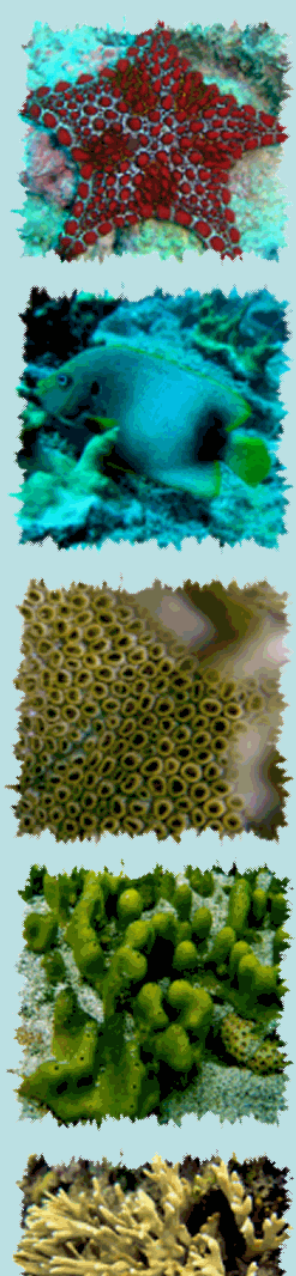


# Arquipélago de Cabo Verde

## *notas da sua história natural, oceanografia e vida marinha*



**Rui Freitas (ISECMAR/UTA)**

**Instituto de Engenharia e Ciências do Mar  
Universidade Técnica do Atlântica**

# Pais insular, tropical e de origem vulcânica...

*formed by rock accumulation, resulting from eruptions from a hotspot under submarine platforms*

Σ Área: 4033 km<sup>2</sup>

*10 islands (of which nine are inhabited) and eight islets*

750 km to Senegal

presqu'île du Cap-Vert

Senegal

Gambia

Guiné Bissau

Youngers  
cliffs

Olders  
flats

# REPORTS

## Large archipelagic mole limpets

de  
eira<sup>1</sup>, Rui Seabra<sup>2</sup>, Fernando P. Lima<sup>2</sup>,  
ta Castilho<sup>1</sup>

St. Antão  
(7.5 My)

S. Vicente  
(6.6 My)

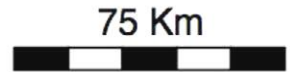
S. Nicolau  
(6.2 My)

Sal  
(25.6 My)

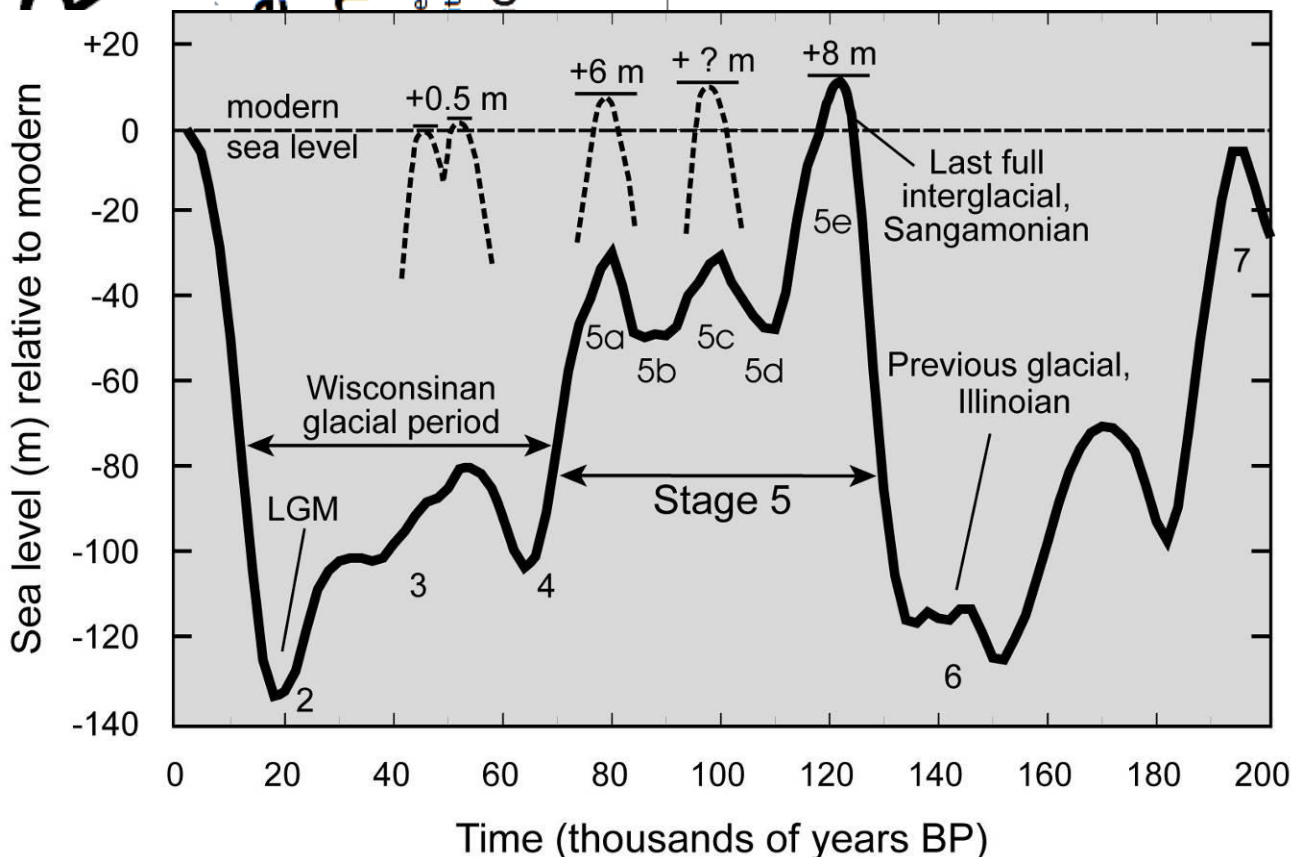
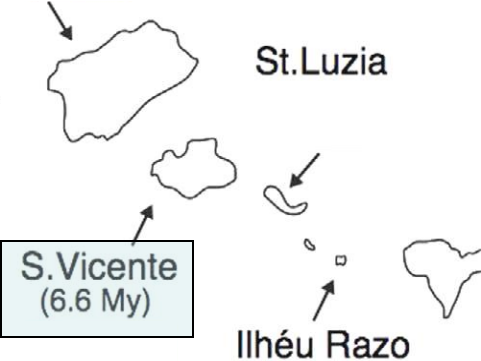
Boavista  
(16.6 My)

Maio  
(21.1 My)

Santiago  
(1.3 My)

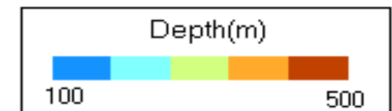
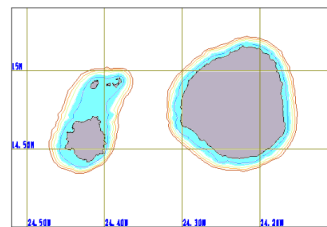
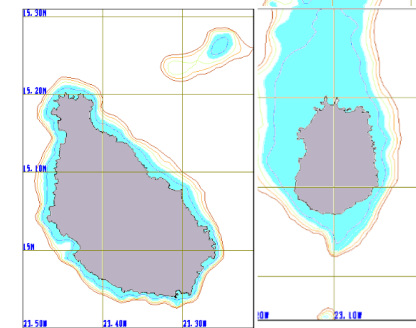
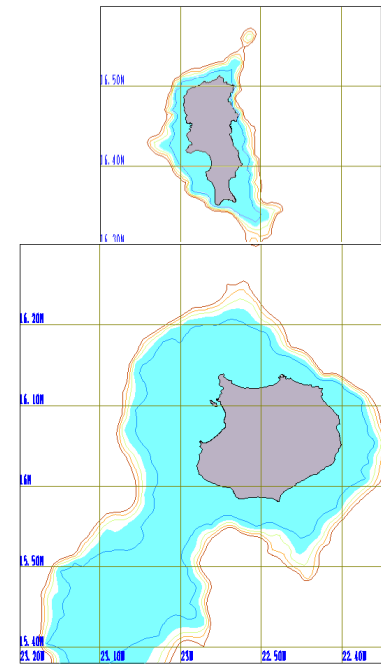
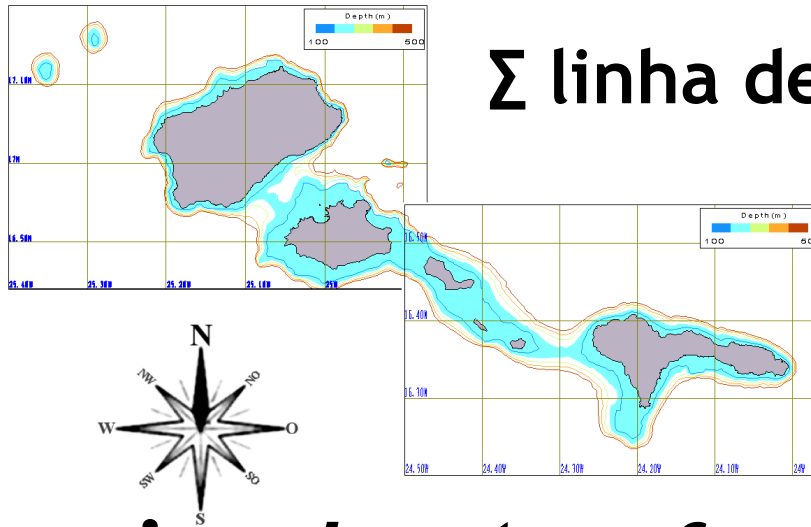


