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Short communication

Identification of acoustic records of the Argentinian Calamar *Illex argentinus* (Castellanos, 1960) along the outer shelf and shelf break of the south and southeast coast of Brazil

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Abstract

A series of regular large-scale acoustic surveys was carried out over the exclusive economic zone (EEZ) of the south and southeast Brazilian coast, along the external shelf and shelf break areas, during the winter of 1996 and the spring of 1997. Different echo-types were recorded, most of them due to small to medium size mesopelagic foraging fish such as *Maurollicus stehmanni* and Myctophidae species. Deeper acoustic records were also observed in the mesopelagic stratum at night forming extensive layers at depths of over 200 m. These echo-records were not registered during the day. An analysis of the echograms showed that the echo-traces at depths between 200 and 700 m were horizontally extended with colours varying from dark blue to light green. In order to sample the organisms, which formed the deep acoustic targets (DATs), further cruises were conducted with a combination of acoustics and fishing to capture organisms in the water column and on the bottom. This study analyses the results of the surveys in order to identify the organisms responsible for the echo records and evaluate their specific composition. © 2005 Published by Elsevier B.V.

Keywords: Hydroacoustics; *Illex argentinus*; Deep acoustic targets; Squid

1. Introduction

Acoustic assessment surveys carried out during pre-arranged cruises are routinely used to map the distribution and abundance of pelagic organisms (Johanesson

and Mitson, 1983; MacLennan and Simmonds, 1992). Demersal species cannot easily be recognized using such a method due to their proximity to the bottom, but they may be differentiated as long as they maintain a minimum distance from the seabed, enough for the acoustic equipment to distinguish fish from the bottom (Ona and Mitson, 1996). Semi-demersal species, on the other hand, can be registered from the moment they move to the water column (Laevastu et al.,

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1996). In order to assess the specific composition and size distribution of the biological structures detected acoustically, it is necessary to sample using different fishing techniques. Equipment used to capture marine organisms is, by definition, selective because it is designed to catch a certain species or a group of species (Okonski and Martini, 1987; Wardle, 1993). Moreover, there may be significant differences in the avoidance reactions between organisms located in the same habitats (Wardle, 1993; Gerlotto and Fréon, 1992; Fréon and Misund, 1999). As a consequence, it is necessary to use different equipment to obtain representative samples of the faunistic composition of the water column and bottom.

During a series of large-scale acoustic surveys carried out along the south and southeast Brazilian coasts many different acoustic signals were recorded, most of them due to small to medium size mesopelagic foraging fish such as *Maurollicus stehmani* and Myctophidae species. Such species were efficiently sampled with a mid-water trawl. Deeper acoustic targets, however,

were more difficult to catch due to their distance from the surface and avoidance reactions. A sampling strategy was then designed in order to catch such evasive organisms. The type of deep acoustic targets, hereafter named DATs, described in this paper, had not previously been observed along the coast of Brazil.

2. Methodology

Fine-scale surveys were conducted over small areas where the largest and densest occurrences of DATs had been observed (Fig. 1). The acoustic surveys were conducted with the R.V. Atlântico Sul using a calibrated Simrad EK-500 scientific echo-sounder operating a hull-mounted 38 kHz *split-beam* transducer with an applied coefficient of absorption of 10 dB/km and a pulse length of 1 ms (millisecond). Table 1 shows information relative to dates, vessel, and the type of fishing gear employed on the surveys. The mid-water trawl had

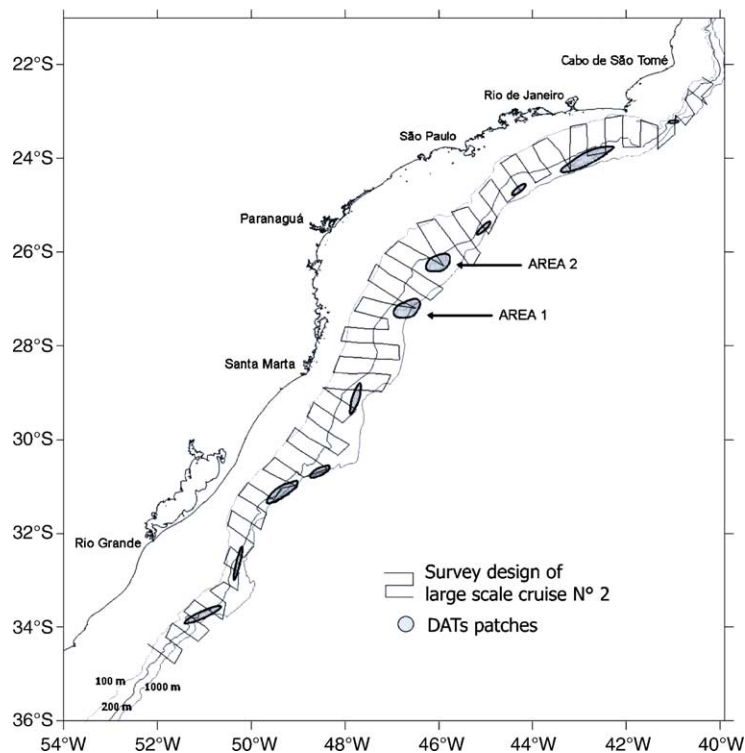


Fig. 1. Survey design of the large-scale surveys, total distance run over transects was about 3.300 n.mi. Dashed areas represent patches of DATs. Areas 1 and 2 indicated by arrows were selected for the fine-scale cruises.

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