ATLANTIC BIRD TRAITS: a dataset of bird morphological traits from the Atlantic forests of South America

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[104] Programa de Pós-Graduação Interunidades em Ecologia Aplicada, Laboratório de Ecologia, Manejo e Conservação de Fauna Silvestre, Departamento de Ciências Florestais, Escola de Agricultura Luiz de Queiroz, Universidade de São Paulo, Av. Pádua Dias, 11, 13418-900, Piracicaba, São Paulo, Brasil

Introduction

Species morphology is one of the oldest and most important branches of biological research owing to its linkage with several evolutionary and ecological patterns and processes (Hutchinson 1959, Gould 1966, Ricklefs 2012, Lamichhaney et al. 2018). To date, several studies have used phenotypic traits to understand how organisms interact with the environment and how these interactions evolved (Polo and Carrascal 1999, Pausas and Verdú 2010, Grant and Grant 2011, Dehling et al. 2016). Nowadays, morphological trait data are fundamental to recently developed conceptual frameworks for predicting the vulnerability of a species and ecosystems to human impacts such as habitat fragmentation and climate changes (Laliberté et al. 2010, Meynard et al. 2011, Mouillot et al. 2013, Salewski et al. 2014).

Data on morphological variation can also provide crucial information that advances our understanding of drivers of taxonomic variation, speciation and adaptation. Furthermore, researchers have become increasingly interested in discovering how environmental factors induce variability in morphological traits (Relyea 2002, Hughes et al. 2013, Guo et al. 2017). For instance, some studies found that both genetic and trait diversity are higher in tropical regions than in temperate regions, and they demonstrated that trait diversity variation could explain species richness variation in a latitudinal pattern of species diversity (Martin and McKay 2004, Araújo and Costa-Pereira 2013). Such an approach can also stimulate the development of new theoretical models that predict the conditions under which adaptive plasticity should evolve, such as adaptive evolution in populations facing novel or disturbed environments, especially when driven by anthropogenic changes (Ghalambor et al. 2007, Gámez-Virués et al. 2015).

The Atlantic Forest originally occupied around 1.56 million km^2 in the eastern part of South America, ranging from 3° to 30° of latitude and from sea level to 2,700 m a.s.l. (Câmara 2003, Muylaert et al. in press). This biogeographic realm presents high environmental heterogeneity and is marked by several geological and climatic processes that favor allopatric speciation (Safriel et al. 1994, da Silva et al. 2004). The Atlantic Forest is also one of the most endangered biodiversity hotspots on Earth (Myers et al. 2000), having been reduced to less than 16% of its original vegetation, and what remains has almost totally disintegrated into forest fragments smaller than 100 ha (Ribeiro et al. 2009). Therefore, this biome provides an ideal system to test how morphological traits vary in response to different anthropogenic influences on the landscape, such as habitat loss and fragmentation, as well as variation with latitude, altitude and spatial heterogeneity.

Here, we present ATLANTIC BIRD TRAITS, a dataset containing measurements of 44 bird morphological traits in 67,197 individual records of 711 species and 2,790 populations from the Atlantic forests of South America (Figure 1). The dataset includes a series of morphological measurements of bill, wing, tail, tarsus, head and total body dimensions (mass and length). For most individuals, we also provide information about age, sex, reproductive stage, ID ring number, molt presence and patterns, among others. All records include information on sampled localities, political units (municipalities and states) and additional biogeographical and environmental descriptors. The ATLANTIC BIRD TRAITS (ABT) is part of ATLANTIC

SERIES of data papers, which also includes data compilation on frugivory (Bello et al. 2017), small mammals (Bovendorp et al. 2017), mammals recorded with cameras (Lima et al. 2017), bats (Muylaert et al. 2017), birds (Hasui et al. 2018), mammal traits (Gonçalves et al. 2018), amphibians (Vancine et al. 2018), butterflies (Santos et al. in press), primates (Culot et al. in review) and epiphytes (Ramos et al. in review). We believe ABT is a major effort to compile individual bird traits found in the Neotropical region, filling an important gap in the knowledge about individual and species variation and distribution of bird morphological attributes and life history. Hence, this dataset opens new avenues for developing research about anthropogenic, macroecological and climate change influences on bird morphological traits. Moreover, this dataset allows a cross-taxa understanding of how morphological trait distribution and variation are related to particular environmental and anthropogenic variables.

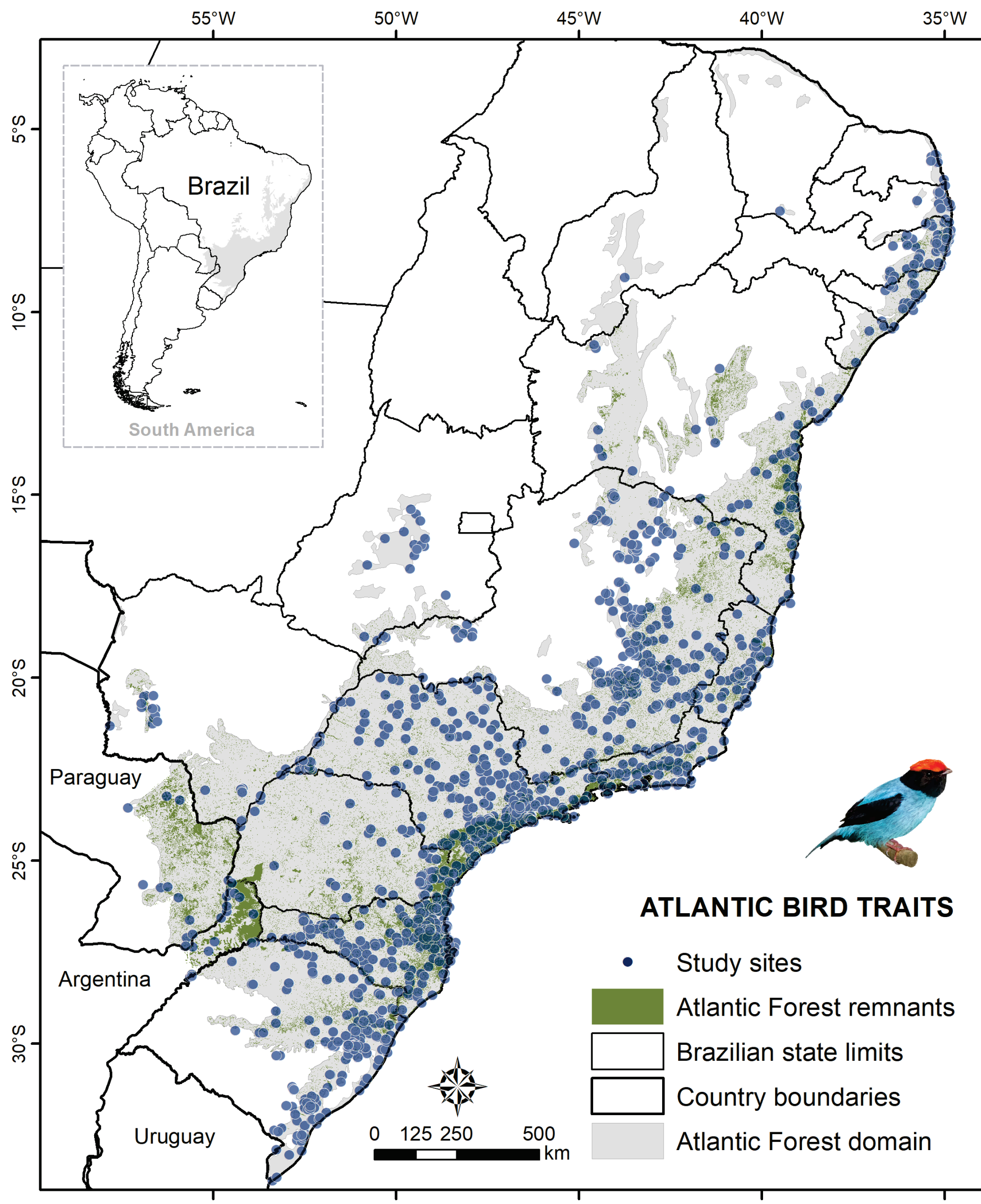

Figure 1. Distribution of original Atlantic Forest domain in South America and current extent of its vegetation. Blue dots represent sampling locations (n = 2,790) for 711 species included in the ATLANTIC BIRD TRAITS dataset.

