

# Nitrogen Isotopic Composition and Density of the Arch

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Citation Report

#	ARTICLE	IF	CITATIONS
1	Nitrogen Isotopes and Mantle Geodynamics: The Emergence of Life and the Atmosphere-Crust-Mantle Connection. <i>Elements</i> , 2013, 9, 359-366.	0.5	152
2	Nitrogen: Highly Volatile yet Surprisingly Compatible. <i>Elements</i> , 2013, 9, 333-338.	0.5	54
3	Radiative forcings for 28 potential Archean greenhouse gases. <i>Climate of the Past</i> , 2014, 10, 1779-1801.	1.3	25
4	Nitrogen isotope fractionation by alternative nitrogenases and past ocean anoxia. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2014, 111, 4782-4787.	3.3	158
5	N-rich fluid inclusions in octahedrally-grown diamond. <i>Earth and Planetary Science Letters</i> , 2014, 393, 39-48.	1.8	22
6	Controls on the Archean Climate System Investigated with a Global Climate Model. <i>Astrobiology</i> , 2014, 14, 241-253.	1.5	42
7	Nitrogen speciation in upper mantle fluids and the origin of Earth's nitrogen-rich atmosphere. <i>Nature Geoscience</i> , 2014, 7, 816-819.	5.4	137
8	Detecting the oldest geodynamo and attendant shielding from the solar wind: Implications for habitability. <i>Physics of the Earth and Planetary Interiors</i> , 2014, 233, 68-87.	0.7	77
9	Nitrogen isotopic fractionation during abiotic synthesis of organic solid particles. <i>Earth and Planetary Science Letters</i> , 2014, 393, 2-13.	1.8	26
10	Nucleoside phosphorylation by the mineral schreibersite. <i>Scientific Reports</i> , 2015, 5, 17198.	1.6	82
11	DETECTING AND CONSTRAINING N <sub>2</sub> ABUNDANCES IN PLANETARY ATMOSPHERES USING COLLISIONAL PAIRS. <i>Astrophysical Journal</i> , 2015, 810, 57.	1.6	73
12	Isotopic evidence for biological nitrogen fixation by molybdenum-nitrogenase from 3.2ÂGyr. <i>Nature</i> , 2015, 520, 666-669.	13.7	213
13	A Hadean to Paleoproterozoic geodynamo recorded by single zircon crystals. <i>Science</i> , 2015, 349, 521-524.	6.0	207
14	Epitaxial growth of a monolayer WSe <sub>2</sub> -MoS <sub>2</sub> lateral p-n junction with an atomically sharp interface. <i>Science</i> , 2015, 349, 524-528.	6.0	1,009
15	WATER FORMATION IN THE UPPER ATMOSPHERE OF THE EARLY EARTH. <i>Astrophysical Journal Letters</i> , 2015, 807, L29.	3.0	4
16	The nitrogen budget of Earth. <i>Earth-Science Reviews</i> , 2015, 148, 150-173.	4.0	148
17	Nitrogen distribution between aqueous fluids and silicate melts. <i>Earth and Planetary Science Letters</i> , 2015, 411, 218-228.	1.8	48
18	Water, Air, Earth and Cosmic Radiation. <i>Origins of Life and Evolution of Biospheres</i> , 2015, 45, 5-13.	0.8	15

