

Time-Series Oceanographic Study at the 'Estación Permanente de Estudios Ambientales'

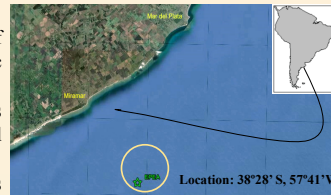
Instituto Nacional de Investigación y Desarrollo Pesquero, Mar del Plata, Argentina
EPEA - Antares



Project: 'Marine Plankton Dynamics and Climatic Change (DiPlamCC)'

Objectives

- To understand the variability in the dynamics and the diversity of plankton and environmental conditions in relationship to climatic changes.
- To obtain a time series of measurements of environmental variables (meteorological, physical and chemical) and plankton components (all size fractions).
- Elaborate a conceptual frame of the trophic structure of plankton and its temporal variations.
- To distinguish, in the long-term, local expected variability in oceanographic conditions from especial events; and try to determine if these are linked to global climate change.



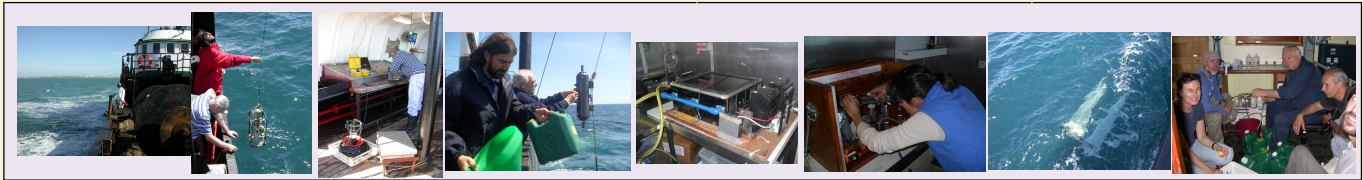
- Started: February 2000
- Frequency: monthly**
- Cruises on board INIDEP-vessels
- **unfortunate gaps

Project PI

Rubén M. Negri (INIDEP-Mar del Plata National University 'UNMDP')

Participants

- | | |
|---------------------------------------|-------------------------------------|
| Mario O. Carignan (INIDEP) | Nutrients |
| Georgina Cepeda (CIC) | Zooplankton |
| A. Daniel Cuscho Colleoni (INIDEP) | Chlorophyll a |
| Maria V. Diaz (CONICET - INIDEP) | Ichthyoplankton |
| M. Constanza Hozbor (INIDEP) | Bacterioplankton |
| Ezequiel Leonarduzzi (INIDEP) | Ichthyoplankton |
| Viviana A. Lutz (CONICET-INIDEP) | Bio-optics |
| Genelisa Molinari (INIDEP) | Physical Oceanography - Meteorology |
| Luciano Padovani (Student - CONICET) | Zooplankton |
| Marcelo Pajaro (INIDEP) | Ichthyoplankton |
| Silvia Perotti (INIDEP) | Bacterioplankton |
| Valeria Sogano (INIDEP) | Primary Production |
| Ricardo I. Silva (INIDEP) | Pico Phytoplankton |
| Guillermo Ruiz (NANO) | Bio-optics |
| Brenda Temperoni (UNMDP) | Zooplankton |
| M. Delia Vinas (CONICET-INIDEP-UNMDP) | Zooplankton |
| Carla Berghoff (MnD&T) | PP & CO ₂ |



In situ Measurements

Sample collection at discrete depths

Physical: • CTD profiles: Temperature, Conductivity

Optical:

- Surface Irradiance (PAR)
- Downwelling PAR profile
- Passive Fluorescence profile

Net tows:

- Phytoplankton (> 25 µm)
- Zooplankton (> 60 µm; > 200 µm)
- Ichthyoplankton (> 300 µm)

Chemical: • Oxygen (Winkler)
• Nutrients (multi-analyzer)

Biological:

- Chlorophyll-a total and Chl-a < 5 µm (spectrofluorometry)
- Phytoplankton (microscopy - molecular)
- Bacterioplankton (epifluorescence microscopy)
- Bio-optical:** (spectrophotometric)
 - Particulate material
 - Phytoplankton
 - Detritus
 - Chromophoric-Dissolved-Organic-Matter

Studies of annual and inter-annual variations in the following variables

Physical temperature, Salinity, Density

Meteorological Winds

Chemical Nutrients: Oxygen

Optical Surface Irradiance (I_0), Coefficient of attenuation of downwelling irradiance K_d (PAR), Depth of 1% ($Z_{1\% I_0}$), coefficient of absorption of total particulate material (a_t), coefficient of absorption of phytoplankton (a_p), coefficient of absorption of detritus (a_d), coefficient of absorption of chromophoric-dissolved-organic-matter (a_c)

Plankton

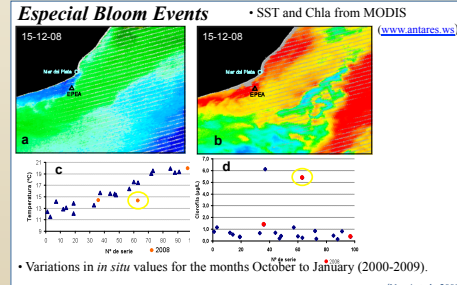
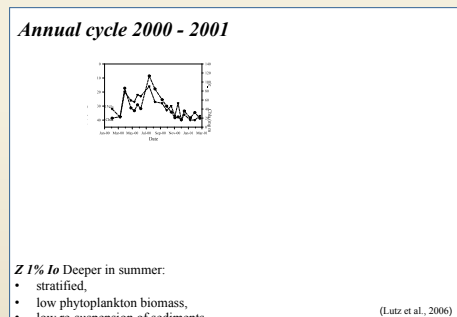
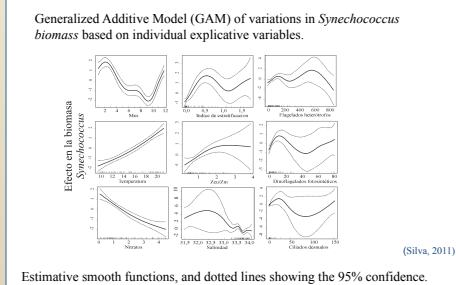
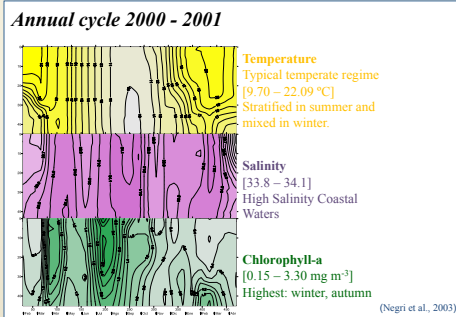
Phytoplankton 'Bulk properties'

- Chlorophyll-a as a proxy of phytoplankton biomass
- Primary Production (¹⁴C uptake)

Plankton structure

- Composition and abundance of all the fractions of autotrophic phytoplankton [ultra < 5 µm > nano < 20 µm > micro]
- Composition and abundance of bacterioplankton
- Composition and abundance of zooplankton
 - Biomass of copepods
 - Diversity of copepods using molecular techniques
 - Abundance of anchovy eggs and larvae
 - Nutritional state of anchovy larvae

Examples of Variations in Oceanographic Conditions



Future Challenges

- Human resources
- Dynamics: Physical (Advection, Turbulence) and Physiological (Primary Production)
- Buoy

Maintaining continuity in the frequency of field sampling!

Support from Scientific Agencies to these Key Studies!