METADATA

CLASS I. DATA SET DESCRIPTORS

A. Data set identity:

Title: ATLANTIC BIRD TRAITS: a dataset of bird morphological traits from the Atlantic forests of South America

B. Data set identification code:

Suggested Data set Identity Codes:

ATLANTIC_BIRD_TRAITS_completed_2018_11_d05.csv,

C. Data set description:

1. Principal Investigator(s):

1 Rodolpho Credo Rodrigues, and

2 Milton Cezar Ribeiro

1 - Programa de Pós-Graduação em Ecologia, Departamento de Ecologia, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, 321, Travessa 14, 05508-090, São Paulo, São Paulo, Brasil

2 - Universidade Estadual Paulista (UNESP), Instituto de Biociências, Departamento de Ecologia, CP. 199, Rio Claro, São Paulo, 13506-900, Brasil

2. Abstract: Scientists have long been trying to understand why the Neotropical region holds the highest diversity of birds on Earth. Recently, there has been increased interest in morphological variation between and within species, and in how climate, topography and anthropogenic pressures may explain and affect phenotypic variation. Because morphological data are not always available for many species at the local or regional scale, we are limited in our understanding of intra- and inter-species spatial morphological variation. Here we present the ATLANTIC BIRD TRAITS, a dataset that includes measurements of up to 44 morphological traits in 67,197 bird records from 2,790 populations distributed throughout the Atlantic forests of South America. This dataset comprises information, compiled over two centuries (1820–2018), for 711 bird species, which represent 80% of all known bird diversity in the Atlantic Forest. Among the most commonly reported traits are sex (n=65,717), age (n=63,852), body mass (n=58,768), flight molt presence (n=44,941), molt presence (n=44,847), body molt presence (n=44,606), tail length (n=43,005), reproductive stage (n=42,588), bill length (n=37,409), body length (n=28,394), right wing length (n=21,950), tarsus length (n=20,342) and, wing length (n=18,071). The most frequently recorded species are: *Chiroxiphia caudata* (n=1,837), *Turdus albicollis* (n=1,658), *Trichothraupis melanops* (n=1,468), *Turdus leucomelas* (n=1,436), and *Basileuterus culicivorus* (n=1,384). The species recorded in the greatest number of sampling localities are *Basileuterus culicivorus* (n=243), *Trichothraupis melanops* (n=242), *Chiroxiphia caudata* (n=210), *Platyrinchus mystaceus* (n=208), and *Turdus rufiventris* (n=191). ATLANTIC BIRD TRAITS (ABT) is the most comprehensive dataset on measurements of bird morphological traits found in a biodiversity hotspot; it provides data for basic and applied

research at multiple scales—from individual to community—and from the local to the macroecological perspectives. No copyright or proprietary restrictions are associated with the use of this dataset. Please cite this data paper when the data are used in publications or teaching and educational activities.

D. Key words: Tropical forest, rapid evolution, functional diversity, phenotypic plasticity, phylogenetic diversity, body size, interspecific variation, individual variation.

E. Description: The dataset compiles information collected at 2,790 sites distributed over 28 degrees of latitude, 23 degrees of longitude, and from sea level to 2,588 m a.s.l. (Figure 1). Thus, the database provides information on almost all of the 1.56 million km² of the Atlantic Forest domain (Muylaert et al. 2018) and on a wide range of environmental conditions, including 12 vegetation types (Ribeiro et al. 2009), eight biogeographical sub-regions (da Silva and Casteleti 2003), 17 ecoregions, four bioregions (Olson et al. 2001), and great variations in annual mean temperature, and annual total precipitation (from 12.4 to 28.7°C and from 514 to 3,202 mm, respectively).

Our dataset includes information on 44 morphological traits acquired in the field or in museum collections. Traits were measured in 67,197 individual records of 711 bird species distributed among 66 families and 23 orders (Figure 2). These records represent ~80% of the bird diversity known to occur in the Atlantic Forest, which comprises a total of 861 bird species (Moreira-Lima and Silveira, 2017). We provide quantitative information related to total body dimensions (body mass and body length, with 58,768 and 28,394 records, respectively) and several bird body parts, such as wings (n=43,451), tail (n=43,121), tarsus (n=43,113), bill length (n=45,521), and bill width and depth (n=19,147, and n=18,576, respectively; Figure 3). We also present categorical information about sex (n=65,717), age (n=63,852), molt (overall, body molt, and flight molt; ~44,000 records each), reproductive stage (n=42,588), brood patch (n=1,705), fat deposition (n=781), cloacal protuberance (n=593), skull ossification (n=303) and others (Figure 3). The dataset also includes other information from each bird record, such as survey year (n=65,950) and date (n=62,264), ID ring number (n=50,919), recaptures (n=38,251), and voucher number (n=10,276), museum collection (n=4,884), and collector name (n=59,700) of birds from biological collections.

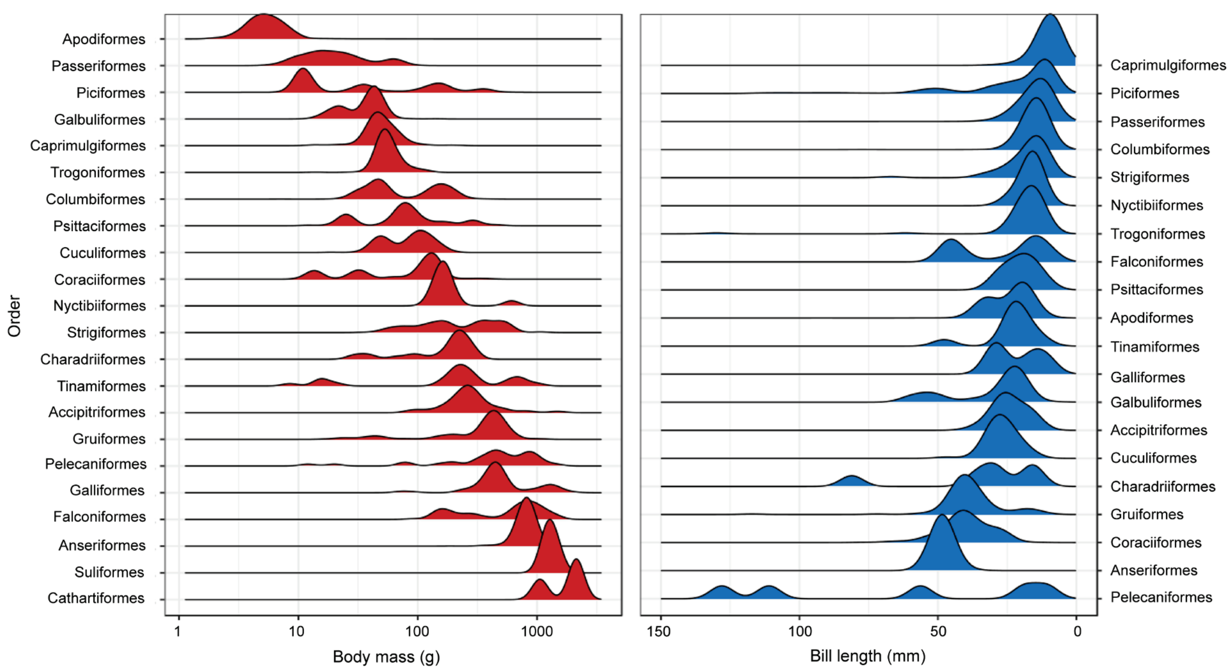

Figure 2. Variation in body mass (g) and bill length (mm) of bird records in the ATLANTIC BIRD TRAITS database, per avian order (22 and 20 orders, respectively).

