

Biologia Quantitativa

2025/01

Módulo 02

Bases de Dados e seu Uso

Depto de Zoologia
01 de abril de 2025

Exemplo de Pesquisa Moderna

- Trabalho na Serra da Mesa, Goiás. Laboratório Prof Reuber, UnB/EFL.



Lizards on newly created islands independently and rapidly adapt in morphology and diet

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Contributed by Thomas W. Schoener, June 21, 2017 (sent for review December 31, 2016; reviewed by Raymond B. Huey and Dolph Schluter)

Rapid adaptive changes can result from the drastic alterations humans impose on ecosystems. For example, flooding large areas for hydroelectric dams converts mountaintops into islands and leaves surviving populations in a new environment. We report differences in morphology and diet of the termite-eating gecko *Gymnodactylus amarali* between five such newly created islands

study, because it was the most common lizard species in the area at the time of the field study.

We evaluated the effects of isolation (actually, insularization) on diet and morphology of *G. amarali* populations on islands formed by the Serra da Mesa reservoir. We collected data on lizard diet and morphology on five islands, as well as five nearby



Data from: Lizards on newly created islands independently and rapidly adapt in morphology and diet

Eloy de Amorim M, Schoener TW, Santoro GRCC, Lins ACR, Piovio-Scott J, Brandão RA

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Occurrence records
1,921,499,521

Datasets
65,023


Publishing institutions
1,787

Peer-reviewed papers using data
6,668




News

First thematic help desk to support mobilization of biodiversity data related to disease vectors




News

New feature enables search of occurrence data by global IUCN Red List Category




News

Call for proposals for the 2022 Capacity Enhancement Support Programme




News

Call for nominations to the 2022 GBIF Young Researchers Award




News

Call for data papers describing datasets on vectors of human diseases




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Tajikistan joins GBIF as associate participant



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2022 Ebbe Nielsen Challenge seeks open-data innovations for biodiversity



News


Megadiverse country of Guatemala joins GBIF



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Explore Your Observations Community Identify More


 **rbcav2003**


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All Updates Your Content Following Real Time Discussions


Let's Get Started by Posting Some Observations

Need inspiration? Here's some organisms being observed nearby...


Rufous Horned Lark


Chalk-browed Mockingbird


Burrowing Owl


Gray Cracker


Get outside, and observe an individual organism. Pick something wild and take a clear, full frame photo. If you already have a photo of something wild, add it now. You can also use the iNaturalist mobile apps to record observations.


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Student accounts	09:38 AM	6
Find introduced status	07:03 AM	5
Wild cherry (Prunus avium) and ornamental cherries ('flowering cherries')	Jan 24	4
Add Contrast changing buttons on Identify modal	Jan 24	1

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Google Earth Engine Data Catalog

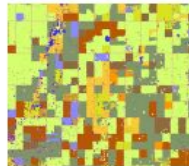
Earth Engine Data Catalog

Earth Engine's public data catalog includes a variety of standard Earth science raster datasets. You can import these datasets into your script environment with a single click. You can also upload your own raster data or vector data for private use or sharing in your scripts.

Looking for another dataset not in Earth Engine yet? Let us know by suggesting a dataset.

Filter list of datasets

Canada AAFC Annual Crop Inventory



Starting in 2009, the Earth Observation Team of the Science and Technology Branch (STB) at Agriculture and Agri-Food Canada (AAFC) began the process of generating annual crop type digital maps. Focusing on the Prairie Provinces in 2009 and 2010, a Decision Tree (DT) based methodology ...

aaft canada crop
landcover

Allen Coral Atlas (ACA) -
Geomorphic Zonation and
Benthic Habitat - v1.0



The Allen Coral Atlas dataset maps the geomorphic zonation and benthic habitat for the world's shallow coral reefs at 5m pixel resolution. The underlying satellite image data are temporal composites of PlanetScope satellite imagery spanning from 2018-2020. The habitat maps are created via a machine learning ...

