Five decades – Five main achievements:

GESAMP through the years

by

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First GESAMP activity - member of Working Group 14 in 1976

Member of GESAMP since 1987

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A Critical Factor in GESAMP's Success

In my opinion, one of the most important factors in the long-term success of GESAMP is that the members of GESAMP are experts who are asked to serve in an independent capacity. They represent themselves and their scientific expertise. As GESAMP Reports and Studies Number 1 stated: "Members would be appointed in their individual capacities." They do not represent their home institution, their home nation, or the UN agency that supports them.

This has been reiterated many times, and the most recent GESAMP Reports and Studies document R&S 101, published only last month, again states clearly :
"GESAMP is an advisory body consisting of specialized experts nominated by the Sponsoring Agencies. The report contains views expressed or endorsed by members of GESAMP who act in their individual capacities; their views may not necessarily correspond with those of the Sponsoring Agencies."

GESAMP has been fortunate indeed to have had so many outstanding independent international experts on all aspects of the marine environment and its protection for the past 50 years.

Deciding on the 5 greatest achievements of GESAMP over a 50 year period is a daunting task!

Just continuing to exist over 50 years is a tremendous achievement in itself!

With so many GESAMP achievements, I decided to develop 2 different categories of achievements, with 5 in each category. These categories are as follows:

Scientific Achievements of GESAMP

GESAMP science expanded our fundamental understanding of the ocean

GESAMP science provided a service for the use and protection of the ocean

Operational Achievements of GESAMP

The selection of the 10 topics below are purely my own opinion and should not in any way minimize the importance and impacts of many other GESAMP activities and achievements over the past 5 decades.

Five Scientific Achievements of GESAMP

1. Reviews Related to the Health of the Oceans

2. Reviews of Harmful Substances

3. Ballast Water Management

4. Plastics and Micro-Plastics in the Marine Environment

5. The Air/Sea Exchange of Chemicals

1. Reviews Related to the Health of the Oceans

There have been 4 working groups and 5 different GESAMP R&S documents developed for this area:

Working Group 18: The Health of the Ocean
R&S 15 – The Review of the Health of the Oceans (1982)

Working Group 26: State of the Marine Environment
R&S 39 – The State of the Marine Environment (1990)

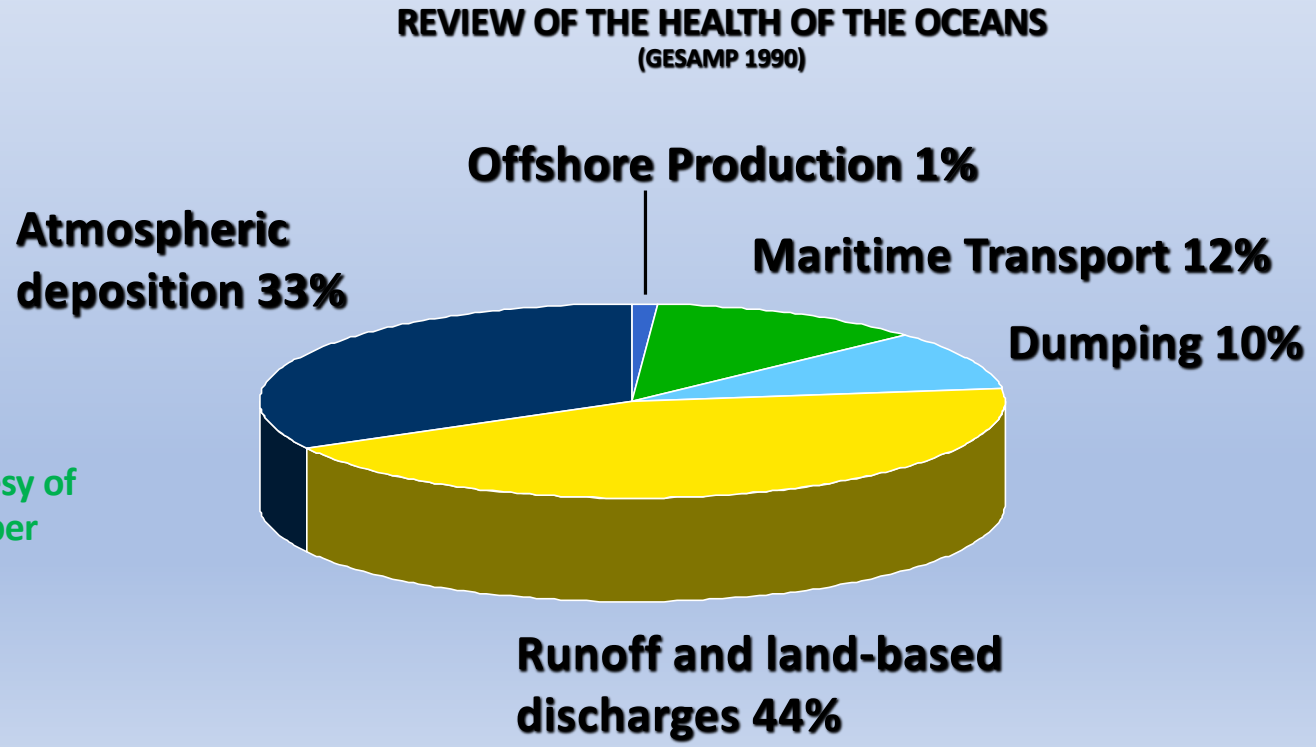
Working Group 29: Comprehensive Framework for the Assessment and Regulation of Waste Disposal in the Marine Environment
R&S 45 – Global Strategies for Marine Environmental Protection (1991)