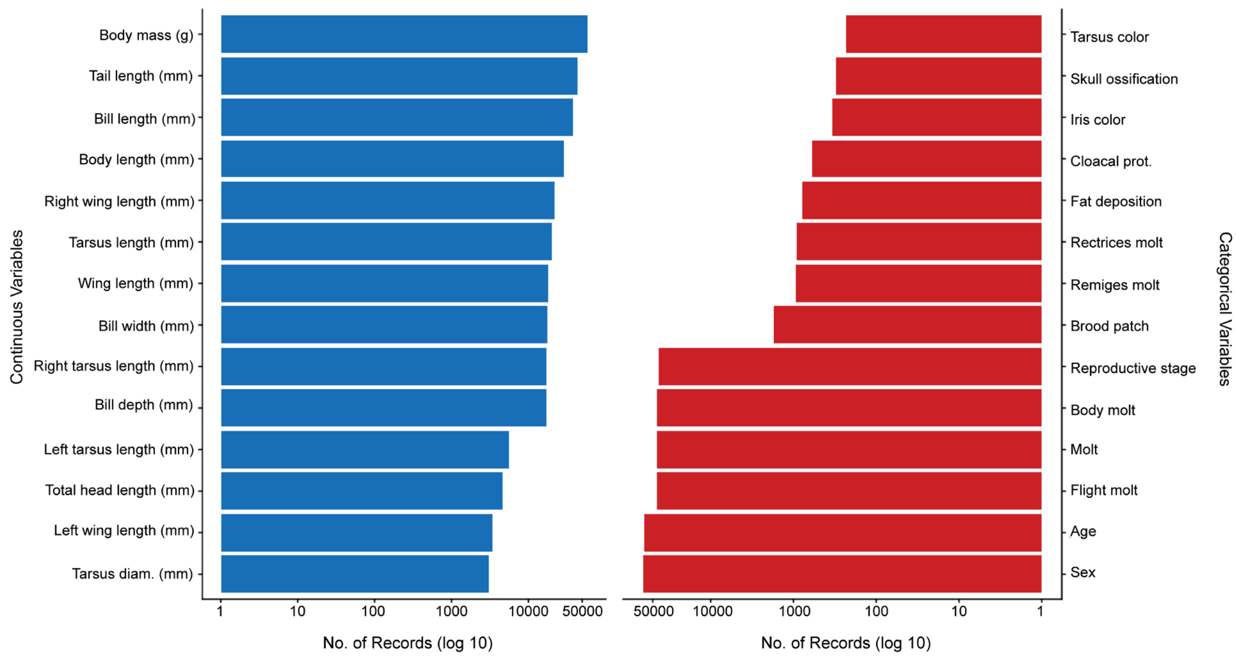

Figure 3. Number of records of the 28 most frequent morphological traits presented in the ATLANTIC BIRD TRAITS.

This dataset, which includes data collected between 1820 and 2018, was compiled from information gathered by researchers in the field, from twelve museum collections and from eight published papers. Morphological traits were measured for a total of 711 species, and most of these measurements (n=26) were obtained for at least 100 species. The nine most representative measures were obtained for more than 600 species (Figure 4).

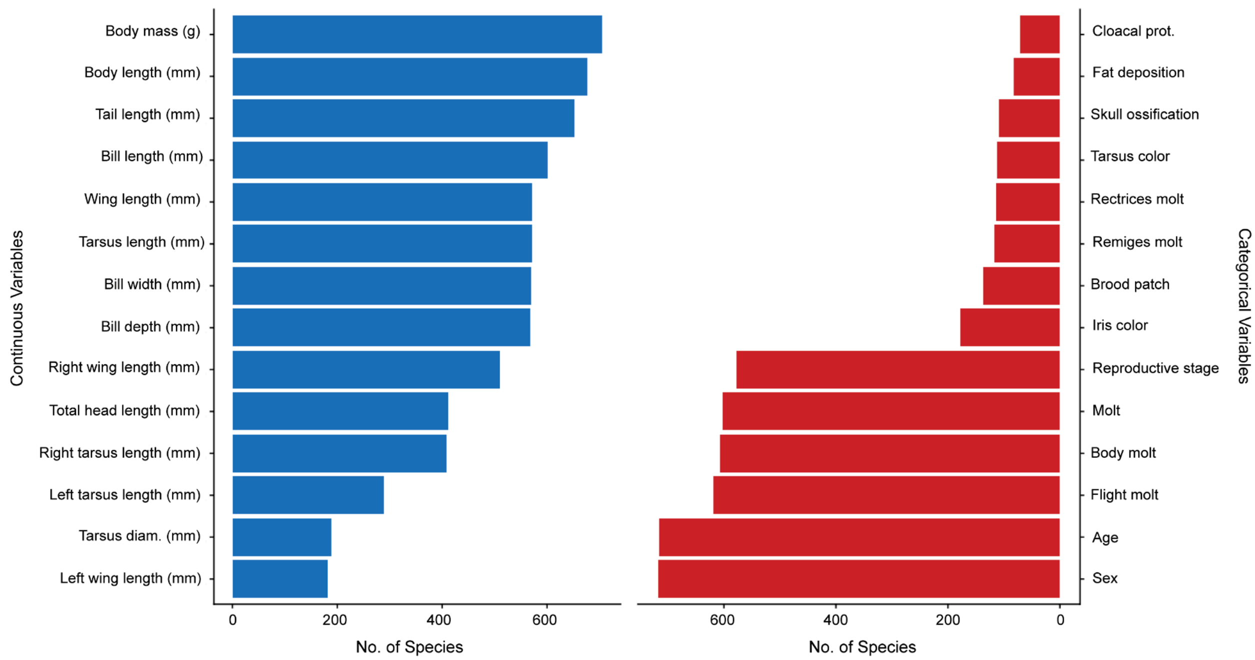

Figure 4. Number of species measured for the 28 most frequent morphological traits presented in the ATLANTIC BIRD TRAITS.

Overall, the species with the greatest number of records in the dataset were *Chiroxiphia caudata* (n=1,837), *Turdus albicollis* (n=1,658), *Trichothraupis melanops* (n=1,468), *Turdus leucomelas* (n=1,436), and *Basileuterus culicivorus* (n=1,365)(Figure 5). Some of them were also among the species recorded in the greatest number of localities: *Basileuterus culicivorus* (n=243), *Trichothraupis melanops* (n=242), *Chiroxiphia caudata* (n=210), *Platyrinchus mystaceus* (n=208), and *Turdus rufiventris* (n=191) (Figure 5).

