Papéis Avulsos de Zoologia
Museu de Zoologia da Universidade de São Paulo

ARTICLE

First record of Juan Fernández Petrel *Pterodroma externa* (Salvin, 1875) in Brazil

Carla Beatriz Barbosa[1,5]; Angélica María Sánchez-Sarmiento[1,6]; Raquel Beneton Ferioli[1,7]; Simone Baratto Leonardi[1,8]; Mariana de Karam e Britto[1,9]; Fernando Siqueira Alvarenga[2,10]; Claudia Carvalho do Nascimento[2,11]; Patrícia Pereira Serafini[3,12]; Milton Kampel[4,13] & Hugo Gallo-Neto[1,14]

[1] Instituto Argonauta para a Conservação Costeira e Marinha. Ubatuba, SP, Brasil.
[2] Mineral Engenharia e Meio Ambiente. São Paulo, SP, Brasil.
[3] Universidade Federal de Santa Catarina (UFSC), Centro de Ciências Biológicas (CCB), Departamento de Bioquímica (BQA), Laboratório de Biomarcadores de Contaminação Aquática e Imunoquímica (LABCAI). Florianópolis, SC, Brasil.
[4] Instituto Nacional de Pesquisas Espaciais (INPE). São José dos Campos, SP, Brasil.
[5] ORCID: https://orcid.org/0000-0002-5044-0974. E-mail: coordenacao@institutoargonauta.org (corresponding author)
[6] ORCID: https://orcid.org/0000-0001-6818-4609. E-mail: angelica.sarmiento@institutoargonauta.org.br
[7] ORCID: https://orcid.org/0000-0001-9212-7778. E-mail: raquel.ferioli@institutoargonauta.org.br
[8] ORCID: https://orcid.org/0009-0001-2899-5439. E-mail: simone.leonardi@institutoargonauta.org.br
[9] ORCID: https://orcid.org/0009-0004-9966-513X. E-mail: mariana.britto@institutoargonauta.org.br
[10] ORCID: https://orcid.org/0009-0003-4226-4258. E-mail: falvarenga@mineral.eng.br
[11] ORCID: https://orcid.org/0000-0001-9247-5000. E-mail: cnascimento@mineral.eng.br
[12] ORCID: https://orcid.org/0000-0002-2448-7621. E-mail: patriciaserafini@gmail.com
[13] ORCID: https://orcid.org/0000-0002-0011-2083. E-mail: milton.kampel@inpe.br
[14] ORCID: https://orcid.org/0000-0001-7769-5638. E-mail: hugo@aquariodeubatuba.com.br

Abstract. We document the first recorded occurrence of a Juan Fernández Petrel *Pterodroma externa* specimen in São Paulo State, South Atlantic, Brazil. This finding improves our understanding of the distribution of this pelagic species, which is rarely observed along the coast. It also suggests that unusual oceanographic conditions may disorient seabirds, causing them to appear in atypical areas.

Keywords. Procellariidae; Southwestern Atlantic; New occurrence.

INTRODUCTION

Procellariiformes constitutes an order of about 150 species of pelagic birds (Gill & Donsker, 2024), with a wide variety of forms and habits (aerial *versus* aquatic) but with a similar biology (Marchant & Higgins, 1990). Birds belonging to the Procellariidae are cosmopolitan and essentially pelagic, represented by the "true petrels". The genus *Pterodroma,* with 35 currently accepted species (Gill & Donsker, 2024), is one of the four main groups of this family.

The Juan Fernandez Petrel (*Pterodroma externa*) is approximately 43 cm long with a wingspan of 95 to 97 cm (Onley & Scofield, 2007). It has a crown, nape sides of the head, and an area around and immediately below the eye dark brown-grey, forming a brown cap; the upper parts are silvery-grey with darker wings and tail, a distinct "M" pattern visible from one wingtip to the other across the lower back, the underparts are white, except for the dark wingtips and the trailing edge. A small, variable black carpal bar is like a small, black "comma" in front of the elbow joint. The tail feathers have dark tips; the upper tail is slate grey with white feather bases, which show as a white "U" shaped mark on the rump when worn. Legs pinkish-flesh with fleshy outer webs and dark outer webs and toes (Imber *et al.,* 1991; Spear *et al.,* 1992; Onley & Scofield, 2007).

