

WG 153 FLOTSAM

1. Brief summary with the main highlights (200-300 words)

FLOTSAM focus was to identify gaps in knowledge of ocean dynamics that may affect litter distribution and transport; to improve modelling capabilities; to evaluate existing and emerging remote sensing (RS) technologies and to improve people's awareness of marine debris.

These objectives have been accomplished with remarkable results, including highly cited papers and the development of new approaches in modelling. The WG's new perspectives in RS fostered dedicated funding programs from space agencies and innovative RS methodological guidelines (MOEJ in prep) and establishment of the IOCCG RSMLD Task Force. Maximenko et al., 2018 highlighted the urgent need of a global observing system for marine litter and SCOR acknowledged it, which led to the development of IMDOS. Startup meetings in this direction have been carried out and other actions are ongoing. IMDOS will be a major legacy as well as an ECOP (Early Career Ocean Professionals) network resulting from a dedicated workshop. FLOTSAM is also contributing to the UN Environment Programme (UNEP) Intergovernmental Negotiating Committee (Plastic Treaty).

2. Activities since previous report to SCOR (e.g., virtual or in-person meetings, email discussions, special sessions). Limit 1000 words

A series of virtual meetings have been done to identify the Interim Steering Committee of IMDOS (3 FLOTSAM members included); to define the UN Decade Side events and their follow-ups and to organize the first meeting FLOTSAM/IMDOS in Japan dedicated to data harmonization (August 2023). A physical meeting of selected members was in Busan during 7IMDC in October 2022 and a special session dedicated to plastic transport at Ocean Science meeting in New Orleans (virtual) in February 2022.

The more relevant activity was the participation to INC-1 and INC-2 of the UNEA activities for a legally binding instrument to reduce plastic pollution by UN member states, aka the Plastic Treaty. Two joint statements have been submitted to UN Assembly of National Delegates by ISC, MBARI and SCOR representatives. New partnerships with GOOS and GEO Blue Planet will be discussed at the International Marine Debris Data Harmonization Workshop held on 29-31 August 2023 in Tokyo, Japan.

3. Documents published since previous report to SCOR (e.g., peer-reviewed journal articles, reports, Web pages) and should be limited to publications that resulted directly from WG activities and which acknowledge SCOR support

Most FLOTSAM papers that have been published have already been included in previous annual reports. Meetings have been carried out and papers have been published so the major FLOTSAM tasks have been accomplished. For this reason, SCOR was approved to work on the transition of FLOTSAM to IMDOS, which is still ongoing.

The activities of the last year have been mainly dedicated to improving the dissemination of results at the highest possible level (ToR4). The Plastic Treaty statements have been the most relevant high level dissemination of scientific knowledge on plastic pollution in the ocean. A major outcome is that

SCOR has been accredited to UN to work on the Plastic Treaty. The submitted statements underline that the co-organizers of the S&T Major Group are ready to mobilize science and scientists across the world towards this aim. This is ongoing through contribution to SCEPT and to IAEA and UNEP. Texts can be found at <https://council.science/current/blog/negotiations-ending-global-plastic-pollution-scientific-assessment/>.

Plastic has also been successfully proposed to become an Essential Ocean Variable (EOV) and FLOTSAM is involved in the submission process. A preliminary request has already been submitted, and in response a detailed workplan has been requested. (<https://oceanrep.geomar.de/id/eprint/57193/>). Discussion of the EOV will be one of the topics of the agenda of IMDOS meeting in Japan.

4. Progress toward achieving group's terms of reference. List each term of reference separately and describe progress on each one. Limit 1000 words

TOR1 - Identify gaps in our knowledge of the near-surface ocean dynamics that may affect litter distribution and transport

After FLOTSAM pointed out the need of scientific effort on the near-surface ocean dynamics to understand and describe litter distribution and transport, the topic received a lot of attention. FLOTSAM's first identification of the major processes defined the general framework and selected processes such as Ekman currents, geostrophy, Stokes drift, waves and mesoscale physical processes, which have been further addressed. The most recent literature is focused on the gaps in knowledge identified by FLOTSAM. This outcome has been widely disseminated at conferences, lectures, summer schools and papers and is now accepted as basic knowledge and the basis for future research. The proposed objectives of this ToR have been achieved and the activities will finish with the cointroduction to the IMDOS startup meeting in Japan on late August 2023.

TOR 2 - Improve future marine litter modelling capabilities

The capability to model plastic transport was greatly improved in the last years and new approaches and codes are now available and widely used. FLOTSAM was a very active part of this change in modelling effort. The present cutting-edge modelling is based upon code and parametrizations improved also by FLOTSAM. The Digital Twin of the Ocean will benefit from this advance in knowledge. Modelling is an important part of IMDOS and an important pillar is devoted to modelling. The proposed objectives of this ToR have been achieved and the final action to this ToR will be at the IMDOS startup meeting in Japan on late August 2023.

