Fishing in troubled waters - Evidence for higher diversity and high abundance of cold-water corals along the Chilean coast

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Introduction

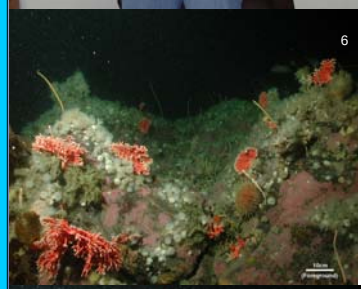
While status and threats of corals in other parts of the world are comparably well studied, even basic data on composition, size and distribution of coral communities are extremely scarce for the South East Pacific. With just 18 known species of azooxanthellate Scleractinia[1], 9 antipatharians, 4 hydrocorals and few registers of gorgonians, the cold-water coral fauna of continental Chile has been considered depauperate. In contrast to this assumption, recent SCUBA diving surveys recorded extended and hitherto unknown coral communities in shallow-water of the Chilean fjord region[2,3]. Longline fisheries on demersal fish species regularly deliver cold-water corals from greater depth as a by-catch entangled in the gear. We present a list of Scleractinia, "Gorgoniaria", Antipatharia and Stylasteridae based on specimens that have been sampled by SCUBA diving and by biological observers on fishing boats. This list includes several recently added as well as new records for Chile.

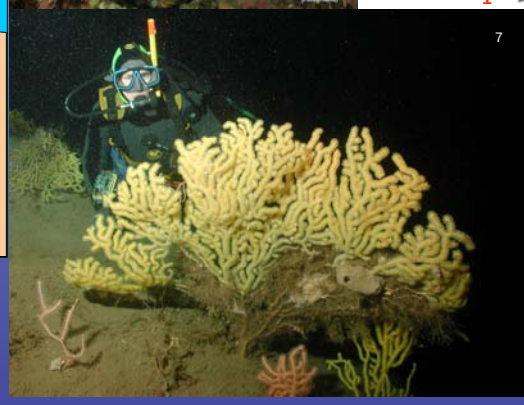
[1]Cairns S, Häussermann V, Försterra G (2005) A review of the Scleractinia (Cnidaria: Anthozoa) of Chile, with the description of two new species. Zootaxa 1018: 14-46
[2]Försterra G, Häussermann V (2003) First report on large scleractinian (Cnidaria: Anthozoa) accumulations in cold-temperate shallow water of south Chilean fjords. Zool. Verh. (Leiden) 345: 117-128
[3]Försterra G, Beuck L, Häussermann V, Freiwald A (2005) Shallow-water *Desmophyllum dianthus* (Scleractinia) from Chile: characteristics of the biocenosis, the bioeroding community, heterotrophic interactions and (palaeo)-bathymetric implications. In: Freiwald A, Roberts JM (eds) Cold-water Corals and Ecosystems. Springer-Verlag, Berlin Heidelberg, pp 937-977

Material and Methods

The material of shallow-water corals (Scleractinia, "Gorgoniaria", Stylasteridae) was gained during SCUBA-diving surveys down to 40 m at several sites in Chilean fjords and channels from ~42°S to ~50°S. In the fjord Comau these surveys were accompanied by ROV-transects down to 250 m. Most samples of deep-water corals ("Gorgoniaria", Antipatharia and Scleractinia) from the Patagonian coast were fractions of colonies that got entangled in longline gear during fishing on demersal species like Patagonian Toothfish (*Dissostichus eleginoides*) in depths down to 2500 m. Some samples and data of Antipatharia and "Gorgoniaria" from the central Chilean coast come from bottom trawls for surveys on Orange Roughy (*Hoplostethus atlanticus*) at the O'Higgins sea mount.

The samples of deep-water corals were preserved dry, leaving the polyp tissue in more or less poor condition; the shallow-water species sampled by SCUBA diving were either carefully dried or preserved in 96% ethanol. The samples were sent to specialists for identification. Identifications of Alcyonacea have not been finished before the printing of this poster.