The breeding range of this species is restricted to the Alejandro Selkirk Island (formerly Más Afuera) in the Juan Fernández Archipelago, off the central coast of Chile in the Pacific Ocean (Brooke, 1987). During the breeding season, from December to May, *P. externa* nests on grassy slopes at altitudes between 600 and 1,150, using burrows or areas under tufts of vegetation (Reyes-Arriagada *et al.,* 2012). Outside of the breeding season, the species is almost exclusively marine and rarely seen on land, sailing widely across the Pacific Ocean. The species has been recorded from waters off Mexico to near Japan, indicating a wide

Pap. Avulsos Zool., 2024; v.64: e202464037
https://doi.org/10.11606/1807-0205/2024.64.037
https://www.revistas.usp.br/paz
https://www.scielo.br/paz
Edited by: Luís Fábio Silveira
Received: 29/07/2024
Accepted: 19/08/2024
Published: 01/10/2024

ISSN On-Line: 1807-0205
ISSN Printed: 0031-1049
ISNI: 0000-0004-0384-1825

distribution in high seas (Santaella & Sada, 1991; Mochizuki, 1996; Carboneras *et al.,* 2020).

During the breeding season, the species is frequently recorded in the Pacific Islands, which, according to Flood *et al.* (2021), would indicate that some individuals are non-breeders, probably immature, while breeders may be visiting, for example, during the pre-laying exodus. This species has been recorded in Manoa Valley, Oahu, Hawaii (Clapp, 1984). Moderate numbers of *P. externa* have been recorded around Rapa and Marotiri, the Austral Islands, and East Polynesia, mainly over seamounts and often associated with seabird feeding frenzies, providing evidence that the species also regularly migrates westwards at mid-latitudes (Flood *et al.,* 2021). Other records include the south-west Pacific Ocean in the Chatham Islands (Imber *et al.,* 1991) and the Waikato District, New Zealand (Reed, 1976); and Tristan da Cunha and Gough in the South Atlantic (Mathews, 1931, 1932; Speight, 2010). Valdebenito *et al.* (1990) cites *P. externa* as one of the likely species dispersing plants of the genus *Peperomia* (Piperaceae) from Más Afuera Island to Inaccessible in Tristan da Cunha, probably accidentally touching this island during their circumpolar migrations. Other records of *P. externa* in South America include a vagrant specimen in Ecuador (Galapagos) and hypothetical records at sea off Colombia and Peru (Sánchez-Nivicela *et al.,* 2023; Echeverry-Galvis *et al.,* 2024). According to the IUCN Red List (BirdLife International, 2018), *P. externa* is classified as Vulnerable despite having an estimated population of around 3 million individuals with no apparent decline. Shirihai *et al.* (2015) counted approximately 85,000 individuals recorded at sea. The species is considered vulnerable due to its extremely restricted breeding area, indicating that it faces a high risk of extinction in the near future mainly due to the impacts of invasive species introductions and habitat degradation (Bourne *et al.,* 1992; Hahn & Römer 2002; Reyes-Arriagada *et al.,* 2012; Shirihai *et al.,* 2015).

Here, we present the first record of *P. externa* in Brazil (see Pacheco *et al.,* 2021), based on a specimen recently found in São Paulo State. We suggest grazina-das-juan-fernández as the common name in Portuguese.

MATERIAL AND METHODS

The Record

On February 18, 2024, a live specimen of *P. externa* was seen in a schoolyard in the city of São José dos Campos, São Paulo State, Brazil (23°11′19.1″S, 45°53′25.6″W, Fig. 1), above 568 m above sea level, and approximately 63 km away from the coast. On the next day, the bird was handed over to the Environmental Military police, who tried unsuccessfully to take the animal to a Wildlife Rehabilitation Center (CRAS) in the city. On February