Working Group on Marine Environmental Assessment (No number)
R&S 70 - A Sea of Troubles (2001)
R&S 71 - Protecting the Oceans from Land-based Activities (2001)

1. Reviews Related to the Health of the Oceans

R&S 15 (1982) gave one of the first indications of the importance of land-based sources of marine pollution.

R&S 39 (1990) stated clearly that "A wide range of activities on land contribute to the release of contaminants to the sea, either directly or carried by rivers and the atmosphere, while sea-borne activities make a minor addition." It also found that "in the open ocean, in contrast to coastal zones, impact from Man's direct activity is slight and, while concentrations of some contaminants are enhanced, they are still low, and measurable effects are not detected."



Slide courtesy of Mike Huber

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1. Reviews Related to the Health of the Oceans

R&S 39 (1990) and R&S 70 and 71 (2001) reinforced the themes of the importance of land-based activities (LBAs), with the most severe problems in nearshore areas and enclosed seas, and that alterations of major fluxes of nutrients and sediments as well as habitat degradation were more important globally than toxic pollutants.

R&S 70 (A Sea of Troubles) was GESAMP's early attempt at a "summary for policy makers". It was professionally edited and focused on the non-specialist in a pro-active manner. As Mike Huber has pointed out, the stark statement in R&S 70 that "most of the problems identified decades ago have not been resolved, and many are worsening" was widely quoted in a multitude of fora and hopefully helped incite some action. Producing "Seas of Troubles" also related to our organizational achievements of evolving and adapting.

2. Reviews of Harmful Substances

WORKING GROUP 1: Evaluation of the Hazards of Harmful Substances Carried by Ships

GESAMP Working Group 1 was established in 1974 to evaluate the environmental hazards of harmful substances carried by ships and provide advice to IMO. Its Terms of Reference are "To examine and evaluate data and to provide such other advice as may be requested, particularly by IMO, for evaluating the environmental hazards of harmful substances carried by ships, in accordance with the rationale approved by GESAMP for this purpose".

The hazard evaluations are carried out based on the criteria set out in the GESAMP Reports and Studies No. 64 – Revised GESAMP Hazard Evaluation Procedure for Chemical Substances Carried by Ships, 2nd edition (2014). This procedure has been revised a number of times since WG 1 was first established to reflect changes and improvements in the established methodologies for assessing hazard end-points over time.

Working Group 1 meets roughly once a year to evaluate submissions of harmful liquid substances and to assign what are known as 'GESAMP Hazard Profiles (GHP)' for the respective substances. The resulting profiles are added to a rolling list containing all GHPs assigned by the Working Group since its inception, which is updated and published annually by IMO.

WG 1 has met at least 55 times and has evaluated thousands of chemicals for the shipping community.