17.0  
16.5



-23.0

$\Sigma$  linha de costa de 965 km

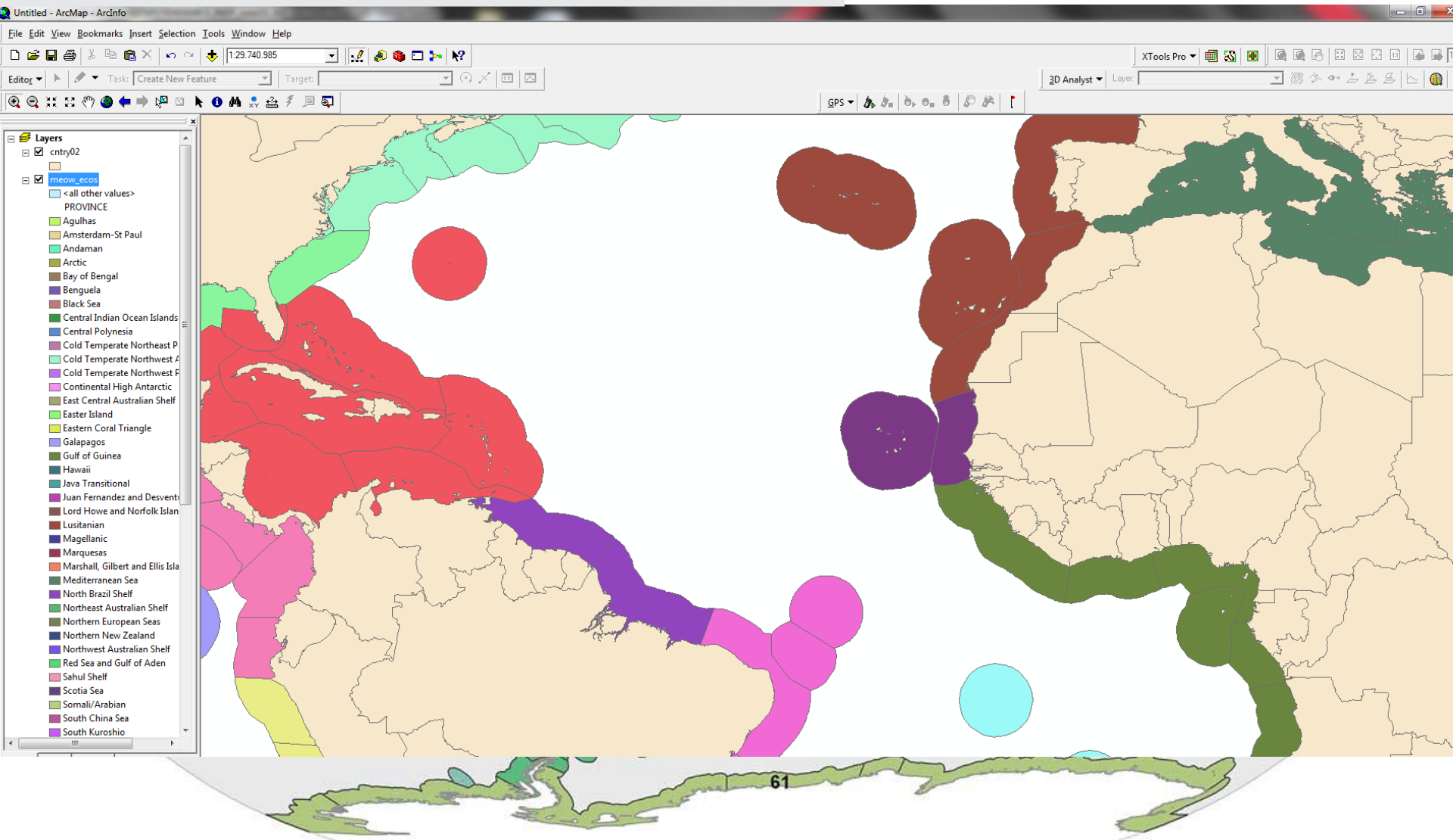


***Plataforma insular (profs <200 m) cobrem uma área de 5,934 km<sup>2</sup>***  
***+46% área submersa***

# West African Transition

- 79. Cape Verde
- 80. Sahelian Upwelling

# of the World: on of Coastal



Level 1	Level 2	Examples
Plate boundary islands	Islands at divergent plate boundaries Islands at convergent plate boundaries Islands along transverse plate boundaries	Iceland, St Paul (Indian Ocean) Antilles, South Sandwich (Atlantic) Cikobia and Clipperton (Pacific)
Intra-plate islands	Linear groups of islands Clustered groups of islands Isolated islands	Hawaii, Marquesas, Tuamotu Canaries, Galápagos, Cape Verde St Helena, Christmas Island (Indian Ocean), Easter Island

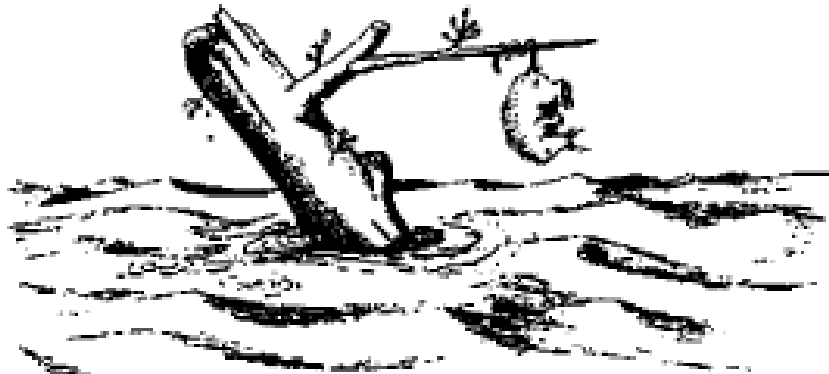
# Island SECOND EDITION Biogeography

**ECOLOGY, EVOLUTION, AND CONSERVATION**

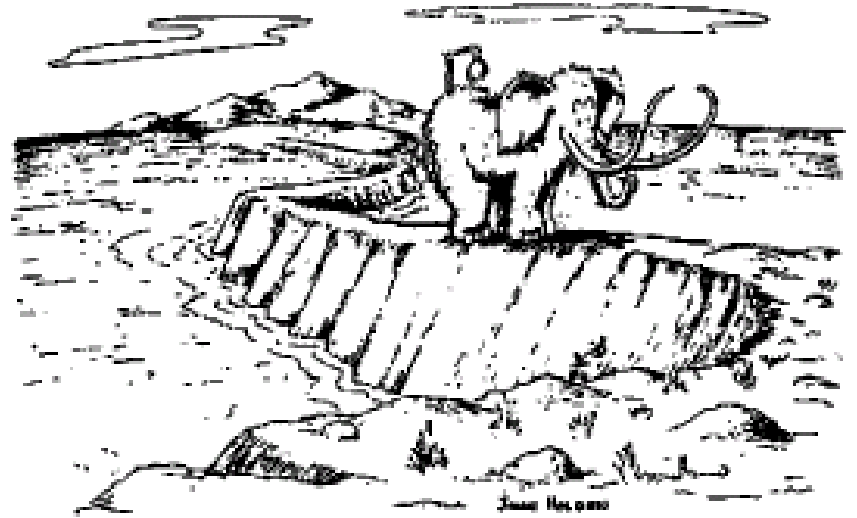
Robert J. Whittaker

José María Fernández-Palacios

Rafting



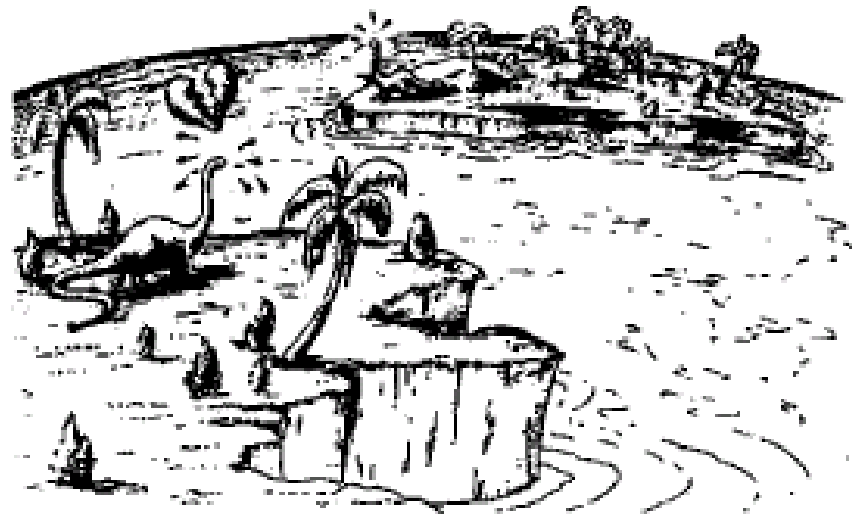
Land-bridges

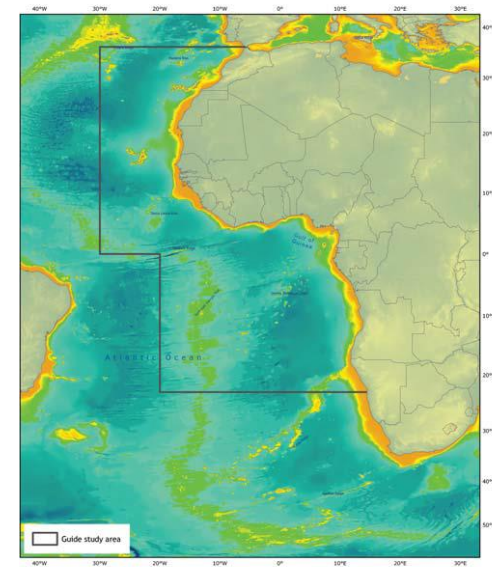
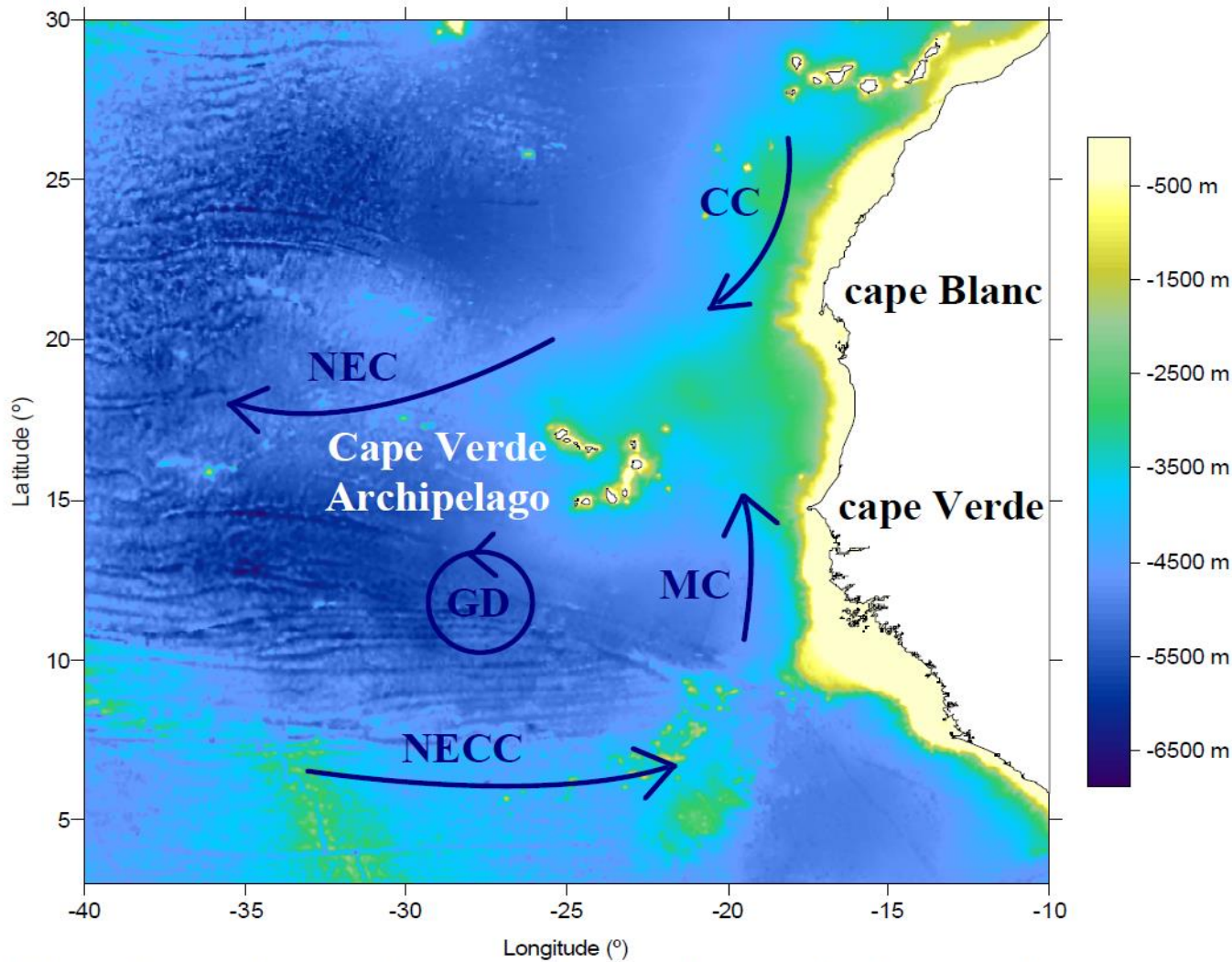


