

## LA CAML 3

### **Pacific-Antarctic influence on the Atlantic side of the Magellan Strait: Long term monitoring of Patagonian microbial communities at ca. 52°S.**

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Multidisciplinary, international efforts have led to a fair knowledge of microbial communities (pico-, nano- and microplankton) as to their structure, abundance, and processes involved in the global carbon cycle. Advanced, exhaustive studies on this field have been encouraged in many different sectors of the World Ocean, including those of difficult access such as the Antarctic. Curiously, for a few geographic areas adjacent to the latter region and under its strong, direct influence, studies of this kind are only in their initial stages. Such is the case of the Argentine shelf, which is characterized both by being one of the widest in the world and by its high diversity of marine ecosystems. In terms of dynamic processes (removal of CO<sub>2</sub> from the atmosphere through photosynthesis, nutrient recycling, coupling of phytoplanktonic and bacterioplanktonic production, food web interactions, transport of species by currents), this lack of knowledge prevents from establishing links and comparisons with adjacent oceanic regions (e.g., Southern Ocean, SE Pacific), as well as from constructing ecosystem models aimed to predict the patterns of carbon flux, among other limitations. Previous results from latitudinal transects extending from the Argentine shelf to the Southern Ocean during austral summer revealed that South Patagonian waters (mainly those along the coast of the Santa Cruz Province) favour the development of an extremely rich pseudo-estuarine ecosystem hosting high microbial and heterotrophic biomasses. These waters are under the influence of (1) nutrient-enriched Circumpolar waters, (2) a tongue of low-salinity, subantarctic waters proceeding from the Strait of Magellan (the most important choke point between the Atlantic and Pacific) and the Cape Horn Current, and extending northward up to 47°S, (3) frontal processes, and (4) human impact due to exploitation of living and non-living resources. Moreover, while the Atlantic side of the Magellan Strait exhibits the world's second largest tidal ranges, the Pacific end receives the direct effect from glacial continental ice melting during summer. Given the implications of this particular sector in local carbon fluxes, marine fisheries and Global Change, further critical questions arise: Is the Pacific-Atlantic link a potential catalyst of microbial activity on the Atlantic side of the Magellan Strait? Which are the environmental factors causing and regulating such high productivity levels? Is this phenomenon permanent, occasional or seasonal? To what degree do these unexpectedly high heterotrophic biomasses contribute to the local carbon flux and to Global Change? Which are the relationships between food-web structure, organic matter fluxes and climatic variability (e.g., ENSO)? What is the magnitude and fate of primary and secondary production in this area and how will it change as global temperature increases and atmospheric ozone becomes further depleted? These important questions need to be answered in the forthcoming years in order to understand both the dynamics of this unique environment and the connections between Polar and mid-latitude ecosystems (for instance, how and to what extent "open-ocean" Drake Passage waters impact on this environment, and how this impact compares with that caused by the "protected" chokepoint of the Magellan Strait, directly influenced by the ENSO cycles). As a starting point for this ample research field, the present project intends to initiate a long-term monitoring of microscopic communities and their role in biogeochemical cycles through a Time Series Station in neritic Patagonian waters (ca. 52°S). Such a station will be the core of in situ and experimental studies on seasonal and interannual variability of the local microbial community structure, cell size and abundance, key species and functional groups, red tides, alternation between bacterioplankton and net phytoplankton dominance, etc. Data will be analyzed in relation to the main physico-chemical and geological constraints of the sector (temperature and salinity fluctuations, wind, turbulence, local tidal ranges, re-suspension processes, land-coast and plankton-benthos-sediment interactions, quality, origin and concentration of DOM and POM, organic and inorganic nutrients, DO, pH, chlorophyll, among others) as well as to meso-scale phenomena such as ENSO (actual and past conditions). This approach is expected to help in the understanding of coastal ecosystem responses to natural and anthropogenic changes and to promote the development of disciplines such as Aquatic Microbial Ecology and Marine Biogeochemistry in the young generation of scientists.