StoichLife: A Global Dataset of Plant and Animal Elemental Content

Angélica L. González, Julian Merder, Karl Andraczek, Ulrich Brose, Michał Filipiak, Stan Harpole, Helmut Hillebrand, Michelle C. Jackson, Malte Jochum, Shawn J. Leroux, Mark P. Nessel, Renske E. Onstein, Rachel Paseka, George L.W. Perry, Amanda Rugenski, Judith Sitters, Erik Sperfeld, Maren Striebel, Eugenia Zandona, Jean-Christophe Aymes, Alice Blanckaert, Sarah Bluhm, Hideyuki Doi, Nico Eisenhauer, Vinicius F. Farjalla, James Hood, Pavel Kratina, Jacques Labonne, Catherine Lovelock, Eric K. Moody, Attila Mozsár, Liam Nash, Melanie Pollierer, Anton Potapov, Gustavo Q. Romero, Jean-Marc Roussel, Stefan Scheu, Nicole Scheunemann, Julia Seeber, Michael Steinwandter, Winda Ika Susanti, Alexei Tiunov, Olivier Dézerald

Supplementary Material – This file contains

Supplementary Text 1. Description Methods Unpublished Data

1. Doi template

Elemental C and N data were obtained as a by-product of the isotopic analysis ($\delta^{13}C$ and $\delta^{15}N$). Samples were collected from the reach in the Ohkura River (a fourth-order stream) in Sendai, Japan. Invertebrates were sampled using a kick net and allowed to clear their guts before being prepared for stable isotope analysis. Samples were frozen and then oven-dried at 60°C, ground to a homogenous powder, and analyzed for their carbon and nitrogen ratios at the Tohoku University using a continuous flow isotope ratio mass spectrometer (Delta plus IRMS coupled with a EA1110 elemental analyzer, Finnigan mat).

2. Farjalla template

Samples of aquatic macroinvertebrates were collected at 36 sampling points within five small watersheds located in the Brazilian Amazon (Latitude: 1°01'87''S - 1°92'81''S; Longitude: 56°30'10''W - 56°60'01''W). All sampling points are characterized by small, low-order streams (locally known as igarapés), which are well-preserved and share similar limnological conditions, such as low concentrations of dissolved nutrients, acidic pH, and sandy sediment with organic matter deposits in backwater areas. In the laboratory, the samples were washed, and the macroinvertebrates were separated alive by order or family and placed in vials for 24 hours to allow gut clearance. All individuals were identified at least at the Family taxonomic level, except for Oligochaeta. The individuals were dried in an oven at 50°C for 48 hours or until they reached a constant weight. The nitrogen concentration was determined using the Kjeldahl method[74], and the phosphorus concentration was determined according to[75] after acid digestion. Both methods were adapted for small-sized samples.

74. Allen SE, Grimshaw HM, Parkinson JA, Quarmby C (1974). Chemical analysis of ecological material. Oxford: Blackwell Scientific Publications. 565 p.

75. Fassbender HW (1973). Simulate P-Bestinmung in N-Kjeldahl Ausfschlub von Bodenproben. Die phosphörsäure 30: 44-53.

3. Filipiak template

Coleoptera samples were collected by net and allowed to empty their guts for 24 hours before being frozen. Hymenoptera samples were bred at the experimental apiary of the Institute of Environmental Sciences, Jagiellonian University. These were adult forms obtained immediately after pupation; they did not eat after pupation, so there was no need to empty the intestines (the larva defecates completely before pupation). Elemental C and N data were determined using a Vario EL III Elementar automatic CHNS analyser. All samples were frozen and then vacuum dried to a dry mass. The samples were ground to a homogenous powder and analyzed at the Institute of Environmental Sciences, Jagiellonian University in Kraków, Poland. Additional information on the methods can be found in[76]

76. Filipiak, M., Woyciechowski, M. & Czarnoleski, M. 2021. Stoichiometric niche, nutrient partitioning and resource allocation in a solitary bee are sex-specific and phosphorous is allocated mainly to the cocoon. *Sci Rep* **11**, 652.