Results

List of species, depths and regions of cold-water corals (Anthozoa and Hydrozoa) included in this survey.

Scleractinia (Anthozoa)		
Bathycyathus chilensis	S+D (26-420 m)	JF, PP
Caryophyllia huinayensis	S+D (11-800 m)	PP, MP
Tethocyathus endesa	S+D (11-240 m)	PP, MP
Desmophyllum dianthus	S+D (4-2460 m)	JF, MP (Photo 4)
*Madrepora oculata**	D (600-2500 m)	JF, PP (Photo 3)
Antipatharia (Anthozoa)		
Plumapathes aff. *fernandezi*	S (40 m)	JF
*Bathypathes patula**	D (600 m)	PP
*Antipathes speciosa**	D (600 m)	PP
Cladopathes sp., cf. *C. plumosa**	D (1300 m)	MP
Lillipathes sp.*	D (2000 m)	MP (Photo 1)
Chrysopathes sp.	D (~550 m)	PP (Photo 2)
Leiopathes sp	D (~550 m)	PP
Alcyonacea (Anthozoa)		
Isididae sp. 1*+2*	D (1200/1800 m)	MP (Photo 5)
Isididae sp. 3+4*	D (~550/1300 m)	PP
Leptogorgia platyclados	S (5-30 m)	PP
Primnoella biserialis	S (10-40 (80?) m)	MP
Primnoella compressa	S (10-40 (80?) m)	MP
Thouarella aff. *chilensis**	S (38-130 m)	PP, MP
Gorgoniaria sp.1+2*	D (250/600 m)	PP
¿Plumarella sp.*	D (300-600 m)	PP
Gorgoniaria sp. 3*+4+5	D (1900/15-40 m)	MP (Photo 7)
Paragorgiidae sp. 1+2	D (~550 m)	PP
Alcyonium sp. 1-3	S (20-40 m)	MP

Stylasteridae (Hydrozoa)		
*Stylaster densicaulis**	S+D (30-1244 m)	MP
Errina antarctica forma *moseleyi*	S+D (15-771 m)	MP
Errina antarctica	D (25-32 m)	MP (Photo 6)
*Errina sp.**	D (80 m)	MP
Stylasteridae sp.*	D (80 m)	MP

Legend:
S: shallow-water, D: deep-water;
PP: Peruvian Province, MP: Magellanic Province, JF: Juán Fernández Islands;
*: specimens from longline fishery

Discussion and Conclusions

The chance of a coral getting from great depth on board of a longline fishing boat is comparably low. The chance of such a coral then being brought to a University is even lower. In view of this fact, the quantity and diversity of coral samples gathered this way along the Patagonian coast is surprisingly high and gives the impression of a much richer coral fauna than hitherto believed. This impression is supported by the fact that at least 4 new registers for Chile and at least one new species were among the 11 specimens of Antipatharia and that the specimens of *Madrepora oculata* were new records for Chile.

For the shallow-water coral fauna in the Chilean fiords and channels the pattern is similar. Despite low sampling effort in comparison to the size of the region, large and dense accumulations of "Gorgoniaria" and Stylasteridae and banks of Scleractinia were found at many sites. Two of the three species of Scleractinia were new to science. The ROV studies and records from the literature indicate a bathymetrical distribution of large Scleractinia banks from shallow-water (<10m) down to several hundreds of meters.

The difficulties in identification are partially due to the poor knowledge of the coral fauna along the Chilean coast (especially for Alcyonacea) and the poor condition of most of the deep-water material (Antipatharia). The results also indicate that longline fisheries on demersal species, too, can produce damage to coral assemblages and should be recognized as a potentially harmful fishing technique. All these facts indicate an urgent need for surveys contributing to a better understanding of the distribution, structure, species composition and damage situation of Chilean cold-water coral communities.

Acknowledgements

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