

The Environment Ontology

Barbra Ferrell

Presented: April 20, 2022

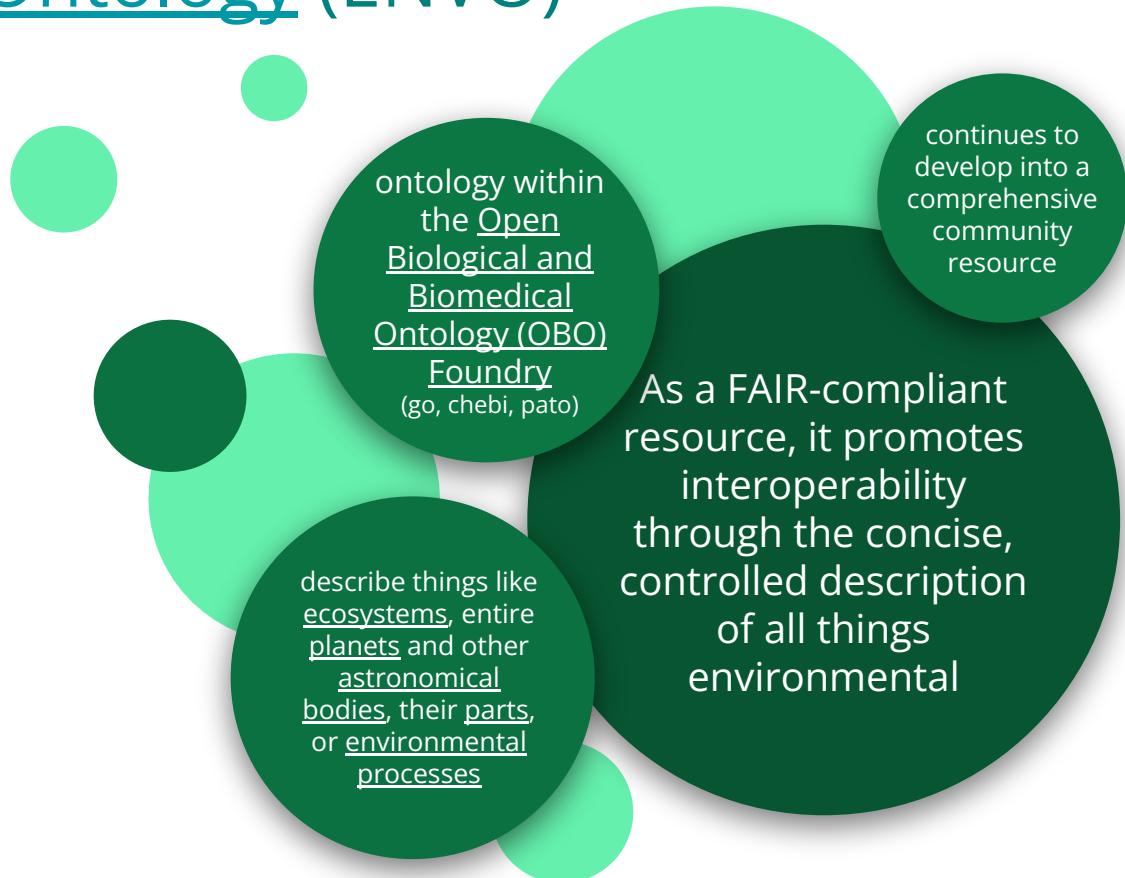
The Sequence Read Archive

- Already discussed the SRA controlled vocabulary
 - Run
 - Library
 - Read
 - Spot
 - BioProject
 - BioSample