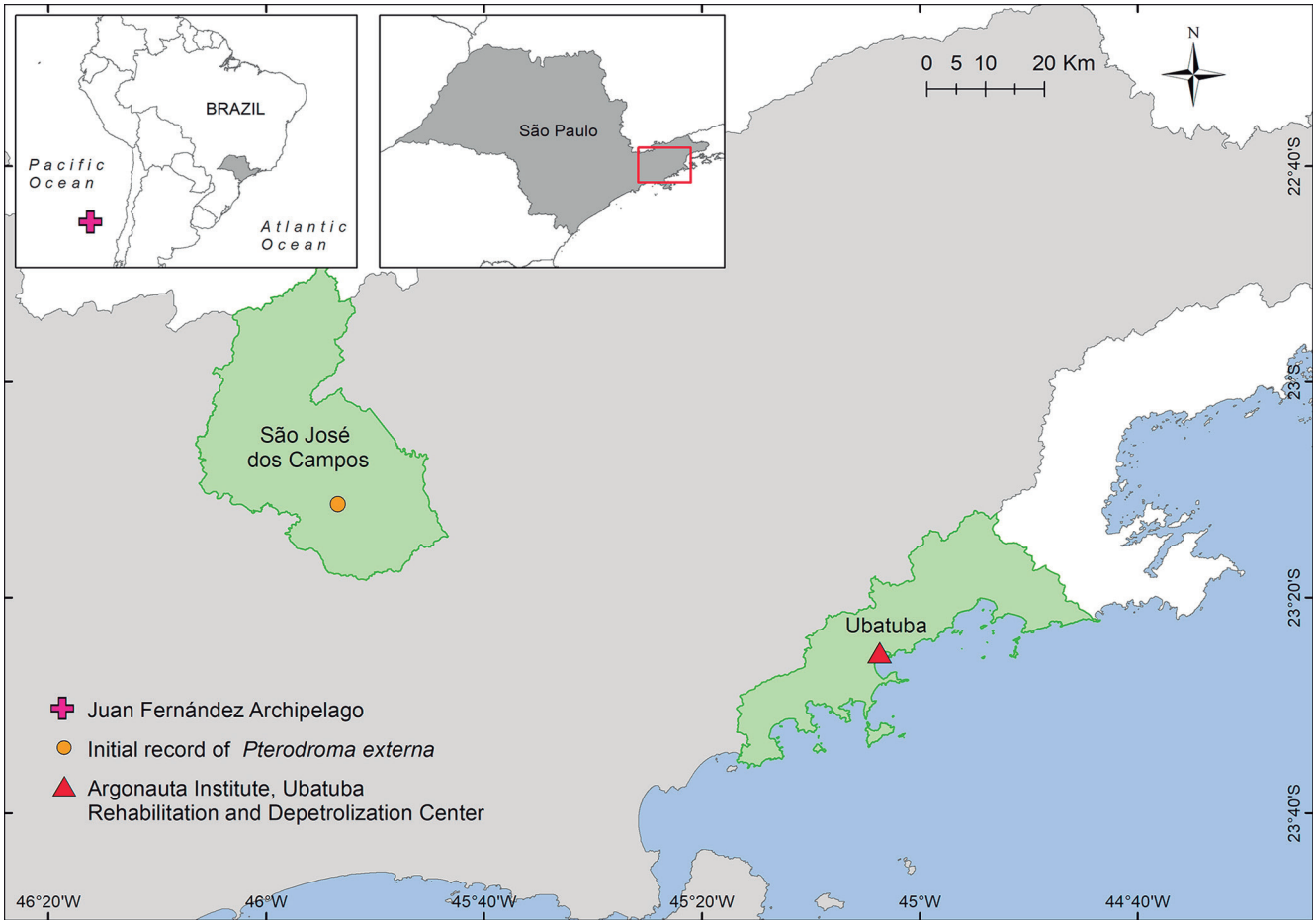

Figure 1. Location of the initial record of the *Pterodroma externa* and the rehabilitation center where the bird underwent treatment. Note the location of Ilhas Juan Fernández (left upper corner), showing how the specimen was far from the natural occurrence area.

Table 1. Complete biometrics of the *Pterodroma externa* in the admission to the Rehabilitation and Depetrolization Center in Ubatuba/SP.

Parameters	Measurements
Length	42.5 cm
Wingspan	98.4 cm
Weight	340 g
Total head length	9 cm
Bill depth	1.8 cm
Minimum bill depth	1.2 cm
Bill depth at gonys	1.4 cm
Width of bill	1.75 cm
Culmen length	3.6 cm
Nalospi	2.9 cm
Tarsus length	4 cm
Foot length	5.9 cm
Middle toe length (with claw)	5.1 cm
Middle toe length	4.3 cm
Wing length	31.5 cm
Tail length	13.6 cm
Middle tarsus diameter	0.4 cm

20, 2024, and after contact with the Argonauta Institute team, the bird was transferred to the Rehabilitation and Depetrolization Center in Ubatuba, São Paulo, Brazil (Fig. 1). The Argonauta Institute monitors the section 10 (between São Sebastião and Ubatuba) of the Santos Basin Beach Monitoring Project (PMP-BS). The project is carried out from Laguna/SC to Saquarema/RJ and is divided into 15 sections. The aim of this project is to assess the potential impacts of oil production and flow activities on seabirds, turtles, and marine mammals through beach monitoring, veterinary care of live animals, and necropsy of dead animals.

Complete biometrics data were recorded on admission (Table 1). The petrel was kept in treatment until May 06, 2024, when it died. It was then submitted to necropsy, with samples collected for histopathology and additional studies (including DNA analyses and samples stored at the Argonauta Institute and MZUSP). The specimen was deposited in the Museu de Zoologia da Universidade de São Paulo (accession number MZUSP 116.128).

RESULTS

After analyzing the external characteristics, the individual was identified as *P. externa* (Fig. 2). The necropsy revealed that the individual was an adult female, which was confirmed by histopathology.

