MIOP - GSC Project

Project Title

“Minimum Information about an Omic Protocol” (MIOP)

Project Summary (including goals)

Pitch: Protocols used to generate omics datasets are often buried in publications and out of date with current sampling efforts. The Minimum Information for an Omics Protocol specifications (MIOP) will contribute to FAIR searchable protocols enabling their discovery and (re)use. MIOP includes consideration not only of relevant scientific metadata but also the CARE principles and metadata pertaining to ethical, legal, and social issues that are as vital for the interpretation and (re)use of omic data and the biosamples from which they are derived.

Abstract: Methodological information is essential to understanding the biomolecular data it generates (its limitations, strengths, and the ability to integrate and compare it with other datasets). However, in the biomolecular community, this information is often buried in publications that lack sufficient detail and are neither machine-readable nor actionable. This is an issue across environments. Within the marine environment, the Better Biomolecular Ocean Practices (BeBOP), an endorsed UN Ocean Decade Project and part of the IOC-UNESCO Ocean Best Practices System (OBPS), has started an effort to exhume and empower these critical information artifacts. Within BeBOP, we are developing machine-readable templates and new metadata specifications that are designed to work together to enable open-access sharing of protocol information. This new standard, called Minimum Information about an Omics Protocol or MIOP, records the relevant scientific metadata but also metadata pertaining to ethical, legal, and social issues that are as vital for the interpretation and (re)use of omic data and the biosamples from which they are derived. MIOP is designed with the goal of being incorporated into the GSC, using similar software infrastructure (yaml files). This work is done in alignment with strategic Ocean Biomolecular Observing Network (OBON) partners in ocean observing and contributing to OBON’s aims for capacity sharing and inter-programme coordination (OBON - OceanPractices; both UN Ocean Decade programmes).

Project Leads

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Project Initiation Date

The project was initiated at the *Evolving and Sustaining Ocean Best Practices IV OBPS Workshop 18; 21-25 & 30 Sep 2020* (https://doi.org/10.25607/OBP-1036) through the Omics and eDNA Working Group (Co-leads: Neil Davies, Raïssa Meyer, Katie Pitz, and Robyn Samuel). The MIOP concept was presented at the GSC's 22nd Meeting (GSC22) held in March 2022: *UNESCO-IOC: Ocean Best Practices System & Ocean Data and Information System / MIOP - Minimum information about an omics protocol - Kathleen Pitz (MBARI)*

A first version of MIOP was released via github, (Kathleen Pitz, Raïssa Meyer, & Pier Luigi Buttigieg. (2023). *BeBOP-OBON/miop: MIOP* release v0.1.0 (v0.1). Zenodo. https://doi.org/10.5281/zenodo.7637660).

Project Status (year updated)

MIOP has been developed initially in the context of OBPS led by the BeBOP working group. Through the GSC, it could/should expand to provide a service for those working in other environments under the OMIC BON umbrella. A new inclusive homepage under the GSC could then be linked out to the OMIC BON website. The BeBOP working group is considered the initial GSC working group that is open to others beyond marine environments (e.g., in collaboration with Omic BON). Our expertise lies mainly in working in the marine environment and with DNA. Through the GSC we would be able to evaluate how well MIOP reflects the needs of more diverse environmental and omic research communities.

MIOP is intended to be a community-developed metadata specification for genomic protocols in any environment. MIOP is a standardized way to capture and exchange protocol metadata

across the wider genomics communities towards increasing the use and visibility of omics protocols. It would also enable better data reuse and potentially lead to the harmonization of methods used to collect new data. While focused on the description of protocols, it would aid in the implementation of new standards in how we collect and process genomic data as they are developed. MIOP could enhance how MixS checklists and packages manage protocol-related metadata.

References and Links

For our current website and working space, see https://bebop-obon.github.io/miop.html ; https://github.com/BeBOP-OBON/miop. MIOP terms are defined in a yaml file here: https://github.com/BeBOP-OBON/miop/blob/main/model/schema/terms.yaml.

MIOP standard: https://github.com/BeBOP-OBON/miop
BeBOP github page: https://github.com/BeBOP-OBON
Protocol templates: https://github.com/BeBOP-OBON/0_protocol_collection_template
OBPS task team website:
https://www.oceanbestpractices.org/about/task-teams/obps-task-team-21-03-omics-edna-protocol-management/

An example of an institution using the protocol templates within a github webpage:
https://bebop-obon.github.io/mbari_protocol_collection/

OmicBON https://geobon.org/bons/thematic-bon/omic-bon/
Ocean Biomolecular Observing Network (OBON): https://www.obon-ocean.org/
Ocean Practices for the Decade (OceanPractices):
https://www.oceanbestpractices.org/ocean-practices-for-the-decade/

Simpson, P., Pearlman, F. and Pearlman, J. (eds) (2021) Evolving and Sustaining Ocean Best Practices Workshop IV, 18; 21-25 & 30 Sep 2020 [Online]: Proceedings, Volumes 1 & 2. Paris, France, UNESCO, 66pp. & 115pp. (IOC Workshop Report No. 294, Vols. 1 & 2). DOI: https://doi.org/10.25607/OBP-1036