Jump-dispersal



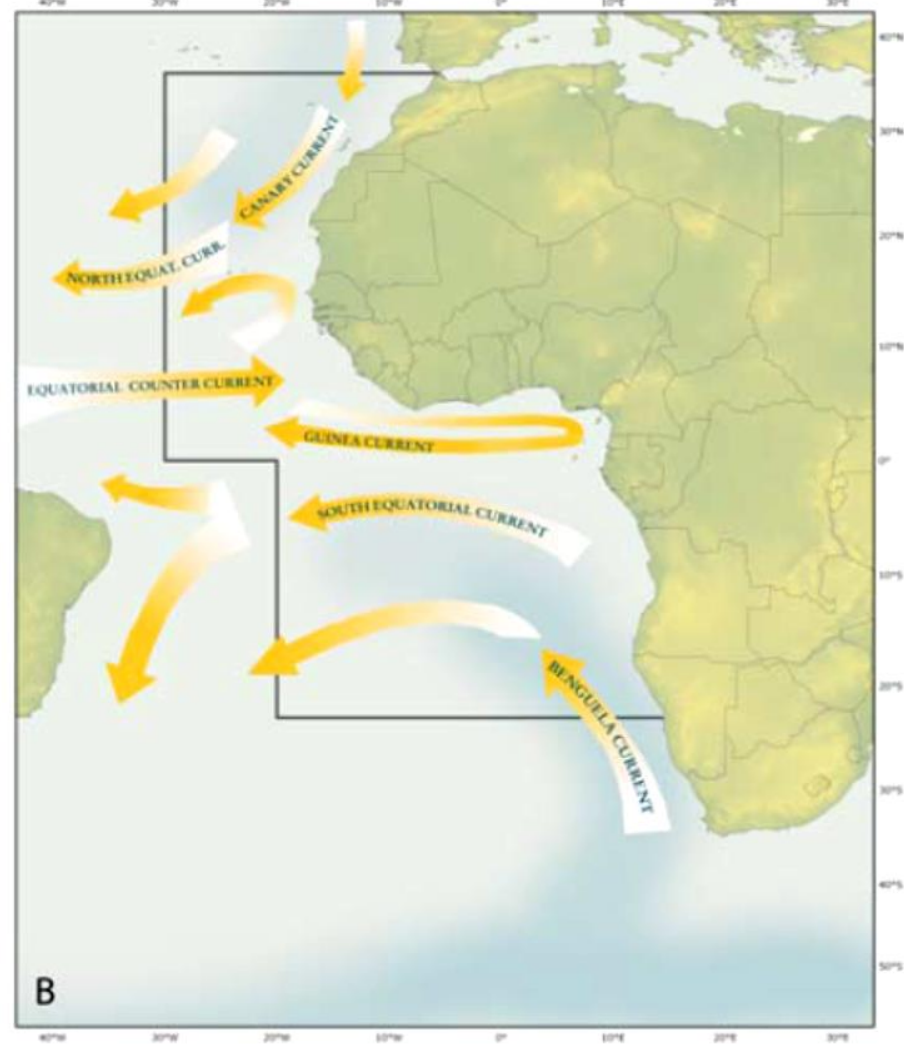
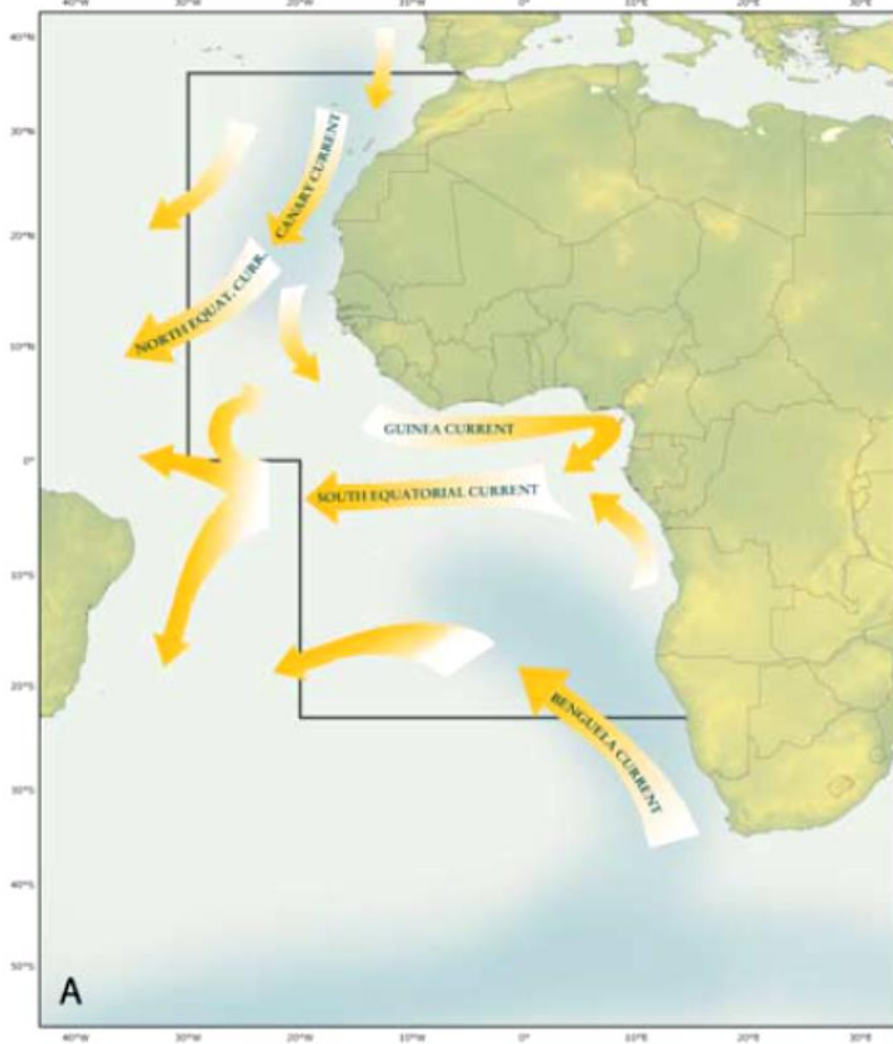
Separation by plate tectonic processes





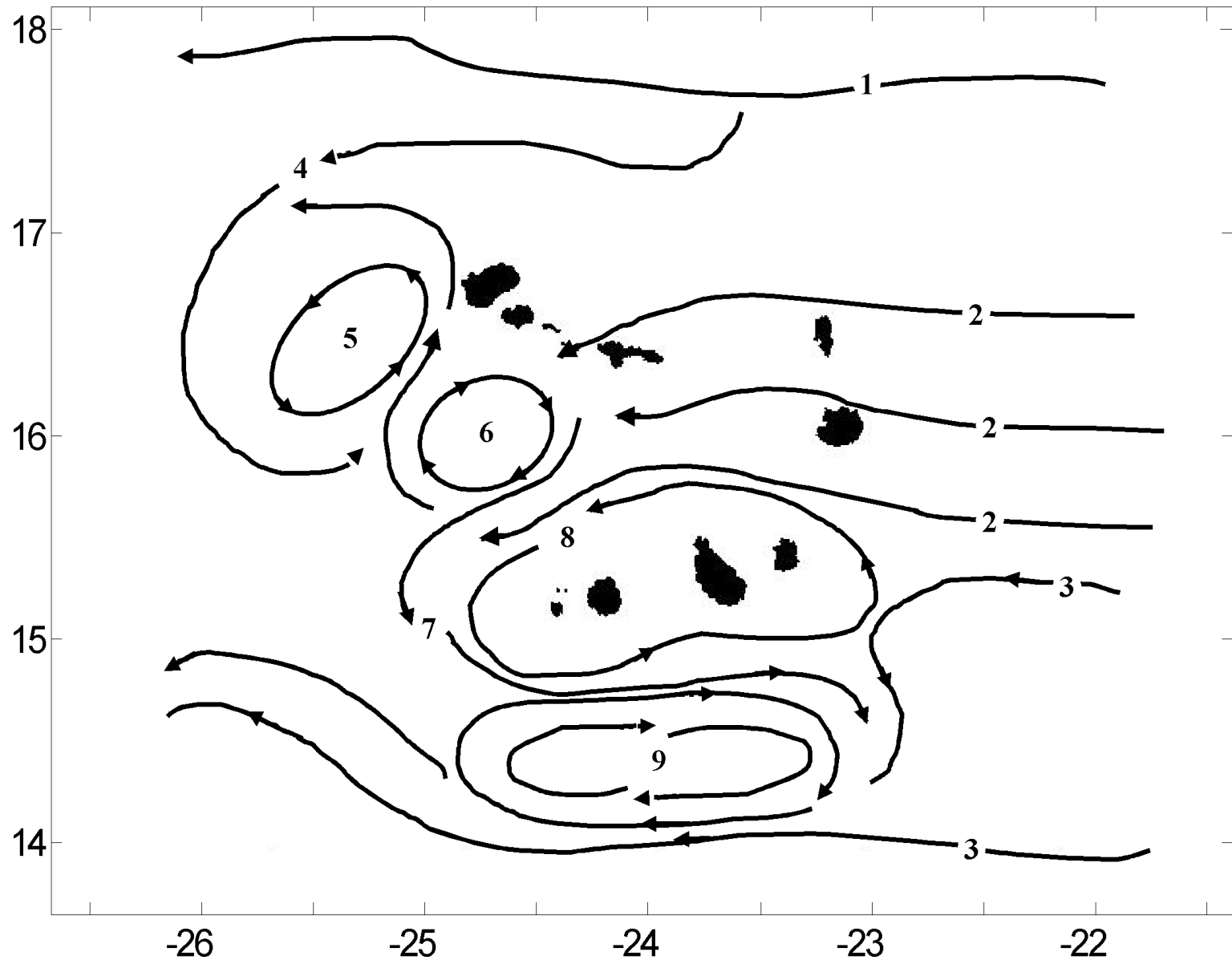
***Fronteira Este do giro subtropical do Atlântico Norte e limite sul da Corrente das Canárias e afectada à grande escala pela interacção entre a CC, a NEC e a NECC***

