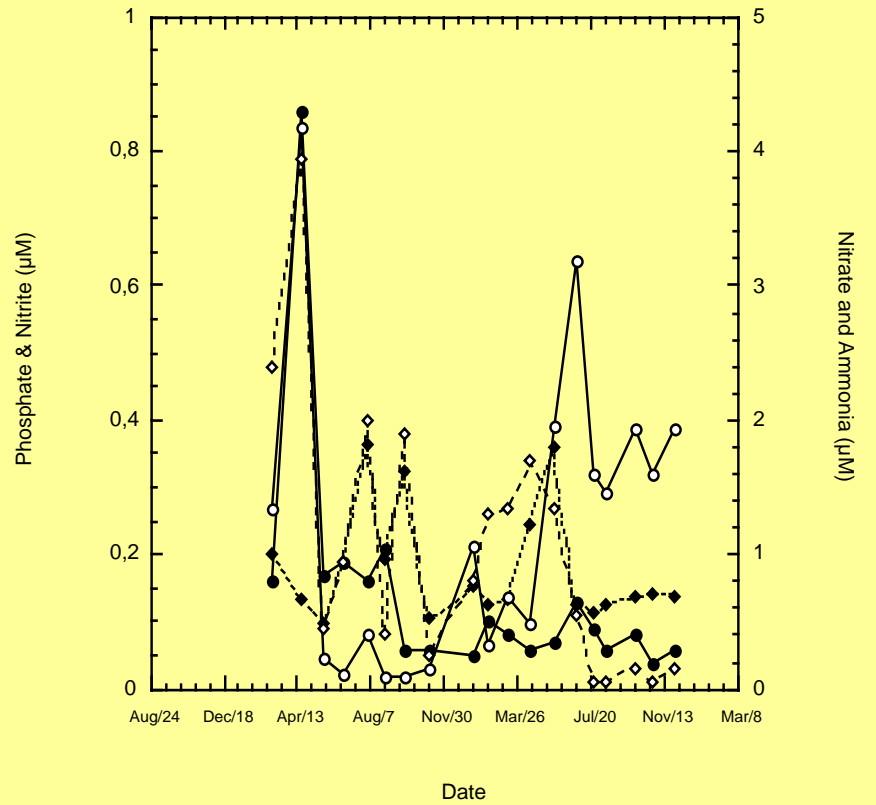




Blanes (2000-2003)



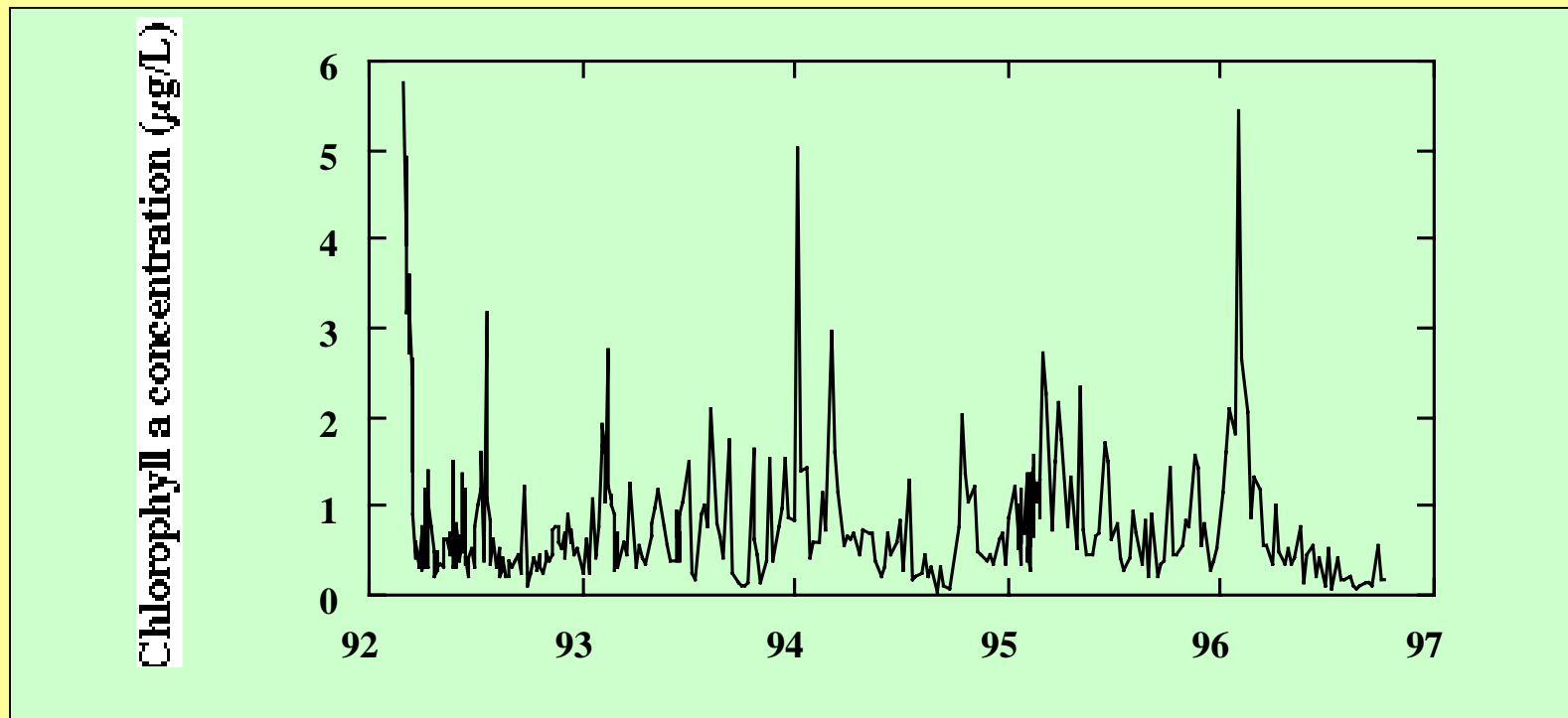
Blanes (2000-2003)