4. Hood template

All caddisfly samples were analyzed for δ13C and δ15N as well as carbon (C), nitrogen (N), and phosphorus (P) content. Caddisfly samples were transported back to the lab in cooled containers of stream water. In the lab, they were allowed to clear their guts for approximately 24 h, then rinsed in deionized (DI) water and dried at 60 ˚C. Dried individuals were weighed to the nearest 0.1 µg on a microbalance (Mettler UMT2) and then ground to a fine powder. Samples were homogenized to quantify invertebrate stable isotope and stoichiometry (C, N, and P). Invertebrate samples were analyzed for C and N content with a Perkin Elmer 2400 CHNS analyzer. Invertebrate P samples were ashed (550 ˚C) and hydrolyzed in HCl. Additional details on the methods can be found in[77]

77. Hood, James Michael, II. 2010. Consumer nutrient stoichiometry: Patterns, homeostasis, and links with fitness. Ph.D. diss., University of Minnesota, USA.

5. Jackson templates

Elemental C and N data were obtained as a by-product of the isotopic analysis (δ13C and δ15N). Samples were collected from streams from across a latitudinal gradient in South Africa covering seven ecoregions. Invertebrates were sampled from 22 of the sites using a kick net and allowed to clear their guts before being prepared for stable isotope analysis. Samples were frozen and then oven-dried at 60°C, ground to a homogenous powder, and analyzed for their carbon and nitrogen ratios at the Mammal Research Institute (MRI), University of Pretoria, Pretoria, South Africa, using a continuous flow isotope ratio mass spectrometer (DeltaV IRMS coupled with a Flash 1112 elemental analyzer with a ConFloIV interface). Additional details on methods are provided here[78].

Invertebrates were collected using pond nets at riffles in each stream site tributary of the Keiskamma (Eastern Cape Province), the Thukela, and the uMgeni (KwaZulu-Natal Province) Rivers in South Africa. Collected invertebrates were allowed to clear their guts before analyses, oven-dried at 60°C to constant weight, ground to a homogeneous powder, and weighed. Carbon and nitrogen stable isotope analysis was then conducted using a mass spectrometer coupled to an elemental analysis at the Mammal Research Institute (MRI), University of Pretoria, South Africa. Additional details on methods are provided here[79]

78. Jackson, MC., Fourie, HE., Dalu, T., Woodford, DJ., Wasserman, RJ., Zengeya, TA., Ellender, BR., Kimberg, PK., Jordaan, MS., Chimimba, CT. & Weyl, OLF. 2020. Food web properties vary with climate and land use in South African streams. Functional Ecology 34(8): 1653-1665.

79. Jackson, MC., Woodford, DJ., Bellingan, TA., Weyl, OLF., Potgieter, MJ., Rivers-Moore, NA., Ellender, BR., Fourie, HE. & Chimimba, CT. 2016. Trophic overlap between fish and riparian spiders: potential impacts of an invasive fish on terrestrial consumers. Ecology and Evolution 6(6): 1745-1752.

6. Harrower template

Elemental C and N data were obtained as a by-product of the isotopic analysis (δ13C and δ15N). Most soil animals were collected using Kempson/Berlese extractors. Arthropods were identified to the lowest taxonomic level required for categorization into discrete functional feeding guilds (predator, herbivore, detritivore), dried at 60°C for 48 h. Elemental analyses were performed using IRMSs coupled with an elemental analyzer. Data was collected as part of[80]

80. William Harrower. 2017. “Changes in trophic structure along a gradient of water availability in temperate montane grasslands” Doctoral, 117 pp. Thesis. University of British Columbia, CA.

7. Kratina template

Sampling of terrestrial and aquatic invertebrate communities from headwater streams was done manually. All individuals were identified to the lowest taxonomic level required for categorization into discrete functional feeding guilds (predator, herbivore, detritivore, fungivore, omnivore, and parasite) and separated by morphospecies. Invertebrates were stored at −20°C and subsequently dried at 60°C for 48 h. Invertebrates from the temperate sites were analyzed at Queen Mary University of London, UK, using a Sercon Integra 2 CF-IRMS (Sercon Ltd.) with casein standards, and from the tropical sites at the UC Davis Stable Isotope Facility, California, USA, using a PDZ Europa ANCA-GSL coupled with a PDZ Europa 20-20 IRMS (Sercon Ltd.). Additional details on the methods are now provided in[81,82]

81. Liam, N., Pavel, K., Recalde, F., Jones, JI., Izzo, T. & Romero, G. 2023. Tropical and temperate differences in the trophic structure and aquatic prey use of riparian predators. Ecology Letters 26(12): 2122-2134

82. Liam, N., Pavel, K., Recalde, F., Jones, JI., Izzo, T. & Romero, G. 2023. Tropical and temperate differences in the trophic structure and aquatic prey use of riparian predators. Dataset, Dryad.

