

Session 4

A promising effect of El Niño on sardinella distribution along the northwest African coast: a potential source of seasonal predictability?

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

Abstract

Many questions remain open concerning the effect of environmental variability on abundance and distribution dynamics of round sardinella (*Sardinella aurita*) over the Canary upwelling system. This issue is of special relevance due to the great role that sardinella plays in northwest African fisheries and marine ecosystems. Here, the possible climate drivers of sardinella population migration along the northwest Africa are addressed. To this aim, we have used data provided by the coupled model compounded by the Regional Oceanic Modelling System ROMS, configured for the northwest African upwelling system, and by the biogeochemical model PISCES, which simulates plankton productivity and carbon biomass based upon the main nutrients. This coupled model has been run over the period 1980-2009 using an atmospheric reanalysis and consistent oceanic boundary conditions. Finally, an evolutionary individual-based Lagrangian model has been used to simulate the spatio-temporal behaviour of sardinella according to the environmental constraints obtained from ROMS-PISCES. Strikingly, a robust anomalous increase (decrease) of sardinella biomass has been identified from early to late winter off Cape Blanc (Saharan coast) in response to the Pacific El Niño conditions. This dipolar pattern reflects an alteration of the normal migration of sardinella between the Saharan and the Mauritanian waters and seems to be primarily mediated by the effect that El Niño-related anomalous winds has on the meridional currents along the northwest African coast. This sardinella response to El Niño is reinforced in late winter through an anomalous warming of the Mauritanian waters due to an anomalous weakening of coastal upwelling also forced by the aforementioned El Niño-related anomalous winds. According to our results this anomalous response of sardinella biomass might be predicted, for El Niño years, few months in advance from the El Niño-related SST patterns. This fact opens the possibility to the development of predictive tools, which should be necessarily assessed in further works.



Commission Sous-Régionale des Pêches
Sub-Regional Fisheries Commission



International Conference ICAWA 2017 & 2018 Extended book of Abstract

THE AWA PROJECT
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of fisheries and the
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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: Ndague DIOGOUL (IRD, Sénégal), Cordula Zenk (Geomar, Germany) and Mahaut de Vareilles (UiB, Norway)

With the collaboration of

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ISBN: 978-2-9553602-0-6

Cover design: AWA (BMBF – IRD) project

Logo and flyers: Laurent CORSINI (IRD)

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

Oral presentation