

POLYCHAETE ASSEMBLAGES IN SW ATLANTIC: RESULTS OF “SHINKAI MARU” IV, V, X AND XI (1978- 1979) CRUISES IN PATAGONIA AND BUENOS AIRES.

ASOCIACIONES DE POLIQUETOS EN EL ATLÁNTICO SW: RESULTADOS DE LAS CAMPAÑAS “SHINKAI MARU” IV, V, X AND XI (1978-1979) EN PATAGONIA Y BUENOS AIRES.

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RESUMEN

El objetivo de este trabajo es estudiar la composición de poliquetos en una amplia zona de la plataforma argentina, entre 36°S y 55°S, a partir de muestras colectadas en fondos blandos con rastra Picard, durante las campañas “Shinkai Maru” desarrolladas en 1978-79. Dado que el área de estudio comprende las provincias Biogeográficas Magallánica y Argentina, se analiza si los resultados muestran diferencias en la composición de poliquetos en ambas Provincias. Se estudió un total de 816 individuos; 29 familias, representadas por 70 taxa, fueron identificadas. Las familias más frecuentes (36-57% estaciones de muestreo) y abundantes fueron Onuphidae, Nephtyidae y Ampharetidae, representadas por *Kinbergonuphis dorsalis*, *Aglaophamus* sp. y *Ampharete kerguelensis*, respectivamente. El Análisis de Agrupamientos, la prueba SIMPER y el ANOSIM mostraron dos conjuntos de especies en dos áreas bien definidas, de acuerdo con un límite aproximado a los 60m de profundidad, en correspondencia con las clásicas Provincias Magallánica y Argentina.

Palabras clave: poliquetos bentónicos, fondos blandos, riqueza específica, plataforma continental, Argentina, Provincia Magallánica.

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ABSTRACT

The aim of this paper is to study the polychaete composition from a wide area in the Argentinean shelf, between 36°S and 55°S, by means of samples collected from soft bottoms with Picard dredge, during the “Shinkai Maru” cruises developed in 1978-79. As the study area comprises both the Magellanic and Argentinean Biogeographic Provinces, we analyze if these results show differences in polychaete composition between both Provinces. A total of 816 individuals was studied; 29 families, represented by 70 taxa, were identified. The most frequent (36-57% sampling stations) and abundant families were Onuphidae, Nephtyidae and Ampharetidae, mainly represented by *Kinbergonuphis dorsalis*, *Aglaophamus* sp. and *Ampharete kerguelensis*, respectively. Cluster Analysis, SIMPER test and ANOSIM showed two different species assemblages in two well defined areas according to a nearly 60m depth boundary, in correspondence with the classical Magellanic and Argentinean Provinces.

Key words: continental shelf, Argentina, Magallanic Province.

INTRODUCTION

Current knowledge on spatial distribution of polychaetes in the Argentine Sea, including shelf areas in Patagonia and Buenos Aires, is related with the sampling effort exerted on different geographical areas (see Elías *et al.* 2006¹; Bremec & Giberto 2008). Available information mainly comes from oceanographic cruises developed by research vessels in shelf waters and monitoring in a few coastal localities. The information on species richness of other benthic invertebrate groups reflects a similar state of the art (López Gappa 2000; López Gappa & Landoni 2005; López Gappa *et al.* 2006).

The polychaetes from the Argentine continental shelf, a wide area in the southwestern Atlantic Ocean, have not been exhaustively studied; some papers on structure and distribution of benthic communities in this area excluded polychaetes due to insufficient taxonomic knowledge and consequently, difficulties in identification (Roux *et al.*, 1988; Bastida *et al.*, 1992). Most of the studies developed in the northern shelf (Orensanz 1972a-b; 1973a-b; 1974a-b-c-d; 1975; 1976; Rullier & Amoureaux 1979; Salazar-Vallejo & Orensanz 1991; Bremec & Lana 1994; Bremec & Giberto 2004; Böggemann & Orensanz 2007) give information on different polychaete