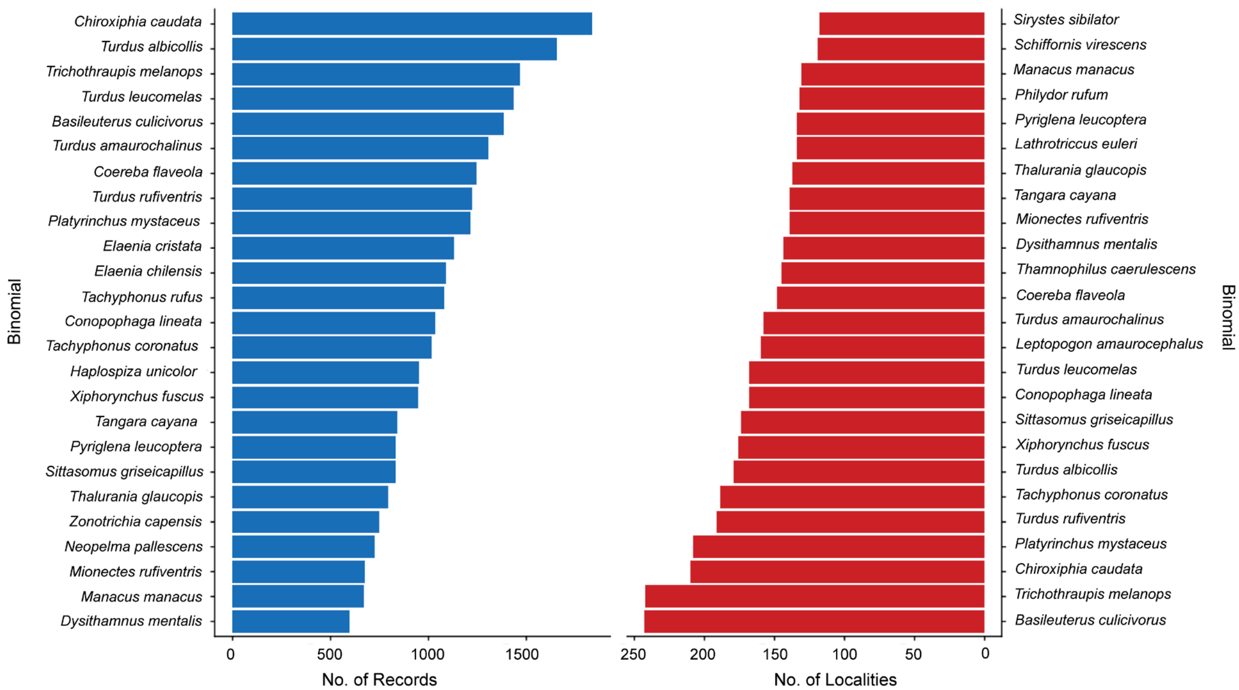

Figure 5. Number of records and localities for the 25 most frequent species presented in the ATLANTIC BIRD TRAITS.

CLASS II. RESEARCH ORIGIN DESCRIPTORS

A. Overall project description

Identity: Compilation of morphological and life-history traits, at species and individual levels, of birds in the Atlantic forests of South America.

Originators: The ATLANTIC BIRD TRAITS was coordinated by Rodolpho Credo Rodrigues and Milton Ribeiro (UNESP), and the database was assembled with help from all the other authors. This is part of the ATLANTIC SERIES, which is led by Mauro Galetti and Milton

Ribeiro at São Paulo State University (UNESP), Brazil.

Period of study: Data collection reported in studies occurred from 1820 to 2018.

Objectives: We aimed to 1) provide information on 44 morphological traits, measured in ~80% (n=711) of bird species known to occur in the Atlantic forests and collected during the last two centuries (1820 to 2018); 2) provide information on traits and distribution data of bird assemblages at 2,790 sites and in a wide variety of environmental conditions, biogeographical regions and vegetation types; 3) summarize information about variations in morphology at the individual, species, family and order levels of birds in the Atlantic forests; and 4) provide data for phylogenetic and functional analyses of local and regional patterns in morphological trait variation.

Abstract: Same as above.

Sources of funding: The database construction is supported by São Paulo Research Foundation (FAPESP 2017/21816-0, 2015/17739-4, 2013/50421-2). The studies that produced the information compiled in our dataset were funded by grants, scholarships, and fellowships given by the Brazilian Council for Scientific and Technological Development (CNPq grants no. 474945/2010-3 and 248588/2013-3 to MP, 305401/20149 to LEL, 503496/2014-6 to VC, 474072/2010-0 to MAE, 305798/2014-6 to MASA, 307934/2011-0 to AU, 308503/2014-7 to KMPMBF, 456446/2014-1 to CD, 310550/2015-7 to LB, 133477/2015-0 to VBA, 142346/2013-6 to VCO, 161089/2014-3 to JEFO, 304244/2016-3 to MAP, 457444/2012-6, 302291/2015-6 and 457974/2014-1 to LFS, 312045/2013-1 and 312292/2016-3 to MCR), São Paulo Research

Foundation (FAPESP grants no. 2010/05343-5 to ERA, 2013/19250-7 to RCR, 2015/17739-4 to RLM, 2018/001073 to JCCP, 2010/19876-5 to VRT, 2010/11798-5 to VC, 2002/01746-1 to AU, 2011/06782-5 and 2014/09300-0 to KMPMBF, 2012/17225-2 to VBA, 2012/17225-2 to AEJ, 2012/20593-3 to CC, 2013/24929-9 and 2014/23809-2 to AAAB, 2005/56708-5 to MO, 2016/11595-3 to CZK, 2014/23132-2 to JEFO, 1999/05123-4 to JPM, 2007/56378-0 to LFS, 2013/50421-2 to MCR, 2011/04046-0 to DTAL and BIOTA/FAPESP grants no. 1998/10968-0 to EH, 2004/04820-3 to AAB), Rio de Janeiro Research Foundation (FAPERJ grant no. E-26/203.191/2015 to MASA, E-26/201.778/2017 to MBV, E-26/201.724/2015 to FGC, E-26/200.551/2016 to JMS, E-01/201.955/2017 to CCCM, E-26/201.674/2017 to RSSC), Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES PNPD 2013/2257 to MRL and CAPES PNPD 2013/1723 to ERA), Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia do Estado de Mato Grosso do Sul (Fundect 020/05 and Fundect 005/08 to ACA, EAF, RRF, Fundect/CAPES 23/200.638/2014 to ACA, CF and EF and LCR, 307016/2015-3 to EF), Universidade Estadual de Santa Cruz (UESC/PROPP grant no. 00220.1100.1644 to JCMF), Bahia Research Foundation (FAPESB grant no. BOL0488/2016 to IM), The Rufford Foundation (grant no. 22426-1 to IM and 18269-1 to VC), Fundação Grupo Boticário de Proteção à Natureza (grant no. 102-20141 and 0866-20101 to MAE), Fundação Nacional de Desenvolvimento do Ensino Superior Particular (FUNADESP grant no. 38/2012 to CD), Programa das Nações Unidas para o Desenvolvimento (PNUD BRA 01/037 to EAS). We also list other funding sources: IdeaWild, Neotropical Bird Club Conservation Awards Fund, Association of Field Ornithologists, Organização para a Conservação das Terras (OCT), Carlos

Chagas Filho Foundation of Rio de Janeiro, Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC), Fundação de Amparo à Pesquisa do Estado da Bahia (FAPESB), Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG), Fundação Amazônica de Defesa da Biosfera (FDB), Fundação Estadual de Pesquisa Agropecuária do Rio Grande do Sul, Instituto de Pesquisas Veterinárias Desidério Finamor, Instituto do Meio Ambiente, Programa de Pesquisa em Biodiversidade da Mata Atlântica (PPBio-MA), Mater Natura/FEMA, Embrapa Florestas (Macroprogram 2), Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental (SPVS), Centro Nacional de Pesquisa e Conservação das Aves Silvestres (CEMAVE), Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Fundação de Estudos e Pesquisas Agrícolas e Florestais (FEPAF), Instituto Chico Mendes de Biodiversidade (ICMBio/MMA), Fundação Pró-Natureza (Funatura), PETROBRAS (via REPAR Bird Monitoring), Fundação O Boticário de Proteção à Natureza, Cia. Suzano de Papel e Celulose S.A., Plantações Michelin da Bahia Ltda., LWARCEL Celulose. MCR is also funded by Procad/CAPES project # 88881.068425/2014-01.