8. Leroux template

Fishes were collected while returning to freshwater to spawn and downstream migrating kelts. Fish samples were dried at 50◦ C until a constant mass was obtained (c. 5 days) and then ground to a fine powder with a mortar and pestle, which was homogenized as described in[83].
Fish samples were freeze-dried for dry mass estimates and analyzed for body P at the Agriculture and Food Laboratory at the University of Guelph on a VARIAN VISTRA-Pro simultaneous ICP-OES using test methods SNL-019,047 with a bovine liver standard (NIST 1577c). Subsamples were further analyzed for C and N analysis on a Carlo Erba NA 1500 Series II Elemental Analyzer at the stable-isotope laboratory at Memorial University of Newfoundland. Additional details on the methods are provided here[84,85]

83. Ebel, JD., Leroux, SJ., Robertson, MJ. & Dempson, JB. 2015. Ontogenetic differences in Atlantic salmon phosphorus concentration and its implications for cross ecosystem fluxes. Ecosphere 6(8): 1-18.

84. Ebel, JD., Leroux, SJ., Robertson, MJ. & Dempson, JB. 2016. Whole body-element composition of Atlantic salmon *Salmo salar* influenced by migration direction and life stage in three distinct populations. Fish Biology 89(5): 2365-2374.

85. Ebel, Jonathan; Leroux, Shawn; J. Robertson, Martha; Brian Dempson, J. (2016). Whole body element composition of Atlantic salmon (Salmo salar L.). figshare. Dataset.

9. Moody and Rugensky templates

All fish from Mexico were collected from the Cuatro Cienegas basin. To measure fish body stoichiometry, samples were dried and homogenized by using either a ball mill (laboratory samples) or a Wiley mill (field samples). The C and N contents on a CHN analyzer and P contents were obtained using the ammonium molybdate method after hydrochloric acid digestion (field samples) and measured in a spectrophotometer. Additional details on the methods can be found here[86,87]

Fish specimens from southern Peru and eastern Panamá were collected for body stoichiometry analyses using combinations of nets and electricity. All fish specimens were euthanized after capture via overdose of clove oil, following approved Royal Ontario Museum and Smithsonian Tropical Research Institute Institutional Animal Care and Use guidelines. Due to the remote sampling locations without access to electricity, whole specimens for nutrient analyses were field preserved in excess of table salt (NaCl). Specimens were rinsed in NANOpure-filtered water and then rehydrated for 3 days to remove any salt or other unrelated soluble material. Samples were re-dried them at 60°C until they reached constant mass and homogenized using a ball mill. Body %C and %N were measured using a PerkinElmer 2400 CHN analyser and %P using the acid molybdate method following HCl digestion. Additional details on fish data from South America and Panama are provided here[59,88]

The invertebrate data from Panama were collected manually and transported on ice to the lab. There was no allowed time for gut clearance beyond the lag between field collection and freezing. Invertebrates were identified with a stereoscope; samples were dried to a constant mass at 50°C. For P analysis, samples were digested in 1N HCl and ran the digest on an ICP-MS (Thermo iCAP 6300). For C and N, samples were analyzed on a CHN analyzer (Thermo Flash 2000 CHNS/O Analyzer). The sample mass was measured with an analytical balance, but the individual mass of each organism was also estimated using length-dry mass regressions[89]

59. Moody, EK., Lujan, NK., Roach, KA. & Winemiller, KO. 2019. Threshold elemental ratios and the temperature dependence of herbivory in fishes. Functional Ecology 33, 913–923.

86. Moody, EK., Carson, EW., Corman, JR., Espinosa-Pérez, H., Ramos, J., Sabo, JL. & Elser, JJ. 2018. Consumption explains intraspecific variation in nutrient recycling stoichiometry in a desert fish. Ecology 99(7): 1552-1561.

87. Moody, EK., Carson, EW., Corman, JR., Espinosa-Pérez, H., Ramos, J., Sabo, JL. & Elser, JJ. 2018. Consumption explains intraspecific variation in nutrient recycling stoichiometry in a desert fish. Dataset, Dryad.

88. Moody, EK., Lujan, NK., Roach, KA. & Winemiller, KO. 2019. Threshold elemental ratios and the temperature dependence of herbivory in fishes. Functional Ecology 33(5): 913-923.

89. Benke, Ac., Huryn, AD., Smock, LA. & Wallace, JB. Length-Mass Relationships for Freshwater Macroinvertebrates in North America with Particular Reference to the Southeastern United States. 1999. Journal of the North American Benthological Society 18(3): 308-343.