coral ocean planet
planet-derived reef seagrass

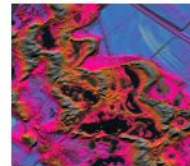
AHN Netherlands 0.5m DEM,
Interpolated



The AHN DEM is a 0.5m DEM covering the Netherlands. It was generated from LiDAR data taken in the spring between 2007 and 2012. It contains ground level samples with all other items above ground (such as buildings, bridges, trees etc.) removed. This version is ...

ahn dem elevation
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AHN Netherlands 0.5m DEM, Non-
Interpolated



The AHN DEM is a 0.5m DEM covering the Netherlands. It was generated from LiDAR data taken in the spring between 2007 and 2012. It contains ground level samples with all other items above ground (such as buildings, bridges, trees etc.) removed. This version is ...

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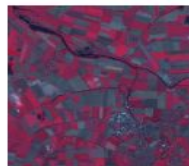
AHN Netherlands 0.5m DEM, Raw
Samples



The AHN DEM is a 0.5m DEM covering the Netherlands. It was generated from LiDAR data taken in the spring between 2007 and 2012. This version contains both ground level samples and items above ground level (such as buildings, bridges, trees etc.). The point cloud ...

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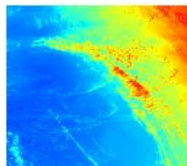
ASTER LIT Radiance



The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) is a multispectral imager that was launched on board NASA's Terra spacecraft in December, 1999. ASTER can collect data in 14 spectral bands from the visible to the thermal infrared. Each scene covers an area of ...

aster eos imagery nasa
nir radiance

Australian 5M DEM



The Digital Elevation Model (DEM) 5 Metre Grid of Australia derived from LiDAR model represents a National 5 metre (bare earth) DEM which has been derived from some 236 individual LiDAR surveys between 2001 and 2018 covering an area in excess of 248,000 square kilometres. ...

australia dem elevation ga
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DEM-H: Australian SRTM
Hydrologically Enforced Digital
Elevation Model



The Hydrologically Enforced Digital Elevation Model (DEM-H) was derived from the SRTM data acquired by NASA in February 2000. The model has been hydrologically conditioned and drainage enforced. The DEM-H captures flow paths based on SRTM elevations and mapped stream lines, and supports delineation of ...

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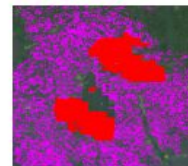
DEM-S: Australian Smoothed
Digital Elevation Model



The Smoothed Digital Elevation Model (DEM-S) was derived from the SRTM data acquired by NASA in February 2000. DEM-S represents ground surface topography (excluding vegetation features) and has been smoothed to reduce noise and improve the representation of surface shape. An adaptive process applied more ...

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Global Map of Oil Palm Plantations



The dataset is a 10m global industrial and smallholder oil palm map for 2019. It covers areas where oil palm plantations were detected. The classified images are the output of a convolutional neural network based on Sentinel-1 and Sentinel-2 half-year composites. See article for additional ...

biodiversity biopama
conservation crop global
landuse

Como usar o Google Earth Engine

- Fazer cadastro:
<https://code.earthengine.google.com/register>
- Catálogo de dados:
<https://developers.google.com/earth-engine/datasets>
- Exemplo de dados: Índice de Vegetação:
https://developers.google.com/earth-engine/datasets/catalog/MODIS_061_MCD15A3H
- Exemplo de dados: Mapbiomas:
https://code.earthengine.google.com/?accept_repo=users%2Fmapbiomas%2Fuser-toolkit&scriptPath=users%2Fmapbiomas%2Fuser-toolkit%3Amapbiomas-user-toolkit-lulc.js

As 4 abordagens para usar R

- Importar e organizar dados e objetos
- Funções e operações
- Visualização e descrição de dados
- Ajuste de modelos e análises estatísticas

Colocando dados no R

- Manual usando comandos R e arquivos de texto ou clipboard
- Usando menu do Rstudio
- Carregando pacotes contendo conjuntos de dados
- Executando scripts do R para local ou internet