DISCUSSION

Pterodroma externa and White-necked Petrel *Pterodroma cervicalis* are similar in mass, wingspan, and tail length, have similar flight behavior, and overlap in their distributions in the eastern Pacific (Spear *et al.,* 1992); therefore, these species are distinguished by specific external characters. The Vanuatu petrel *Pterodroma occulta* is likely to be very difficult to separate from *Pterodroma cervicalis* (Onley & Scofield, 2007). Criteria for distinguishing *P. externa* from *P. cervicalis* and *P. occulta,* include the white collar (nape) separating the black cap and gray back (Fig. 2), except in a few cases of birds within very worn plumage when the larger dark underwing patch from the carpal should help (Spear *et al.,* 1992; Onley & Scofield, 2007). The black cap of *P. cervicalis* contrasts sharply with the white nape. On the other hand, the cap of *P. externa* is sooty, or brownish gray. In white-naped *P. externa* the contrast was less striking than in *P. cervicalis* (Spear *et al.,* 1992), and the larger dark bar on the underwing margin of *P. cervicalis,* compared to the gray nape, smaller underwing bar (Fig. 2), or spot, and the gray cap of *P. externa* (Spear *et al.,* 1992; Onley & Scofield, 2007). The field identification characteristics of the specimen in this study are compatible with those reported for the species *P. externa* regarding length (43 cm), wingspan (97 cm), and weight (310-555 g) (Marchant & Higgins, 1990; Spear *et al.,* 1992; Onley & Scofield, 2007), very similar to the description reported by Murphy (1936). Biological variations in weight and biometrics could be attributed to sex, as females are, on average, smaller than males (Onley & Scofield, 2007).

It is worth highlighting that this individual, an adult female, was found in Brazil in February, during the breeding season, when it was expected to occur close to the reproductive colony. The movements of *P. externa* are considered trans-equatorial migrants from the breeding grounds to the North Pacific from October to June (Marchant & Higgins, 1990). Some birds, presumably vagrants, may disperse farther West than usual (Marchant & Higgins, 1990). The specimen observed here was probably a vagrant found in an area outside the known or usual range of the species. Long-distance vagrancy may be related to abnormal disturbances in the oceanic and atmospheric circulations, particularly cyclonic storms, and inefficient orientation and navigation in the larger and more robust migratory species, which may continue to wander in search of congenial areas until they die a very long way from home (Bourne, 1967). They are particularly vulnerable to being blown westwards and to higher latitudes in the subtropical zone and sometimes back eastwards again along the paths of hurricanes and other tropical storms (Bourne, 1967). The estimated speed of *P. externa* in strong winds is approximately 200 km/h, similar to that of the Peregrine Falcon *Falco peregrinus* (Shirihai *et al.,* 2015), enhancing the possibilities for this species to be far away from its original location as observed in this vagrant specimen. Extreme climatic events have already been responsible for unusual records of another *Pterodroma* species (*P. incerta*) on the interior of Brazil, in eastern Brazilian Amazonia, at least 400 km away from the nearest open sea (Marajó Bay) (Teixeira *et al.,* 1986) and in Southern Brazil, after Hurricane Catarina, with at least 354 petrels found in 26 different locations up to 420 km from the coast and up to 1,100 m above sea level (Bugoni *et al.,* 2007).

Regarding the meteorological context, in southern South America, jet streams (JS) are known to be associated with blockages, frontal systems, and convective