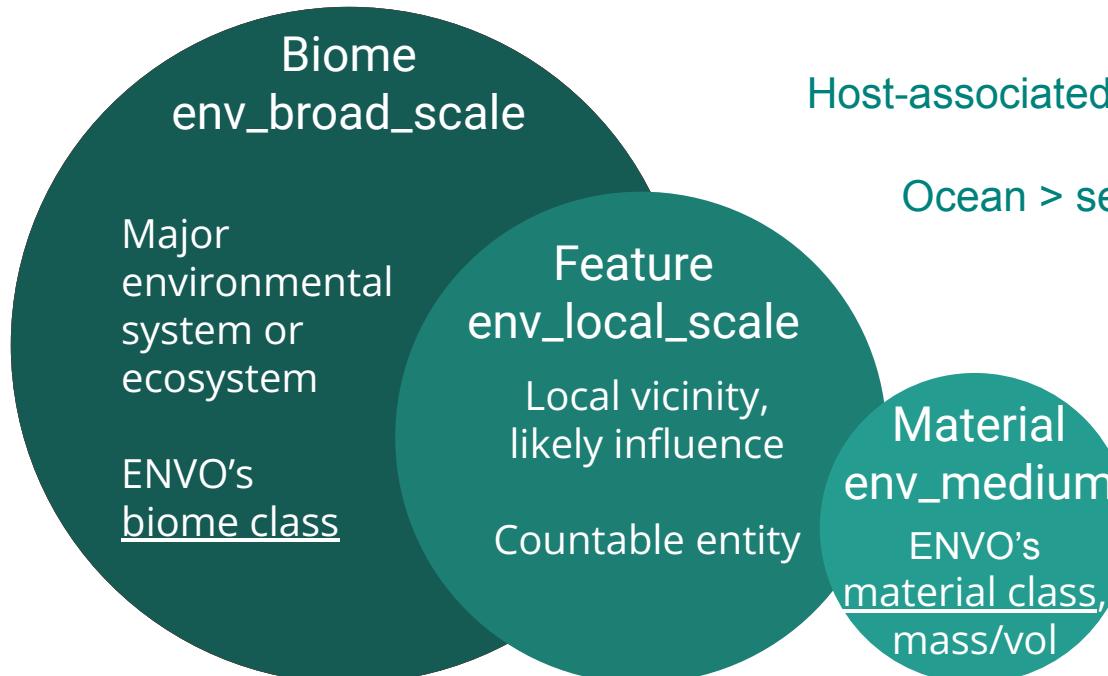
The Environment Ontology (ENVO)

EnvO is a community ontology for the concise, controlled description of environments



Supports Genomic Standards Consortium (GSC) metadata checklists

Minimum Information about any (x) Sequence - MIxS



Other GSC projects and frameworks

- MIxS (2011)
 - MIGS - genomes
 - MIMS - metagenomes
 - MIMARKS - marker genes
- MIxS-ers - MIxS Compliance and Interoperability Working Group
- BIOM - the Biological Observation Matrix format
- Minimum Information about a Single Amplified Genome ([MISAG](#))
- Minimum Information about a Metagenome-Assembled Genome ([MISAG](#))
- Minimum Information about an Uncultured Virus Genome ([MIUViG](#))

You can contribute to ENVO: New Terms

Abandoned fishing gear

Polluted river

Aqueous inkjet printer ink

Rock dust

Cleanroom

Subglacial

Earth-filled dam

Varnish

Electrical switch

Water column

Food waste

Wood dust



Let's explore The Environment Ontology

The Environment
Ontology

About EnvO

Annotation guidelines

Browse EnvO

Downloads

Participate

Contact

The Environment Ontology



Browse EnvO

“...can make browsing it - in its entirety - a bit daunting”

- Custom subsets can be tailored to define choices
- Upper-level terms that you don't need
- Make browsing easier on yourself
 - Biome
 - Environmental material
 - Environmental system process
- Downloads: Web Resources
 - OntoBee
 - European Bioinformatics Institute's Ontology Lookup Service (OLS)

OntoBee

Ontobee

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Keywords: water

Ontology: ENVO

• IRI: <http://purl.obolibrary.org/obo/envo.owl>
• OBO Foundry: Library
• Download: <http://purl.obolibrary.org/obo/envo.owl>
• Home: <http://environmentontology.org/>
• Documentation: <http://environmentontology.org/>
• Contact: p.buttigieg@gmail.com
• Description: Ontology of environmental features and habitats

Annotations

- **comment:** Includes Ontology(OntologyID(OntologyIRI(< http://purl.obolibrary.org/obo/envo/modules/process_attribute.owl Axioms: 2])
- **comment:** Includes Ontology(OntologyID(OntologyIRI(< http://purl.obolibrary.org/obo/envo/modules/entity_attribute.owl Axioms: 19])
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- **comment:** Includes Ontology(OntologyID(OntologyIRI(< http://purl.obolibrary.org/obo/envo/modules/chemical_content.owl Logical Axioms: 88])
- **comment:** Includes Ontology(OntologyID(OntologyIRI(< http://purl.obolibrary.org/obo/envo/modules/entity_attribute_location.owl Logical Axioms: 22])
- **creator:** <http://orcid.org/0000-0002-4366-3088>, <http://orcid.org/0000-0002-6601-2165>, <http://orcid.org/0000-0002-8343-602X>
- **description:** ENVO is an ontology which represents knowledge about environments, environmental processes, ecosystems and species.
- **title:** The Environment Ontology
- **versionIRI:** <http://purl.obolibrary.org/obo/releases/2021-05-14/envo.owl>
- **versionInfo:** 2021-05-14
- **GitRepository:** <https://github.com/EnvironmentOntology/envo>
- **bug-database:** <https://github.com/EnvironmentOntology/envo/issues/>
- **default-namespace:** ENVO