families or assemblages distributed in the Argentine Biogeographic Province. Other papers (Blake 1983; Bremec & Elías 1999; Hartman 1953; 1966; Hartmann-Schroeder 1983; Hartmann-Schroeder & Hartmann, 1962; Lana & Bremec 1994; Orensanz 1974e; 1990; Uschakov 1962; Wesenberg-Lund 1962; Bremec *et al.* 2000; Elías *et al.* 2003) mention subantarctic species from the Patagonian shelf (Magellanic Biogeographic Province) and the Strait of Magellan and Antarctica. In general, taxonomical and ecological information on the Strait of Magellan is available in papers produced during the last years (Sanfilippo 1994; Mariani *et al.* 1996; Gambi & Mariani 1999; Rozbacylo *et al.* 1997²; Montiel *et al.* 2005a; Montiel *et al.* 2005b).

The aim of this paper is to study the polychaete composition from a wide area in the Argentinean shelf, between 36°S and 55°S, by means of samples collected during the “Shinkai Maru” cruises developed in 1978-79. As the study area comprises both the Magellanic and Argentinean Biogeographic Provinces, we analyze if these results show differences in polychaete composition between both Provinces.

¹ Elías, R., Bremec, C., Lana, P. C. & J. M. Orensanz. 2006. Historia y perspectivas de los estudios sobre poliquetos del Mar Argentino. 1º Simposio Latino-Americano de Polychaeta, 3-12 Julio 2006, San Pablo, Brasil: 20.

² Rozbacylo, N., Ríos, C. & E. Mutschke. 1997. Poliquetos de la región de Magallanes: estado actual de su conocimiento a través de un análisis histórico y un estudio de caso. Resúmenes del Seminario-Taller Internacional sobre Investigación Biológica Marina en el área de Magallanes en relación con la Antártida, Univ. de Magallanes, Punta Arenas, Chile, 7-11 de abril, 1997: 75.

MATERIAL AND METHODS

The biological material was collected in the continental shelf bottoms of Argentina, between 36° - 55° S (Fig. 1) and 44 - 192m water depth. We analyze the polychaete composition in samples taken during the "Shinkai Maru" cruises IV, V, X and XI between 36° and 50° S with Picard dredge from soft bottoms and sieved with 1mm mesh screen (Bastida *et al.* 1992), while information between 50° and 55° S was taken from Bremec *et al.* (2000), who studied material from the same source. A total of 39 sampling sites, most of them distributed in

transects, are herein studied (Table 1). Specimens were fixed in 4% formaldehyde, preserved in alcohol 70% and identified at the lowest taxonomic level possible. The information on the composition of the benthic fauna, excluding polychaetes, was obtained in Bastida *et al.* (1992), while the percentages of occurrence of taxonomic groups (N° of individuals) were recalculated to show the relative dominance of polychaetes within the total benthic fraction. Cluster Analysis was applied to the Bray-Curtis similarity index assess polychaete assemblages in the study area and Similarity Percentage Analyses (SIMPER) was applied to describe the contribution of species