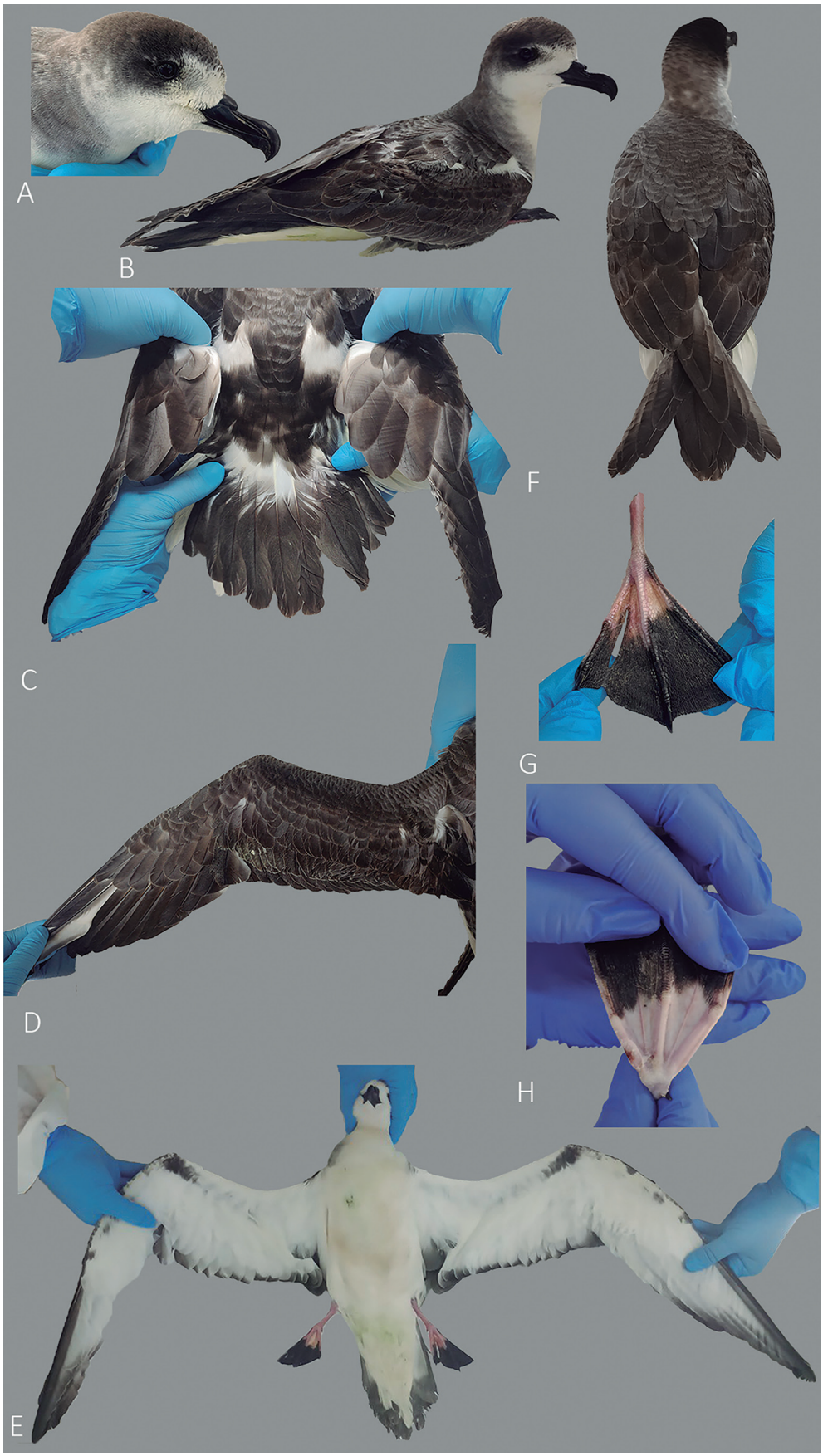

Figure 2. Juan Fernandez Petrel *Pterodroma externa* specimen found in São Paulo state, South Atlantic, Brazil. (A) Right lateral view, note dark panda eye-patch typical of the species. (B) Right lateral view, the entire body. Note an obvious blackish mask grading into a more contrasting cap than its mantle (F). (C, D) Dorsal view, note large white bases on primaries and tail feathers, posterior aspect of wings and tail (C), and left wing (D). (E) Underwing pattern with a black comma (variable black carpal bar) in the bend of the wing. (F) Mantle, note a silvery-gray cap, with darker wings and tail. (G, H) Legs displaying pinkish-flesh with fleshy outer webs and dark outer webs and toes, dorsoplantar aspect (G), and plantar dorsal aspect (H).

systems. In Brazil, jet streams are responsible for the development or intensification of convection in the south and southeast of the country (Kousky & Cavalcanti, 1984). Jet stream climatology shows seasonal variations in the Southern Hemisphere (Gallego *et al.,* 2005). For the subtropical jet (SJ), which typically forms on the poleward side of the Hadley cell due to angular momentum transport (Hoskins *et al.,* 1983), wind speed has generally increased in winter and decreased in summer (Manney & Hegglin, 2018). In El Niño years, such as 2023-2024, the tropical troposphere warms, and the Hadley circulation strengthens and contracts, causing the SJ to move towards the equator (Choudhury *et al.,* 2021). Global warming increases the intensity of El Niño and reduces the pressure difference between the poles and the equator, which also affects the jet stream. According to the Brazilian National Meteorological Institute, February 2024 was marked by heat typical of the austral summer and the continuing influence of El Niño. In El Niño years, the Atlantic jet stream tends to become more intense near South America. These variations in position and intensity affect other meteorological systems, such as the passage of cold fronts. On 16 February, the Marine Meteorological Service (https://community.wmo.int/en/marine-services) warned of the formation of the oceanic cyclone Akará, classified as a tropical storm, off the north coast of Rio de Janeiro (24.5°S, 40.0°W) moving south towards São Paulo and beyond, with winds of up to 40 knots (75 km/h).

Other factors influencing weather patterns to be considered include the Quasi-Biennial Oscillation (QBO). This tropical phenomenon may affect the circulation and composition of the global atmosphere through a variety of mechanisms. The QBO also directly affects tropospheric variability by influencing the Pacific subtropical jet and tropical convention on both seasonal mean and subseasonal timescales (Garfinkel *et al.,* 2022). According to the NOAA Physical Sciences Laboratory (https://psl.noaa.gov/data/correlation/qbo.data), in February 2024, the QBO was in an easterly phase, which is generally stronger (30-35 m/s) than the westerly phase (15-20 m/s). According to Madden & Julian, 1994, the vertical influence of the QBO on modes of equatorial tropospheric variability, such as the Madden-Julian Oscillation (MJO), has recently been observed (Toms *et al.,* 2020). The MJO is the largest source of subseasonal (20-60 days) tropical variability, propagating pulses of large-scale organized deep convection and precipitation eastward (Andrews *et al.,* 2024). According to the NOAA Climate Prediction Center (NOAA, 2024), the upper-level velocity potential anomaly fields showed continued MJO activity in mid-February, with eastward propagation of the enhanced convection centered over the Americas.