10. Various templates (González unpublished, Lutz.unpublished, Farina.unpublished, Alfaro.unpublished)

Aquatic invertebrates were sampled from tank bromeliads by either dissection of the plant or by sucking out the water and its content with a large-mouthed pipette. After sampling, the invertebrates were kept alive in water overnight to allow gut clearance. Before chemical analyses, the individuals were counted and identified to the lowest possible taxonomic level and classified by trophic group (i.e. detritivores and carnivores) and functional group (i.e., shredders, scrapers, filter feeders and gatherers) using information from field observations (Bromeliad Working Group including all authors). Invertebrates were oven-dried at 60°C for 72 h. we measured the body size of individuals using an electronic balance (0.1 µg). The percentage of C and N for invertebrates was measured using a CN analyzer (Model Carlo Erba NC2500) at the Stable Isotope Laboratory at Cornell University, Ithaca, NY. We measured the P content in whole invertebrates using the persulfate digestion and ascorbic acid methods[90].

All sampled spiders and prey from Ecuador (Lutz and Fariña templates) were killed using a killing jar and oven-dried at 60°C for 72 h. Individuals were ground into a fine powder with a mortar and pestle, weighted using an electronic microbalance (±0.1µg). C and N analyses were determined using CN2500 elemental analyzer at the University of Cornell Stable Isotope Lab. P content was determined using the persulfate digestion and ascorbic acid methods.

Andean arthropods were collected using pitfall traps. Body C, N and P content of arthropods sampled in the Andean Dry Puna, Bolivia were analyzed in a CN2500 elemental analyzer for C and N, and P content was determined using the persulfate digestion and ascorbic acid methods. Before analyses, arthropods were oven-dried at 60°C for 72 h, ground into a fine powder with a mortar and pestle, weighted using an electronic microbalance (±0.1µg). Additional information can be found here[91].

90. APHA (1992) Standard Methods for the Examination of Water and Wastewater. 18th Edition, American Public Health Association (APHA), American Water Works Association (AWWA) and Water Pollution Control Federation (WPCF), Washington DC.

91. Alfaro Ayllon, Fernando. 2014. Causes and consequences of nitrogen limited chronosequences: evidence from the andean dry puna. Doctoral Thesis. Pontificia Universidad Católica de Chile. Chile.

11. Paseka templates

Aquatic invertebrates, parasites, and fishes were collected from freshwater ecosystems in New Jersey using Hess and dip-net sampling. All collected individuals were dried at 60° C for at least 48 hours, weighed with a microbalance, and stored in a desiccator until elemental analysis. Carbon and nitrogen content were measured with a Carlo Erba NA 1500 Series 2 elemental analyzer [92], and we measured P on a spectrophotometer with the molybdate method following combustion at 500° C and digestion in acid. Data was collected as part of[93]

92. Verardo, DJ., Froelich, PN. & McIntyre, A. 1990. Determination of organic carbon and nitrogen in marine sediments using the Carlo Erba NA-1500 analyzer. Deep Sea Research Part A. Oceanographic Research Papers 37(1) :157-165

93. Paseka, Rachel E. 2018. Linking host-parasite interactions and ecosystem processes with energy and elements. Doctoral Thesis. Rutgers University, USA. 13851033.

12. Potapov and Scheu templates

Elemental C and N data were obtained as a by-product of the isotopic analysis (δ13C and δ15N). Most soil animals were collected using Kempson/Berlese extractors. Elemental analyses were performed using IRMSs coupled with elemental analyzers. Since many soil animals are relatively small, %C and %N analyses (e.g. < 50-100ug) were done following[94]
Trophic levels were assigned very rough since the knowledge of the feeding habits in many soil animal groups is limited.

94. Langel, R. & Dyckmans, J. 2014. Combined ^{13}C and ^{15}N isotope analysis on small samples using a near-conventional elemental analyzer/isotope ratio mass spectrometer setup. Rapid Communications in Mass Spectrometry 28(9): 1019-1022.

13. Romero template

Arthropods (aquatic and terrestrial) were manually collected, counted, identified up to the lowest taxonomic level (at least family), and classified within the four trophic guilds (predators, phytophages, detritivores, and omnivores). Arthropods were preserved at −20 °C, and once in the laboratory, they were oven-dried at 60 °C for 48 h and then ground to homogenize the tissues. Arthropods were weighed using a digital scale (precision: 0·0001 g) and analyzed for $\delta^{13}C$ and $\delta^{15}N$ and elemental content of C and N in the UC Davis Stable Isotope Facility, California, USA through elemental analyzer PDZ Europa ANCA-GSL coupled with an IRMS (PDZ Europa 20-20, Sercon Ltd., Cheshire, UK). More details on the methods are provided by[95]

95. Recalde, FC., Postali, TC. & Romero, GQ. Unravelling the role of allochthonous aquatic resources to food web structure in a tropical riparian forest. Journal of Animal Ecology 85(2) : 525-536.

