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LETTER TO THE EDITOR

Benthic diversity in a submarine canyon in the Argentine sea

Diversidad bentónica en un cañón submarino en el mar argentino

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INTRODUCTION

The extensive Argentinean continental shelf is dominated by soft sediments, mainly composed of sand with minor quantities of shells and mud. Its external edge, where the continental slope starts, varies between 110 and 165 m depth approximately and usually associated with the 200 m isobath. The continental slope shows many recognized deep submarine canyons, varying in depth and extension (Parker et al. 1997). The characterization of benthic assemblages in the Argentine sea mainly comes from shelf areas (Bastida et al. 1992, 2007, Roux et al. 1993, 2005). More recent contributions deal with the invertebrate by-catch associated with the Patagonian scallop *Zygochlamys patagonica* (King & Broderip, 1832) fishery in shelf-break frontal areas (Bremec & Lasta 2002, Bremec et al. 2000, 2008, Schejter & Bremec 2007, Schejter et al. 2006, 2008, Escolar et al. 2009), mainly between 90 and 140 m depth.

The current knowledge of bottoms deeper than 200 m in the Argentine sea is scarce (see Bremec 1992, Bastida et al. 2007). The faunal composition from locations sampled during different cruises and distributed along the wide latitudinal gradient between 39º and 53º S was included in the ecological analysis of data from the Buenos Aires (one sampling site, Roux et al. 1993) and Patagonian shelves (seven sampling sites, Roux et al. 2005).

During a monitoring cruise (BIP "Oca Balda", INIDEP) developed in 2005 for stock assessment of *Z. patagonica*, two submarine canyons were detected by means of a multibeam SIMRAD EM1002 sonar and one of them was sampled. The aims of this paper are to communicate novel information about the benthic species composition in deep Argentinean bottoms and to discuss faunal affinities with the neighbouring Patagonian scallop fishing grounds located at lower shelf depth.

The material was collected in April 2005 at a canyon located at 43º35' S and 59º33' W, 325 m depth, on board the BIP Oca Balda (INIDEP). A sample of 39 kg was obtained using a 2.5 m mouth opening dredge, 10 mm mesh size. Material was frozen on-board and fully sorted at laboratory. The species were identified, quantified and weighted.

Eighty six taxa of mega and macroinvertebrates were found in the surveyed canyon (Table 1). Twenty echinoderm species were collected in the canyon at 325 m depth, together with tunicates, brachiopods, pycnogonids, foraminifers and bryozoans. *Z. patagonica* contributed with nearly 20 % of the total biomass; other small bivalves and gastropods reached only 0.5 %. Echinoderms and sponges followed molluscs in wet weight (16 % and 10 %, respectively). Cnidarians, decapods and tubes of the worm *Chaetopterus* sp. reached nearly 5 % of the total sample biomass. Mollusc shells represented 7.5 % of the sample in wet weight; the main species identified were *Z. patagonica*, *Eurhomalaea exalbida* (Reeve, 1836), *Ameghinomya antiqua* (King, 1832), *Adelomelon ancilla* (Solander, 1786), Volutidae, *Fusitriton magellanicus* Röding, 1798, *Buccinanops* sp., *Petricola dactylus* d'Orbigny, 1823, *Calyptraea pileolus* (d'Orbigny, 1841), *Limatula pygmaea* (Philippi, 1845) and Mactridae. Damaged biological material, composed by rests of invertebrates, reached 30 % (nearly 10 kg) of the total sample.

The faunal composition found in the surveyed canyon is similar to that referred in adjacent external shelf areas, mainly between 90 and 130 m depth. Nearly 90 % of the identified taxa are currently collected in the Patagonian scallop beds influenced by a shelf-break productive front (Bremec & Lasta 2002, Schejter & Bremec 2007). However, taxonomic richness inside canyon was higher than in the surrounding fishing ground identified in the Patagonian scallop fishery as “Unidad 9” (Res. 9/2006, CFP), considering the colonial fauna as single taxa (sponges, Hydroids, bryozoans and ascidiaceans) (Bremec et al. 2009). Due to its topography, fishery vessels do not trawl the canyon or surrounding areas, which remained undisturbed. Many studies have been performed regarding comparisons of faunal composition and community structure in marine canyons and adjacent areas, but whether the richness and biomass of fauna inside the canyon was higher (Ramírez-Llondra et al. 2008), similar (Houston & Hendrich 1994, Ramírez-Llondra et al. 2010) or lower (Maurer et al. 1994) than in the adjacent area depended on differences in environmental and habitat factors such as fishing disturbance, rate of organic matter deposition and sea floor morphology. In this study case, the biomass of Patagonian scallops in the fishing grounds distributed along the 100 m isobath in the Argentinean shelf usually exceeds 20 % of the total caught in commercial hauls, estimation that varies due to the patchy distribution of the species.

Regarding molluscs of commercial value distributed in deep waters, only *Z. patagonica* was previously found at 960 m depth (Waloszek 1991), and occasionally the gastropods of the genus *Adelomelon*, *Odontocymbiola* and *Zidona* in locations deeper than 200 m (Bremec et al. 2001 and references therein), without showing exploitable densities. Among Echinoderms, only the ophiuroids *Gorgonocephalus chilensis* (Philippi, 1858) and *Ophiacantha vivipara* Ljungman, 1870 were previously recorded between 212 and 256 m depth in seven sampling locations in Patagonian waters between 47° and 53° S, together with other Magellanic species (Roux et al. 2005).