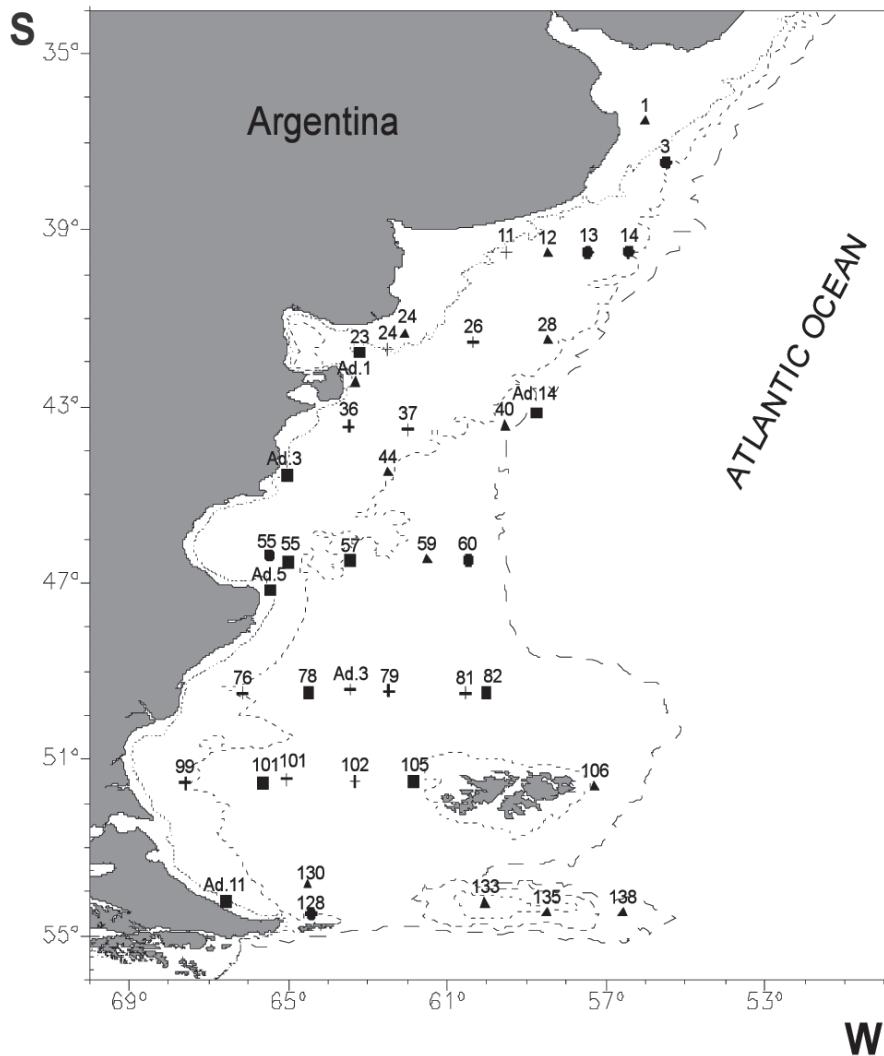


Fig. 1. Location of the sampling stations in Patagonian and Buenos Aires shelves. Cruises "Shinkai Maru" IV (●), V (+), X (▲) and XI (■).

TABLA 1. List of the sampling stations, latitude (S°), longitude (W°) and depth (m) in the study area.

“Shinkai Maru” cruises	Station	Latitude	Longitude	Depth
IV	3	37°28'00"	55°30'00"	80
IV	13	39°30'00"	57°28'00"	90
IV	14	39°29'00"	56°26'00"	90
IV	55	46°33'00"	65°31'02"	79
IV	128	54°30'00"	64°25'00"	111
IV	60	46°29'00"	60°28'00"	155
V	11	39°30'02"	59°30'03"	60
V	26	41°32'05"	60°21'06"	67
V	24	41°42'00"	62°30'00"	50
V	36	43°27'02"	63°28'09"	72
V	37	43°31'00"	61°59'05"	91
V	Ad.3	49°25'06"	63°26'06"	145
V	76	49°30'00"	66°09'06"	98
V	79	49°27'03"	62°28'05"	152
V	99	51°32'03"	67°35'05"	100
V	101	51°29'08"	65°32'02"	134
V	102	51°30'08"	63°10'05"	180
V	81	49°30'00"	60°32'02"	178
X	1	36°32'00"	56°01'00"	20
X	12	39°32'00"	58°28'00"	83
X	24	41°30'00"	62°31'00"	44
X	28	41°31'00"	58°28'00"	83
X	Ad.1	42°28'00"	63°19'00"	56
X	40	43°27'00"	59°32'00"	145
X	44	44°30'00"	62°29'00"	103
X	106	51°38'00"	57°18'00"	189
X	130	54°18'00"	64°25'00"	161
X	133	54°16'00"	60°03'00"	100
X	135	54°30'00"	58°30'00"	133
X	138	54°30'00"	56°35'00"	135
X	59	46°28'00"	61°30'00"	121
XI	82	49°28'00"	60°28'00"	188
XI	55	46°31'00"	65°27'00"	72
XI	57	46°30'00"	63°26'00"	115
XI	Ad.3	44°34'00"	65°01'00"	82
XI	Ad.5	47°04'00"	65°27'00"	70
XI	78	49°29'00"	64°29'00"	120
XI	Ad.14	43°33'00"	59°50'00"	116
XI	23	41°46'00"	63°13'00"	65
XI	101	51°24'00"	65°29'00"	135
XI	105	51°29'00"	61°50'00"	192
XI	Ad.11	54°13'00"	66°33'00"	55