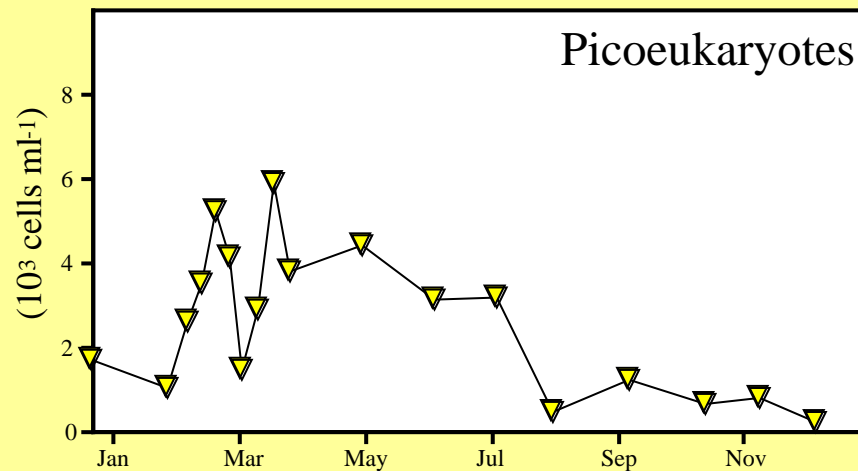
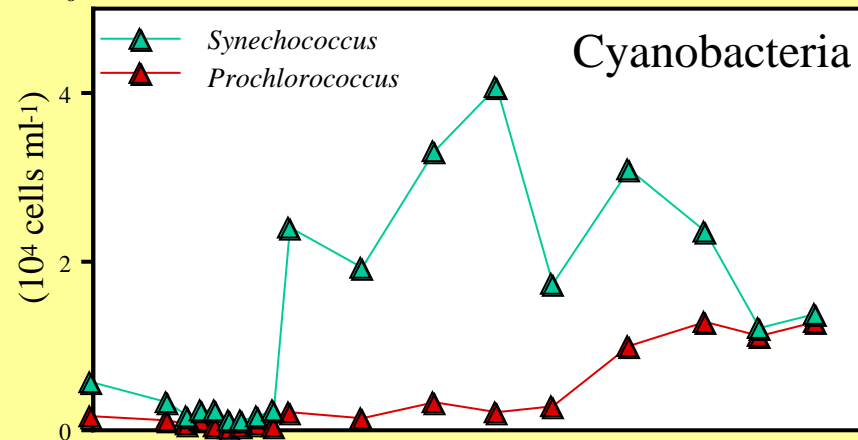
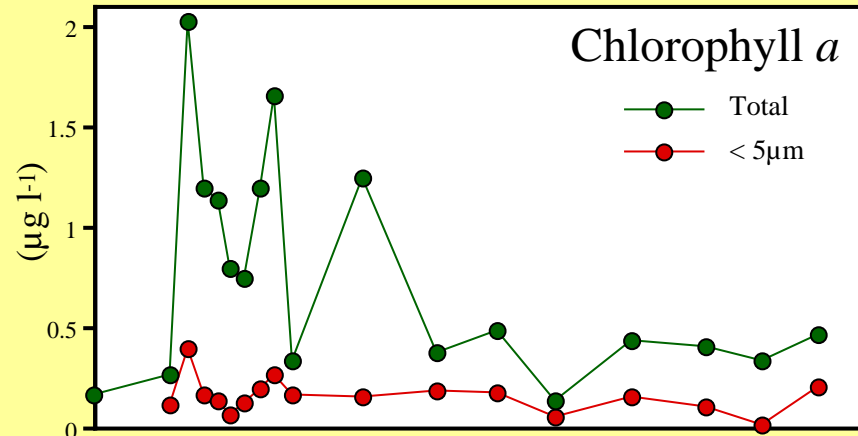
Seasonality of phytoplankton