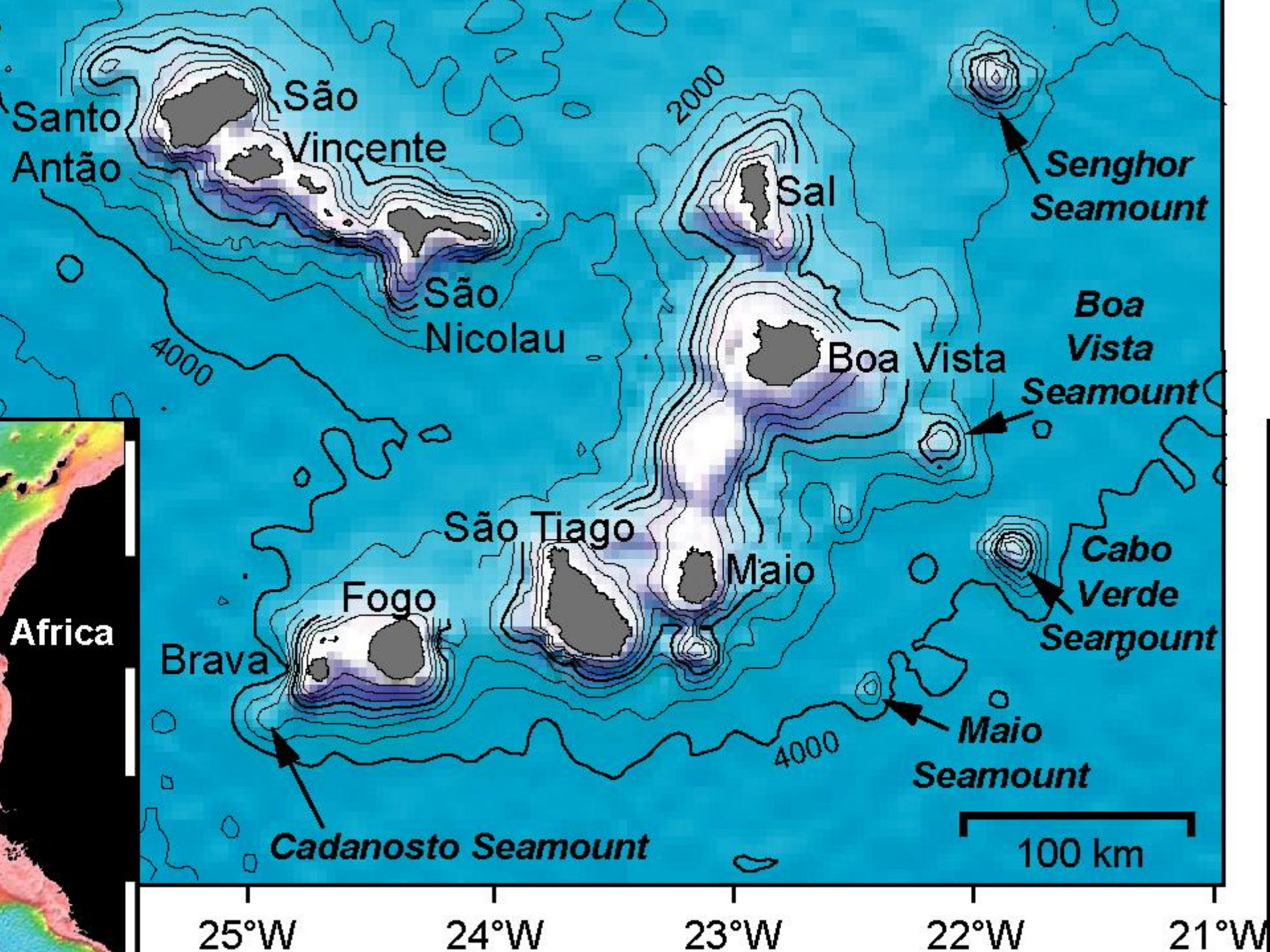




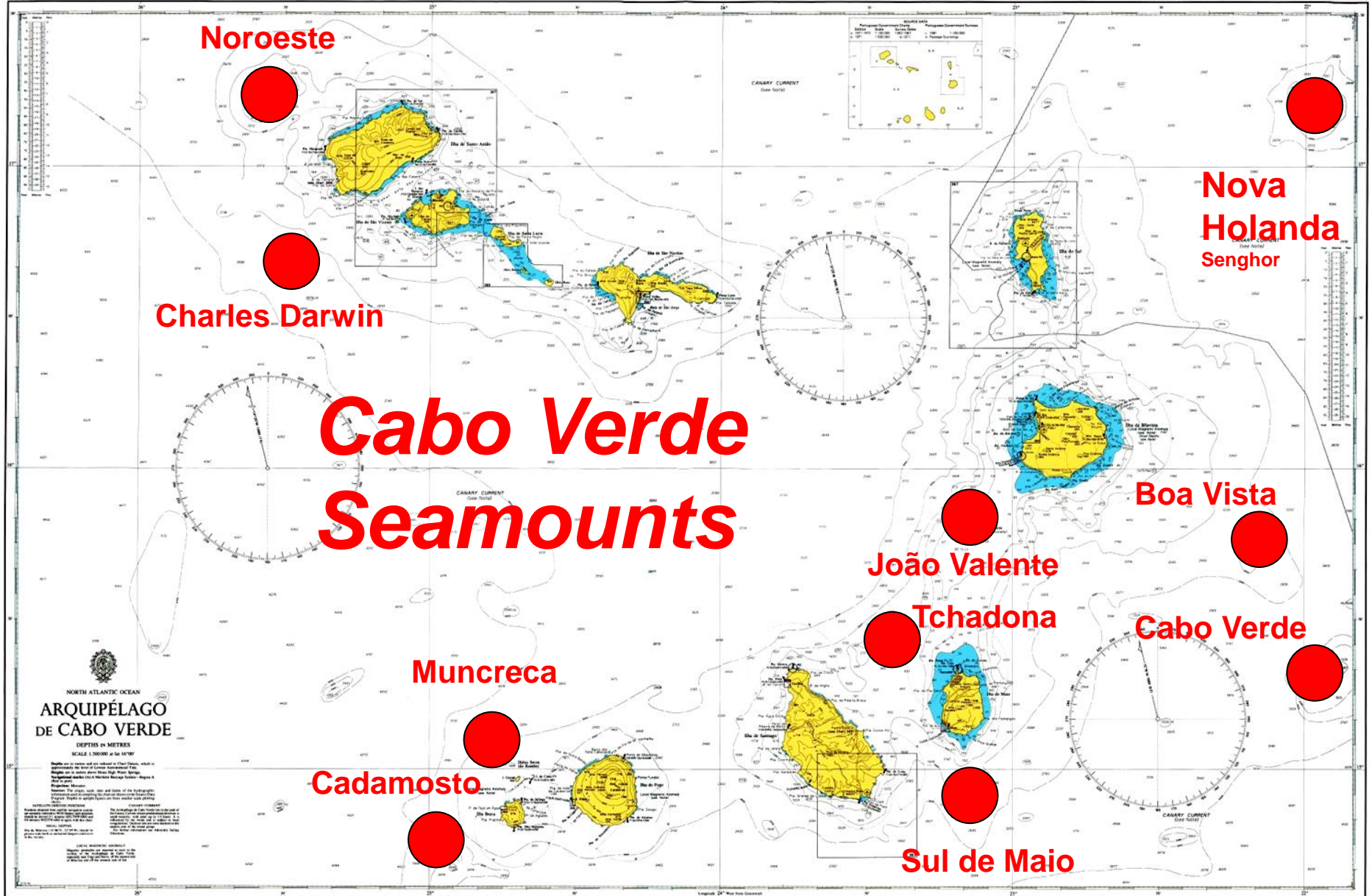
**Fig. 4 Major surface currents in a) February and b) July**  
 (adapted from Wauthy, 1983 as shown in Schneider, 1990)

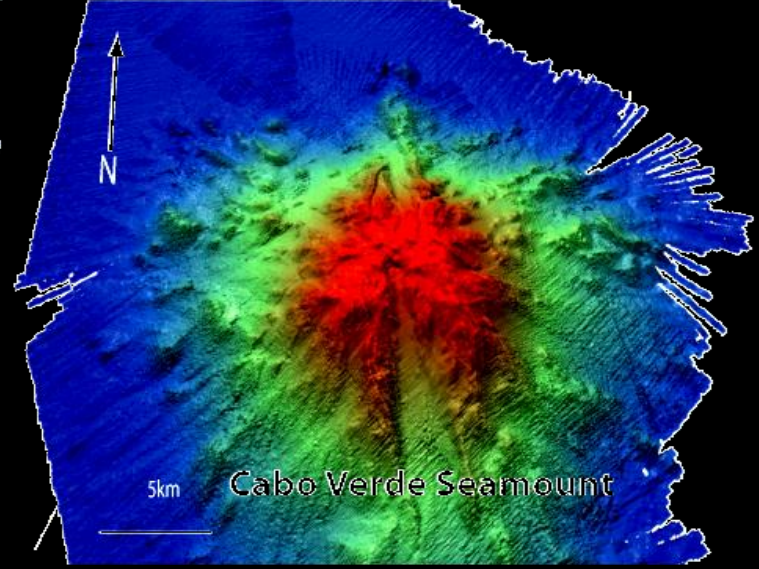
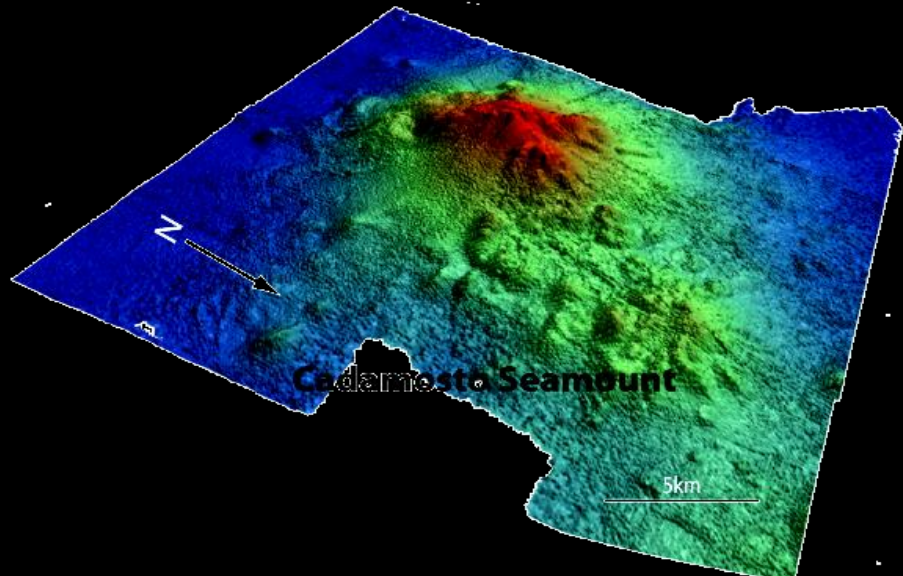
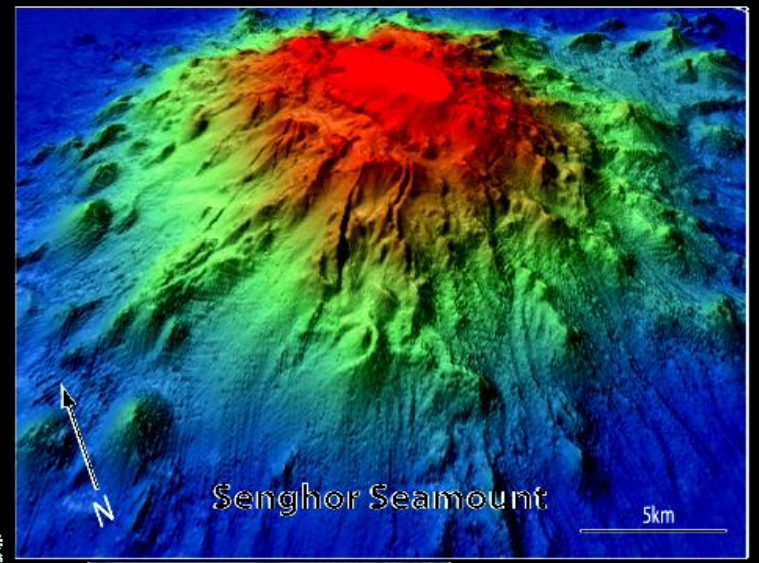
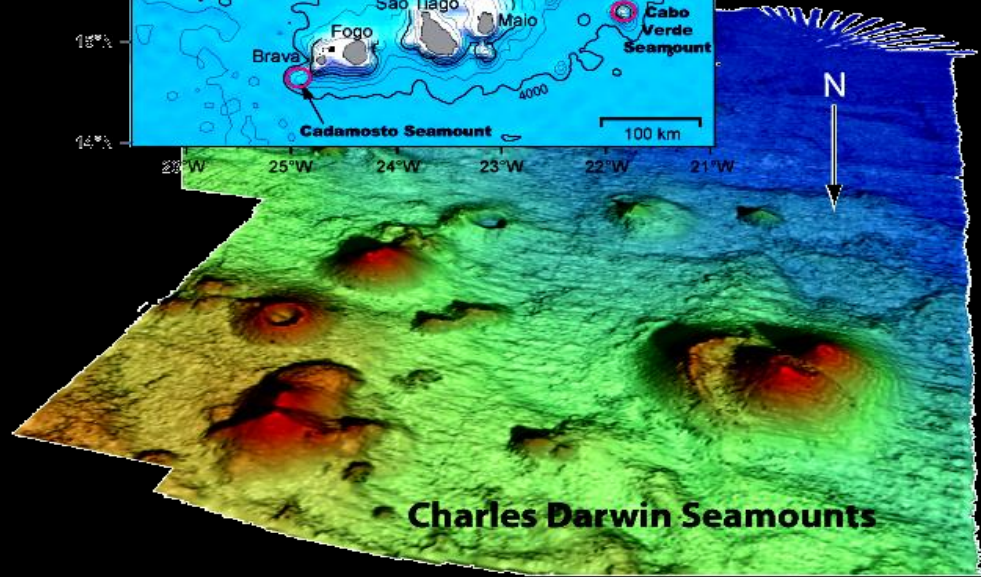
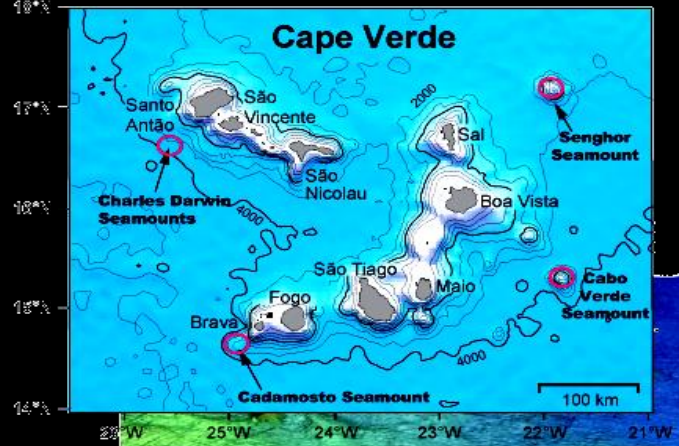
# Padrão de circulação geral no interior do arquipélago de Cabo Verde (Medina, 2007-8)