14. Rousell template

Freshwater animals were collected by electrofishing (fish), deep netting (amphibian), and benthic sampling with Surber nets (invertebrates) in streams (Sélune River in France, Kerguelen Islands) and ponds (Rennes, France). After removal of the digestive tract (fish and amphibian), each individual was freeze-dried, ground to a homogenous powder using a mixer mill, weighed (ca. 0.90 -1.10 mg), and measured by continuous-flow isotope-ratio mass spectrometry, using mass spectrometers (Delta Plus XP and Delta V Plus, Thermo Finnigan) interfaced with elemental analyzers (Carlo Erba NC2500 and Costech 4010, Thermo Finnigan) at the Stable Isotopes in Nature Laboratory, University of New Brunswick (Canada).

15. Tiunov templates

Elemental C and N data were obtained as a by-product of the isotopic analysis ($\delta^{13}C$ and $\delta^{15}N$). Invertebrate animals were collected by manually sorting soil samples (macrofauna); or hand-picking (e.g., most ants, diplopods, and termites). Smaller animals (including mesofauna, i.e., Collembola and Oribatida) were collected using Tullgren funnels or similar dry/heat extraction devices. Collected animals were dried at 50-60°C for 2–3 days. The dry weight was determined using a Mettler-Toledo MX5 microbalance. Elemental analyses were performed by using a Thermo Delta V Plus continuous-flow IRMS coupled with an elemental analyzer (Thermo Flash 1112) at the Joint Usage Center at the Institute of Ecology and Evolution RAS (Moscow). IAEA reference materials USGS 40 and USGS 41 (glutamic acid)

and internal laboratory standards (glycine, acetanilide) were used to calibrate instruments and correct drifts.

16. Thomisch and Eisenhauer template

Elemental C and N data were obtained as a by-product of the isotopic analysis (δ13C and δ15N). Invertebrate sampling was conducted in October 2008 on untreated control plots as part of an earlier study. Soil macrofauna and mesofauna were collected using soil cores. The macrofauna was extracted using heat extraction, while the mesofauna was extracted using the Macfadyen method. Where possible, the collected invertebrates were identified at the species level using taxonomic literature and online resources. Samples were dried and weighed, and elemental contents were measured using a mass spectrometer (Delta Plus) coupled with an elemental analyzer (NA2500), calibrated with acetanilide of known isotopic composition. Data was collected as part of [96]

96. Thomisch, K. Biologische Diversität und Ökologie Struktur des Bodennahrungsnetzes in einem Pflanzendiversitätsgradienten vorgelegt von Matrikelnummer. Bachelorarbeit im Studiengang 20711211, Georg-August-Universität Göttingen Johann-Friedrich-Blumenbach-Institut für Zoologie & Anthropologie Abteilung Tierökologie.

17. Zandona template

Collected invertebrates were allowed to clear their guts before being euthanized on ice for body stoichiometry and dried. Fish bodies without intestines were dried following the same protocol for invertebrates - dried in an oven at 50°C until constant weights were achieved. Once dried, invertebrate and fish bodies were separately ground into a fine powder. Subsamples were analyzed for %C and %N using an Elemental Vario III analyzer. Subsamples for particulate P analysis were ashed at 500°C for two hours and then digested with HCl at 105°C for another two hours to analyze the Soluble Reactive Phosphorus (SRP) liberated following[97,98]. Bone meal and spinach were used as standards for the analysis.

97. Murphy, J. & Riley JP. 1962. A modified single solution method for the determination of phosphate in natural waters. Analytica Chimica Acta 27: 31-36

98. Stainton, MP., Capel, MJ. & Armstrong, FAJ. 1974. The Chemical Analysis of Fresh Water. Environment Canada. Fisheries and Marine Service. Winnipeg, Canada.

Supplementary Table 1. Qualitative and quantitative description of metadata. When the variable type is a 'factor', the quantitative description provides the number of factor levels, while if it is 'numeric' it provides the minimum / mean (± standard deviation) / maximum values. Note that a quantitative description of latitude and longitude coordinates is not presented. For each variable in the database, the percent of missing information (% NA) out of the total number of observations in the database (n = 28,049) is provided within a parenthesis.