to the dissimilarity between groups of stations. The Analysis of Similarities (ANOSIM) was carried out between samples located in the Argentinean (less than ~60m depth, stations SMV 11 and 24, SMX 1, 24 and Ad1, SMXI 23) and Magellanic Provinces (rest of stations) (Seminario sobre biogeografía de los

organismos marinos 1964, Boschi 2000) to analyze polychaete distribution patterns, considering the null hypothesis of no differences between Provinces. We used PRIMER version 6.1 (Clarke & Gorley 2006) with transformed (fourth root) abundance and presence-absence data, excluding unique findings.

RESULTS

The relative dominance (n° of individuals) of polychaetes in the samples collected in the Argentinean shelf was 12.3% (816 individuals), after molluscs (43.7%), crustaceans (23.2%) and echinoderms (20.7%). The total number of families identified was 29 (Table 2, Fig. 2). The most frequent (36-57% stations) and abundant families were Onuphidae, Nephtyidae and Ampharetidae, mainly

represented by *Kinbergonuphis dorsalis* (Ehlers, 1897), *Aglaophamus* sp. and *Ampharete kerguelensis* (McIntosh, 1885) respectively. Polychaetes were represented by 70 taxa, 35 of them identified at species level (Table 2). The total number of taxa with unique presence was 31, and 24 of them were identified at generic or family level.

Both cluster analyses among sites show one group of sampling stations with the presence of species largely distributed in the Patagonian and Buenos Aires

TABLE 2: List of the polychaete taxa found in the study area (Unid= Unidentified).

FAMILY	SPECIES
EUPHROSINIDAE	<i>Euphrosine armadilloides</i> Ehlers, 1900
APHRODITIDAE	<i>Aphrodisia longicornis</i> Kinberg, 1855
POLYNOIDAE	<i>Harmothoe</i> sp. 1 <i>Harmothoe</i> sp. 2
SIGALIONIDAE	<i>Sigalionidae</i> unid.
GLYCERIDAE	<i>Glycera americana</i> Leidy, 1855 <i>Glycera capitata</i> Orsted, 1842 <i>Glycera</i> sp. <i>Hemipodus</i> sp.
GONIADIDAE	<i>Glycinde</i> sp.
PHYLLODOCIDAE	<i>Paranaitis</i> sp. <i>Phyllodoce patagonica</i> (Kingberg, 1866) Phyllodocidae unid.
NEREIDIDAE	<i>Eunereis patagonica</i> (McIntosh, 1885)
SYLLIDAE	<i>Nereididae</i> unid. <i>Syllis (Syllis) magellanica</i> Augener, 1918 <i>Syllis (Langerhansia) anops</i> Ehlers, 1897 <i>Syllis</i> sp. <i>Typosyllis</i> sp.
NEPHTYIDAE	<i>Aglaophamus</i> sp. <i>Nephtys magellanica</i> Augener, 1912 <i>Nephtys</i> sp.
EUNICIDAE	<i>Eunice pennata</i> (O. F. Muller, 1776)
ONUPHIDAE	<i>Eunice magellanica</i> McIntosh, 1885 <i>Kinbergonuphis dorsalis</i> (Ehlers, 1897)
OENONIDAE	<i>Nothria anoculata</i> Orensanz, 1974 <i>Drilonereis tenuis</i> (Ehlers, 1901)
LUMBRINERIDAE	<i>Notocirrus lorum</i> Ehlers, 1897 <i>Notocirrus virginis</i> (Kinberg, 1865) <i>Lumbrineris cingulata</i> (Ehlers, 1897) <i>Lumbrineris</i> sp.
CHAETOPTERIDAE	<i>Phyllochaetopterus socialis platensis</i> Hartman, 1953
SPIONIDAE	<i>Spiophanes</i> sp.
ORBINIIDAE	<i>Phylo felix</i> Kinberg, 1866 <i>Scoloplos</i> sp.
CIRRATULIDAE	<i>Orbiniidae</i> unid.
FLABELLIGERIDAE	<i>Cirratulidae</i> unid. <i>Piromis capitata</i> (Nonato, 1966)