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# Science

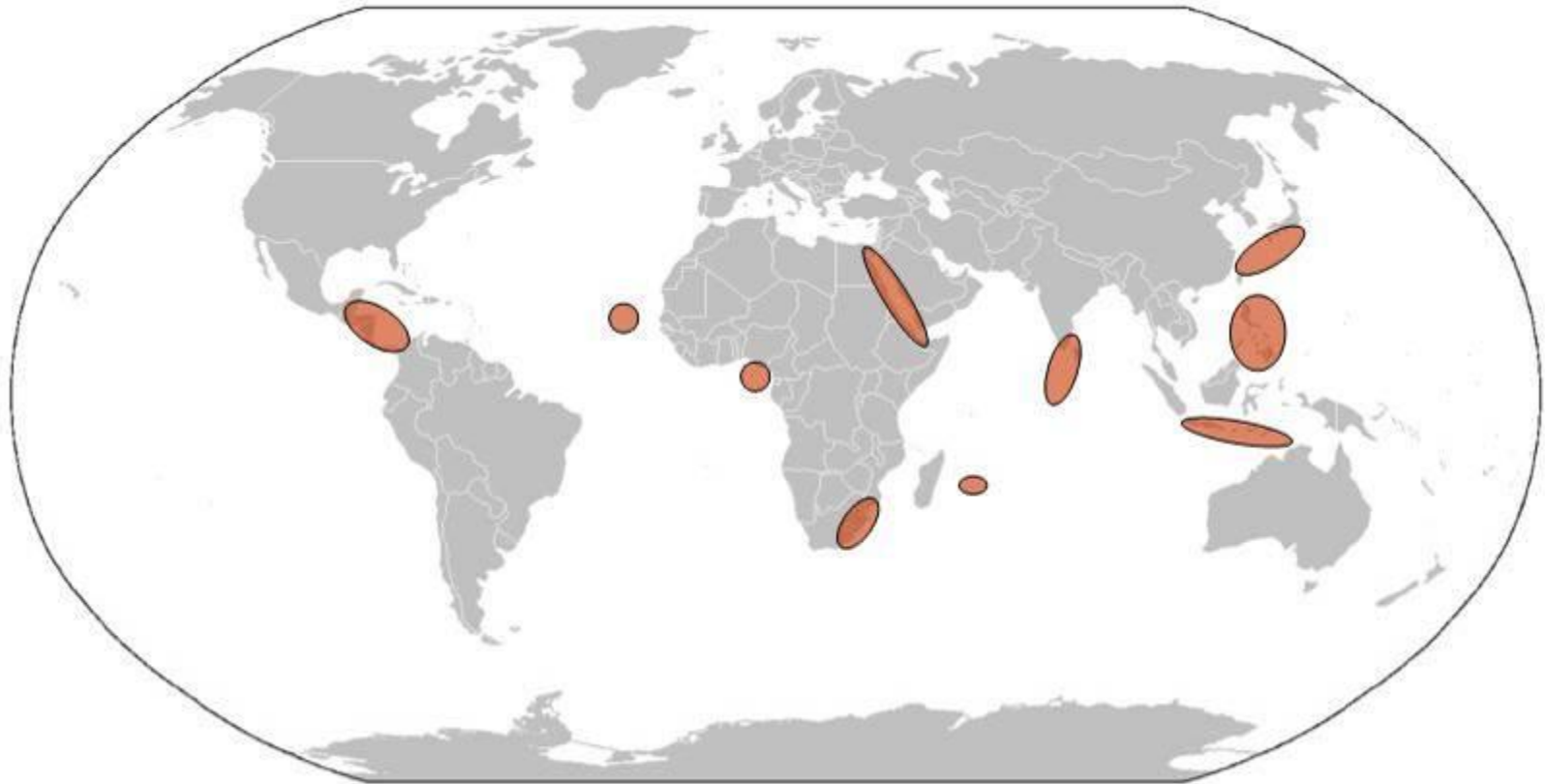
AAAS

## Marine Biodiversity Hotspots and Conservation Priorities for Tropical Reefs

Callum M. Roberts, *et al.*

*Science* **295**, 1280 (2002);

DOI: 10.1126/science.1067728



**Figure 1.** Approximate locations of 10 marine biodiversity hotspots as centres of reef fish, coral, snail, and lobster endemism also facing relatively high threats (Roberts *et al.* 2002). Areas are (from West to East) West Caribbean, Cape Verde Islands, Gulf of Guinea, Eastern South Africa, Red Sea, South Mascarene Islands, North Indian Ocean, Sunda Islands, Philippines, South Japan.

# Cabo Verde: Biodiversidade marinha única mundial, altas taxas de endemismos (paleo-monotipos) e singularidades biogeográficas

**EXEMPLOS % DE ENDEMICIDADE**

- 8.3% para peixes costeiros/recifais
- 9.2% para bivalves marinhos
- 44% lapas d'bluxa d'cunha
- 50% lesmas do mar
- 70-95% buzios conus
- 100% *Euthria* gastropodes marinhos  
- peq buzios

Molecular Ecology (2005) 14, 267–272

Explosive radiatio  
flock

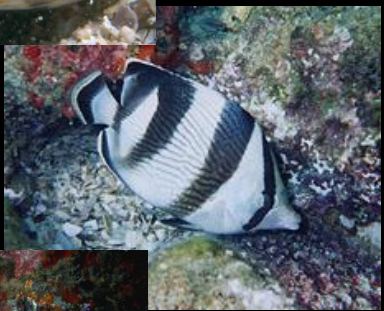
THOMAS F. DUDA JR\*† and  
\*Naos Marine Laboratory, Smithsonian I  
of Biology, University of Washington, Seattle WA  
Santiago de Compostela, Spain

Origin  
The cone s  
terrestrial scale  
Howard Peters, Bethan C. O'Le  
ment Department, Wentworth Way, University of York

n at a  
um M. Roberts

# Checklists of Crustacea Decapoda from the Canary and Cape Verde Islands, with an assessment of Macaronesian and Cape Verde biogeographic marine ecoregions

JOSÉ A. GONZÁLEZ



González (2018) complementa essas teorias levando em consideração a idade geológica relativamente jovem, a boa conexão biológica, apesar de seu isolamento, e o estado relativamente saudável dos habitats costeiros.





## Outros Factores a Considerar como:

1. a limitada plataforma insular
2. zona intertidal restrita
3. sazonalidade da produtividade oceanográfica
4. regimes pluviométricos

parecem determinar a **baixa densidade populacional de organismos marinhos no arquipélago de Cabo Verde, contribuindo assim para a fragilidade desse ecossistema.**

Esses pressupostos são mais favoráveis, em parte para as espécies de peixes com menor capacidade de dispersão, para se diferenciar em um evento de especialização e endemismos notáveis em pequenos peixes, especialmente com paleoendêmias e taxon monotípicos na área.



**Rolán, E. 1991.**

La familia **Conidae** (Molusca: Gastropoda) en el **archipiélago de Cabo Verde** (África occidental).

**Tesis doctoral.**

Universidad de Santiago de Compostela.