Variable names	Description	Type	% NA	Quantitative Description
data.source1	References	factor	0.0	227
data.type	Type of data: either a published paper, a template, or a database	factor	0.0	8
data.provider1	Persons who provided data	factor	0.0	24
lat.dec	Latitude coordinate in decimals (South-negative, North-positive)	numeric	4.1	-
long.dec	Longitude coordinate in decimals (West-negative, East-positive)	numeric	17.0	-
location	Locations for which both latitude and longitude coordinates are documented	factor	17.0	1,120
habitat.gen	Aquatic or terrestrial habitats	factor	0.0	2
habitat	Freshwater, marine, or terrestrial habitats	factor	0.0	3
kingdom_init	Taxonomy: 'kingdom' as found in original data	factor	0.0	2
phylum_init	Taxonomy: 'phylum' as found in original data	factor	6.3	21
class_init	Taxonomy: 'class' as found in original data	factor	8.9	53
order_init	Taxonomy: 'order' as found in original data	factor	6.1	231
family_init	Taxonomy: 'family' as found in original data	factor	10.2	842
sp.morphosp_init	Taxonomy: 'morphospecies' as found in original data	factor	6.3	6,084
kingdom_revised	Taxonomy: 'kingdom' after corrections with	factor	0.0	2

	currently accepted taxonomy			
phylum_revised	Taxonomy: 'phylum' after corrections with currently accepted taxonomy	factor	0.0	16
class_revised	Taxonomy: 'class' after corrections with currently accepted taxonomy	factor	2.1	50
order_revised	Taxonomy: 'order' after corrections with currently accepted taxonomy	factor	2.7	208
family_revised	Taxonomy: 'family' after corrections with currently accepted taxonomy	factor	6.9	837
sp.morphosp_revised	Taxonomy: 'morphospecies' after corrections with currently accepted taxonomy	factor	0.0	5,876
species.level	Organisms identified at the species (y) or morphospecies (n) level	factor	0.0	2
autohetero	Autotroph or heterotroph trophic groups	factor	0.0	2
invert.vert.auto	Autotroph, invertebrate or vertebrate functional groups	factor	0.0	3
taxa.c	carbon content of organisms (%)	numeric	33.8	0.6 / 43.036 (9.848) / 78.06
taxa.n	nitrogen content of organisms (%)	numeric	8.5	0.062 / 7.727 (4.386) / 19.541
taxa.p	phosphorus content of organisms (%)	numeric	48.5	0.004 / 1.02 (1.422) / 8.88
taxa.cn	C:N of organisms in molar ratios (C molar / N molar)	numeric	34.5	2.074 / 6.966 (7.268) / 223.271
taxa.cp	C:P of organisms in molar ratios (C molar / P molar)	numeric	74.7	7.369 / 272.331 (433.617) / 9154.683
taxa.np	N:P of organisms in molar ratios (N molar / P molar)	numeric	56.3	0.17 / 30.316 (32.82) / 789.434
taxa.mass.cn	C:N of organisms as mass ratios (%C / %N)	numeric		
taxa.mass.cp	C:P of organisms as mass ratios (%C / %P)	numeric		
taxa.mass.np	N:P of organisms as mass ratios (%N / %P)	numeric		

body.weight.gr	body dry mass (g)	numeric	64.6	0 / 4.227 (38.837) / 842.422
temperature	Mean annual temperature at 10 m above ground data from NASA (T10M, 0.5° x 0.5° resolution)	numeric	17.0	-11.73 / 14.578 (8.914) / 27.78
radiation	Mean annual solar radiation data from NASA (ALLSKY_SFC_SW_DWN: All Sky Insolation Incident on a Horizontal Surface in W m2, 1° x 1° resolution)	numeric	17.0	1.92 / 4.13 (1.099) / 6.53
N	Global N availability data from Ackerman et al. 2019 (g N / m2, 2° x 2.5° resolution)	numeric	17.0	1.765 / 820.967 (602.592) / 2256.071
P_ter	Soil P labile data from ORNL DAAC (the Oak Ridge National Laboratory Distributed Active Archive Center (g P / m2, 0.5° x 0.5° resolution)	numeric	19.4	7.759 / 28.389 (15.546) / 163.565
P_mar	Total marine P data from NCAR WOA (the National Center for Atmospheric Research World Ocean Atlas (micromoles P / kg, 1° x 1° resolution)	numeric	17.0	0.021 / 0.332 (0.262) / 1.76