Simple Tools for Microbial Ecology

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Background

Analyzing data is an essential part of microbial ecology. Large datasets require programming skills, which while possessed by an ever increasing number of researchers, are not widespred. By implementing interactive web applications and easier to construct cloud pipelines, we can increase the amount of data exploration a researcher can perform by taking away the need for programming.

Methods

Websites were developed in Laravel using Vue.js for their front end framework. The SAG assembly pipeline is based on sample code from AWS and previously published pipelines, implemented using AWS specific tools. All project websites are hosted on a custom server at the ICM.

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Interactive Microbial Abundance Analysis

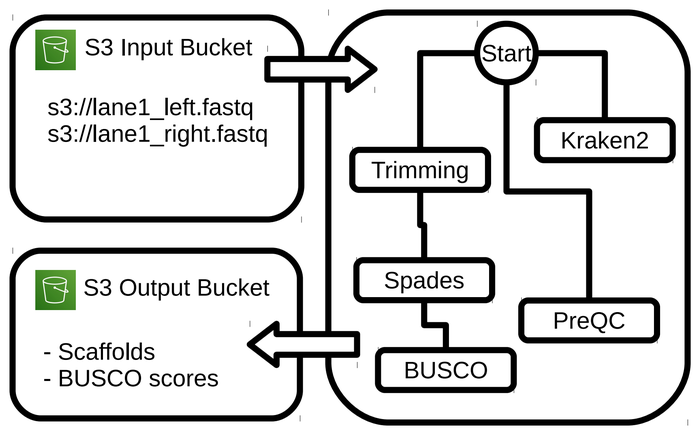
Geographical sampling
http://micromap.esr15.site

	A	C	D	E	F
1	sequence_id	sample1	sample2	sample3	sample4
2	ASV_1	7883	4134	7044	1267
3	ASV_10	0	0	0	0
4	ASV_100	78	53	70	61
5	ASV_1000	0	0	0	0
6	ASV_10000	0	0	0	0
7	ASV_10001	0	0	0	0
8	ASV_10002	0	0	0	0
9	ASV_10003	0	0	0	0
10	ASV_10004	0	0	0	0

Temporal sampling
http://bbs.esr15.site

	A	B	C	D	E
1	asv_id	BL040126	BL040223	BL040322	BL040419
2	1	0.00	0.00	0.00	0.00
3	2	0.00	0.00	0.00	0.00
4	3	0.00	0.00	0.00	0.00
5	4	0.00	0.00	0.00	0.00
6	5	0.00	0.00	0.00	0.00
7	6	0.00	0.00	0.00	0.00
8	7	0.00	0.00	0.00	0.00
9	8	0.00	0.00	0.00	0.00
10	9	0.00	0.00	0.00	0.00

SAG Cloud Assembly Pipeline



Total cost:
1.6$

Inputs

FASTA **-or-** **Taxonomy**

Infrastructure

Server **Blast Database** **MySQL Database**

Cloud Pipeline Setup

>bash startup.sh

10 minutes AWS CloudFormation Templates Stacks

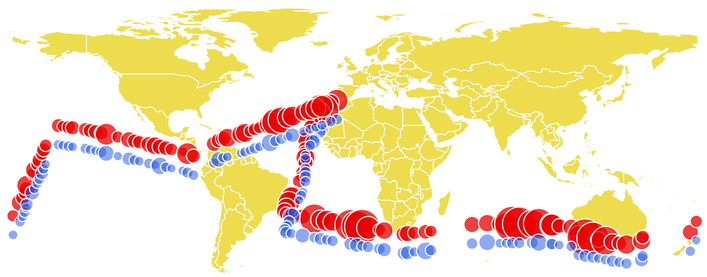
60 minutes Amazon EC2 AMI Docker Images

Amazon Elastic Container Registry · AWS Batch · Amazon Simple Storage Service · AWS Step Functions

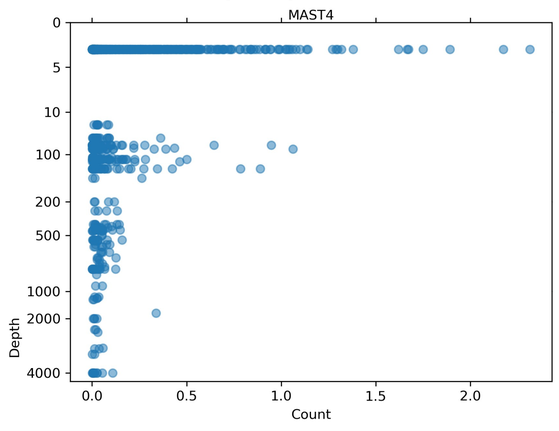
Interactive Microbial Abundance

Interactive map displaying abundances

Interactive comparisons

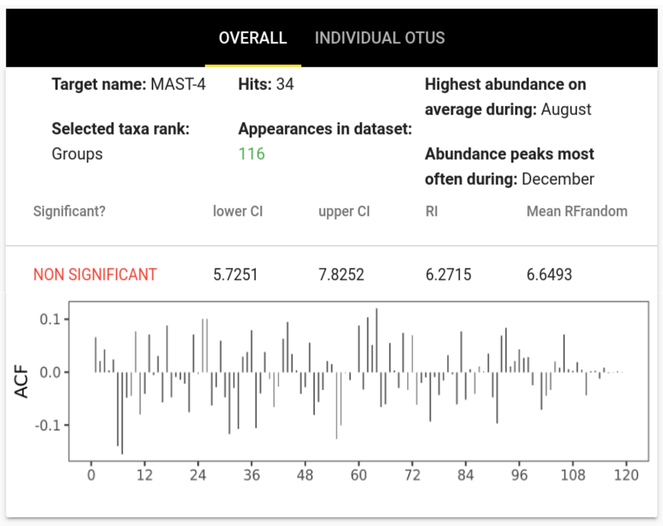


Depth profiles

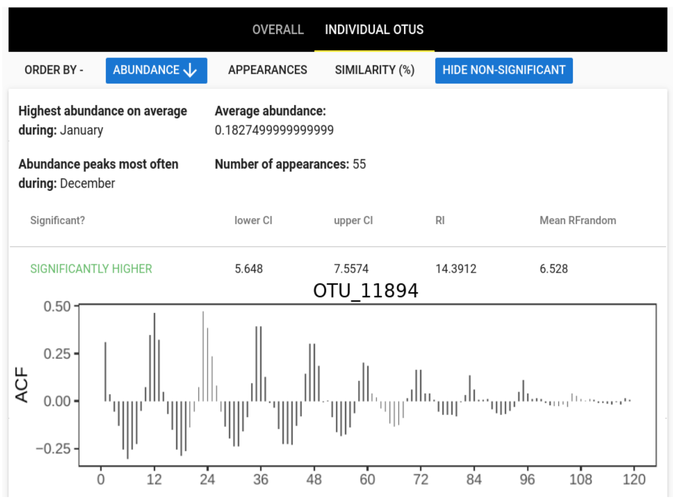


Blanes Bay Taxa Seasonality

Overall group seasonality



Individual OTU seasonality



References and Funding

Giner, C. R., Balagué, V., Krabberød, A. K., Ferrera, I., Reñé, A., Garcés, E., Gasol J. M., R. Logares & Massana, R. (2019). Quantifying long-term recurrence in planktonic microbial eukaryotes. Molecular ecology, 28(5), 923-935.

This work has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. H2020-MSCA-ITN-2015-675752.