Ontobee

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Environment Ontology

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OntoBee



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Environment Ontology

Keywords: Search terms

Class: liquid water

Term IRI: http://purl.obolibrary.org/obo/ENVO_00002006

Definition: An environmental material primarily composed of dihydrogen oxide in its liquid form. [database_cross_reference: MA:ma]

Annotations

- database_cross_reference: LTER:617; <https://en.wikipedia.org/wiki/Water>; EcoLexicon:water
- has_broad_synonym: water

Class Hierarchy

Thing

- + entity
- + continuant
- + independent continuant
- + material entity
- + fiat object
- + environmental material
- + fluid environmental material
- + liquid environmental material
- + oil
- refined asphalt
- + liquefied hydrocarbon gas
- fracking liquid
- + paint
- + colorant fluid
- liquid water
 - + saline water
 - + fresh water
 - surface water
 - + leachate
 - drilling bore water
 - + contaminated water
 - oil field production water
 - oligotrophic water
 - + eutrophic water
 - mesotrophic water
 - distilled water
 - bore hole water
 - sterile water
 - + underground water
 - muddy water
 - anoxic water
 - alkaline water
 - + stormwater
- [more...](#)

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EBI Ontology Lookup Service (OLS)

EMBL-EBI

Services

Research

Training

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The Environment Ontology

ENVO is an ontology which represents knowledge about environments, environmental processes, ecosystems, habitats, and related entities

water

Search

Terms

Download

Ontology Homepage

Request a Term

Exact match Obsolete terms

Term type

class 809

property 3

individual 1

Ontology

The Environment Ontology
(ENVO)

ENVO

813

Search results for water

Showing 1 to 10 of 813 results

water

CHEBI:15377

http://purl.obolibrary.org/obo/CHEBI_15377

Ontology: [The Environment Ontology](#)

ENVO

liquid water

ENVO:00002006

http://purl.obolibrary.org/obo/ENVO_00002006

An environmental material primarily composed of dihydrogen oxide in its liquid form.

Ontology: [The Environment Ontology](#)

ENVO

fissure water

ENVO:01000940

http://purl.obolibrary.org/obo/ENVO_01000940

Water which is partially contained within a fissure or a geological fracture



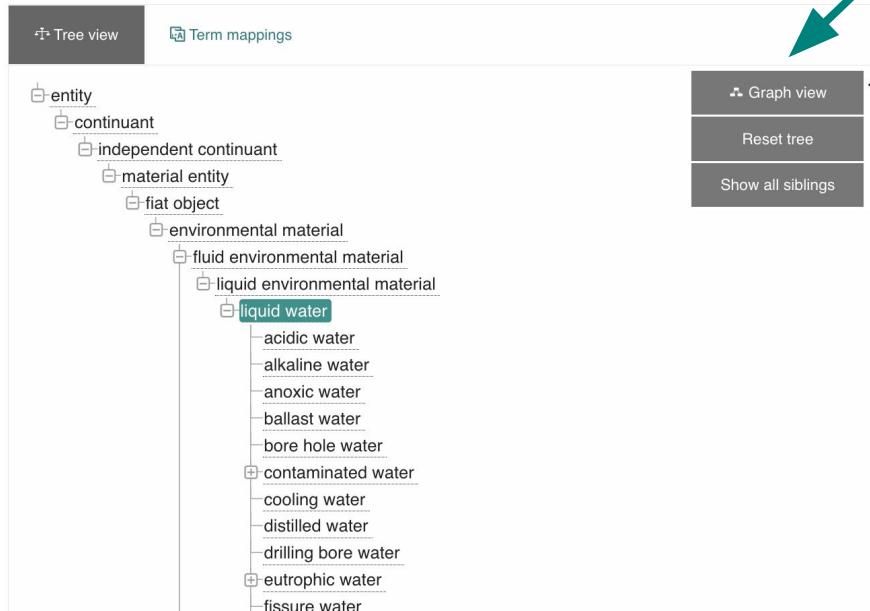
water

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liquid water

http://purl.obolibrary.org/obo/ENVO_00002006 [Copy](#)

An environmental material primarily composed of dihydrogen oxide in its liquid form. [http://www.informatics.jax.org/obolibrary/resource/doc/ENVO/ENVO_00002006]