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19	UV SURFACE ENVIRONMENT OF EARTH-LIKE PLANETS ORBITING FGKM STARS THROUGH GEOLOGICAL EVOLUTION. <i>Astrophysical Journal</i> , 2015, 806, 137.	1.6	105
20	Nitrogen isotope evidence for alkaline lakes on late Archean continents. <i>Earth and Planetary Science Letters</i> , 2015, 411, 1-10.	1.8	104
21	Modeling $N_2$ through Geological Time: Implications for Planetary Climates and Atmospheric Biosignatures. <i>Astrobiology</i> , 2016, 16, 949-963.	1.5	53
22	The Pale Orange Dot: The Spectrum and Habitability of Hazy Archean Earth. <i>Astrobiology</i> , 2016, 16, 873-899.	1.5	229
23	Atmospheric nitrogen evolution on Earth and Venus. <i>Earth and Planetary Science Letters</i> , 2016, 447, 103-111.	1.8	58
24	Earth's air pressure 2.7 billion years ago constrained to less than half of modern levels. <i>Nature Geoscience</i> , 2016, 9, 448-451.	5.4	132
25	Archean coastal-plain paleosols and life on land. <i>Gondwana Research</i> , 2016, 40, 1-20.	3.0	35
26	The evolution of Earth's biogeochemical nitrogen cycle. <i>Earth-Science Reviews</i> , 2016, 160, 220-239.	4.0	269
27	The thermodynamic effect of atmospheric mass on early Earth's temperature. <i>Geophysical Research Letters</i> , 2016, 43, 11,414.	1.5	14
28	Influence of the UV Environment on the Synthesis of Prebiotic Molecules. <i>Astrobiology</i> , 2016, 16, 68-88.	1.5	106
29	Interpretation of the nitrogen isotopic composition of Precambrian sedimentary rocks: Assumptions and perspectives. <i>Chemical Geology</i> , 2016, 429, 93-110.	1.4	136
30	Equable end Mesoproterozoic climate in the absence of high $CO_2$ . <i>Geology</i> , 2017, 45, 231-234.	2.0	31
31	The geobiological nitrogen cycle: From microbes to the mantle. <i>Geobiology</i> , 2017, 15, 343-352.	1.1	81
32	The relationship between mantle pH and the deep nitrogen cycle. <i>Geochimica Et Cosmochimica Acta</i> , 2017, 209, 149-160.	1.6	40
33	Reflections on $O_2$ as a Biosignature in Exoplanetary Atmospheres. <i>Astrobiology</i> , 2017, 17, 1022-1052.	1.5	119
34	Constraints on the Early Terrestrial Surface UV Environment Relevant to Prebiotic Chemistry. <i>Astrobiology</i> , 2017, 17, 169-204.	1.5	54
35	Dynamics of Massive Atmospheres. <i>Astrophysical Journal</i> , 2017, 845, 1.	1.6	21
36	Low oxygen and argon in the Neoproterozoic atmosphere at 815 Ma. <i>Earth and Planetary Science Letters</i> , 2017, 480, 66-74.	1.8	22

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38	Earth: Atmospheric Evolution of a Habitable Planet. , 2018, , 1-37.		4
39	Nitrogen solubility in the deep mantle and the origin of Earth's primordial nitrogen budget. Earth and Planetary Science Letters, 2018, 488, 134-143.	1.8	41
40	Salinity of the Archaean oceans from analysis of fluid inclusions in quartz. Comptes Rendus - Geoscience, 2018, 350, 154-163.	0.4	47
41	Spectra of Earth-like Planets through Geological Evolution around FGKM Stars. Astrophysical Journal, 2018, 854, 19.	1.6	61
42	Disequilibrium biosignatures over Earth history and implications for detecting exoplanet life. Science Advances, 2018, 4, eaao5747.	4.7	111
43	Evolution of atmospheric xenon and other noble gases inferred from Archean to Paleoproterozoic rocks. Geochimica Et Cosmochimica Acta, 2018, 232, 82-100.	1.6	81
44	Earth Without Life: A Systems Model of a Global Abiotic Nitrogen Cycle. Astrobiology, 2018, 18, 897-914.	1.5	28
45	The oldest known paleosol profiles on Earth: 3.46 Ga Panorama Formation, Western Australia. Palaeogeography, Palaeoclimatology, Palaeoecology, 2018, 489, 230-248.	1.0	28
46	Origins of building blocks of life: A review. Geoscience Frontiers, 2018, 9, 1117-1153.	4.3	292
47	Symbiosis: Why Was the Transition from Microbial Prokaryotes to Eukaryotic Organisms a Cosmic Gigayear Event?. , 2018, , 355-405.		5
48	Nitrogen evolution within the Earth's atmosphereâ€‘mantle system assessed by recycling in subduction zones. Earth and Planetary Science Letters, 2018, 482, 556-566.	1.8	58
49	Earth: Atmospheric Evolution of a Habitable Planet. , 2018, , 2817-2853.		6
50	Eolianite Grain Size Distributions as a Proxy for Large Changes in Planetary Atmospheric Density. Journal of Geophysical Research E: Planets, 2018, 123, 2506-2526.	1.5	11
51	Effect of Geologically Constrained Environmental Parameters on the Atmosphere and Biosphere of Early Earth. ACS Earth and Space Chemistry, 2018, 2, 1112-1136.	1.2	8
52	Exploring the Origins of Earthâ€™s Nitrogen: Astronomical Observations of Nitrogen-bearing Organics in Protostellar Environments. Astrophysical Journal, 2018, 866, 156.	1.6	8
53	Evaluating Climate Sensitivity to CO <sub>2</sub> Across Earth's History. Journal of Geophysical Research D: Atmospheres, 2018, 123, 11,861.	1.2	16
54	Biogeodynamics: bridging the gap between surface and deep Earth processes. Philosophical Transactions Series A, Mathematical, Physical, and Engineering Sciences, 2018, 376, 20170401.	1.6	20
55	Water near its Supercritical Point and at Alkaline pH for the Production of Ferric Oxides and Silicates in Anoxic Conditions. A New Hypothesis for the Synthesis of Minerals Observed in Banded Iron Formations and for the Related Geobiotropic Chemistry inside Fluid Inclusions. Origins of Life and Evolution of Biospheres. 2018, 48, 289-320.	0.8	14

