Floating Litter and its Oceanic TranSport Analysis and Modelling (FLOTSAM)

SCOR Working Group 153

Vice-Chairs:

Kara Lavender Law (SEA Woods Hole USA)
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FLOTSAM Terms of Reference

- Identify gaps in our knowledge of the near-surface ocean dynamics that may affect litter distribution and transport.

- Improve future marine litter modelling capabilities.

- Evaluate existing and emerging remote sensing technologies that can be applied to marine litter in the open ocean.

• Improve awareness of the scientific understanding of marine debris, based on better observations and modelling results

FLOTSAM WG meetings
11 March 2018 San Diego, CA
7-9 May 2019 Utrecht, Netherlands

2021 plans Japan

2022
UN Decade Event
UN Ocean Conference Lisbon
SETAC
7IMDC
GESAMP

Richard Lounsbery Foundation additional support online ECOPs webinar
As of May/June 2020, this highly cited paper received enough citations to place it in the top 1% of the academic field of Environment/Ecology based on a highly cited threshold for the field and publication year.

Data from Essential Science Indicators

Many FLOTSAM products

Papers

Highly cited
Other FLOTSAM products

ESA OSIP
NASA interest
Scientific projects after FLOTSAM

Ministry of the Environment
Government of Japan
Other FLOTSAM products
Moving Forward from FLOTSAM
IMDOS 2023 meeting and FLOTSAM

SCOR is being supporting the development of the IMDOS program.

Part of FLOTSAM funds have been used to meet in Japan and discuss new guidelines for remote sensing and a common database structure based upon FLOTSAM framework.

Note: Japan was the original location planned for 3° FLOTSAM meeting.
IMDOS
INTEGRATED MARINE DEBRIS OBSERVING SYSTEM

From vision to implementation

Artur Palacz (IOCCP/IOPAN), Audrey Hasson (GEO Blue Planet/MQi)
Community vision for an IMDOS

- Integration of remote sensing and in situ observations
- Use of models to optimize the design monitoring system
- Interaction with other observing systems monitoring physical, chemical and biological processes in the ocean and on shorelines
- Engagement of volunteer and citizen science initiatives
- Establishing best practices and harmonized methodologies for the different elements of the observing system
- Enabling synthesized data to support innovative research and serve a diverse community of users

Also calling for identification of relevant EOV(s).
Societal needs for information

Observations requirements

Observing elements

IMDOS Integrated Marine Debris Observing System

Mission

Provide coordination and guidance to lead the marine debris community in establishing a sustained global observing system.

Coordination & guidance

Data harmonization

Sustained observations

Increase of technical readiness levels

Federated & interoperable data management systems

Research

Data-based information for science & decision-making
E.g. indicators, policy briefs, scientific papers, assessments, tools, etc.

Globaly coordinated and sustained Interoperable observations

Harmonized monitoring

Standardized data

Addressing knowledge gaps
IMDOS Project Office and Governance

Audrey Hasson

Artur Palacz

Mine Tekman (ECS)

Institute of Oceanology Polish Academy of Sciences

GOOS
The Global Ocean Observing System
IMDOS Interim Governance

- Interim Coordination office
  - Artur Palacz (GOOS)
  - Audrey Hasson (GEO Blue Planet)
  - Mine Tekman (ECS)

- Interim Steering Committee
  - Nikolai Maximenko
  - Stefano Aliani
  - Alex Turra
  - Kara Lavender Law
  - Francois Galgani
  - Georg Hanke
  - Paolo Corradi
## Essential Ocean Variable Specification Sheet

### Marine Plastics Debris

<table>
<thead>
<tr>
<th>Name of EOV</th>
<th>Marine Plastics Debris</th>
</tr>
</thead>
<tbody>
<tr>
<td>EOV sub-variables</td>
<td></td>
</tr>
<tr>
<td>beach litter: abundance per type &amp; size category</td>
<td></td>
</tr>
<tr>
<td>floating microplastics: abundance, weight</td>
<td></td>
</tr>
<tr>
<td>floating macroplastics: abundance</td>
<td></td>
</tr>
<tr>
<td>seafloor litter: abundance per type &amp; size class (macro, micro)</td>
<td></td>
</tr>
</tbody>
</table>

**Additional sub-variables under consideration:**
- Macroplastics in biota (ingestion by seabirds, fish, sea turtles)
- Microplastics in biota (ingestion by seabirds, bivalves)

- Based on GESAMP WG40 recommendations for global scale monitoring
- Setting global requirements for what to observe, when, where and how
- Concept of TRLs used to describe the maturity of different EOV elements → direct application of EUROQCHARM’s work on the RAPs and respective TRL assessment
Marine Debris EOV

- Based on GESAMP WG40 recommendations for global scale monitoring
- Reconciling EOVs & SDG indicator frameworks
- Broad public consultation to be launched later in 2022
What does it take to build an observing network?