B. Specific subproject description

Site description: ATLANTIC BIRD TRAITS comprises data collected from throughout the entire extent of the Atlantic forests in South America. This biogeographic realm stretches from northeastern to southern Brazil, includes northern Argentina and southeastern Paraguay, and covers around 1.56 million km² (Muylaert et al. 2018). Although more than 85% of the biome's original extent has already been lost and fragmented (Ribeiro et al. 2009), it remains one of the most biologically diverse regions in the world (Myers et al. 2000). The Atlantic Forest holds 861 bird species, including 213 endemics and 98 that are globally threatened (Moreira-Lima and Silveira, 2017). This great bird diversity results from the high environmental heterogeneity due to wide latitudinal (3° S to 33° S) and altitudinal (0 to ~2,900m a.s.l.) ranges, diverse climate regimes (mean annual temperature ranges from 12.4 to 28.7 °C, and annual rainfall ranges from 1,000 to 4,200 mm), and many different forest types (IBGE 2008, Ribeiro et al. 2011). The main threats to biodiversity are forest loss, fragmentation, and forest disturbance associated with human occupation (e.g. logging and hunting) (Bencke et al. 2006, Jenkins et al. 2015). More than 80% of the Atlantic Forest remnants are isolated (> 1 km from the nearest remnant), small (< 50 ha) and surrounded by agricultural areas (Ribeiro et al. 2009, Joly et al. 2014). Threatened species mainly occur in Brazil's southern and southeastern lowlands, southeastern mountains and Northeast Region (Bencke et al. 2006).

Data compilation: We compiled data from published sources (da Silva et al. 2002, Bugoni et al. 2002, Marini et al. 2007, de Faria and de Paula 2008, Specht et al. 2008, Vasconcelos et al. 2008, Canabarro and Fedrizzi 2010, Barnett and Buzzeti 2014), museum collections (Universidade Regional de Blumenau - FURB, Universidade Federal de Pernambuco - UFPE, Museu de Zoologia da Universidade de São Paulo - MZUSP, Museu de Zoologia da Universidade Estadual de Feira de Santana - MZFS, Departamento de Zoologia da Universidade Federal de Minas Gerais - DZUFMG, Louisiana State University Museum of Natural Science - LSUMZ, National Museum of Natural History - MNHN, Museu de Biologia Professor Mello Leitão - MBML, Museu Nacional do Rio de Janeiro - MNRJ, Museu de História Natural Capão da Imbuia de

Curitiba - MHNCI, Natural History Museum of Los Angeles County - LACM, American Museum of Natural History, New York - AMNH, and others cited in ATLANTIC_BIRD_TRAITS_Measurement_infos.pdf), and our unpublished reports. We searched for published studies in online academic databases (Web of Science, Scopus, Scielo), using keywords in English and Portuguese (see ATLANTIC_BIRD_TRAITS_Search_Keywords.csv for details). The keywords were chosen to restrict our searches to studies related to the bird taxonomic group, its morphological traits, and the Atlantic Forest domain. Each result of our search had to present at least one of the keywords in each keyword group. Studies that did not present raw data on morphological traits but may contain more specific information of relevance (*e.g.* mean and standard deviation of a measured trait) were compiled in the ATLANTIC_BIRD_TRAITS_Additional_References.csv file.

Research Methods: Generally, the traits of each specimen were measured using the sampling protocols described in Ralph et al. (1993), IBAMA (1994), Sick 1997, Sutherland et al. (2004) and FAO (2007). However, most of the researchers that participated in this project also used specific protocols based on other sources and summarized their details and references in the file ATLANTIC_BIRD_TRAITS_Measurement_infos.pdf. This material presents information about the equipment used, accuracy and some particularities adopted in the measurement of specific groups of birds, and we strongly recommend that users consult this material to take full advantage of the data. Missing information was labeled ‘NA’.

Taxonomy and systematics: All species records were carefully checked by VRT, TVVC, and

LFS. We excluded possible misidentification of bird species inside Atlantic Forest domain and eliminated synonymy problems following the Brazilian Ornithological Records Committee (Piacentini et al. 2015).

C. Data limitations and potential enhancements

Several slightly different measurement methods were adopted by each of the 62 teams and the individual researchers. The levels of accuracy could not be assessed for all measured individuals, but some researchers reported the form of measurement, model or type of material used to measure birds (different types of rulers and caliper models and precision). These observations about the data collection protocols are available in the document ATLANTIC_BIRD_TRAITS_Measurement_infos.pdf, and we strongly recommend that all users consult this material to assure the correct usage of the data.

Another limitation of the data is that not all measurement errors or typing errors were possible to track and correct. We checked the minimum and maximum measurements of each morphological trait available in the database against measurements of specimens deposited in the Zoology Museum collection of São Paulo University. Individual records that present at least one suspect trait measurement (e.g. excessively small wing length) are indicated by “Yes” in the Outside.range column. Other possible measurement errors were within the acceptable range for each trait but beyond the range for the species. While we retain such errors in the database, we advise users to cautiously check the data for possible outliers at species level. In addition, some measurements obtained from museum specimens, such as body length, wing and body mass, may not be reliable, because they depend on the preparation techniques used and the description of the living specimen.

Geographic coordinates of the sampled areas were checked for inconsistencies using Google Earth (e. g. sampling points in the sea, or far away the sampling location informed by the authors). However, spatial data obtained long ago from museums may not be precise. In such cases, we used reported reference landmarks to estimate locations. Regarding spatial distribution of sampling frequency, Brazilian states with the fewest individuals sampled in our database are Ceará, Piauí, and Sergipe, all in the Northeast (1, 1, and 249 records, respectively; Figure 1). Despite these states include important areas of endemism, they present few Atlantic Forest remnants. Also, our methodology was based in data compilation from independent researchers or group of researchers, and we recognize that these areas still are underrepresented in our dataset. Then, we believe that additional effort should be made in the region to increase the number of specimens measured and, also increase representation in museums.

We do not include subspecies level records, and we maintain very few records (n=50) from individuals only identified to genus. Also, in accordance with the ATLANTIC BIRDS database (Hasui et al. 2018), we opted to include compiled information from unknown geographic coordinates, from outside our Atlantic Forest domain area, and information on seabirds and sand beaches birds in this database. As such, total number of records included in the dataset is 72,483 and users interested exclusively in Atlantic Forest bird traits should exclude the records labeled “seabird” in the column “Obs.spp” and utilize only the records labeled as “inside the 20 km polygon” in the “AltanticForests_20km_Buffer” column.

