

Echo level segmentation on echo-integration of fisheries acoustics data

Yannick PERROT ^{1,*}, Patrice BREHMER ^{1,3}, Nolwenn BEHAGLE ¹, Anne MOUGET ¹, Chloé MIGAYROU ¹, Gildas ROUDAUT ¹, Ndague DIOGOUL ^{2,1}, Abdoulaye SARRÉ ², and Anne LEBOURGES-DHAUSSY ¹

¹Institut de Recherche pour le Développement (IRD), UMR 195 Lemar (Laboratoire des sciences de l'environnement marin ; CNRS, UBO-IUEM, IRD, Ifremer), Plouzané, France

²Institut Sénégalais de Recherches Agricoles (ISRA), Centre de Recherches Océanographiques de Dakar Thiaroye (CRODT), Pôle de Recherches de Hann, Sénégal

³Université Cheikh Anta Diop (UCAD), Dakar, Senegal

*Correspondance: Tél: (+33) 2 98 22 46 71; Courriel: yannick.perrot@ird.fr (Y. PERROT)

Reçu le 01/04/2018; publié le 15/06/2019

Abstract

In fisheries acoustics the analysis of data usually often concern biomass assessment mainly for small pelagic fish stocks using the well-known echointegration approach. Other can concern the analysis of single fish using their target strength (TS in dB) and more seldom analysis can also be done with the fish school descriptors using *e.g.* shoal extraction method (Movies+, Ifremer Software). In the framework of the Preface project we have focused on the micronektonic layers observed by scientific echosounder. Matecho, a friendly automatized processing method to extract information and perform echo-integration, fish shoal extraction and also performs a segmentation, on each zone of a cruise with a constant twilight, of the echointegrated echogram from an echo level threshold fixed by user to extract micronektonic layers in the water column. Here we describe this methodology which allows an accurate description of the spatial organisation and structuration of the marine ecosystem. The process is based on three main steps which consist in : (i) adjust the echo level threshold in dB, (ii) the extraction of the echoes inside each contours and the calculation of the layer descriptors, (iii) and then the correction of the extraction. Finally the echo segmentation, setup to extract micronektonic sound scattered layer, allows to get 34 layers descriptors, *e.g.*, minimum/maximum depth (m), geographical position in 3D, maximum depth width (m), duration of the layer, surface covered by the layer, mean volume backscattering strength " S_v " (dB re 1 m⁻¹): mean nautical area scattered coefficient " S_a " (or NASC m² nmi⁻²), to characterise their spatial position in the water column and acoustics properties. Moreover, a second class of descriptors, classified by elementary sampling unit (ESU), are estimated *e.g.* number of layer per ESU, layer depth per ESU. An innovative descriptor is also computed using this methodological approach: the water column fulling rate per layer and per ESU. Both classes of descriptors are then available for ecological studies.

Keywords: sound scattering layer, deep scattering layer, fisheries acoustics, acoustics shoal, Matecho.



Commission Sous-Régionale des Pêches
Sub-Regional Fisheries Commission



International Conference ICAWA 2017 & 2018 Extended book of Abstract

THE AWA PROJECT
Ecosystem Approach
to the management
of fisheries and the
marine environment
in West African waters

Cap-Vert

Mauritanie

Sénégal

Gambie

Guinée Bissau

Guinée

Sierra Leone

ISBN: 978-2-9553602-0-6



Bundesministerium
für Bildung
und Forschung



Trilateral German-French-African research initiative

Edited by

Patrice BREHMER (IRD, France)

Technical support: Ndagoue DIOGOUL (IRD, Sénégal), Cordula Zenk (Geomar, Germany) and Mahaut de Vareilles (UiB, Norway)

With the collaboration of

Noel Keenlyside (Norway), Jorge M. NASCIMENTO (CABO VERDE), Vito Melo RAMOS (CABO VERDE), Bamol Ali SOW (SENEGAL), Heino FOCK (GERMANY), Joern SCHMIDT (GERMANY), Werner EKAU (GERMANY), Adama MBAYE (SENEGAL), Assane FALL (MAURITANIA), Ivanice MONTEIRO (CABO VERDE), Aka Marcel KOUASSI (IVORY COAST), Osvaldina SILVA (CABO VERDE), Timothée BROCHIER (FRANCE), Moussa SALL (SENEGAL), Mohamed MAYIF (MAURITANIA), Vamara KONÉ (IVORY COAST), Thomas GORGUES (FRANCE), Carlos FERREIRA SANTOS (CABO VERDE), Idrissa Lamine BAMY (GUINEA), Iça Barry (GUINEA BISSAU), Momodou Sidibe (THE GAMBIA), Hamet Diaw DIADHIOU (SENEGAL)

ISBN: 978-2-9553602-0-6

Cover design: AWA (BMBF – IRD) project

Logo and flyers: Laurent CORSINI (IRD)

The both last ICAWA edition, 2017 and 2018, was done as a joint event with other closely related meeting. In 2017 with the inauguration of the OSCM in Cabo Verde underlining AWA cooperation with INDP and UNICV as well as Geomar and collaborators. In 2018 ICAWA was join to Preface final meeting following the memorandum of understanding signed a couples of years before between the two consortium and which have led at the end to a common policy session followed by the redaction of a policy brief taking advantage of the results of the both projects. Some abstract aside ICAWA joint session are missing see the orgniser to get more information.

Sponsors ICAWA 2017 and IACAWA 2018

These two edition of ICAWA were joint with OSCM inauguration and the final meeting of the European preface project, respectively in 2017 and 2018.



**International PREFACE International Conference on
Ocean, Climate and Ecosystems 17th to 20th APRIL
2018**

Book of abstract and recommendations



**International PREFACE International
Conference on Ocean, Climate and
Ecosystems joint with ICAWA 5th, edition
2018**

**Session 4: «Climate prediction Marine
ecosystems, fisheries management and
climate change». Thursday 19th April
2018**

Poster presentation