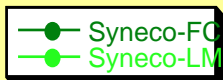
Main peak of chlorophyll *a* during winter, driven by high atmospheric pressures together with irradiances and temperatures higher than similar latitudes in the Atlantic

Smaller peaks in early fall

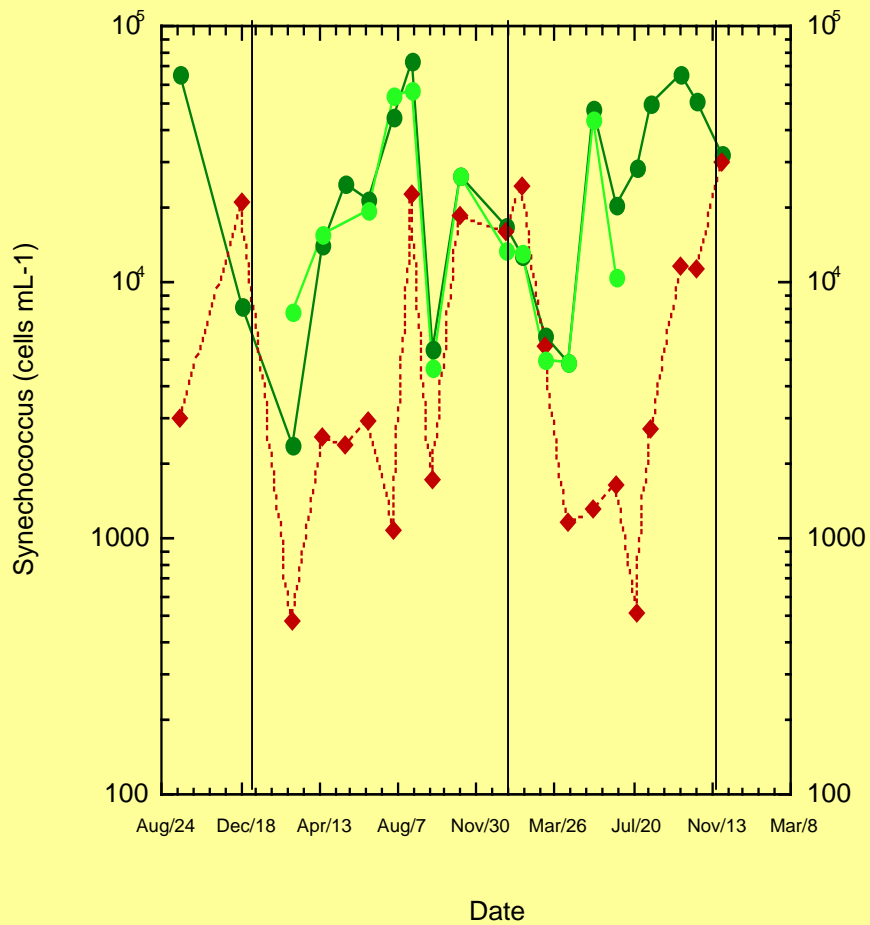


Seasonality of phototrophic microbes 1998

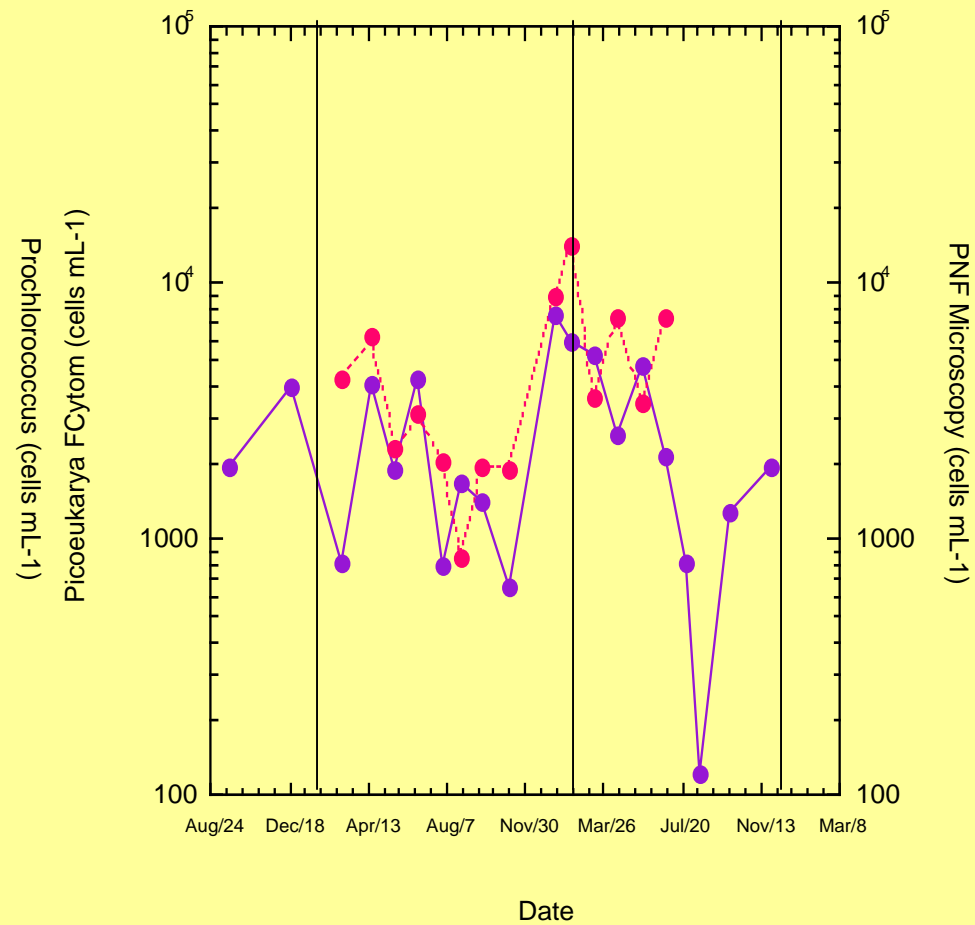




Blanes (2000-2003)

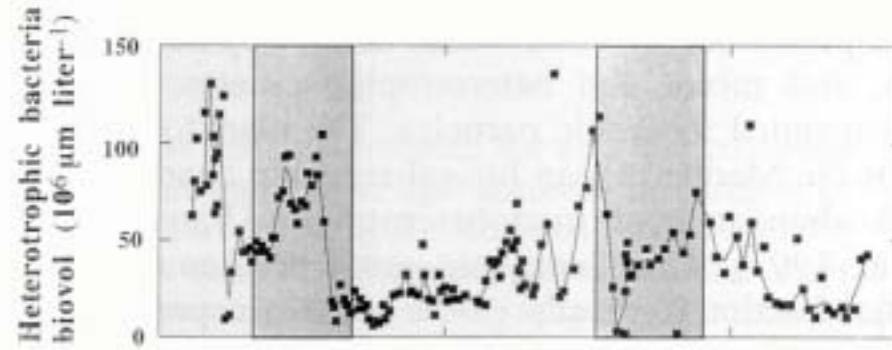


Blanes (2000-2003)