CLASS III. DATA SET STATUS AND ACCESSIBILITY

A. Status

Latest update: November 2018

Latest archive date: November 2018

Metadata status: Last updated on November 2018, version submitted

Data verification: The bird taxonomists LFS and TVVC checked all species reported in the dataset and excluded synonymy problems and those records that were outside the species distribution and were possibly misidentified in the field. We checked sampling coordinates in Google Earth and used the World Geodetic System (WGS84) as the spatial reference system gathering all data points encompassed by a 20 km buffer surrounding the extent of the Atlantic Forest.

B. Accessibility

1. Storage location and medium: The original ATLANTIC BIRD TRAITS dataset can be accessed from the ECOLOGY repository. Updated versions of this dataset and some extra information for both ATLANTIC BIRD TRAITS and other ATLANTIC SERIES datasets can be accessed at https://github.com/LEEClab/Atlantic_series**.** The complete ATLANTIC COLLECTION can be accessed at the following link:

https://esajournals.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1939-9170.AtlanticPapers

2. Contact persons: Rodolpho C. Rodrigues (rdprodrigues@gmail.com) and Milton C. Ribeiro (miltinho.astronauta@gmail.com).

3. Copyright restrictions: None

4. Proprietary restrictions: Please cite this data paper (DOI: to be defined) when using the data.

5. Costs: None

CLASS IV. DATA STRUCTURAL DESCRIPTORS

A. Data set file

1. Identity:

(1) ATLANTIC_BIRD_TRAITS_completed_2018_11_d05.csv

(2) ATLANTIC__BIRD_TRAITS_Spp_Infos.csv

(3) ATLANTIC__BIRD_TRAITS_Measurement_infos.pdf

(4) ATLANTIC_BIRD_TRAITS_Additional_References.csv

(5) ATLANTIC__BIRD_TRAITS_Search_Keywords.csv

2. Size:

(1) ATLANTIC_BIRD_TRAITS_completed_2018_11_d05.csv 40.9 MB

(2) ATLANTIC_BIRD_TRAITS_Spp_Info.csv 195.0 KB

(3) ATLANTIC_BIRD_TRAITS_Measurement_infos.pdf 121.7 KB

(4) ATLANTIC_BIRD_TRAITS_Additional_References.csv 22.5 KB

(5) ATLANTIC_BIRD_TRAITS_Search_Keywords.csv 7.7 KB

3. Format and storage mode: data tables formatted as comma-separated values (*.csv)

Alphanumeric attributes: Mixed

Data anomalies: Where no information is available, cells contain 'NA'.

B. Variable information

1) Table 1. Information on species, traits measured, records and sites sampled.

Variable	Description	Levels or range	Example
ID_ABT	Atlantic Bird Traits identification code	AB0001 … JZS0214 (n=67,197)	AB0032
ID_Res	Identification code from research team	1 … 1899 (n=16,414)	53
Main_researcher	First author or responsible for data collection	A.Bispo … V.Tonetti (n=62)	M.Pichorim
Reference	Reference in Ecology style	(n=8)	de Faria, I. P., and W. S. de Paula. 2008. Body masses of birds from Atlantic Forest region, Southeastern Brazil. Ornitologia Neotropical 19:599-606.
Order	Taxonomic order, following CBRO taxonomic classification (Piacentini et al. 2015)	Accipitriformes, Anseriformes, Apodiformes, Caprimulgiformes, Cariamiformes, Cathartiformes Charadriiformes, Columbiformes, Coraciiformes Cuculiformes, Falconiformes, Galbuliformes, Galliformes, Gruiformes, Nyctibiiformes, Passeriformes, Pelecaniformes, Piciformes, Psittaciformes,	Apodiformes

		Strigiformes, Suliformes, Tinamiformes, Trogoniformes (n=23)	
Family	Taxonomic family, following CBRO taxonomic classification (Piacentini et al. 2015)	Accipitridae … Vireonidae (n=66)	Cracidae
Genus	Genus of the species, following CBRO taxonomic classification (Piacentini et al. 2015)	*Accipiter … Zonotrichia* (n=392)	*Turdus*
Species	Species epithet, following CBRO taxonomic classification (Piacentini et al. 2015)	*acer … zonaris* (n=594)	*rufiventris*
Binomial	Binomial species name, following CBRO taxonomic classification (Piacentini et al. 2015)	*Accipiter bicolor … Zonotrichia capensis* (n=718)	*Chiroxiphia caudata*
Body_mass.g.	Body mass in grams	1.8 – 2150.0	28.5
Body_length.mm.	Body length in millimeters	59 – 1440	227.0
Wing_length.mm.	Wing length in millimeters	35 – 532	117
Wing_length_left.mm.	Length of left wing in millimeters	36 – 343	48.5
Wing_length_right.mm.	Length of right wing in millimeters	40.21 – 341.00	141
Wing_length_left_open.mm.	Length of extended left wing in millimeters, measured from body to wing tip	52 – 253	75
Wing_length_right_open.mm.	Length of extended right wing in millimeters, measured from body to wing tip	49 – 253	198
Wingspan.mm.	Distance between the tips of left and right fully extended wings	320	320
Tail_length.mm.	Tail length in millimeters	18.5 – 668.0	60
Tail_length_left.mm.	Length of the left side of the tail in millimeters	146 – 294	227
Tail_length_right.mm.	Length of the right side of the tail in millimeters	17.3 – 290.0	211
Tarsus_length.mm.	Tarsus length in millimeters	6.6 – 223.0	9.8

Tarsus_length_left.mm.	Length of left tarsus in millimeters	4.4 – 77.0	60
Tarsus_length_right.mm.	Length of right tarsus in millimeters	2.5 – 43.5	3.7
Tarsus_diam.mm.	Tarsus diameter in millimeters	1.09 – 6.90	2.9
Bill_length.mm.	Bill length in millimeters	4.5 – 205.0	4.8
Bill_length_nostril.mm.	Bill length in millimeters, measured from tip to nostril	2.2 – 140.0	100
Bill_depth.mm.	Bill height in millimeters	1.17 – 61.00	7.6
Bill_depth_base.mm.	Bill height in millimeters, measured at the base	1.6 – 38.7	14
Bill_depth_nostril.mm.	Bill height in millimeters, measured at the nostril	3.0 – 8.2	5.1
Bill_width.mm.	Bill width in millimeters	1.45 – 60.00	12.9
Bill_width_base.mm.	Bill width in millimeters, measured at the base	2.4 – 44.3	30.8
Bill_width_nostril.mm.	Bill width in millimeters, measured at the nostril	3.3 – 17.9	5.3
Head_length_total.mm.	Head length in millimeters measured from bill tip to the back of the skull	18 – 210	168
Obs.	Brief additional description regarding the measurements and/or records	(n=306)	Skin with skull; wing closed.
Age	Bird age category	Adult, Juvenile, Nestling, Unknown	Adult
Skull_ossification	Fraction of skull bone presenting ossification, adapted from IBAMA (1994) and Ralph et al. (1993)	less than 0.33, 0.33, more than 0.33, 0.66, more than 0.66, 1	0.66
Sex	Sex of the specimen	Male, Female, Unknown	Female
Tarsus_color	Tarsus color	beige ... yellow-orange (n=41)	green
Iris_color	Color of the iris	black, brown, brown-dark, grey, dark, dirty-white, green, light-brown, light-orange, ochre, orange,	orange

