

THE OCEAN SAMPLING DAY AND ANALYSIS CONSORTIUM

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Abstract

Ocean Sampling Day is a simultaneous, global mega-sequencing campaign that takes place during the boreal summer solstice each year. The European-funded 7th Framework project Micro B3 (Marine Microbial Biodiversity, Bioinformatics, Biotechnology) initiated the first sampling campaign in 2014 with the aim of generating the largest standardized global microbial data set on a single day. Currently, the OSD Analysis Consortium is performing a collective comparative analysis of the OSD 2014 data. The Consortium was established in October 2015 and consists of more than 130 experts in marine science and informatics. Initial results show that the genetic repertoires of the OSD sites are yielding unprecedented insights into microbial adaptations to coastal marine environments.

Keywords: Biodiversity, Metagenomics, Coastal waters, Mediterranean Sea, North Atlantic

Ocean Sampling Day 2014 Data

The Ocean Sampling Day initiative [1] has catalyzed an international network of scientists and citizens to gather the largest standardized microbial phylogenetic and functional dataset on a global scale to date. On June 21st, 2014, the solstice, 150 sampling stations worldwide sampled seawater to characterize DNA for community metagenomic analysis and biodiversity profiling via 16S and 18S rRNA gene amplicon sequencing. OSD participants collect environmental and geospatial data conforming to the M2B3 Standard [2] and Consortium members further extrapolate ancillary data from relevant public repositories [3] to produce highly contextualized molecular datasets.

To comply with the legal requirements for sampling in coastal Exclusive Economic Zones characterizing many of OSD's sampling locations, Micro B3 pioneered the use of an Access and Benefit Sharing (ABS) model agreement and data policy. Our ABS agreement directly implements the Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization in compliance with the Convention on Biological Diversity.

Results

Our initial results show that the genetic repertoire of the mostly coastal OSD sampling sites complements that of the Ocean Microbial-Genome Reference Catalogue (OM-RGC) with the addition of a collection of distinct genes. With over 40 million genes, the OM-RGC represents the largest collection of genes derived from marine reference genomes and mega-sequencing expeditions to date. In addition, the low level of similarity in the genetic distances between the different OSD metagenomes reflects the dynamic and heterogeneous nature of coastal environments.

Coastal zones are at the interface between the terrestrial and marine realms: they are dynamic environments impacted by both natural and anthropogenic drivers. This renders them particularly interesting ecosystems for marine microbial investigations. For example, a global survey of the genes involved in antibiotic resistance, the so-called resistome, is revealing hotspots among OSD coastal sampling locations.

All OSD 2014 data along with detailed documentation are publicly available via the OSD GitHub account (<https://github.com/MicroB3-IS/osd-analysis>). The OSD dataset is a comprehensive and openly accessible resource for future insights into anthropogenic influences and factors shaping the diversity and function of coastal microbial communities.



Fig. 1.

References

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