Pacotes no R

- Os pacotes em R são elementos de programação executáveis que contém rotinas pré-escritas, permitindo:
- Utilizar funções desenvolvidas para aplicações específicas
- Executar análises, plotar gráficos, etc, em formatos e para necessidades personalizadas
- Integrar vários produtos da linguagem R em um arquivo único: dados, funções, variáveis, rotinas
- Minimizar o trabalho de executar trabalhos repetidos
- Distribuir métodos analíticos de forma confiável e replicável

O que é o Rstudio

- Interface Gráfica para a linguagem R
- Cada janela permite um tipo de acesso à linguagem
- 4 janelas básicas:
 - Script ou markdown ou notebook
 - Comando
 - Saída/ajuda
 - Variáveis de estado
- Versões windows, mac, linux, servidor, cloud
- Software gratuito para uso individual, pago na versão empresarial
- Modelo comercial / apoio comunitário

Como funciona o Rstudio

- Oferece janelas para visualizar ao mesmo tempo diversas interfaces do R
- Sem as janelas o usuário teria só uma forma de visualização: a linha de comando
- Uma das janelas é a linha de comando
- Uma janela permite editar e executar os scripts, markdown ou notebooks (o R é uma linguagem interpretada, opera linha por linha, o script é só uma sequência de comandos)
- Uma janela permite administrar pacotes, acessar o help, visualizar saídas gráficas, e outros
- Uma janela mostra as variáveis em uso
- Menu do Rstudio permite executar alguns comandos sem ter de digitar por extenso

Softwares Estatísticos Conhecidos

- R
- Systat, SPSS, SAS, MVSP
- Bioestat - Ayres (gratuito, distribuído pela Soc Civ Mamirauá)
- Vários sites de análise online
- Cuidado: cada software usa um algoritmo próprio para implementar análises, podendo estar sujeitos a erros de aproximação ou “bugs”. Verificar a documentação e notícias na internet.
- É importante padronizar a análise para permitir replicação. Procure publicar seus dados originais junto com os artigos, e use programas de amplo uso quando possível

Sistemas Complexos

(Claudia Pahl-Wostl 1995)

- Extrapolações lineares não são factíveis
- Prever os limites e transições é extremamente difícil
- Fatores relevantes são difíceis de reconhecer devido à sua pequena importância em situações estáveis.
- Relações causa-efeito quase inexistentes. Efeitos dependem do estado atual e do contexto.
- Exemplos: dinâmica de ecossistemas, queimadas, espécies invasoras, sociedades humanas
- Métodos: universos digitais no computador. A vida biológica é digital (4 bases)

Sistemas Complexos

- Apresentam características de auto-organização
- Existem no limite do caos
- Não são previsíveis individualmente, mas seu comportamento segue regras gerais.
- Como estudar? por métodos estatísticos e por modelagem. Embora a trajetória individual do sistema não seja previsível, o conjunto de trajetórias tem limites (atratores)
- Nas sociedades humanas, os sistemas complexos são estudados por meio de análise histórica. É possível demonstrar o encadeamento de variáveis que produziu o resultado observado, a posteriori.

Sistemas Complexos

- Há estabilidade em sistemas complexos?
- Como diferem de comportamento caótico?
- Estudos de simulação mostram resultados interessantes. Exemplo: redes de interação em ecossistemas.
- Se há interações fortes entre todos os componentes do ecossistema, e feedbacks positivos, o sistema é instável
- Em sistemas que tendem à estabilidade, ao longo do tempo, as interações fortes se restringem a um número pequeno de componentes (espécies dominantes) e a mediação se dá principalmente por retroalimentação negativa (feedback negativo).

Sistemas Complexos

- A escolha das medidas é fundamental para entender os processos que ocorrem.
- Por exemplo, uma medida ordinal dá uma idéia da ordem de importância, mas não explicita as magnitudes das diferenças entre os componentes do sistema.
- Já as medidas de intervalo ou razão permitem posicionar melhor a situação de cada componente
- Uma escola de samba é um exemplo ótimo de um sistema complexo (veja as definições anteriores)
- Vamos ver como os resultados variam de ano para ano. E como o uso de medidas de intervalo permite compreender o fenômeno muito melhor do que usando medidas ordinais.