		orange/red, red, white, yellow, yellow-green, yellowish (n=17)	
Reproductive_stage	Reproductive stage when specimen was measured. Yes = breeding; no = not breeding	Yes, no	Yes
Cloacal_prot	Presence of cloacal protuberance, adapted from Ralph et al. (1993)	Yes, no	no
Brood_patch	Presence of brood patch. Stages were defined following IBAMA (1994)	Yes, no, Stage0, Stage1, Stage2, Stage3, Stage4, Stage5, StageT	Yes
Plumage	Type of plumage presented when specimen was measured	reproductive, light-morph, pale-brown-morph, pale-plumage, brown-morph	light-morph
Molt	Presence or absence of molt in any part of the body	Yes, no	Yes
Body_molt	Presence of molt in body feathers	Yes, no, head; back; belly, head, back, head; back, head; belly, back; belly	Yes
Flight_molt	Presence of molt in flight feathers	Yes, no	Yes
Remiges_molt	Presence of molt in primary and/or secondary feathers (Ralph et al. 1993)	p1 … s7 (n=59)	p1,2;s8
Rectrices_molt	Presence of molt in rectrices (Ralph et al. 1993)	r1 … r5 (n=27)	r1,2,3
Fat_deposition	Fat deposition in wishbone, following Dyrcz (1987), IBAMA (1994) and Repenning and Fontana (2011)	Yes, no, 0, 0.5, 1, 1.5, 2, 2.5, 3	1
Gizzard_length.mm.	Length of gizzard in millimeters	13 – 19.15	15.8
Gizzard_width.mm.	Width of gizzard in millimeters	7.08 – 15.50	12.72
Intest_length.mm.	Length of intestine in millimeters	198 – 254	240
Liver_weight.g.	Weight of liver in grams	1.28 – 2.70	2.7
Skin_weight.g.	Weight of specimen in grams	48 – 65	56.81

Status	Status of individual when measured (alive or recently dead and museum skin)	live, museum	live
Voucher	Voucher number of specimen in museum collection	1001 … ZSM not numbered (n=9,947)	1229
Collection	Museum collection to which specimen belongs	AMNH … UFPE (n=12)	MZUSP
Measurer	Name of the specialist who performed measurements	A.Bovo; E.Alexandrino, K.V.C.Barbosa, T.V.V.Costa	T.V.V.Costa
Longitude_decimal_degrees	Latitude of record in decimal degrees (WGS 84)	-34.82; -57.83	-52.498
Latitude_decimal_degrees	Longitude of record in decimal degrees (WGS 84)	-33.75; -5.70	-22.429
Country	English name of the country	Brazil, Argentina, Paraguay	Brazil
State	State, province or department of the capture site, informed by authors	AL … SP (n=26)	PE
Municipality	Municipality of the capture site, informed by authors	Abdon Batista … Xavantina (n=756)	Parnamirim
Locality	Local of the capture site, informed by authors	12 km of Itauninha … Zoológico Hermann Weege (n=2,299)	Parque Estadual do Palmito
Habitat	Habitat type of the capture, informed by authors	aerodrome … urban forest (n=10)	secondary forest
AtlanticForests_20km_Buffer	Sampling locality within the Atlantic forest domain (we considered a 20 km buffer area around the biome integrative limit as the Atlantic Forest domain limit, more details in Muylaert et al. in press)	inside the 20 km polygon	inside the 20 km polygon
Nm_municip	Municipality of the study site based on the geographic coordinates with IBGE (2016) database and complemented by ggmap R package	ABDON BATISTA … XAVANTINA (n=783)	JAQUIRANA

	<https://cran.r-project.org/package=ggmap>		
Nm_state	State, province or department of the study site, derived based on overlap of geographic coordinates with IBGE (2016) database, complemented by ggmap R package <https://cran.r-project.org/package=ggmap>	ALAGOAS … SERGIPE (n=17)	PARANA
Eco_name	Ecoregion following Olson et al. 2001 (ECO_NAME column of the shapefile wwf_terr_ecos, available at WWF website <https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world>)	Alto Paraná Atlantic Forests … Uruguayan savanna (n=17)	Southern Atlantic mangroves
G200_regio	Bioregion following Olson et al. 2001 (G200_REGIO column of the shapefile wwf_terr_ecos, available at WWF website <https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world>)	Atlantic Forests, Cerrado Woodlands and Savannas, Atlantic Dry Forests, Pantanal Flooded Savannas (n=4)	Atlantic dry forests
Ribeirovegtype	Type of vegetation *sensu* Ribeiro et al. (2009)	Água … Savana Estepica (n=12)	Floresta Estacional Decidual
BSRs	Type of biogeographical sub-regions (BSRs) sensu Ribeiro et al. (2009)	Bahia ... Serra do Mar (n=8)	Brejos Nordestinos
Altitude	Altitude in meters above sea level, from the Hydro-1K dataset (United States Geological Survey – USGS, 2001. HYDRO 1K: Elevation Derivative Database. Available at <http://edc.usgs.gov/products/elevation/gtopo30/hydro/namerica.html>) Access on May 5th, 2017.	1 – 2588	1202
Annual_rainfall	Annual rainfall in millimeters, from WorldClim v. 1.4. database, available at <http://www.worldclim.org/version1> Access on December 5th, 2017.	514 – 3202	2694
Annual_mean_te	Annual mean temperature in degrees	12.4 – 28.7	22.5

mperature	Celsius, from WorldClim v. 1.4, available at <http://www.worldclim.org/version1>. Access on December 5th, 2017.		
Year	Year of the record or data collection	1820 ... 2018 (n=123)	2012
Date	Date of the record or data collection (m/d/yyyy)	10/10/1929 … 9/9/2017 (n=5,163)	11/5/2005
Hour	Hour of the record or data collection	02:00 … 22:30 (n=791)	17:57
Recapture	Recapture indicates if the specimen was already captured	Yes, no	no
Ring	Number of individual ring used to mark the measured bird	106351 … WINE 94 (n=42,440)	2D9795
Collector	Name of bird collector or bird measurer (when the column measurer is absent)	Aabreu … Zuche_PriscilaTainara (n=1,352)	Helmut Sick
Obs.spp	Endemic species from other biomes but with occurrence inside the Atlantic Forest domain polygon used	Caatinga Endemic, Cerrado Endemic	Caatinga Endemic
Outside.range	Individual with at least one measurement below minimum acceptable for a variable (minimum and maximum values for each trait were checked in specimens deposited at MZUSP, São Paulo University).	Yes, no	Yes

2) Table 2. Species information on number of records, number of sites sampled, and descriptive statistics (n = no. of records, mean = mean, sd = standard deviation, median = median, min = minimum value, max = maximum value, se = standard error) for the eight main continuous trait measurements present in the dataset.