Molecular Ecology (2005) 14, 267–272

doi: 10.1111/j.1365-294X.2004.02397.x

## **Explosive radiation of Cape Verde *Conus*, a marine species flock**

THOMAS F. DUDA JR\*† and EMILIO ROLÁN‡

\*Naos Marine Laboratory, Smithsonian Tropical Research Institute, Apartado 2072, Balboa Ancon, Republic of Panamá, †Department of Biology, University of Washington, Seattle WA 98195, USA, ‡Museo de Historia Natural, Campus Universitario Sur, 15782 Santiago de Compostela, Spain

**Emilio Rolán**



# Patterns of Cladogenesis in the Venomous Marine Gastropod Genus *Conus* from the Cape Verde Islands

Global Ecology and Conservation 7 (2016) 201–213



Contents lists available at [ScienceDirect](#)

## Global Ecology and Conservation

journal homepage: [www.elsevier.com/locate/gecco](http://www.elsevier.com/locate/gecco)



Original research article

## The cone snails of Cape Verde: Marine endemism at a terrestrial scale



Howard Peters, Bethan C. O'Leary\*, Julie P. Hawkins, Callum M. Roberts

*Environment Department, Wentworth Way, University of York, Heslington, York, YO10 5NG, UK*

**Vitor Vasconcelos** <sup>†,‡,\*</sup>

REGINA L. CUNHA,<sup>\*,†</sup> MANUEL J. TENORIO,<sup>‡</sup> CARLOS AFONSO, <sup>†</sup>RITA CASTILHO<sup>†</sup>  
and RAFAEL ZARDOYA<sup>\*</sup>

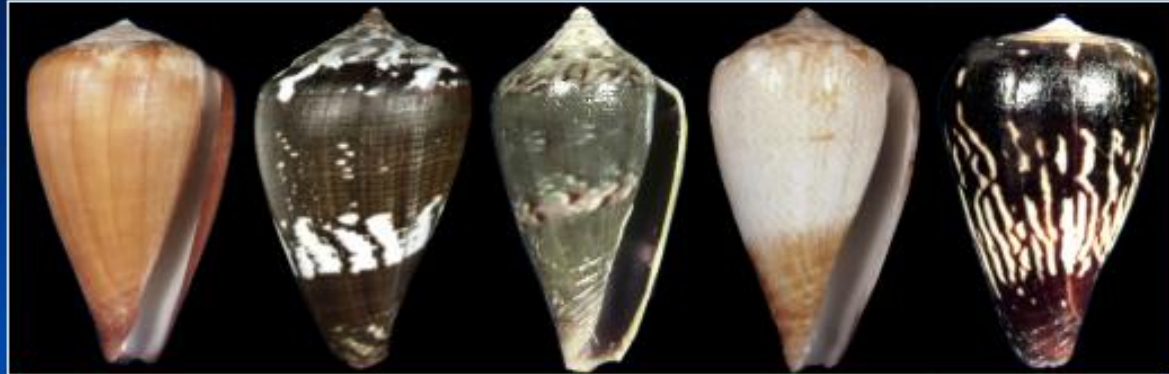
*\*Departamento de Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales-CSIC, José Gutiérrez Abascal, 2, 28006 Madrid, Spain, †CCMAR, Campus de Gambelas-Universidade do Algarve, 8005-139 Faro, Portugal, ‡Facultad de Ciencias, Universidad de Cádiz, 11510 Puerto Real, Cádiz, Spain*

# Cape Verde Cone Fauna

Endemic

Paucispiral protoconch  
Direct development

*Africonus*  
(small shells)



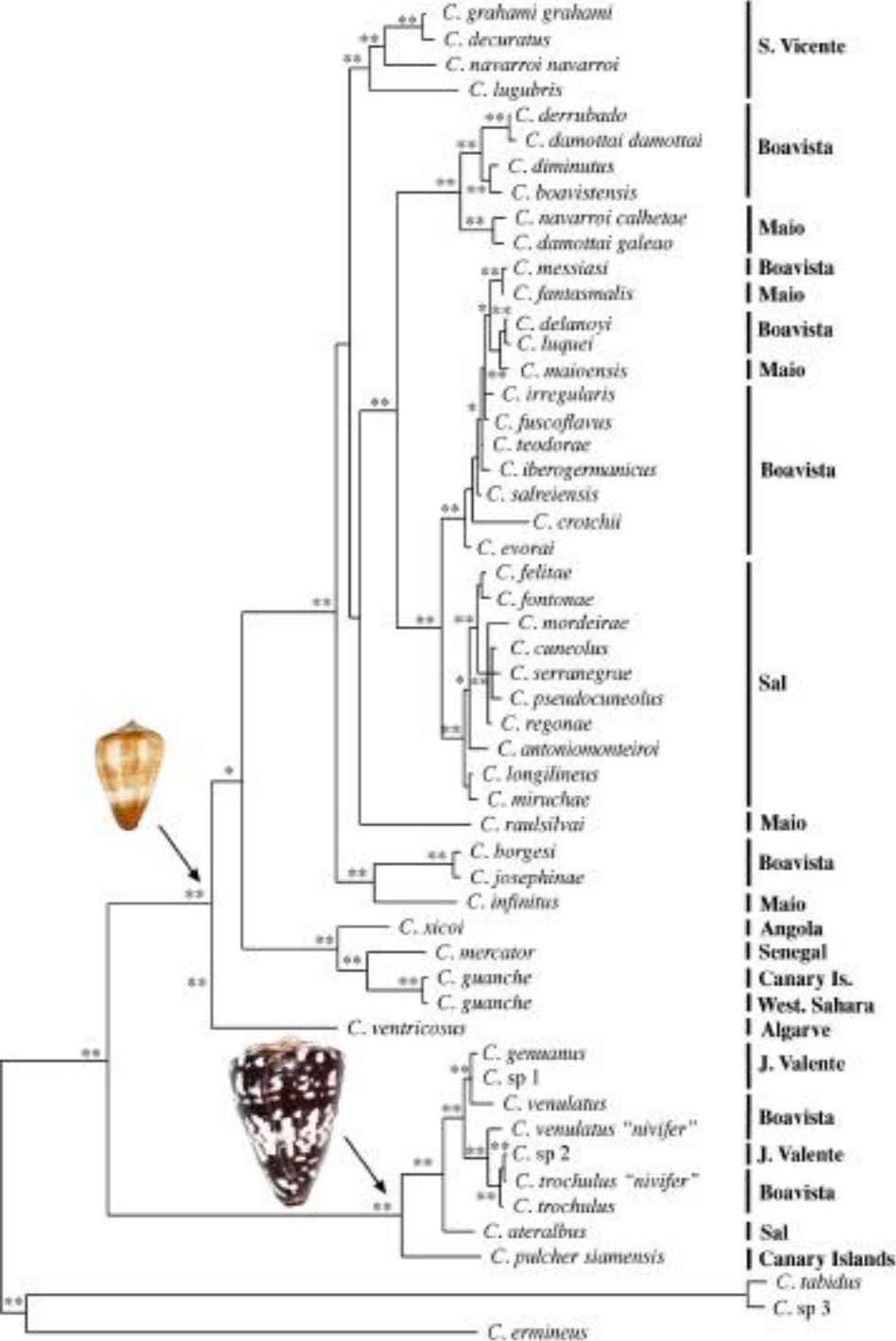
All Islands

*Trovaconus*  
(large shells)



Sal, Boa Vista, Maio, Santiago

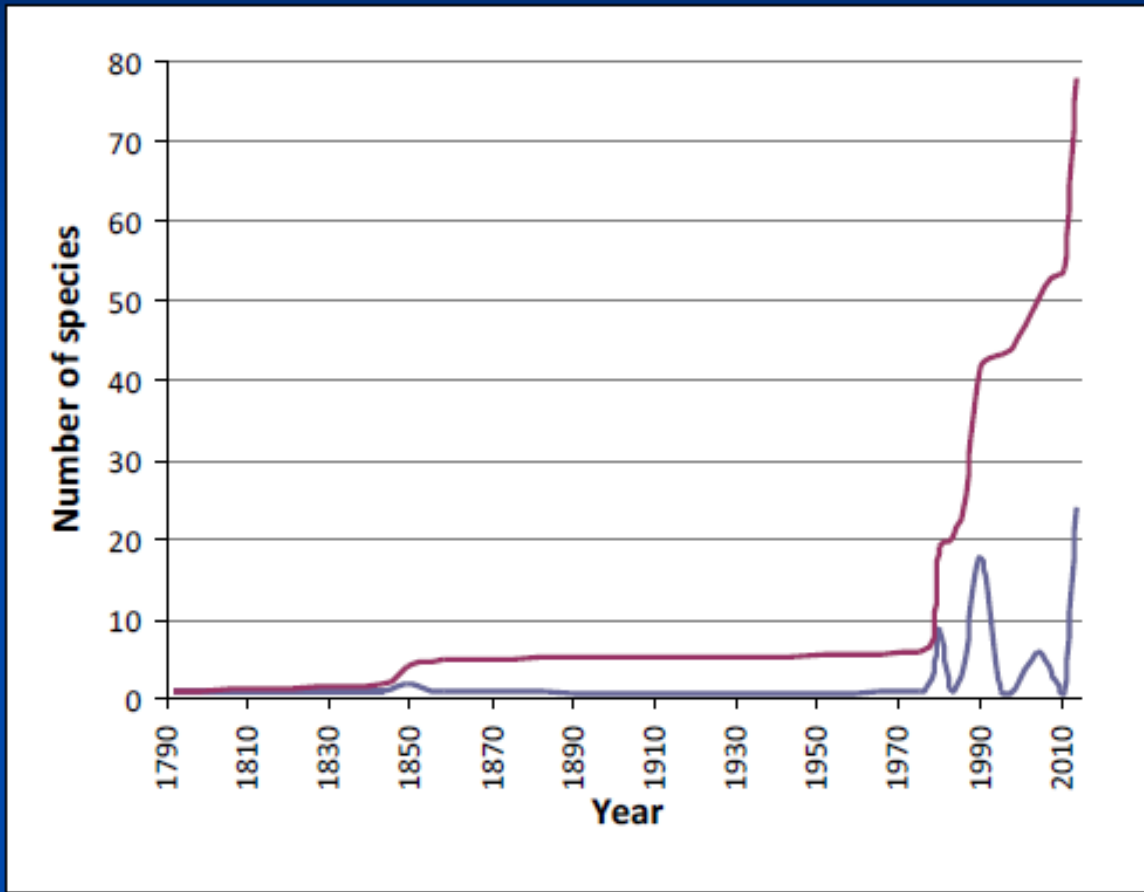
# Conus de Cabo Verde



- The ancestor of *Africonus* arrived at Cape Verde about 16.5 myr ago
- The ancestor of *Trovaconus* arrived at Cape Verde about 4.5 myr ago



# Evolution of the number of taxa described for Cape Verde Islands



Number of taxa for CV Islands(2014): **79**

Number of Cone species (WoRMS, Oct. 2014): **907**

CV Cone species represent ca. 9 % of the Worldwide Cone biodiversity

## CRITICALLY ENDANGERED



*A. lugubris*

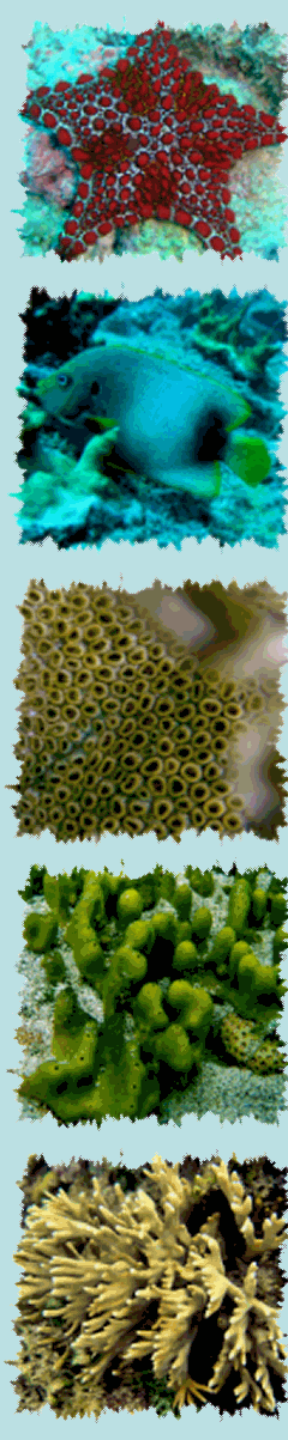


*A. mordeirae*



*A. salreiensis*





**Starting in the mid 1980s,**  
**taxonomic revisions,**  
**descriptions of new species**  
**and new records**  
**illustrated books and checklists**  
**of fish in Cabo Verde**  
**have increased significantly**

e.g. Edwards 1986, Hensley 1986, Matallanas & Brito 1999, Brito & Miller 2001, Menezes *et al.* 2004, González & Tariche 2009, Wirtz 2009, González *et al.* 2010, Fricke *et al.* 2010, Wirtz & Schliewen 2012, Rocha *et al.* 2012a, Vieira *et al.* 2013, Wirtz *et al.* 2013, Freitas *et al.* 2014