- Graph view
- Reset tree
- Show all siblings

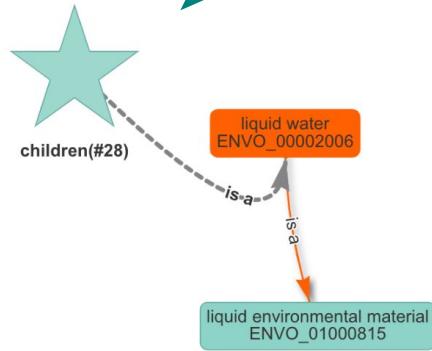
water

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OLS > ENVO > ENVO_00002006

[Help with this visualisation](#)

Visualized term: liquid water (http://purl.obolibrary.org/obo/ENVO_00002006) 



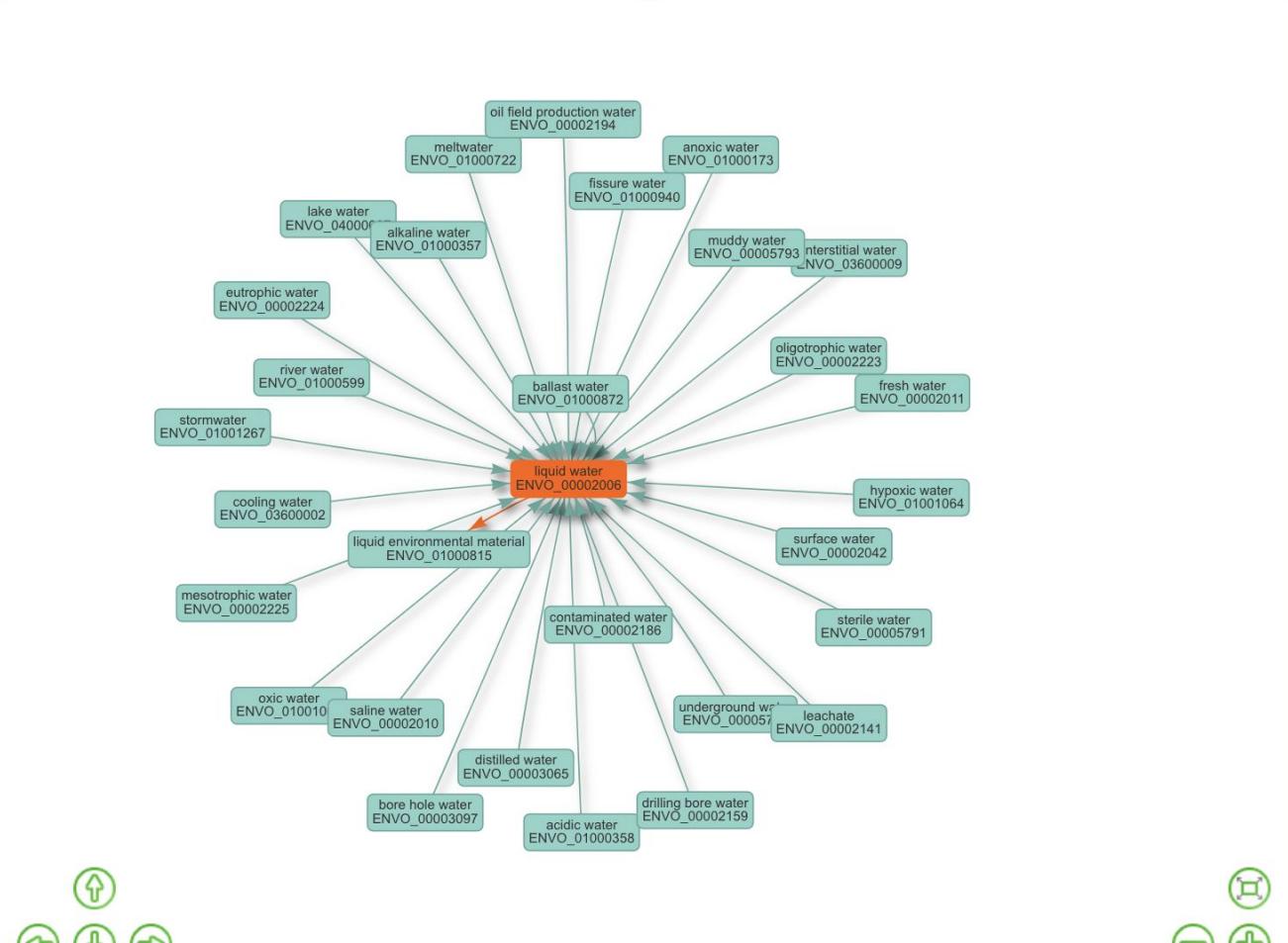
Legend

Relationship	Color	Visibility
Extended nodes (*)		-
is a		<input checked="" type="checkbox"/>
composed primarily of		<input type="checkbox"/>