Variable	Description	Levels	Example
Spp_ID	Identification code for species	1 – 714	4
Binomial	Binomial species name, following CBRO taxonomic classification (Piacentini et al. 2015)	Accipiter bicolor … Zonotrichia capensis	Turdus rufiventris
No.Records	Number of total records of species	1 – 1837	1158
No.Localities	Number of localities where species was sampled	1 – 243	175
Body_mass.g. n	Number of records for body mass	0 – 1687	1245
Body_mass.g. mean	Mean of body mass for species	2.44 – 2128.00	27.62
Body_mass.g. sd	Standard deviation of body mass for species	0.00 – 369.11	2.27
Body_mass.g. median	Median of body mass for species	2.00 – 2128.00	29.00
Body_mass.g. min	Minimum of body mass for species	1.80 – 2106.00	4.00
Body_mass.g. max	Maximum of body mass for species	2.80 – 2150.00	47.00
Body_mass.g. se	Standard error of body mass for species	0.00 – 261.00	0.21
Body_length.mm. n	Number of records for body length	0 – 863	215
Body_length.mm. mean	Mean of body length for species	61.71 – 1030.00	160.75

Body_length.mm. sd	Standard deviation of body length for species	0.35 – 201.34	7.43
Body_length.mm. median	Median of body length for species	62.00 – 1030.00	132.00
Body_length.mm. min	Minimum of body length for species	59.00 – 1030.00	68.00
Body_length.mm. max	Maximum of body length for species	66.00 – 1440.00	170.00
Body_length.mm. se	Standard error of body length for species	0.13 – 123.00	0.63
Wing_length.mm. n	Number of records for wing length	0 – 684	607
Wing_length.mm. mean	Mean of wing length for species	36.10 – 532.00	68.71
Wing_length.mm. sd	Standard deviation of wing length for species	0.00 – 105.40	6.14
Wing_length.mm. median	Median of wing length for species	36.10 – 532.00	73.60
Wing_length.mm. min	Minimum of wing length for species	35.00 – 532.00	35.00
Wing_length.mm. max	Maximum of wing length for species	36.10 – 532.00	95.00
Wing_length.mm. se	Standard error of wing length for species	0.00 – 60.85	0.31
Tail_length.mm. n	Number of records for tail length	0 – 1322	429
Tail_length.mm. mean	Mean of tail length for species	24.37 – 320.00	36.71
Tail_length.mm. sd	Standard deviation of tail length for species	0.00 – 191.58	6.08
Tail_length.mm. median	Median of tail length for species	21.70 – 320.00	76.00
Tail_length.mm. min	Minimum of tail length for species	18.50 – 320.00	25.00
Tail_length.mm. max	Maximum of tail length for species	24.37 – 668.00	91.00
Tail_length.mm. se	Standard error of tail length for species	0.00 – 54.00	2.91

Tarsus_length.mm. n	Number of records for tarsus length	0 – 650	3
Tarsus_length.mm. mean	Mean of tarsus length for species	6.60 – 223.00	18.67
Tarsus_length.mm. sd	Standard deviation of tarsus length for species	0.00 – 34.13	0.58
Tarsus_length.mm. median	Median of tarsus length for species	6.60 – 223.00	17.39
Tarsus_length.mm. min	Minimum of tarsus length for species	6.60 – 223.00	10.81
Tarsus_length.mm. max	Maximum of tarsus length for species	6.60 – 223.00	29.20
Tarsus_length.mm. se	Standard error of tarsus length for species	0.00 – 19.71	0.11
Bill_length.mm. n	Number of records for bill length	0 – 1203	457
Bill_length.mm. mean	Mean of bill length for species	4.60 – 197.33	19.45
Bill_length.mm. sd	Standard deviation of bill length for species	0.00 – 49.59	2.93
Bill_length.mm. median	Median of bill length for species	4.60 – 197.00	20.00
Bill_length.mm. min	Minimum of bill length for species	4.50 – 190.00	6.60
Bill_length.mm. max	Maximum of bill length for species	4.60 – 205.00	50.00
Bill_length.mm. se	Standard error of bill length for species	0.00 – 10.12	0.09
Bill_depth.mm. n	Number of records for bill depth	0 – 450	346
Bill_depth.mm. mean	Mean of bill depth for species	1.40 – 58.69	7.89
Bill_depth.mm. sd	Standard deviation of bill depth for species	0.02 – 12.61	1.27
Bill_depth.mm. median	Median of bill depth for species	1.40 – 58.69	7.90
Bill_depth.mm. min	Minimum of bill depth for species	1.17 – 58.69	3.20

Bill_depth.mm. max	Maximum of bill depth for species	1.40 – 61.00	11.80
Bill_depth.mm. se	Standard error of bill depth for species	0.01 – 6.55	0.10
Bill_width.mm. n	Number of records for bill width	0 – 526	180
Bill_width.mm. mean	Mean of bill width for species	2.55 – 39.98	9.15
Bill_width.mm. sd	Standard deviation of bill width for species	0.10 – 11.09	2.64
Bill_width.mm. median	Median of bill width for species	2.58 – 39.98	9.00
Bill_width.mm. min	Minimum of bill width for species	1.45 – 39.98	1.60
Bill_width.mm. max	Maximum of bill width for species	2.80 – 60.00	22.60
Bill_width.mm. se	Standard error of bill width for species	0.03 – 6.10	0.20

3) Table 3. Additional Measurement Information on Contributor's Datasets.

Variable	Description	Levels	Example
Responsible	Name of the contributor responsible for the additional information and dataset followed by 'Main_researcher' as written in the main database	Arthur Bispo A.Bispo; …; V.Tonetti	Vanesa Bejarano e Alex Jahn V. Bejarano
ID_min	Identification of first record of the dataset	AB0001; … VT0001	AR0001
ID_max	Identification of last record of the dataset	AB0682; ...; VT0049	AR3012
DATASET	Individual dataset file name	Birdtraits_abispo_2018_01_d28_rev.csv; … Birdtraits_vtonetti_2018_01_d29_rev.csv	Birdtraits_pserafini_2018_01_d28_rev.csv
Additional information	Description of additional information on equipment, protocols and procedures followed by research team while performing measurements. We added 'No additional information.' when contributors did not share any additional information. Obs.	n=53	José Nilton Silva J.Silva JS0001 JS0021 Birdtraits_jsilva_2018_01_d28_rev.csv Todos os membros foram aferidos do lado direito. Todas as medidas foram aferidas com paquímetros digitais

	Most information is in Portuguese, which we chose not to translate to maintain the original description.		

4) Table 4. Additional References on Atlantic Forest bird traits**.**

Variable	Description	Levels	Example
Ref_ID	Identification code of each reference	ABT_ADREF001 - ABT_ADREF102	ABT_ADREF034
Reference	Reference in Ecology style	n=102	Alvarenga, H. M. F., E. Höfling, and L. F. Silveira. 2002. Notharchus swainsoni (Gray,1846) (Bucconidae) é uma espécie válida. Ararajuba 10:73–77

5) Table 5. Search keywords and information of bibliography search**.**

Variable	Description	Levels	Example
Database	Scientific databases in which the search was performed	Web of Science; Scielo, SCOPUS	SCOPUS
Indices	Indices that were chosen for the search	Title, keywords, abstract; All indices	Title, keywords, abstract
Field Search	Number of fields that had to contain at least one of the keywords	1; 2; 3; 4	2
Keywords and Boolean Operators		bird, … Brazilian (n=169)	morphological OR morphology OR body mass OR body length OR wing length OR tail length OR tarsus length OR bill length OR bill depth OR bill width OR age OR sex OR brood patch OR plumage OR molt OR moult
No. of Results	Number of scientific papers encountered in the search	35 – 802	134
Date	Date when the search was performed in format (mm/dd/yyyy)	09/27/2017; 10/25/2017	09/27/2017

CLASS V. SUPPLEMENTAL DESCRIPTORS

A. Data acquisition

1. Data request history: None

2. Data set update history: None

3. Data entry/verification procedures

G. History of dataset usage: This dataset gathered information from several published and unpublished studies, and all references are available in the '.csv' files. Users can contact the main authors to ask for the documents used as sources of the measurements.

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