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56	Comparative deep Earth volatile cycles: The case for C recycling from exosphere/mantle fractionation of major (H <sub>2</sub> O, C, N) volatiles and from H <sub>2</sub> O/Ce, CO <sub>2</sub> /Ba, and CO <sub>2</sub> /Nb exosphere ratios. <i>Earth and Planetary Science Letters</i> , 2018, 502, 262-273.	1.8	106
57	EarthN: A New Earth System Nitrogen Model. <i>Geochemistry, Geophysics, Geosystems</i> , 2018, 19, 2516-2542.	1.0	30
58	Possible nitrogen fertilization of the early Earth Ocean by microbial continental ecosystems. <i>Nature Communications</i> , 2018, 9, 2530.	5.8	35
59	Ab Initio Calculations. <i>Encyclopedia of Earth Sciences Series</i> , 2018, , 1-6.	0.1	0
60	Origin and evolution of the atmospheres of early Venus, Earth and Mars. <i>Astronomy and Astrophysics Review</i> , 2018, 26, 1.	9.1	124
61	Similarity Among Atmospheric Thermal Stratifications Over Elevated Surfaces Under Radiative-Convective Equilibrium. <i>Geophysical Research Letters</i> , 2019, 46, 3512-3522.	1.5	3
62	Partitioning of nitrogen during melting and recycling in subduction zones and the evolution of atmospheric nitrogen. <i>Chemical Geology</i> , 2019, 525, 334-342.	1.4	18
63	Geoscience for Understanding Habitability in the Solar System and Beyond. <i>Space Science Reviews</i> , 2019, 215, 1.	3.7	14
64	Periodic Melting of Oligonucleotides by Oscillating Salt Concentrations Triggered by Microscale Water Cycles Inside Heated Rock Pores. <i>Angewandte Chemie - International Edition</i> , 2019, 58, 13155-13160.	7.2	26
65	The Role of N <sub>2</sub> as a Geo-Biosignature for the Detection and Characterization of Earth-like Habitats. <i>Astrobiology</i> , 2019, 19, 927-950.	1.5	38
66	Periodic Melting of Oligonucleotides by Oscillating Salt Concentrations Triggered by Microscale Water Cycles Inside Heated Rock Pores. <i>Angewandte Chemie</i> , 2019, 131, 13289-13294.	1.6	18
68	Host Star Driven Photochemistry in Exoplanet Atmospheres. <i>Lecture Notes in Physics</i> , 2019, , 211-227.	0.3	0
69	Origin of Life's Building Blocks in Carbon- and Nitrogen-Rich Surface Hydrothermal Vents. <i>Life</i> , 2019, 9, 12.	1.1	54
70	Late Delivery of Nitrogen to the Earth. <i>Astronomical Journal</i> , 2019, 157, 80.	1.9	3
71	Nitrogen Oxide Concentrations in Natural Waters on Early Earth. <i>Geochemistry, Geophysics, Geosystems</i> , 2019, 20, 2021-2039.	1.0	65
72	Geochemical evidence for high volatile fluxes from the mantle at the end of the Archaean. <i>Nature</i> , 2019, 575, 485-488.	13.7	20
73	Morphological and isotopic changes of heterocystous cyanobacteria in response to N <sub>2</sub> partial pressure. <i>Geobiology</i> , 2019, 17, 60-75.	1.1	11
74	Origin of Paleoproterozoic Sulfate Deposits. , 2019, , 211-235.		1