Seasonality of heterotrophic microbes 1993

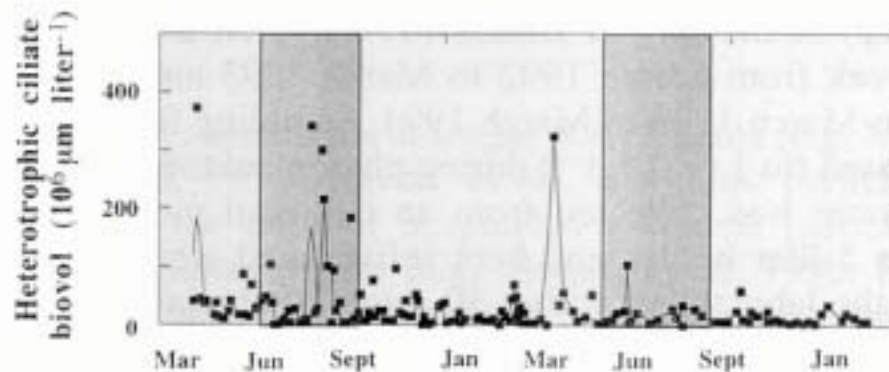
Bacteria



Flagellates

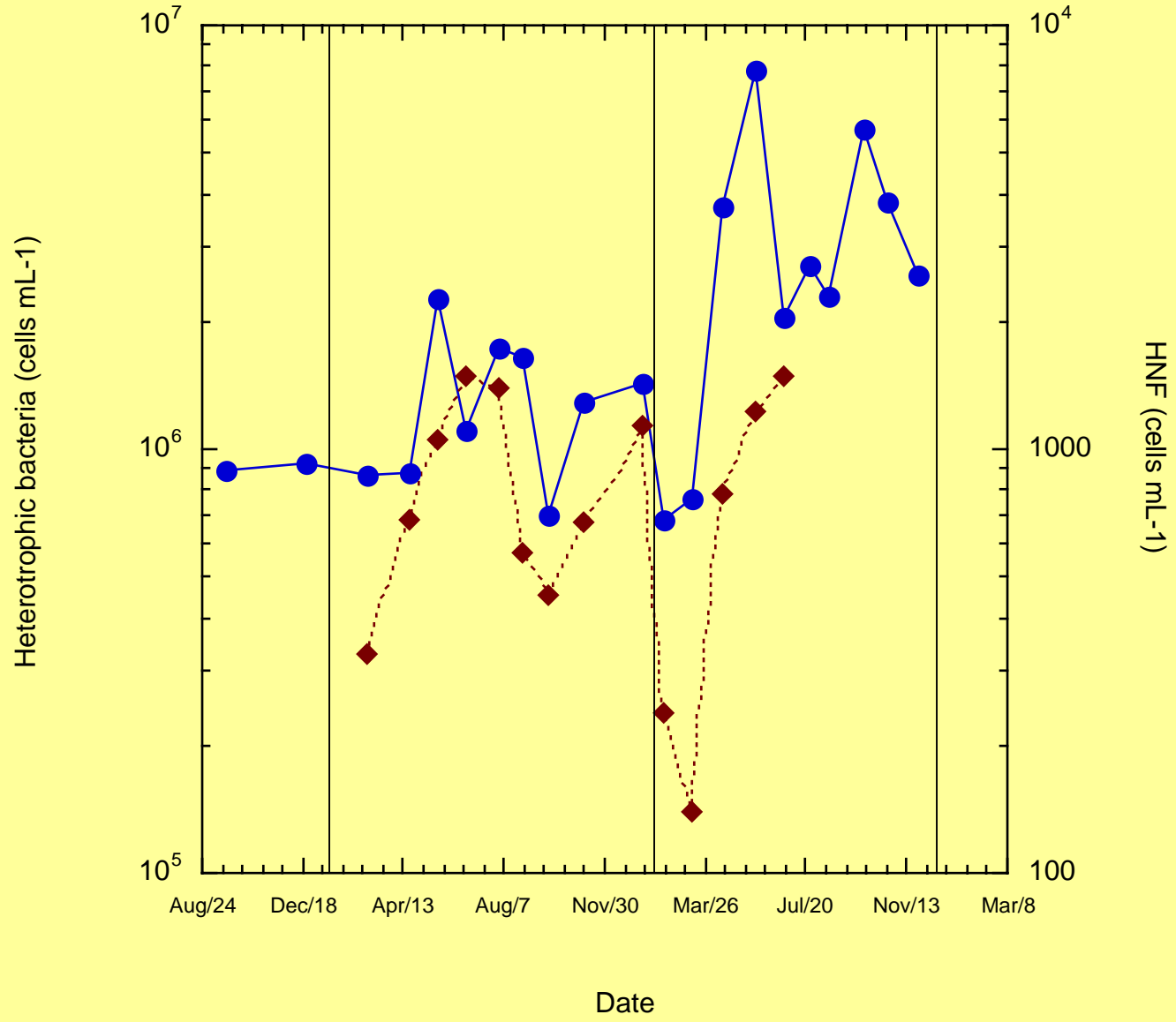


Ciliates

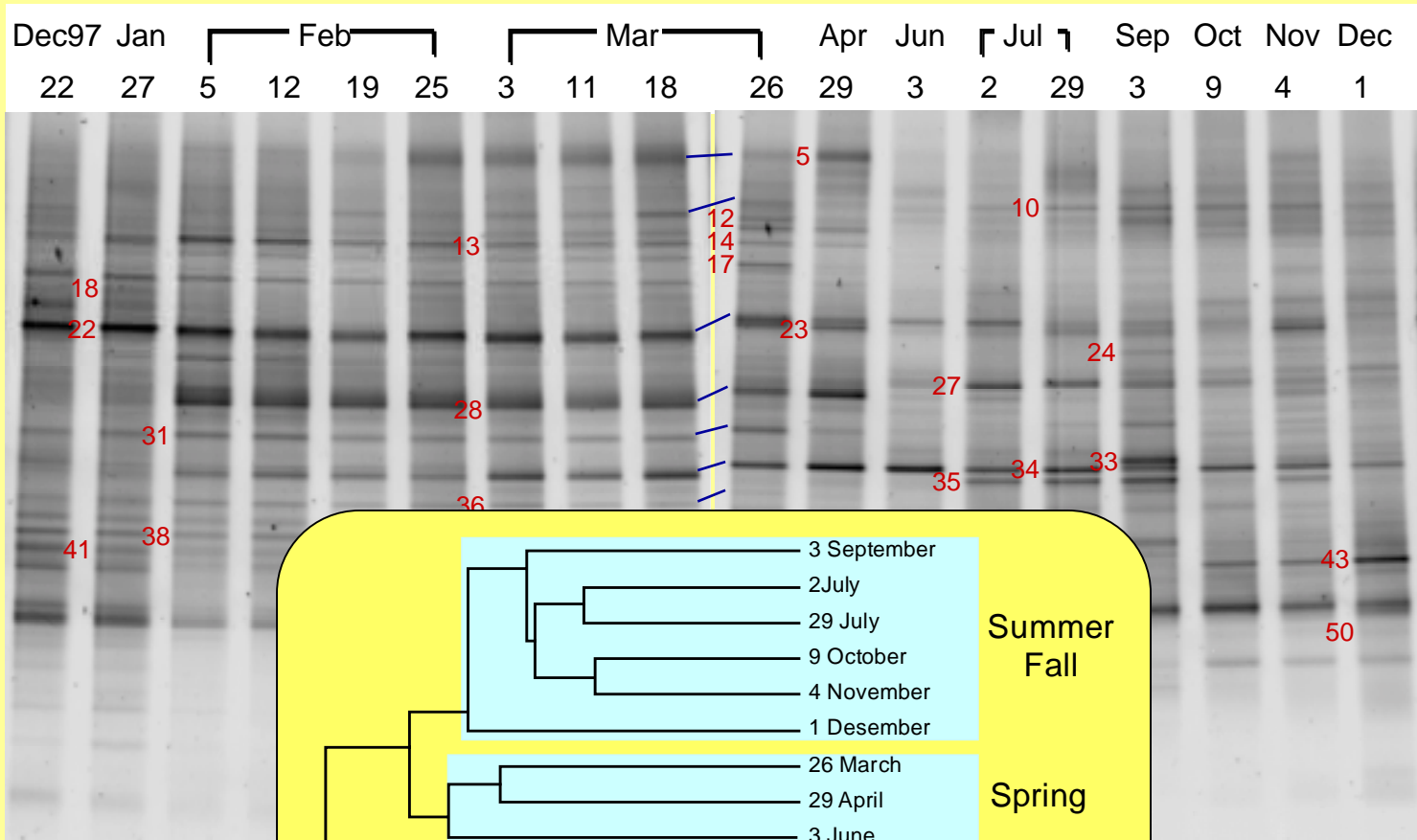