part of		<input type="checkbox"/>
inheres in		<input type="checkbox"/>
has participant		<input type="checkbox"/>
partially_surrounded_by		<input type="checkbox"/>
has part		<input type="checkbox"/>
has output		<input type="checkbox"/>
surrounded by		<input type="checkbox"/>
determined by		<input type="checkbox"/>
has input		<input type="checkbox"/>

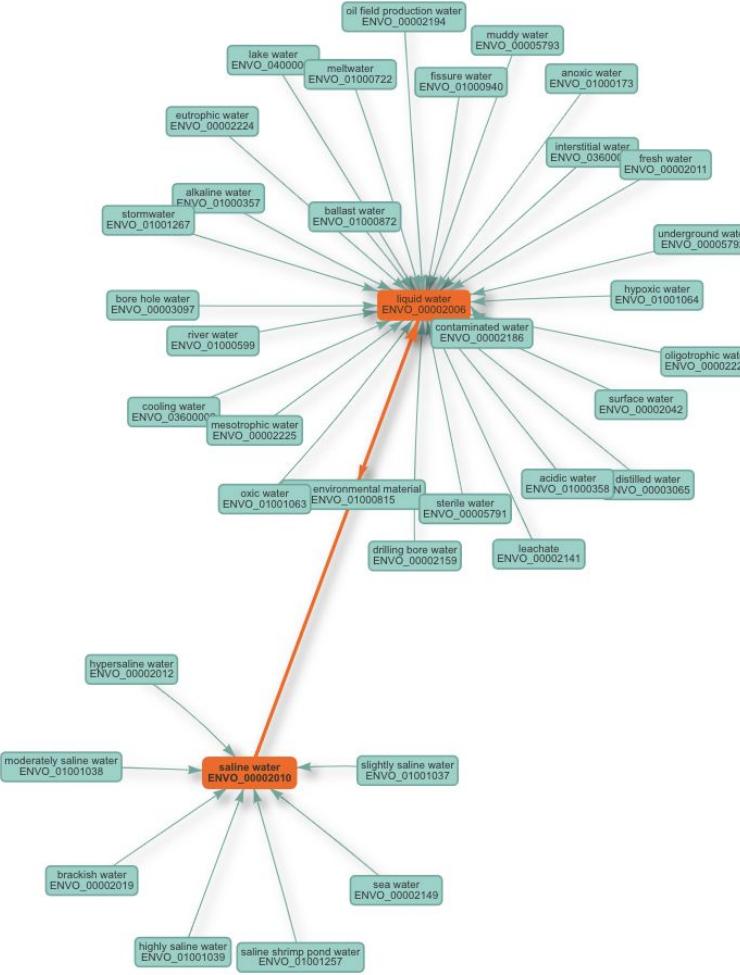


Visualized term: liquid water (http://purl.obolibrary.org/obo/ENVO_00002006) 