- Observations sustained over multiple years
- Data and metadata delivered free, open and in a timely manner
- Standards and best practices developed and followed
- Community-of-practice with a multi-year strategy and implementation plan
- Capacity development and technology transfer to ensure inclusivity
- Tracking and assessment of progress
A federated & interoperable data management system [for surface MP]
IMDOS as a GOOS project

**GOOS network standards**

- **Mission** – fit for purpose – addressing science, policy and management needs
- **Spatial scale** – local and national needs, contributing to global - reporting to relevant indicators
- **Sustainability** – trends over time - repeatability
- **Best practice** – global accepted standards - new technologies (SOPs, data management and delivery)
- **FAIR and open data standards** – data attribution and provenance - open data, metadata supporting interoperability, data aggregation and reuse
- **Capacity development and technology transfer** – supports extension of SOPs and best practices supporting local/regional and/or global needs and priorities
IMDOS as a GOOS project
– IMDOS SC are co-lead of the “Data Harmonization” Community of practice

– Met on Feb 16th with UNEP (Marta, Heidi + DHI) to discuss our relation to them and the evolution of the possible partnership IMDOS/GPML-DP
  • UNEP will work with GOOS and GEO BP on MoUs to officialize cooperation
  • UNEP agrees to co-organize the UN OC official side event

- Met with UNEP during Plastic Treaty Paris
Session 1.5: Integrated Marine Debris Observing System
progress in development and examples of early products

Chairs: Francois Galgani (IFREMER, France) and Nikolai Maximenko (University of Hawaii, USA)

IMDOS is based on the holistic approach to the problem of plastic pollution and it provides a framework for a synthesis of all specialized observational activities.

MILESTONES
- 2018: 6IMDC: A session on global Monitoring
- 2018-2021: IEEE/ EOS and OPBS meetings
- 2019: OceanObs’19 IMDOS session & white paper
- 2018-present: SCOR FLOTSAM Working Group
- 2019: IOC/ GESAMP (technical report on monitoring)
- 2020-present: IOCCG Remote Sensing of Marine Litter and Debris Task Force
- 2021: A G20 Platform on microplastics
- 2021: IMDOS event at the UN Ocean Decade Clean Ocean Laboratory
- 2022: IMDOS event at the UN Ocean Conference (Portugal)
- 2022: IMDOS interim Steering Committee is formed
- 2023: MOEJ Meeting Japan Digital management
- 2023: Moej Meeting on remote sensing guidelines
- 2023: EqC meetitng Brussels
FLOTSAM IMDOS stakeholders analysis

- Scientific institutions
- National Platforms
- Regional Platforms (Regional seas Conventions, MSFD, PICES, ICES, etc.)
- Large scale platforms (GOOS)
- LARGE NGOs (ICC, AWARE, Ghostnets, etc.)
- Global platform (GPML/ML platform/NOAA - GeoBluePlanet)
The value chain of marine debris observations

Artur Palacz (GOOS)

- Treaty
- UN environment programme
- GPML
- United Nations Educational, Scientific and Cultural Organization
- UNESCO
- Intergovernmental Oceanographic Commission
- IODE
- International Oceanographic Data and Information Exchange

- Observations
- Data products
- Modelling products
- Reporting

- vanSebille et al. (2020)
- Isobe et al. (2021)
- Chassignet et al. (2019)
- Isobe et al. (2019)
- Isobe et al. (2021)

- NOAA
- EMODNET
- HOVROV
- Sed. Corer
- Sed. Trap
- NASA
- Manta net
- Drone
- Satellite

User feedback on data adequacy

IMDOS
Integrated Marine Debris Observing System
In March 2022, at the resumed fifth session of the UN Environment Assembly (UNEA-5.2), a historic resolution was adopted to develop an international legally binding instrument on plastic pollution, including in the marine environment.
FLOTSAM for the Plastic Treaty

Thematic side events  Technical webinars  Advisory Zero draft
FLOTSAM for the Plastic Treaty

Punta de l’Este

First Session (INC-1)
FLOTSAM for the Plastic Treaty

Second Session (INC-2)
The future of FLOTSAM
The future of FLOTSAM

IMDOS
The future of FLOTSAM

IMDOS is growing fast
Thank You