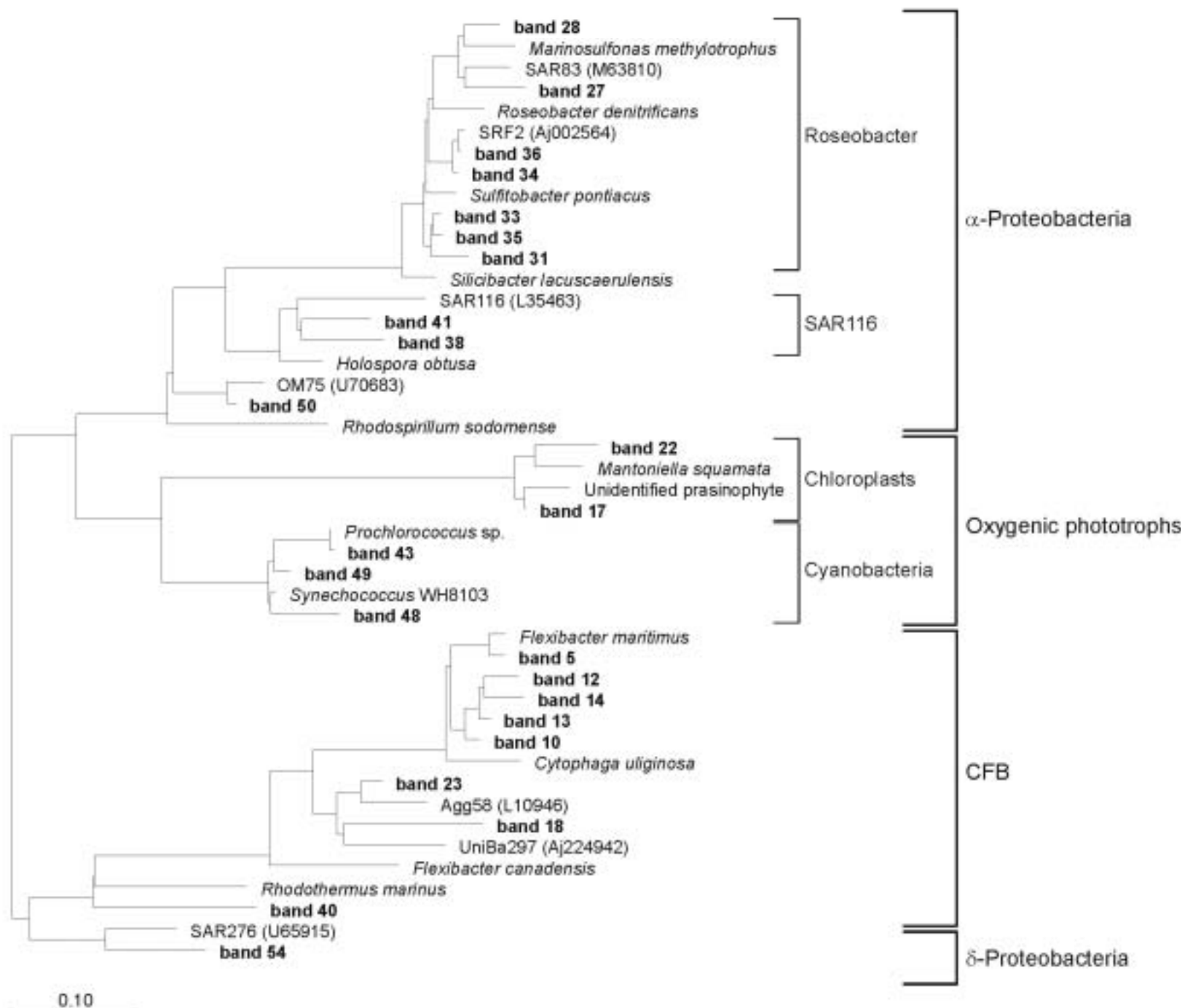


Blanes (2000-2003)

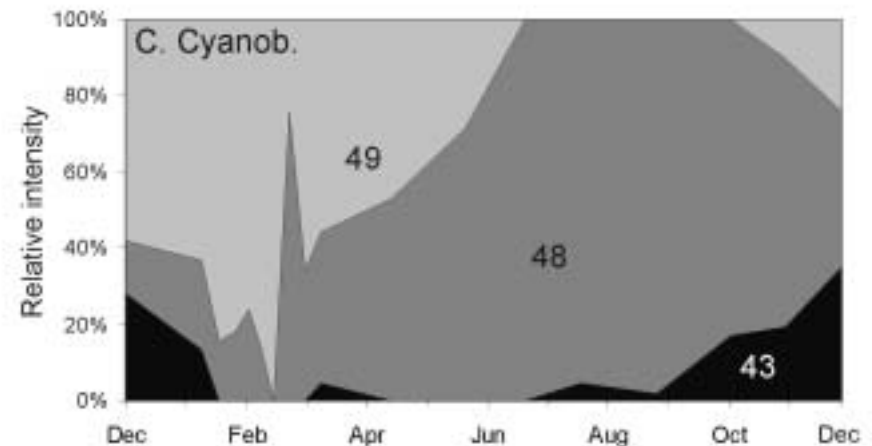