water



water

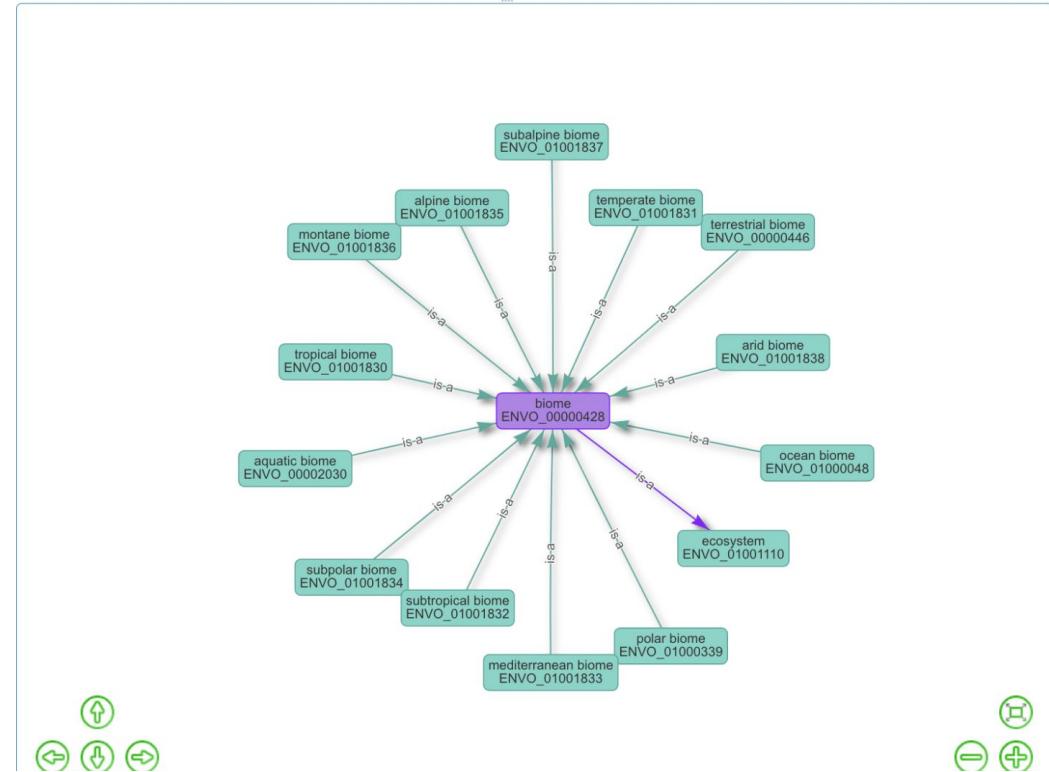


biome

OLS > ENVO > ENVO_00000428

Help with thi

Visualized term: biome (http://purl.obolibrary.org/obo/ENVO_00000428)



Legend

Relationship	Color	Visibility
Extended nodes (*)	red	-
is a	teal	<input checked="" type="checkbox"/>
determined by	yellow	<input type="checkbox"/>
part of	purple	<input type="checkbox"/>
has part	orange	<input type="checkbox"/>
overlaps	blue	<input type="checkbox"/>
Select/Deselect all		<input type="checkbox"/>

List of extended nodes (*):

- biome (ENVO_00000428)

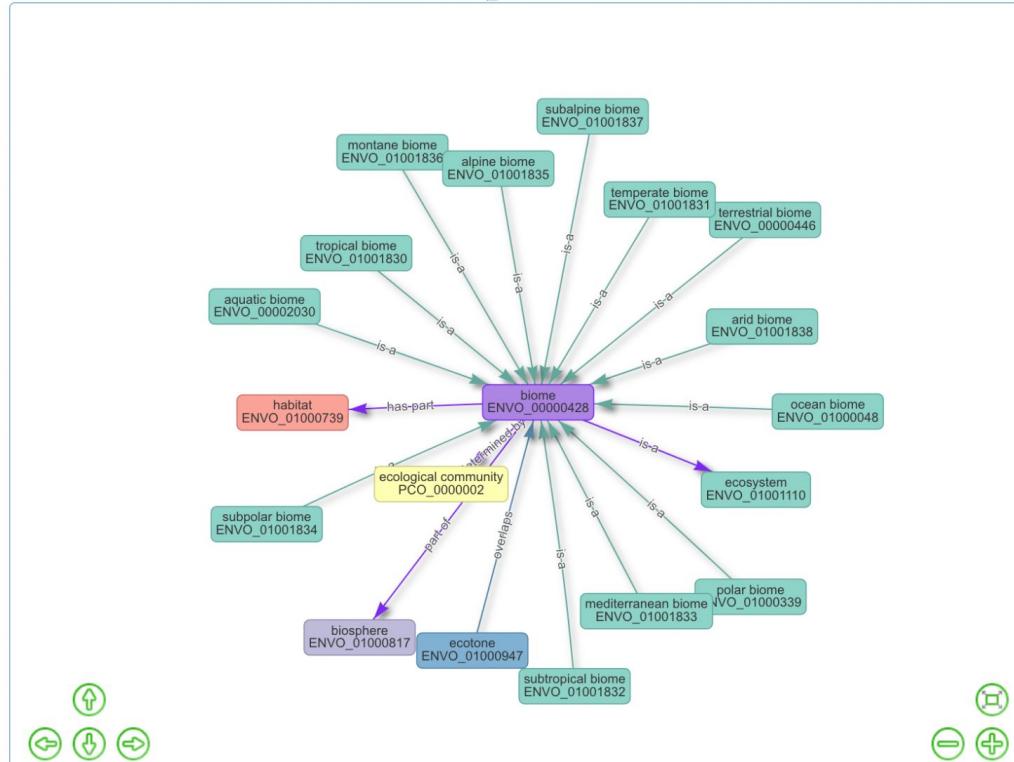


biome

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Help with th

Visualized term: biome (http://purl.obolibrary.org/obo/ENVO_00000428)