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75	Impact of space weather on climate and habitability of terrestrial-type exoplanets. <i>International Journal of Astrobiology</i> , 2020, 19, 136-194.	0.9	125
76	Oxidized micrometeorites suggest either high $\text{CO}_2$ or low $\text{N}_2$ during the Neoproterozoic. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2020, 117, 1360-1366.	3.3	21
77	Exploring cycad foliage as an archive of the isotopic composition of atmospheric nitrogen. <i>Geobiology</i> , 2020, 18, 152-166.	1.1	9
78	Evolution of the Earth's atmosphere during Late Veneer accretion. <i>Monthly Notices of the Royal Astronomical Society</i> , 2020, 499, 5334-5362.	1.6	17
80	Atmospheric Nitrogen When Life Evolved on Earth. <i>Astrobiology</i> , 2020, 20, 1413-1426.	1.5	11
81	Archean to Paleoproterozoic seawater halogen ratios recorded by fluid inclusions in chert and hydrothermal quartz. <i>American Mineralogist</i> , 2020, 105, 1317-1325.	0.9	8
83	Venusian Habitable Climate Scenarios: Modeling Venus Through Time and Applications to Slowly Rotating Venus-Like Exoplanets. <i>Journal of Geophysical Research E: Planets</i> , 2020, 125, e2019JE006276.	1.5	101
84	Mission to Planet Earth: The First Two Billion Years. <i>Space Science Reviews</i> , 2020, 216, 1.	3.7	20
85	Perspectives on Atmospheric Evolution from Noble Gas and Nitrogen Isotopes on Earth, Mars & Venus. <i>Space Science Reviews</i> , 2020, 216, 1.	3.7	37
86	High-resolution Transmission Spectra of Earth Through Geological Time. <i>Astrophysical Journal Letters</i> , 2020, 892, L17.	3.0	15
87	The Archean atmosphere. <i>Science Advances</i> , 2020, 6, eaax1420.	4.7	276
88	Diffusive retention of carbon and nitrogen in a microcrystalline quartz-dominated chert: Implications for reconstructing Earth's ancient atmosphere. <i>Chemical Geology</i> , 2020, 541, 119572.	1.4	0
89	Is the Faint Young Sun Problem for Earth Solved?. <i>Space Science Reviews</i> , 2020, 216, 1.	3.7	30
90	High nitrogen solubility in stishovite ( $\text{SiO}_2$ ) under lower mantle conditions. <i>Scientific Reports</i> , 2020, 10, 10897.	1.6	6
91	Vesicle paleobarometry in the Pongola Supergroup: A cautionary note and guidelines for future studies. <i>South African Journal of Geology</i> , 2020, 123, 95-104.	0.6	0
92	Hydrothermal $^{15}\text{N}/^{14}\text{N}$ abundances constrain the origins of mantle nitrogen. <i>Nature</i> , 2020, 580, 367-371.	13.7	50
93	Radiation of nitrogen-metabolizing enzymes across the tree of life tracks environmental transitions in Earth history. <i>Geobiology</i> , 2021, 19, 18-34.	1.1	36
94	Subduction-Driven Volatile Recycling: A Global Mass Balance. <i>Annual Review of Earth and Planetary Sciences</i> , 2021, 49, 37-70.	4.6	65

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95	Warm and oxidizing slabs limit ingassing efficiency of nitrogen to the mantle. Earth and Planetary Science Letters, 2021, 553, 116615.	1.8	24
96	Equation of State of TiN at High Pressures and Temperatures: A Possible Host for Nitrogen in Planetary Mantles. Journal of Geophysical Research: Solid Earth, 2021, 126, e2020JB020074.	1.4	1
97	Stable Abiotic Production of Ammonia from Nitrate in Komatiite-Hosted Hydrothermal Systems in the Hadean and Archean Oceans. Minerals (Basel, Switzerland), 2021, 11, 321.	0.8	10
98	Life as the Only Reason for the Existence of N <sub>2</sub> -O <sub>2</sub> -Dominated Atmospheres. Astronomy Reports, 2021, 65, 275-296.	0.2	12
99	Benthic redox conditions and nutrient dynamics in the ca. 2.1 Ga Franceville sub-basin. Precambrian Research, 2021, 360, 106234.	1.2	2
100	Nitrogen solubility in basaltic silicate melt - Implications for degassing processes. Chemical Geology, 2021, 573, 120192.	1.4	21
101	Low volcanic outgassing rates for a stagnant lid Archean earth with graphite-saturated magmas. Physics of the Earth and Planetary Interiors, 2021, 320, 106788.	0.7	7
102	Composition of the Earth's Atmosphere. , 2021, , 187-197.		5
103	Nitrogen Isotopes. Encyclopedia of Earth Sciences Series, 2018, , 1-13.	0.1	1
105	Removal of organic contaminants from iron sulfides as a pretreatment for mineral-mediated chemical synthesis under prebiotic hydrothermal conditions. Geochemical Journal, 2017, 51, 495-505.	0.5	3
106	The Inner Solar System's Habitability Through Time. , 2005, , 1-1.		1
107	Finding Signs of Life on Transiting Earthlike Planets: High-resolution Transmission Spectra of Earth through Time around FGKM Host Stars. Astrophysical Journal, 2020, 904, 10.	1.6	7
108	How Does Background Air Pressure Influence the Inner Edge of the Habitable Zone for Tidally Locked Planets in a 3D View?. Astrophysical Journal Letters, 2020, 901, L36.	3.0	10
110	A secular increase in continental crust nitrogen during the Precambrian. Geochemical Perspectives Letters, 0, , 24-28.	1.0	20
111	Earth as an Exoplanet. , 2005, , 1-1.		2
112	Atmophile Elements. Encyclopedia of Earth Sciences Series, 2017, , 1-3.	0.1	0
114	Nitrogen Isotopes. Encyclopedia of Earth Sciences Series, 2018, , 991-1003.	0.1	1
116	Deep Cycles and Super-Terrans. , 2019, , 141-170.		0