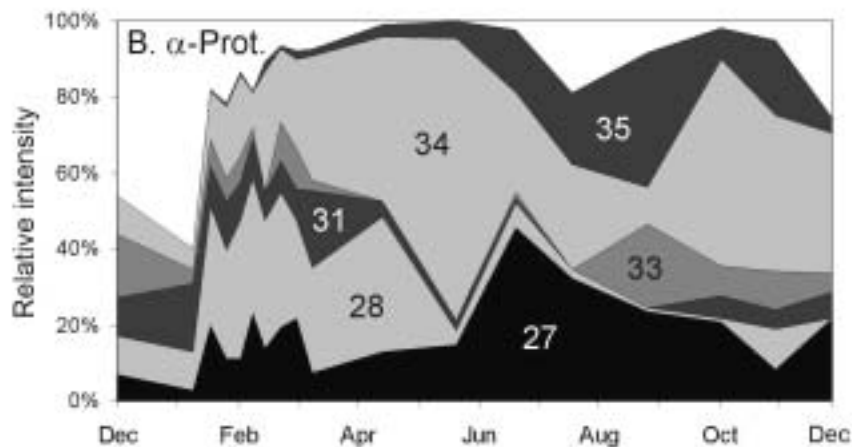
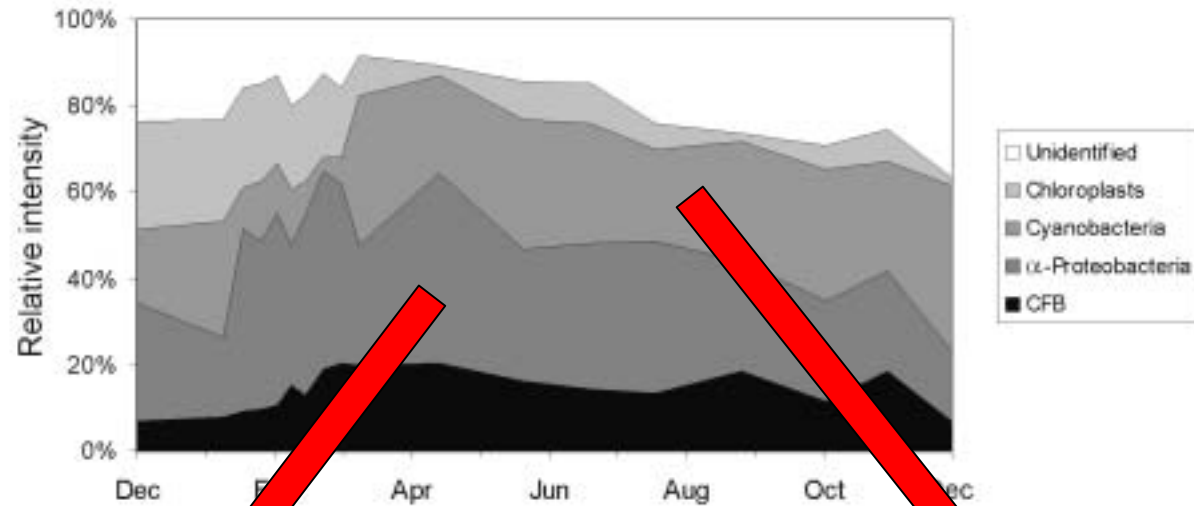