Legend

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overlaps	blue	<input checked="" type="checkbox"/>
Select/Deselect all		<input type="checkbox"/>

List of extended nodes (*):

- biome (ENVO_00000428)



Sample Submission

- [BioSample Templates - NCBI](#)
 - GSC Compliant mandatory for microbe: organism, Strain, isolation date, growth conditions, environment (ENVO biome, feature, material), etc
- [Sample Checklists - ENA Browser](#)
 - [ERC0000013](#) GSC Host-associated
 - Mandatory: collection date, geographic location (country, lat, long), environment (ENVO biome, feature, material)
 - [ERC000011](#) ENA default sample checklist
 - Mandatory: _____ Nothing!
- <https://www.ddbj.nig.ac.jp/biosample/submission-e.html>
 - [BioSample Examples](#)
 - Generic Mandatory: _____ Nothing!

Case Study: SNP Project

Single Nucleotide Polymorphisms analysis supports drug and vaccine development against *Mycobacterium tuberculosis*

- 2013 Bryant et al, BMC, [ENA ERP000111](#)
 - Submissions follow ERC000011 generic
- 2015 Merker et al, Nat. Genter, [PRIEB7281](#), e.g. [SAMEA2533862](#)
 - Submissions follow ERC000011 generic
- 2018 Chemyaeva et al, EID [ENA PRJNA352769](#), e.g. [SAMN07956614](#)
 - Submitted under Pathogen: clinical or host-associated v1.0, with isolate, collection, location, host, host disease, isolation source, lat/long

Case Study: Virioplankton in the open ocean

Spatiotemporal dynamics of dsDNA viruses in bacterial and viral filter fraction in the North Pacific Subtropical Gyre

- Primary BioSample

[SAMN12604809](#)

BioSample BioSample SAMN12604809 |
Create alert Advanced

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Pooled metagenomic reads from Station Aloha samples from 2010 to 2016

Identifiers	BioSample: SAMN12604809; Sample name: Aloha_2_0_pooled	
Organism	marine plankton metagenome unclassified entries; unclassified sequences; metagenomes; ecological metagenomes	
Package	MIMS: metagenome/environmental_water_version 5.0	
Attributes	collection date	2010-08-07/2016-04-16
	depth	5-1000
	geographic location	Pacific Ocean: North Pacific Gyre, Station ALOHA
	latitude and longitude	22.75 N 158 W
	broad-scale environmental context	ENVO:00000447
	local-scale environmental context	ENVO:00000209 ENVO:00000569 ENVO:01000036
	environmental medium	ENVO:00002151
	isolation source	viral sequences binned using virsorter

This sample group is the combination of the individual BioSamples: SAMN11874653, SAMN11874589, SAMN06183626, SAMN06183620, SAMN05991671, SAMN05991687, SAMN11874509, SAMN11874576, SAMN11874597, SAMN11874621, SAMN11874724, SAMN11874764, SAMN11874716, SAMN11874777, SAMN11874620, SAMN05991725, SAMN11874691, SAMN11874656, SAMN11874758, SAMN11874657, SAMN11874650, SAMN11874639, SAMN11874834, SAMN05991727, SAMN05991684, SAMN06183675, SAMN05991713, SAMN11874560, SAMN11874779, SAMN06183606, SAMN11874684, SAMN06183654, SAMN11874542, SAMN11874532, SAMN11874622, SAMN05991723, SAMN05991710, SAMN06183647, SAMN11874763, SAMN06183661, SAMN11874556, SAMN06183685, SAMN11874821, SAMN11874846, SAMN11874525, SAMN11874830, SAMN11874699, SAMN11874510, SAMN11874636, SAMN11874864, SAMN11874709, SAMN11874559, SAMN06183623, SAMN05991716, SAMN11874825, SAMN11874585, SAMN11874599, SAMN11874853, SAMN06183639, SAMN05991676, SAMN05991711, SAMN05991651, SAMN11874727, SAMN06183682, SAMN06183640, SAMN06183684, SAMN11874751, SAMN11874603, SAMN05991718, SAMN11874791, SAMN06183667, SAMN11874728, SAMN11874851, SAMN11874681, SAMN11874825, SAMN11874553, SAMN05991662, SAMN11874769, SAMN11874531, SAMN11874723, SAMN05991732

Batch submissions

[Full !\[\]\(0d6a6f00060aaf300973bf619c8b7212_img.jpg\)](#)**SCOPE HOT time series metagenomic sample HSD00-20a-280-S2C012-0500**