TOR3 - Evaluate existing and emerging remote sensing technologies that can be applied to marine litter in the open ocean.

When the FLOTSAM consortium decided to focus on remote sensing of marine litter, this was just a visionary idea of a group of scientists. SCOR believed in it and now RS of marine litter is a reality and very fast-growing field of science. After that, major funding agencies called for projects on RS of marine litter and the Remote Sensing of Marine Litter and Debris taskforce by IOCCG is dedicated to plastic monitoring by satellite. At present, this is a reality and economic and commercial outputs are starting up with some private companies worldwide that now make their business on litter remote sensing.

TOR4 - Improve awareness of the scientific understanding of marine debris, based on better observations and modelling results.

Scientists around the world were the first major target of our activities for ToR4. Special sessions at conferences and capacity building activities for ECOP (Early Career Ocean Professionals), such as through the 2022 virtual workshop, were particularly successfully to contact scientists around the world, and the original FLOTSAM group has become a global network. Planning a global observing system for plastic litter was a natural output for this network. SCOR appreciated the idea of building upon this network and endorsed the evolution of FLOTSAM to IMDOS. Work is still in progress in this direction and the IMDOS first meeting will take place in Japan in August 2023. FLOTSAM partners will participate in this meeting as well as ECOPs, as ECOPs have always actively participated in WG works and designed and executed a 2022 virtual workshop on "The Future of Ocean Plastics: Designing Diverse Collaboration Frameworks".

FLOTSAM experts also contributed to UN Ocean Decade Side Events. This activity culminated with the presence of FLOTSAM to activities of the works of the UN Intergovernmental Negotiating Committee

on Plastic Pollution. The UN resolution (5/14) requested the Executive Director of the UN Environment Programme (UNEP) to convene an Intergovernmental Negotiating Committee (INC). The purpose of the INC is to develop "the instrument", also referred to as Plastic Treaty, which is to be based on a comprehensive approach, addressing the full life cycle of plastic, including its production, design and disposal. During the latter part of 2022, the INC commenced its work with the ambition to complete the negotiations by the end of 2024. The first session of the INC (INC-1) took place in Punta del Este, Uruguay, from 28 November to 2 December 2022 and FLOTSAM participated through the International Science Council as part of a Major Group. The second session (INC-2) was in Paris, France, from 29 May to 2 June 2023. SCOR was directly accredited to UN and officially involved in the meeting. In both events, a statement to the General Assembly was provided and delivered to National Delegates. The third session (INC-3) is scheduled for 13 to 19 November 2023 at the UNEP Headquarters in Nairobi, Kenya.

The FLOTSAM website has been updated, but the website was not the communication media we decided to use most. On the contrary we dedicated more effort to gathering top scientists around FLOTSAM literacy to build up IMDOS. Papers, virtual and in-person conferences and meetings were the media we used for this purpose. In the last year, official statements to UN National Delegates have been the most relevant dissemination activity. FLOTSAM partners also joined SCEPT, a Scientists Coalition against Plastic Pollution, that was born for INC-1 and is providing support to National Delegates (including developing countries) in their path to decisions in the Plastic Treaty. However, many SCOR partners have been regularly involved in media communication and interviews on many different broadcasting networks. It is noteworthy that FLOTSAM made a difference in the new perception of floating marine litter at academic and public level and SCOR now is a point of reference of marine litter at global scale.

5. WG activities planned for the coming year. Limit 500 words

The project will end this year and its legacy will be the development of IMDOS program. The WG will consider applying for new funds to support IMDOS. FLOTSAM partners will continue to work in support of the Plastic Treaty.

6. Is the group having difficulties expected in achieving terms of reference or meeting original time schedule? If so, why, and what is being done to address the difficulties Limit 200 words

All ToR of the FLOTSAM WG have been successfully achieved despite the difficulties created by the COVID-19 pandemic.

7. Any special comments or requests to SCOR. Limit 100 words.

We greatly appreciate the opportunity SCOR provided to support IMDOS as a successor of FLOTSAM. Our WG succeeded in establishing partnerships and collaborations between many multi-disciplinary international groups and individuals that will last for long time. FLOTSAM/IMDOS partners will consider submitting a request to SCOR and other institutions to support the IMDOS program in the future.

We will also continue to work in support of the Plastic Treaty and we welcome all ideas for possible financial support.

Additional information can be submitted and may be posted at the SCOR Annual Meeting webpage at the discretion of the SCOR Executive Committee Reporter for the WG and the SCOR Secretariat.