Seasonal succession of bacterioplankton 1998

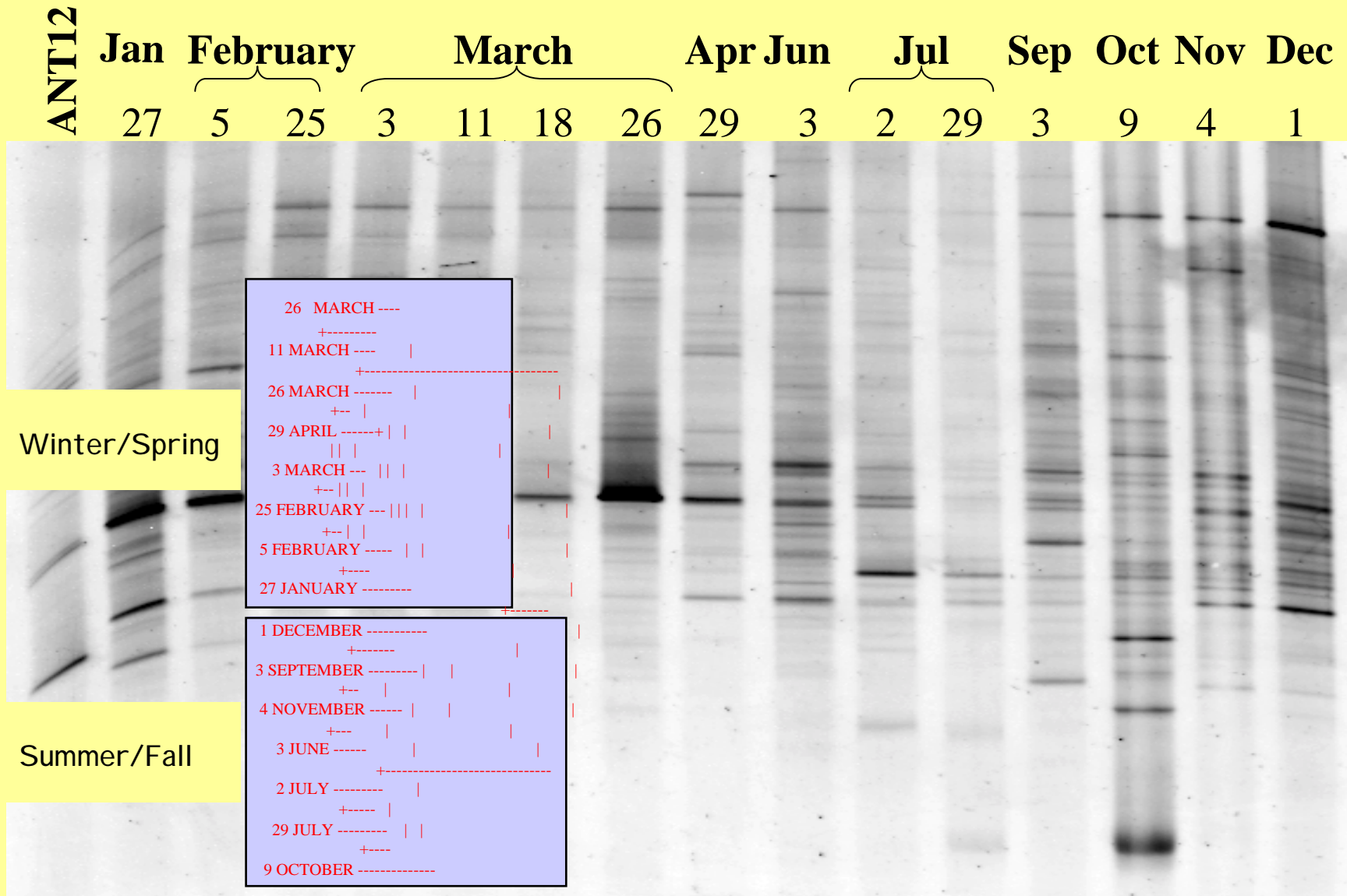




Temporal dynamics of bacterial groups and populations 1998



Seasonal succession of picoeukaryotes in Blanes 1998



DGGE with primers Euk1f and Euk516r