SPIXIANA	36	1	113-142	München, September 2013	ISSN 0341-8391
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**The coastal fishes of the Cape Verde Islands –  
new records and an annotated check-list**

Peter Wirtz, Alberto Brito, Jesús M. Falcón, Rui Freitas, Ronald Fricke,  
Vanda Monteiro, Francisco Reiner & Oksana Tariche

**ENDEMISMOS PARTILHADOS / END / FAMILIES (NUM SPP)**

<b>FAMILY</b>	<b>Azores</b>	<b>Madeira</b>	<b>Canarias</b>	<b>C Verde</b>
RAJIDAE	1	1	1	<b>1(1)</b>
<b><i>MURAENIDAE</i></b>	1	2	2	2
CONGRIDAE	1	1	0	0
<b><i>GOBIESOCIDAE</i></b>	1	1	1	<b>2(1)</b>
BELONIDAE	0	0	0	<b>1(1)</b>
SCORPAENIDAE	<b>2(1)</b>	1	1	0
<b><i>SERRANIDAE</i></b>	1	1	1	1
PRIACANTHIDAE	0	1	1	1
HAEMULIDAE	0	0	0	<b>1(1)</b>
SPARIDAE	0	0	0	<b>4(4)</b>
KYPHOSIDAE	0	0	0	<b>1(1)</b>
MUGILIDAE	0	0	0	<b>1(1)</b>
<b><i>POMACENTRIDAE</i></b>	1	1	1	<b>3(2)</b>
<b><i>LABRIDAE</i></b>	<b>2(1)</b>	2	2	1
PINGUIPEDIDAE	0	0	0	<b>1(1)</b>
LABRISOMIDAE	0	0	0	<b>1(1)</b>
BLENNIIDAE	0	0	0	<b>3(3)</b>
GOBIIDAE	0	1	<b>3(1)</b>	<b>6(5)</b>
SOLEIDAE	0	0	0	<b>1(1)</b>
<b>TOTAL</b>	<b>10(2)</b>	<b>12</b>	<b>13(1)</b>	<b>31(23)</b>





SPIXIANA	35	1	149-154	München, August 2012	ISSN 0341-8391
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**A new species of *Liopropoma* Gill, 1862  
from the Cape Verde Islands, Eastern Atlantic**

(Teleostei, Perciformes, Serranidae)

Peter Wirtz & Ulrich K. Schliewen

ORIGINAL PAPER

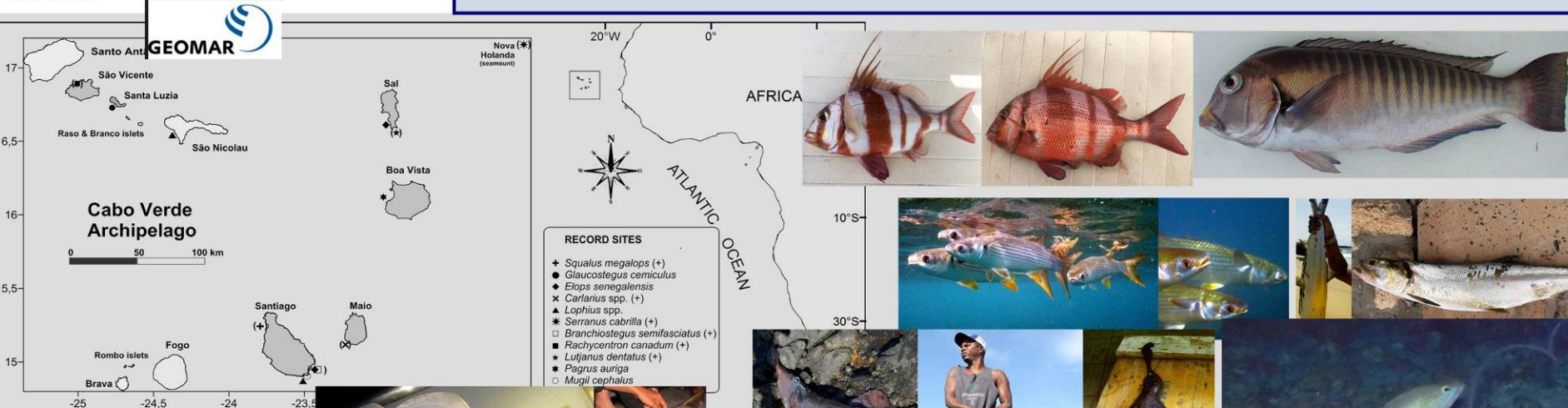
# The occurrence of *Sparisoma frondosum* (Teleostei: Labridae) in the Cape Verde Archipelago, with a summary of expatriated Brazilian endemic reef fishes

Rui Freitas • Osmar J. Luiz • Pericles N. Silva •  
Sergio R. Floeter • Giacomo Bernardi •  
Carlos E. L. Ferreira



# New and confirmed records of fishes from the Cabo Verde Archipelago based on photographic and genetic data

R. Freitas, J.M. Falcón, J.A. González, K.A. Burnett, M. Dureuil, J.H. Caruso, H.J.T. Hoving & A. Brito



Mapa mostrando a posição geográfica das ocorrências por espécies (de acordo com a ocorrência confirmada para outras espécies somente confirmação para

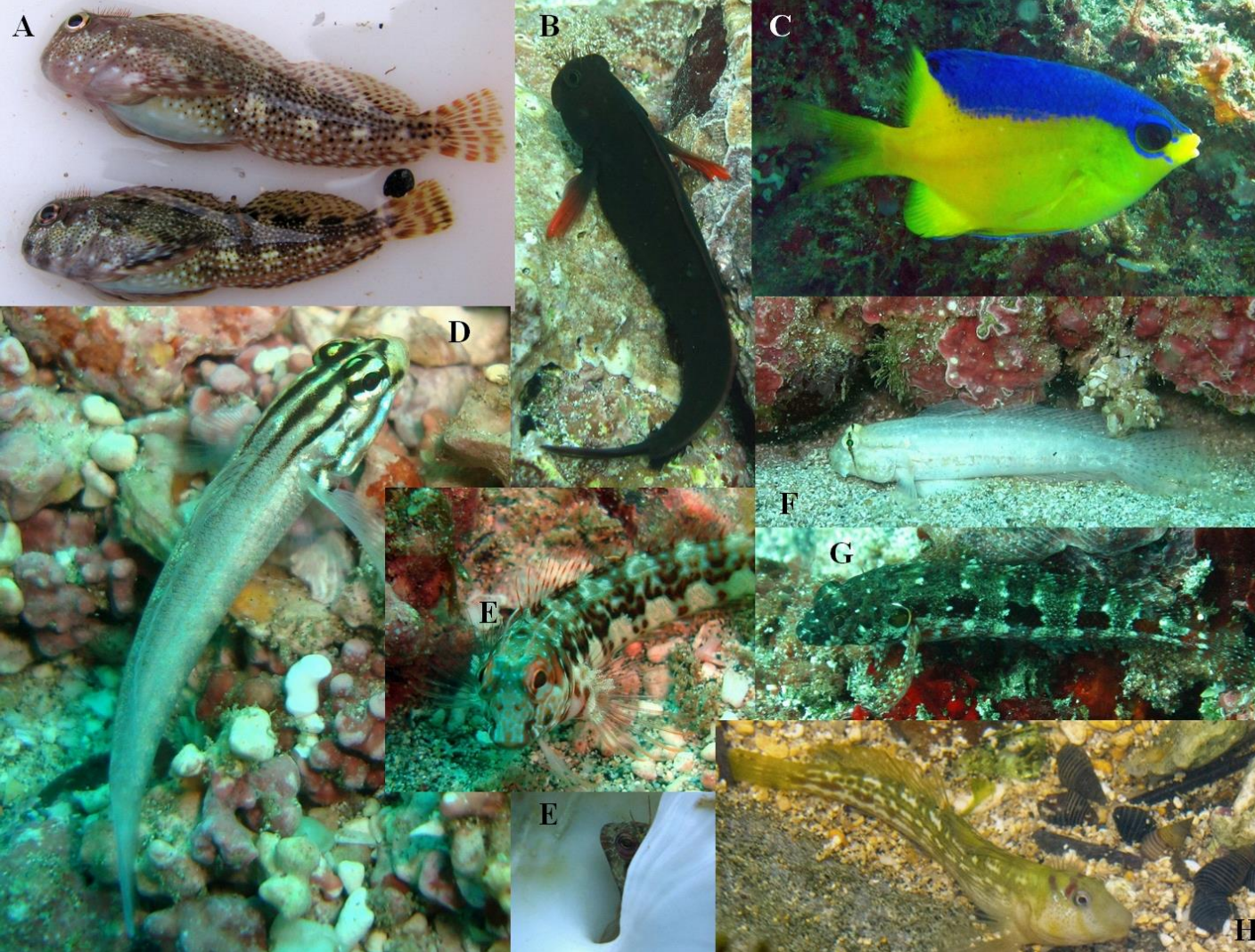


Goraz africano *Lutjanus dentatus* capturado por jiggging na

Cobia (*R. canadum*) de 30 kg fotografado na cidade de Mindelo (ilha de São Vicente) depois de ter sido



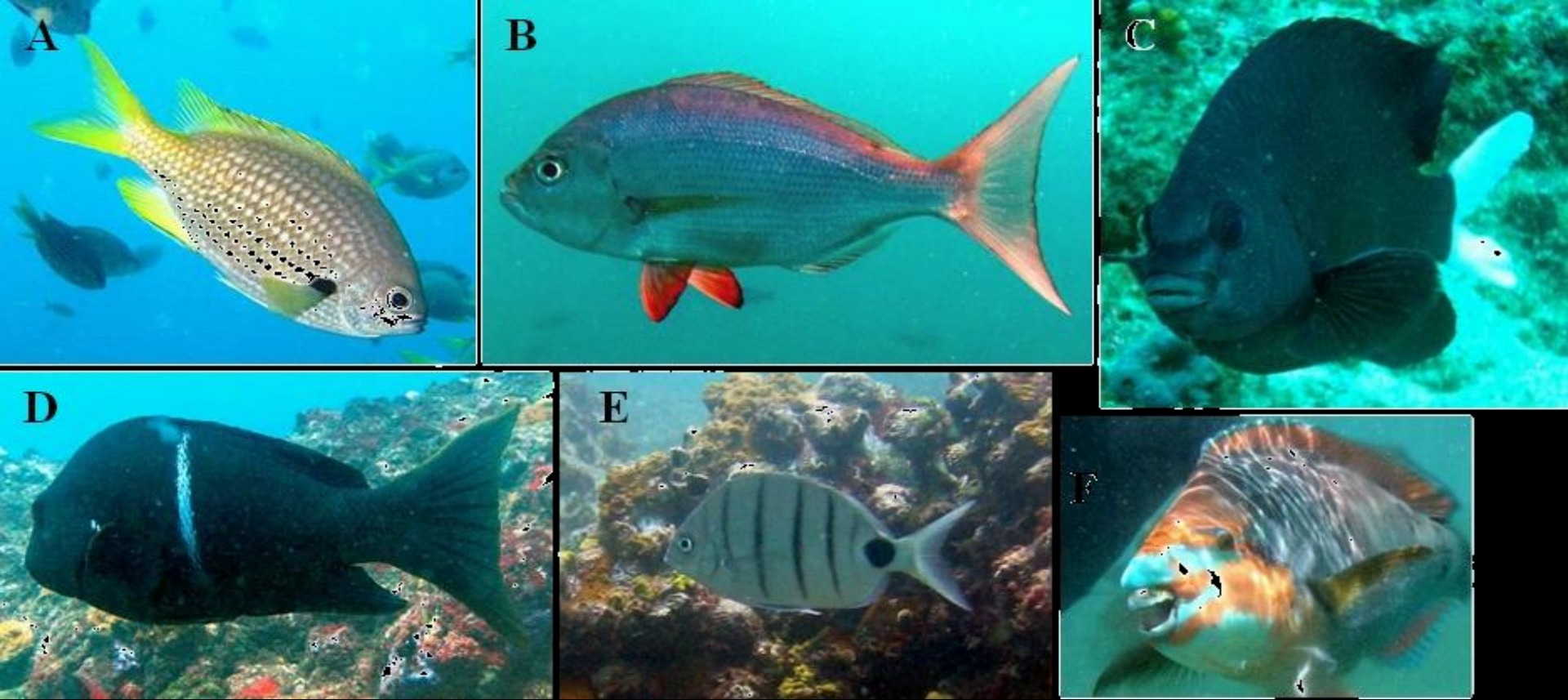
Most of the photos available in this work were possible which came from, were found or sent to social networks on the Internet (ie, messenger, viber, closed groups) or by e-mail.