It is also worth noting that the US Weather Service reported that winds in the mid-Atlantic reached speeds of 265 mph at about 35,000 feet, the cruising altitude for aircraft, as a powerful JS swept through the region on 18 February 2024. This speed was the second-highest recorded since records began in the 1950s. These winds enabled at least three commercial aircraft to reach speeds of 800 mph (Samenow, 2024). It is, therefore, possible that this Petrel was able to take advantage of the strong winds passing over the Andes (Jet Stream) through the continental region of South America. In addition to the convergence of other climate events during this period, which could be worth highlighting, such as El Niño (mainly). An additional hypothesis of this bird's path would be bordering the ocean of the South of South America, rising to the north, and later being displaced to the interior of Brazil by the aforementioned phenomena.

CONCLUSION

In conclusion, this first record of *Pterodroma externa* in Brazil raises discussion on how extreme weather events, such as severe storms and abrupt changes in oceanographic conditions, can disorient seabirds and lead them to unusual areas. Continuous monitoring of pelagic seabird groups such as Procellariiformes, including vagrant individuals, is necessary to better understand distribution patterns (Soares-Santos *et al.,* 2024).

AUTHORS' CONTRIBUTIONS: CBB: Conceptualization; CBB, AMSS, RBF, SB: Writing – original draft; CBB, AMSS, RBF, SB, AMSS, HGN: Visualization; CBB, AMSS, RBF, SB, FA, CCN, PPS: Investigation; CBB, AMSS, RBF, SB, MB, FA, CCN, PPS: Writing – review & editing; CCB, HGN: Funding Acquisition, Supervision; AMSS, RBF, SB, MB: Methodology; MB: Software. All authors actively participated in the discussion of the results; they reviewed and approved the final version of the paper.
CONFLICT OF INTEREST: Authors declare there are no conflicts of interest.
FUNDING INFORMATION: Santos Basin Beach Monitoring Project (PMP-BS), through Mineral Engenharia e Meio Ambiente.
ACKNOWLEDGEMENTS: We are deeply indebted to Professor Luís Fábio Silveira of the Museum of Zoology of the University of São Paulo (MZUSP) for his contributions and manuscript revision. We acknowledge the PMP-BS, an activity developed to meet the requirements of the Federal Environmental Permit of Petrobras' activities in the production and flow of oil and natural gas in the Santos Basin, conducted by IBAMA.

REFERENCES

Andrews, M.B.; Knight, J.R.; Scaife, A.A. & Wicker, W. 2024. Influence of the Quasi-Biennial Oscillation on tropical convection and its teleconnection to the midlatitudes in boreal winter. *Quarterly Journal of the Royal Meteorological Society,* 150(761): 2510-2521. https://doi.org/10.1002/qj.4721.

BirdLife International. 2018. *Pterodroma externa. The IUCN Red List of Threatened Species 2018:* e.T22698030A132620783. Available: https://doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22698030A132620783.en. Access: 20/05/2024.

Bourne, W.R.P. 1967. Long-distance vagrancy in the petrels. *The Ibis,* 109(2): 141-167. https://doi.org/10.1111/j.1474-919X.1967.tb00415.x.

Bourne, W.R.P.; Brooke, M.L.; Clark, G.S. & Stone, T. 1992. Wildlife Conservation problems in the Juan Fernández Archipelago, Chile. *Oryx,* 26(1): 43-51. https://doi.org/10.1017/S003060530002322X.

Brooke, M.L. 1987. Population estimates and breeding biology of the petrels *Pterodroma externa* and *P. longirostris* on isla Alejandro Selkirk, Juan Fernandez Archipelago. *The Condor,* 89(3): 581-586. https://doi.org/10.2307/1368646.

Bugoni, L.; Sander, M. & Costa, E.S. 2007. Effects of the first southern Atlantic hurricane on Atlantic Petrels (*Pterodroma incerta*). *The Wilson Journal of Ornithology,* 119(4): 725-729. https://doi.org/10.1676/06-141.1.

Carboneras, C.; Jutglar, F. & Kirwan, G.M. 2020. Juan Fernandez Petrel (*Pterovdroma externa*), Version 1.0. *In:* del Hoyo, J; Elliott, A.; Sargatal, J.; Christie, D.A. & de Juana, E. (Eds). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY, US. Available: https://birdsoftheworld.org. Access: 13/05/2024. https://doi.org/10.2173/bow.jufpet.01.