PARAONIDAE	Paraonidae unid.
OPHELIIDAE	<i>Ophelina gymnopyge</i> (Ehlers, 1908) <i>Ophelina scaphigera</i> (Ehlers, 1901) <i>Ophelina syringopyge</i> (Ehlers, 1901) <i>Armandia</i> sp. <i>Euzonus</i> sp.
SCALIBREGMATIDAE	<i>Travisia kerguelensis</i> McIntosh, 1885 <i>Travisia olens</i> Ehlers, 1897
MALDANIDAE	<i>Lumbriclymenella robusta</i> Arwidsson, 1911 <i>Rhodine antarctica</i> Gravier, 1907 <i>Euclymene</i> sp. <i>Nicomache</i> sp.
AMPHARETIDAE	Euclymeninae unid. Lumbriclymeninae unid. Maldanidae unid. 1 Maldanidae unid. 2 <i>Ampharete kerguelensis</i> (McIntosh, 1855)
TEREBELLIDAE	<i>Melinna cristata</i> (Sars, 1851) Ampharetidae unid. Terebellidae unid. <i>Pista correntis</i> McIntosh, 1885 Thelepiniae unid.
TRICHOBRANCHIDAE	<i>Terebillides malvinensis</i> Bremec & Elías, 1999
SABELLARIIDAE	<i>Idanthyrsus macropaleus</i> (Schmarda, 1861)
SABELLIDAE	<i>Perkinsiana antarctica</i> (Kinberg, 1867) <i>Euchone</i> sp. <i>Perkinsiana</i> sp.
SERPULIDAE	Fabriciinae unid. Sabellinae unid.1 Sabellinae unid. 2 <i>Serpula narconensis</i> Baird, 1865
OWENIIDAE	<i>Owenia tegula</i> (Kinberg, 1867)

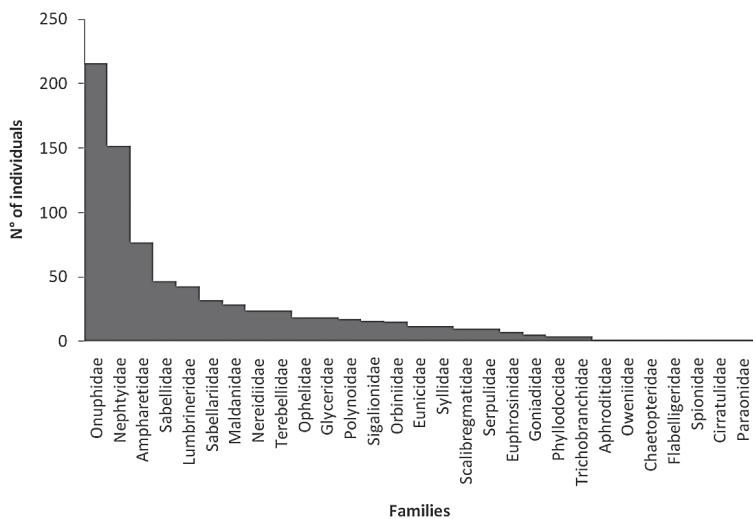


Fig. 2. Polychaete families identified in the Argentinean shelf during this study. Bars indicate the number of individuals.