*Filogenética*  
**Blenniidae**  
 Labrisomidae  
 Gobiesocidae  
 Callionymidae  
**Gobiidae**

Based Wirtiz et al 2013

Algumas (parcialmente) endêmicas pequenas espécies de peixes criptobêncicos do Cabo Verde são: (A) *Scartella caboverdiana* (endemic blenniid); (B) *Ophioblennius atlanticus* (amphi-Atlantic blenniid); (C) juvenile *Similiparma hermani* (endemic, not a cryptic species, but shown here); (D) *Gobius tetrophthalmus* (endemic gobiid); (E) *Parablennius salensis* (endemic blenniid); (F) *Gnatholepis thompsoni* (amphi-Atlantic gobiid); (G) *Labrisomus nuchipinnis* (amphi-Atlantic labrisomid); and (H) adult *Microlipophrys caboverdensis* (endemic blenniid, photo © A. Boyra).



**Photos in different size-scales of some notable Cabo Verdean endemic reef fish: (A) Lubbock's chromis *Chromis lubbocki*, an endemic that is probably dispersing out of the region (?); (B) Bulldog dentex *Virididentex acromegalus*, an endemic monotypic genus; (C) Cape damsel *Similiparma hermani*, a paleoendemic monotypic genus; (D) *Girella stuebeli*, a paleoendemic macroalgal browser and the sole *Girella* sp. in the Atlantic Ocean; (E) White seabream *Diplodus sargus lineatus*, an endemic sub-species and the most ancestral branch of the *D. sargus* clade; and (F) Guinean parrotfish *Scarus hoefleri*, endemic to West Africa (Eastern Atlantic).**

# ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN  
(MINISTERIE VAN WELZIJN, VOLKSGEZONDHEID EN CULTUUR)

Deel 60 no. 12

25 juli 1986

ISSN 0024-0672

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**A NEW DAMSELFISH, *CHROMIS LUBBOCKI* (TELEOSTEI:  
POMACENTRIDAE) FROM THE CAPE VERDE ARCHIPELAGO,  
WITH NOTES ON OTHER EASTERN ATLANTIC POMACENTRIDS**

CANCAP Project, Contributions to the Zoology, Botany and Paleontology of the Canarian-Cape Verdean region of the North Atlantic Ocean, no. 61.

by

**ALASDAIR EDWARDS**

local kyphosid  
macroalgal browser



*Girella stuebeli*

rece

pal



?  
e IO ?

with









# *Tubastraea caboverdiana* Ocaña & Brito, 2015



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R	SPIXIANA	36	1	113-142	München, September 2013	ISSN 0341-8391
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2007)

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## The coastal fishes of the Cape Verde Islands – new records and an annotated check-list

Peter Wirtz, Alberto Brito, Jesús M. Falcón, Rui Freitas, Ronald Fricke,  
Vanda Monteiro, Francisco Reiner & Oksana Tariche

UNA  
IÓN

SPIXIANA	36	1	113-142	München, September 2013	ISSN 0341-8391
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## The coastal fishes of the Cape Verde Islands – new records and an annotated check-list

Peter Wirtz, Alberto Brito, Jesús M. Falcón, Rui Freitas, Ronald Fricke,  
Vanda Monteiro, Francisco Reiner & Oksana Tariche

Rev. Acad. Canar. Cienc., XI (Núms. 3-4), 27-41 (1999)

## CONTRIBUCIÓN AL CONOCIMIENTO DE LA ICTIOFAUNA DE LAS ISLAS DE CABO VERDE

A. Brito\*, R. Herrera\*\*, J. M. Falcón\*, J. A. García-Charton\*\*\*, J. Barquín\* y A.  
Pérez-Ruzafa\*\*\*



## The coastal ichthyofauna of the Cape Verde Islands: a summary and remarks on endemism

Rui Freitas<sup>1</sup>

Freitas

9

Coastal ichthyofauna

Morri *et al.* 2000, Floeter *et al.* 2008) and inclusion of the Cape Verde Islands in a marine biogeographic ‘Macaronesian’ unit does not hold (Wirtz *et al.* 2013).

As reef fish in Cape Verde have only recently been more intensively studied, newly recorded species likely resulted from more

research being carried out rather than being an indicator of recent biological events. New discoveries are still to be expected and, based on reef fish endemism and zoogeography, Cape Verde may perhaps be designated a distinct Atlantic biogeographic province in its own right in the future.



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# Restructuring of the ‘Macaronesia’ biogeographic unit: A marine multi-taxon biogeographical approach

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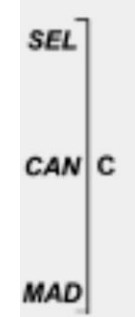
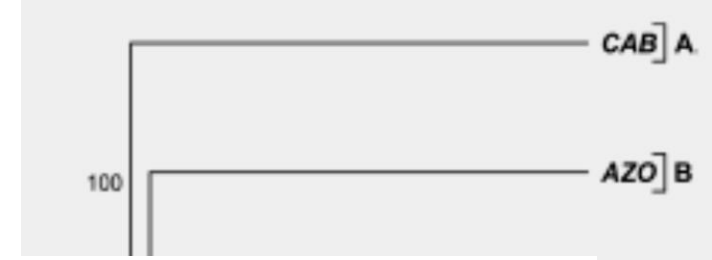
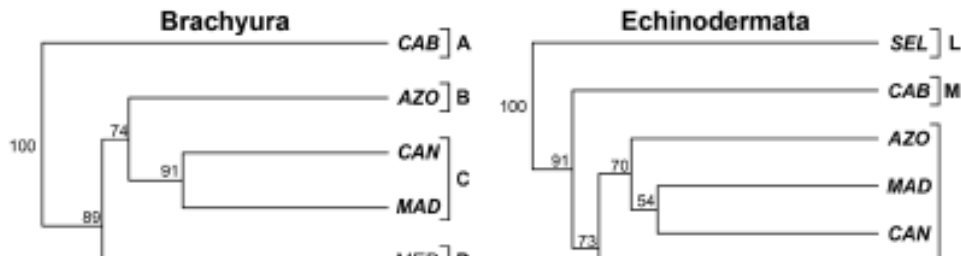


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***Estudo regional em biogeografia marinha reestrutura a normativa “Macaronésia” e aponta Cabo Verde como unidade singular***

		AZO	MAD	SEL	CAN	CAB	Macaronesia
Coastal Fishes	Total	165	208	76	299	303	465
	End	1	0	0	2	22 <sup>(1)</sup>	25 <sup>(2)</sup>
	End (%)	0.6	0.0	0.0	0.7	7.3	5.4
Echinoderms	Total	64	69	18	85	76	151
	End	0	0	0	0	1	1
	End (%)	0.0	0.0	0.0	0.0	1.3	0.7
Gastropods	Total	280	397	207	811	608	1,312
	End	37	14	3	96	268	418
	End (%)	13.2	3.5	1.4	11.8	44.1	31.9
Brachyurans	Total	62	75	n.a.	120	117	177
	End	0 <sup>(3)</sup>	0 <sup>(3)</sup>	n.a.	0 <sup>(3)</sup>	10 <sup>(3)</sup>	10
	End (%)	0.0	0.0	n.a.	0.0	8.5	5.6
Polychaetes	Total	169	300	86	465	213	683
	End	1	10	0	10	9	30
	End (%)	0.6	3.3	0.0	2.2	4.2	4.4
Macroalgae	Total	405	396	295	689	333	949
	End	0	1	0	1	0	2
	End (%)	0.0	0.3	0.0	0.1	0.0	0.2

**Table 1.** Total number of species of coastal fishes, echinoderms, gastropods, brachyuran crabs, and algae reported from the archipelagos of Macaronesia. AZO – Azores; MAD – Madeira; SEL – Selvagens; CAN – Canary Islands; CAB – Cabo Verde. End – number of endemic species in each archipelago. n.a. – not applicable.



***O estudo em sumário:***

***(1) permitiu elucidar a falta de suporte para o conceito actual da Macaronésia como uma unidade biogeográfica marinha coerente***

***(2) veio reforçar que o ambiente marinho costeiro do arquipélago de Cabo Verde possui uma fauna singular, caracterizada por uma rica diversidade***

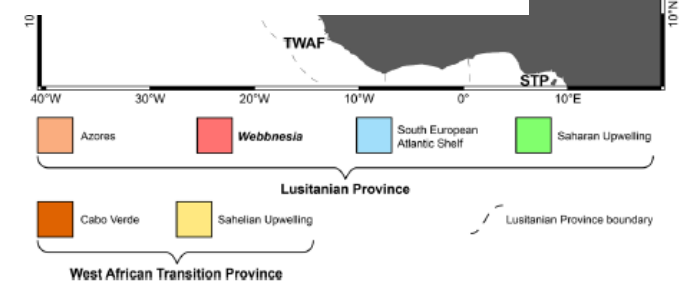
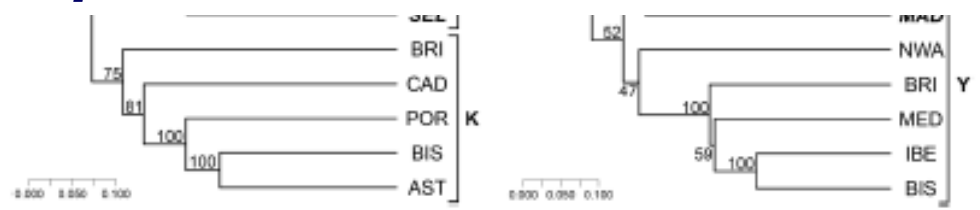
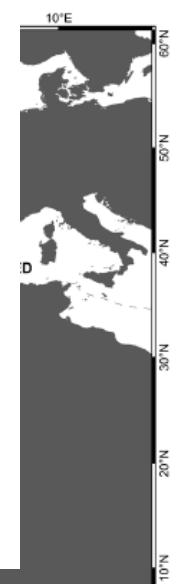


Figure 4. Dendrograms depicting the biogeographic similarity between areas. Numbers correspond to the bootstrap values providing support for each tree node (100 repetitions of 100 trees). Coastal fishes (Simpson