Choudhury, D.; Nath, D. & Chen, W. 2021. The modulation of Indian summer monsoon onset processes during ENSO through equatorward migration of the subtropical jet stream. *Climate Dynamics,* 57: 141-152. https://doi.org/10.1007/s00382-021-05700-4.

Clapp, R.B. 1984. First records of Juan Fernández (*Pterodroma e. externa*) and Stejneger's (*Pterodroma longirostris*) Petrels from Hawaii. *'Elepaio. Journal of the Hawaii Audubon Society,* 44(10): 97-98.

Echeverry-Galvis, M.Á.; Acevedo-Charry, O.; Avendaño, J.E.; Gómez, C.; Stiles, F.G.; Estela, F.A.; Cuervo, A.M.; Freile, J.F.; Plenge, M.A.; Schulenberg, T.S. & Valqui, T. 2024. *Species lists of birds for South American countries and territories:* Colombia, Ecuador and Peru. Version 4, March 2024. Available: https://www.museum.lsu.edu/~Remsen/SACCCountryLists.htm. Access: 21/06/2024.

Flood, R.; Zufelt, K.; Bretagnolle, V. & Shirihai, H. 2021. Pelagic birds around Rapa and Marotiri, French Polynesia, October-December 2019, with notes on Rapa Shearwater *Puffinus myrtae* and Titan Storm Petrel *Fregetta [grallaria] titan. Bulletin of the British Ornithologists' Club,* 141(4): 387-411. https://doi.org/10.25226/bboc.v141i4.2021.a3.

Gallego, D.; Ribera, P.; Garcia-Herrera, R.; Hernandez, E. & Gimeno, L. 2005. A new look for the Southern Hemisphere jet stream. *Climate Dynamics,* 24: 607-621. https://doi.org/10.1007/s00382-005-0006-7.

Garfinkel, C.I.; Gerber, E.P.; Shamir, O.; Rao, J.; Jucker, M.; White, I. & Paldor, N. 2022. A QBO Cookbook: Sensitivity of the Quasi-Biennial Oscillation to Resolution, Resolved Waves, and Parameterized Gravity Waves. *Journal of Advances in Modeling Earth Systems,* 14(3). https://doi.org/10.1029/2021MS002568.

Gill, F. & Donsker, D. (Eds). 2024. International Ornithologists' Union World Bird List. 2024. *IOC World Bird List,* Version 14.1. Available: http://www.worldbirdnames.org/bow/petrels. Access: 13/06/2024.

Hahn, I. & Römer, U. 2002. Threatened avifauna of the Juan Fernández archipelago, Chile: the impact of introduced mammals and conservation priorities. *Cotinga,* 17: 66-72.

Hoskins, B.J.; James, I.N. & White, G.H. 1983. The shape, propagation and mean-flow interaction of large-scale weather systems. *Journal of the Atmospheric Sciences,* 40(7): 1595-1612. https://doi.org/10.1175/1520-0469(1983)040<1595:TSPAMF>2.0.CO;2.

Imber, M.J.; Merton, D.V.; West, J.A. & Tennyson, A.J.D. 1991. Juan Fernandez Petrels prospecting at the Chatham Islands. *Notornis,* 38(1): 60-62.

Kousky, V. & Cavalcanti, I.F.A. 1984. Eventos Oscilação Sul – El Niño: Características, Evolução e Anomalias de Precipitação. *Ciência e Cultura,* 36(11): 1888-1889.

Madden, R.A. & Julian, P.R. 1994. Observations of the 40-50-day tropical oscillation – A review. *Monthly Weather Review,* 122(5): 814-837. https://doi.org/10.1175/1520-0493(1994)122<0814:OOTDTO>2.0.CO;2.

Manney, G.L. & Hegglin, M.I. 2018. Seasonal and Regional Variations of Long-Term Changes in Upper-Tropospheric Jets from Reanalyses. *Journal of Climate,* 31: 423-448. https://doi.org/10.1175/JCLI-D-17-0303.1.

Marchant, S. & Higgins, P.J. (Eds) 1990. Ratites to ducks; Part A, Ratites to petrels *In: Handbook of Australian, New Zealand & Antarctic Birds.* Oxford University Press, Melbourne, v. 1, p. 263-470.

Mathews, G.M. 1931. Description of *Pterodroma externa tristani*. *Bulletin of the British Ornithologists Club,* 52: 63.

Mathews, G.M. 1932. The birds of Tristan da Cunha. *Novitates zoologicae: a journal of zoology in connection with the Tring Museum,* 38: 13-48. https://doi.org/10.5962/bhl.part.14741.

Mochizuki, H. 1996. [Procellariiforms observed off N.E. Japan in July-August.] *Japanese Journal of Ornithology,* 45(3): 191-193. (In Japanese.). https://doi.org/10.3838/jjo.45.191.