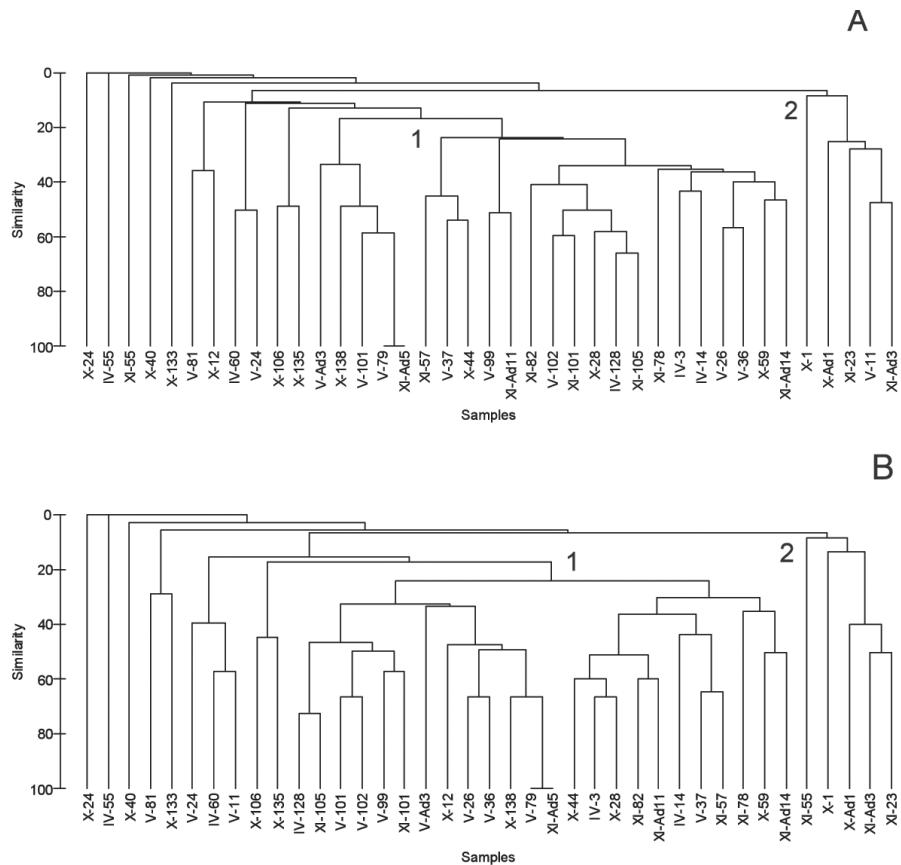


Fig. 3. Dendograms among sampling stations in the Argentinean shelf during this study. Abundance data (A), Presence-Absence data (B).

shelves (Fig. 3 A and B, group 1). Coastal stations were clustered in separate groupings (Fig. 3 A and B, group 2) or showed lower similarity (stations 24 and 55). The SIMPER test (presence-absence data) resulted in an average dissimilarity = 94.71% between both groups. *K. dorsalis*, *Aglaophamus* sp., *A. kerguelensis*, *Perkinsiana antarctica* (Kinberg, 1867), *Idanthyrsus macropaleus* (Schmarda, 1861) and *Travisia kerguelensis* McIntosh, 1885 contributed 88% to the average similarity of group 1 (= 32%). The species *Eunice pennata* (O.F. Muller, 1776), *Harmothoe* sp.1, *Glycera americana* Leidy, 1855 and *Drilonereis tenuis* (Ehlers, 1900) contributed 91% to the average similarity of group 2 (= 14%). The results of the ANOSIM analysis between stations from Argentinean and Magellanic Provinces (Global R = 0.334; p = 0.01) lead to the rejection of the null hypothesis and show differences in the polychaete species composition.

DISCUSSION

This study gives faunistic information on benthic assemblages from a wide geographical area in the SW Atlantic, between 36° and 55°S. The relative abundance of polychaetes (n° of individuals) within the benthic fraction herein analyzed did not reach a high average value (12%) for the whole study area. Previous studies indicate noticeable differences between southern Patagonian shelf and Straits of Magellan, where 9% and 35-67% in dominance of polychaetes were estimated respectively (Gambi & Mariani 1999, Bremec *et al.* 2000, Thatje & Brown 2009). This data show that polychaetes have a relatively limited quantitative importance in the soft bottoms of the study area, although they are expected to be an abundant taxon in this type of substrate (Knox & Lowry 1977, Hutchinson 1998). Regarding the number of taxa found in ecological

surveys developed with the same sampling device in the study area, the contribution of polychaetes is neither dominant. The taxa herein identified represent 13% of the mollusk, echinoderm, bryozoan (Bastida *et al.* 1992) and polychaete species (this study) collected during "Shinkai Maru" cruises. Similar results were obtained by Roux *et al.* (1993) and Sánchez *et al.* (2010) in areas between 38°S and 44°S and 38 to 218m depth, in which polychaetes conformed 16-19% of the collected species.