In general, the identified bioclasts correspond to species frequently distributed in coastal or middle shelf waters, what suggests their transport to deeper areas through the submarine canyons (Parker et al. 1997), phenomenon already described in other regions (i.e., Shepard et al. 1979, Puig et al. 2003, Turcheto et al 2007, Flexas et al. 2008). Usually, submarine canyons are very active and productive systems in the ocean hosting a wide variety of benthic, demersal and pelagic taxa; they provide favourable areas of recruitment and maintenance of benthic megafauna species (Sardá et al. 1994, Zuñiga et al. 2009) not only because of the high production rates due to currents, oceanographical features and morphology itself, but also because they provide refuges and protected areas in some cases where fishing disturbance is not acting. This seems to be the present study case, in which the provided results represent the only information about fauna in submarine canyons of the Argentine sea.

In septentrional Argentinean shelf areas, the composition of benthic species also indicates its Magellanic origin and wide distribution in depths higher than 90 m. The invertebrates *Epicodakia falklandica* Dell, 1964, *Amphiura eugeniae* (Ljungman, 1867), *Pseudechinus magellanicus* (Philippi, 1857) and *Hiatella meridionalis* (d’Orbigny, 1846) characterized areas located at 39°03’ S - 55°41’ W, nearly 200 m depth (Roux et al. 1993). The latter two species were also recorded in the studied canyon, where both Magellanic and Antarctic components were found. For example, the ophiurid *Astrotoma agassizi* Lyman, 1875 (Table 1) was the most frequent species in the macrobenthic assemblage collected around South Georgia and Shag Rocks during 1994 (Roux et al. 2002), and the sponge *Guitarra dendyi* (Kirkpatrick, 1907) (Table 1) was only known from Antarctica (Bertolino et al. 2006) before the present sampling.

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TABLE 1

Taxa collected in the submarine canyon, Argentina.

Taxa colectados en canon submarine, Argentina.

Porifera
Craniella leptoderma (Sollas, 1886)
Guitarra dendyi (Kirkpatrick, 1907)
Myxilla mollis Ridley & Dendy, 1886
Pseudosuberites cf. *antarcticus* Carter, 1876
Stelodoryx argentinae Bertolino et al., 2007
Tedania charcoti Topsent, 1907
Tedania massa Ridley & Dendy, 1886
Tedania mucosa Thiele, 1905
Tedania sarai Bertolino et al., 2007
Cnidaria
Acryptolaria conferta (Allman, 1877)
Actinostola crassicornis (Hertwig, 1882)
Alcyonium digitatum Linnaeus, 1758
Campanularia sp.
Filellum serratum (Clarke, 1879)
Plumularia insignis Allman, 1883
Sertularella sp.
Symplectoscyphus sp.
Thouarella sp.
Tulpa tulipifera (Allman, 1888)
Actiniaria unid.
Stylasteridae unid.
Cnidaria unid.
Polychaeta
Chaetopterus sp.
Idanthyrsus armatus Kinberg, 1867
Serpula narconensis Baird, 1865
Serpulidae unid.
Brachiopoda
Lyothirella uva (Broderip, 1833)
Magellania venosa (Solander, 1786)
Terebratella dorsata (Gmelin, 1790)
Mollusca
Admete magellanica Strebel, 1905
Calliostoma sp.
Calyptraea pileolus (d'Orbigny, 1841)
Capulus compressus Smith, 1891
Entodesma sp.
Epitonium magellanicum (Philippi, 1845)
Fuegotrophon pallidus (King & Broderip, 1832)
Hiatella meridionalis (d'Orbigny, 1846)
Lamellaria sp.
Limatula sp.
Marginella warreni Marrat, 1876
Odontocymbiola magellanica Gmelin, 1791
Paraeuthria sp.
Trophon ohlini Strebel, 1905
Zygochlamys patagonica (King & Broderip, 1832)
Naticidae unid.
Nudibranchia unid.
Polyplacophora unid.
Bivalvia unid.
Gastropoda unid.
Crustacea
Pagurus comptus White, 1847
Serolis polaris Richardson, 1911
Serolis schytei Lutken, 1858
Sympagurus dimorphus (Studer, 1882)
Antarcturidae unid.
Sphaeromatidae unid.
Isopoda unid. 1
Isopoda unid. 2
Isopoda unid. 3
Echinodermata
Astrotoma agassizi Lyman, 1875
Austrocidaris canaliculata (A. Agassiz, 1863)
Ctenodiscus australis Lutken, 1871
Diplasterias brandti Bell, 1881
Gorgonocephalus chilensis (Philippi, 1858)
Odontaster penicillatus (Philippi, 1870)
Ophiacanta vivipara Ljungman, 1870
Ophiactis asperula (Philippi, 1858)
Ophiomyxa vivipara Studer, 1876
Ophiura lymani (Ljungman, 1871)
Porania sp.
Pseudechinus magellanicus (Philippi, 1857)
Pseudocnus dubiosus leoninus (Semper, 1868)
Solaster sp.
Sterechinus agassizi Mortensen, 1910
Trypilaster philippii (Gray, 1851)
Comatulida unid.
Pterasteridae unid.
Asteroidea 1
Asteroidea 2
Ascidiacea
Alloeocarpa incrustans (Herdman, 1886)
Didemnium sp.
Paramolgula gregaria (Lesson, 1830)
Sycozoa sp.
Ascidiacea unid.
Others
Bryozoa
Foraminifera
Pycnogonida

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