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118	Archean Eon. , 2022, , 1-11.		0
119	The origin and dynamics of nitrogen in the Earth's mantle constrained by $^{15}\text{N}/^{14}\text{N}$ in hydrothermal gases. <i>Chemical Geology</i> , 2022, 591, 120709.	1.4	6
120	An exploration of whether Earth can be built from chondritic components, not bulk chondrites. <i>Geochimica Et Cosmochimica Acta</i> , 2022, 318, 428-451.	1.6	8
121	The behaviour of nitrogen during subduction of oceanic crust: Insights from in situ SIMS analyses of high-pressure rocks. <i>Geochimica Et Cosmochimica Acta</i> , 2022, 321, 16-34.	1.6	14
122	Experimental determination of $\text{N}_2$ solubility in silicate melts and implications for $\text{N}_2$ - $\text{Ar}$ - $\text{CO}_2$ fractionation in magmas. <i>Geochimica Et Cosmochimica Acta</i> , 2022, 326, 17-40.	1.6	5
123	The origin of nitrogen in Earth's mantle: Constraints from basalts $^{15}\text{N}/^{14}\text{N}$ and $\text{N}_2/3\text{He}$ ratios. <i>Chemical Geology</i> , 2022, 597, 120780.	1.4	5
124	Atmospheric Pressure and Snowball Earth Deglaciation. <i>Journal of Geophysical Research D: Atmospheres</i> , 2021, 126, .	1.2	1
125	The Origin of Earth's Mantle Nitrogen: Primordial or Early Biogeochemical Cycling?. <i>Geochemistry, Geophysics, Geosystems</i> , 2022, 23, .	1.0	3
126	The Earth's atmosphere – A stable isotope perspective and review. <i>Applied Geochemistry</i> , 2022, 143, 105355.	1.4	6
127	Moderate levels of oxygenation during the late stage of Earth's Great Oxidation Event. <i>Earth and Planetary Science Letters</i> , 2022, 594, 117716.	1.8	8
128	Earth's Atmosphere, Origin and Evolution of. , 2022, , 1-5.		0
129	Smaller Sensitivity of Precipitation to Surface Temperature Under Massive Atmospheres. <i>Geophysical Research Letters</i> , 2022, 49, .	1.5	0
130	The Long-Term Evolution of the Atmosphere of Venus: Processes and Feedback Mechanisms. <i>Space Science Reviews</i> , 2022, 218, .	3.7	20
132	Multiverse Predictions for Habitability: Stellar and Atmospheric Habitability. <i>Universe</i> , 2023, 9, 4.	0.9	1
133	Isotopic evidence for increased carbon and nitrogen exchanges between peatland plants and their symbiotic microbes with rising atmospheric $\text{CO}_2$ concentrations since 15,000 cal. year BP. <i>Global Change Biology</i> , 2023, 29, 1939-1950.	4.2	3
135	Nitrogen impacts on structural stability of feldspar: Constraints from high temperature and high pressure spectroscopy and machine learning. <i>Physics of the Earth and Planetary Interiors</i> , 2023, 336, 106997.	0.7	0
136	The Habitability of Venus. <i>Space Science Reviews</i> , 2023, 219, .	3.7	10
137	Nitrate limitation in early Neoproterozoic oceans delayed the ecological rise of eukaryotes. <i>Science Advances</i> , 2023, 9, .	4.7	5



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145	Earth's Atmosphere, Origin and Evolution of. , 2023, , 859-863.		0
146	Archean Eon. , 2023, , 169-180.		0
153	Precambrian evolution of the nitrogen cycle. , 2023, , .		0