The polychaete species richness in our study developed in Atlantic waters was 72. Historical information on polychaete taxonomic research for the Pacific and Atlantic Magellan region gives a total of 431 species, from which 25% occurred as single findings and the most speciose family was Syllidae (Montiel *et al.* 2005). In the present sampling, nearly half of the taxa collected were unique records and the higher species richness corresponded to Maldanidae (8 taxa, see Table 2), while the most abundant families were less diversified: Onuphidae, Nephtyidae and Ampharetidae. The frequent group of species, mainly represented by *Kinbergonuphis dorsalis*, *Aglaophamus* sp. and *Ampharete kerguelensis*, were largely distributed in the whole study area. They come from samples collected at more than 70m depth (with the exception of station Ad11, 55m depth, located at Tierra del Fuego, see Figs. 1 and 3) together with other three well represented species: *Perkinsiana antarctica*, *Idanthyrsus macropaleus*, *Travisia kerguelensis*. Sediment composition on the continental shelf is dominated by sands and silts < 2mm, at depths between 50 and 200m (Bastida *et al.* 1981, 1992). The present sampling area is homogeneous when compared with the other Magellanic habitats, channels and fjords on the Pacific (42°S-55°S) and the Straits of Magellan (52°58'-53°43'S and 70°55'-70°71'W), both with heterogeneous and patchy types of sediments (see Montiel *et al.* 2005). Environmental differences, *i.e* higher habitat diversity and wider depth range, favours the higher dominance and diversity of austral species when compared with the homogeneous habitats sampled in Patagonia (Mariani *et al.* 1996; Gambi & Mariani 1999, Bremec *et al.* 2000, Montiel *et al.* 2005) and Buenos Aires shelves. The group of stations between 36° - 47° S and 44 – 65m depth (see Figs. 1 and 3) was characterized by species of different families than those above referred: *Eunice pennata*, *Harmothoe* sp.1, *Glycera americana* and

Drilonereis tenuis. The sediments in these areas are composed by a coarse fraction > 2mm that prevails near the coast, at depths lower than 50m (Bastida *et al.* 1981, 1992). Only *G. americana* was known from Brazil to Golfo Nuevo (43°S); both *D. tenuis* and *E. pennata* were previously recorded in subantarctic waters (Orensanz 1990; Orensanz *et al.* in prep.). Shallower and more samples are needed in order to properly characterize the faunal components in the Argentine Province.

These results show the presence of different assemblages in the two mentioned areas and are, in general, in agreement with the ANOSIM developed between stations located at the classical Magellanic and Argentinean Provinces (see Seminario sobre biogeografía de los organismos marinos 1964, Boschi 2000, López Gappa 2000). It must be pointed out that although nearly 60m depth was considered in this study to sort the sampling stations for the ANOSIM, the limits of these provinces are difficult to establish (see Boschi, 2000). In this study, both abundance and presence of the species defined the clusters of stations. Unique presences were excluded in this analysis, and hence developed with 38 taxa; however the significant difference between them was revealed, as well as the affinities of the deeper area with the polychaete fauna that characterizes the Atlantic side of the tip of South America, Magellanic subregion suggested by Montiel *et al.* (2005). The present results also indicate the presence of the same abundant assemblage of species in soft bottoms of middle and deep shelf, extending northwards at least at 36°S.

Regarding the more coastal area (selected as Argentine Province in this study), these analyses show affinities of the stations distributed between 36°S and reaching nearly 47°S (station 55); this latitude exceeds the general scheme that indicates faunal transition at 42°-43°S. Although the number of locations sampled at lower depths, between 44 and 65m, is scarce, we stress out the significant differences between the areas herein recognized. Moreover, it was carried out with biological material sampled with the same dredge and spatially distributed in transects, in order to cover the study area as regularly as possible. Future studies considering historical data of polychaete taxonomy in the Argentine Province, and transitional zones of distribution, like Peninsula Valdés (42°S) and the

Río de la Plata estuary (35° S), deserve detailed study in the case of polychaetes. In example, species of *Sabellaria* well known for Brazilian localities, were recorded in Buenos Aires waters, although the latter zone was considered a zoogeographical barrier in the distribution of marine fauna between Brasil and Argentina (Bremec & Giberto 2004).

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