Identifiers BioSample: SAMN11874653; Sample name: HSD00-20a-280-S2C012-0500; SRA: SRS4861776

Organism [marine plankton metagenome](#)
unclassified entries; unclassified sequences; metagenomes; ecological metagenomes

Package [MIMS: metagenome/environmental_water; version 5.0](#)

Attributes	collection date	2016-01-14
	depth	500
	geographic location	Pacific Ocean: North Pacific Gyre, Station ALOHA
	latitude and longitude	22.75 N 158 W
	alkalinity	2289
	chlorophyll	NA
	dissolved inorganic carbon	2244
	nitrogen	33
	pH	7.45
	phaeopigments	NA
	salinity	34
	silicate	56
	temperature	7
	broad-scale environmental context	ENVO:00000447
	local-scale environmental context	ENVO:00000209 ENVO:01000036
	environmental medium	ENVO:00002151
	phosphate	2
	total particulate carbon	NA
	isolation source	ocean water sample from Hawaii Ocean Time-series (HOT) cruises
	filter_size_um	2

Case Study: SARS CoV2 BioSamples

National Library of Medicine
National Center for Biotechnology Information

BioSample BioSample Advanced

Full ▾ Send ▾

hCoV-19/Ireland/KE-NVRL-S22IRL00264834/2022

Identifiers BioSample: SAMEA14093104; Sample name: S22IRL00264834; SRA: ERS11696216

Organism **Severe acute respiratory syndrome coronavirus 2**
Viruses; Riboviria; Orthomavirae; Picornaviridae; Nidovirales; Coronavirinae; Coronaviridae; Orthocoronavirinae; Betacoronavirus; Sarbecovirus; Severe acute respiratory syndrome-related coronavirus

Attributes collection date: 2022-03-22
geographic location: Ireland
host age: 11-20 years
host common name: human
host disease outcome: not provided
host health state: not provided
host: Homo sapiens
host sex: female
host subject id: not provided
isolate: not applicable
collecting institution: National Virus Reference Laboratory
collector name: not provided
geographic location (latitude): 53.1424 DD
geographic location (longitude): 7.6921 DD
geographic location (region and locality): Europe / Ireland / Kildare
isolation source host-associated: Oro-Nasopharyngeal swab
sample capture status: active surveillance in response to outbreak
virus identifier: hCoV-19/Ireland/KE-NVRL-S22IRL00264834/2022
ENA-FIRST-PUBLIC: 2022-04-14
ENA-LAST-UPDATE: 2022-04-14

SAMEA14093104

National Library of Medicine
National Center for Biotechnology Information

BioSample BioSample Advanced

Full ▾ Send ▾

CDC Sars CoV2 Sequencing Baseline Constellation

Identifiers BioSample: SAMN26090060; SRA: SR512653303; CDC-OAMD: SARS-CoV-2/Human/USA/AL-CDC-ASC210691677/2022

Organism **Severe acute respiratory syndrome coronavirus 2**
Viruses; Riboviria; Orthomavirae; Picornaviridae; Nidovirales; Coronavirinae; Coronaviridae; Orthocoronavirinae; Betacoronavirus; Sarbecovirus; Severe acute respiratory syndrome-related coronavirus

Package [SARS-CoV-2: clinical or host-associated: version 1.0](#)

Attributes isolate: SARS-CoV-2/Human/USA/AL-CDC-ASC210691677/2022
collected by: Aegis Sciences Corporation
collection date: 2022-02-01
isolation source: Nasal - Anterior Nares
geographic location: USA: Alabama
host: Homo sapiens
host disease: COVID-19
host sex: male
host age: 71
collection device: Nasal - Anterior Nares
collection method: Nasal - Anterior Nares
purpose of sequencing: baseline surveillance (random sampling)
host_race: White
diagnostic_gene_name_1: N gene
diagnostic_pcr_protocol_1: TaqPath COVID-19 Combo Kit
diagnostic_pcr_Ct_value_1: 24.245298
diagnostic_gene_name_2: S gene
diagnostic_pcr_protocol_2: TaqPath COVID-19 Combo Kit
diagnostic_pcr_Ct_value_2: Unknown
diagnostic_gene_name_3: ORF1ab
diagnostic_pcr_protocol_3: TaqPath COVID-19 Combo Kit
diagnostic_pcr_Ct_value_3: 21.93018
lineage/clade name: BA.1.1

BioProject PRJNA731148 Severe acute respiratory syndrome coronavirus 2
Retrieve [all samples](#) from this project

SAMN26090060

Thank you!

Questions?