Murphy, R.C. 1936. The Petrels. *In:* Murphy, R.C., *Oceanic birds of South America: a study of species of the related coasts and seas, including the American quadrant of Antarctica, based upon the Brewster-Sanford collection in the American Museum of Natural History.* The Macmillan Company, New York, v. 2, p. 700-702. https://doi.org/10.5962/bhl.title.11916.

National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. 2024. Madden-Julian Oscillation: Recent Evolution, Current Status and Predictions. Update prepared by the Climate Prediction Center NWS/NCEP/CPC. Available: https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/ARCHIVE/PDF/mjo_evol-status-fcsts-20240219.pdf. Access: 28/06/2024.

Onley, D.J. & Scofield, R.P. 2007. *Albatrosses, Petrels, and Shearwaters of the World.* Bloomsbury Publishing Plc, London. Print.

Pacheco, J.F.; Silveira, L.F.; Aleixo, A.; Agne, C.E.; Bencke, G.A.; Bravo, G.A.; Brito, G.R.R.; Cohn-Haft, M.; Mauricio, G.N.; Naka, L.N.; Olmos, F.; Posso, S.; Lees, A.C.; Figueiredo, L.F.A.; Carrano, E.; Guedes, R.C.; Cesari, E.; Franz, I.; Schunck, F. & Picentini, V.Q. 2021. Annotated checklist of the birds of Brazil by the Brazilian Ornithological Records Committee – second edition. *Ornithology Research,* 29(2): 94-105. https://doi.org/10.1007/s43388-021-00058-x.

Reed, S.M. 1976. Correction to short note on Black-capped Petrel in the Waikato. *Notornis,* 23(4): 355.

Reyes-Arriagada, R.; Hodum, P.J. & Schlatter, R.P. 2012. Nest site use in sympatric petrels of the Juan Fernández archipielago, Chile: Juan Fernández Petrel (*Pterodroma externa*) and Stejneger's Petrel (*Pterodroma longirostris*). *Ornitologia Neotropical,* 23(1): 73-82.

Samenow, J. 2024. Planes top 800 mph as near-records winds sweep high over Mid-Atlantic. The Washington Post. Available: https://www.washingtonpost.com/weather/2024/02/18/record-jet-stream-winds-dc-flights. Access: 28/06/2024.

Sánchez-Nivicela, M.; Freile, J.F.; Olmstead, S.; Athanas, N.; Brinkhuizen, D.M.; Navarrete, L.; Nilsson, J. & Greenfield, P.J. 2023. Sixth report of the Committee for Ecuadorian Records in Ornithology (CERO). *Revista Ecuatoriana de Ornitología,* 9: 76-103. https://doi.org/10.18272/reo.v9i2.2856.

Santaella, L. & Sada, A.M. 1991. The avifauna of the Revillagigedo Islands, Mexico: additional data and observations. *Wilson Bulletin,* 103(4): 668-675. https://www.jstor.org/stable/4163094.

Shirihai, H.; Díaz, H.A.; Huichalaf, J.E. & Bretagnolle, V. 2015. Endemic breeding birds of Juan Fernández archipelago, Chile. *Dutch Birding.* 37(1): 1-19.

Soares-Santos, L.P.; Olmos, F.; Rocha, T.A.; Brito, M.C.G.Q.; Lima, G.R.; Luna, C.L.B.; Torres, R.A.; Araujo, R. & Serafini, P.P. 2024. New records of Procellariiformes in the Fernando de Noronha archipelago: who is looking out for them? *Check-list,* 20(1): 12-28. https://doi.org/10.15560/20.1.12.

Spear, L.B.; Howell, S.N.G. & Ainley, D.G. 1992. Notes on the At-Sea Identification of Some Pacific Gadfly Petrels (Genus: *Pterodroma*). *Colonial Waterbirds,* 15(2): 202-218. https://doi.org/10.2307/1521454.

Speight, G. 2010. A Juan Fernandez Petrel off Gough Island – the first live record for the Atlantic. *Birding World,* 23(7): 307-308.

Teixeira, D.M.; Oren, D. & Best, R.C. 1986. Notes on Brazilian Seabirds 2. *Bulletin of the British Ornithologist's Club,* 106: 74-77.

Toms, B.A.; Barnes, E.A.; Maloney, E.D. & van den Heever, S.C. 2020. The global teleconnection Signature of the Madden-Julian Oscillation and Its Modulation by the Quasi-biennial Oscillation. *Journal of Geophysical Research: Atmospheres,* 125(7): 1-23. https://doi.org/10.1029/2020JD032653.

Valdebenito, H.A.; Stuessy, T.F. & Crawford, D.J. 1990. A new biogeographic connection between islands in the Atlantic and Pacific Oceans. *Nature,* 347: 549-550. https://doi.org/10.1038/347549a0.

Published with the financial support of the "Programa de Apoio às Publicações Científicas Periódicas da Universidade de São Paulo"