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2. Reviews of Harmful Substances

Two other working groups in this area have generated 7 Reports and Studies documents

WORKING GROUP 4: Review of harmful substances in the marine environment

This WG apparently morphed into WG 13 below.

WORKING GROUP 13: Review of potentially harmful substances

R&S 22 "Review of Potentially Harmful Substances – Cadmium, Lead, and Tin" (1984)
R&S 28 "Review of Potentially Harmful Substances – Arsenic, Mercury, and Selenium" (1985)
R&S 29 "Review of Potentially Harmful Substances – Organosilicon Compounds (Silanes and Siloxanes" (1986)
R&S 34 "Review of Potentially Harmful Substances – Nutrients" (1990)
R&S 42 "Review of Potentially Harmful Substances – Choosing Priority Organochlorines for Marine Hazard Assessment" (1990)
R&S 46 "Review of Potentially Harmful Substances – Carcinogens" (1991)
R&S 50 "Impact of Oil and Related Chemicals on the Marine Environment (1993)

3. Ballast Water Management

<u>WORKING GROUP 34:</u> Ballast Water

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), was adopted at IMO in 2004 because of the increasing concern of the international community to the transfer of invasive species in ships' ballast water.

The GESAMP "Ballast Water Working Group on Active Substances", or WG 34, was established in November 2005 to review proposals submitted to IMO that make use of 'Active Substances', defined as "substances or organisms, including a virus or a fungus, that have a general or specific action on or against harmful aquatic organisms and pathogens".

WG 34 reports to IMO on whether such proposals present unreasonable risk to the environment, human health, property or resources. WG 34 does not evaluate the operation or design of the systems, or their effectiveness, only their potential for environmental and human health risks.

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3. Ballast Water Management

The approval of systems that make use of active substances consists of two-tiers – Basic and Final Approval, and involves the evaluation of the physical and chemical hazards to ensure that a ballast water management system does not pose unreasonable risks for environment, human health, property or resources.

As of the end of 2018 BWWG has given basic approval to 59 and final approval to 48 ballast water management systems. BWWG can meet several times a year, depending on the pressure of proposals to review new ballast water management systems.

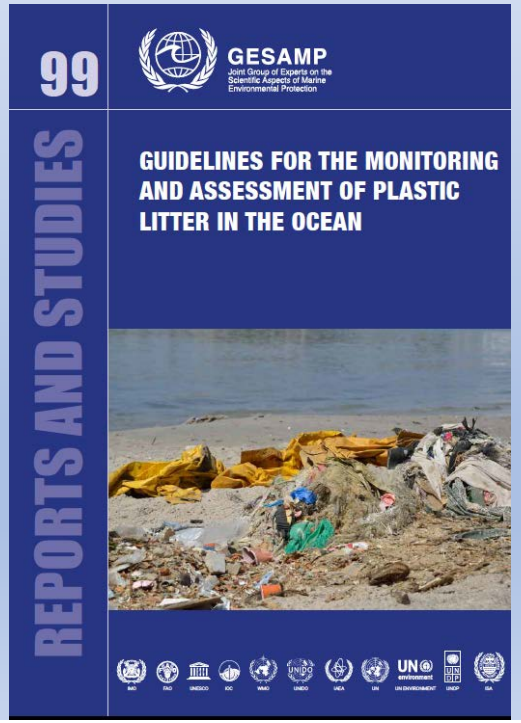
This GESAMP working group thus provides a critical service to the maritime industry.

4. Plastics and Micro-Plastics in the Marine Environment

<u>Working Group 40:</u> Sources, fate and effects of plastics and micro-plastics in the marine environment

R&S 90 "Sources, Fate, and Effects of Microplastics in the Marine Environment – Part 1" (2015)
R&S 93 "Sources, Fate, and Effects of Microplastics in the Marine Environment – Part 2" (2016)
R&S 99 "Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean" (2019)

Marine litter has significant ecological, social and economic impacts. Plastics form a large proportion of marine litter, and the widespread occurrence of large plastic debris and the impacts this can have both on marine fauna and uses of the environment have been well documented. Plastic debris comes in a wide variety of sizes and has been found throughout the world ocean. Plastics degrade extremely slowly in the open ocean. In recent years the existence of micro-plastics and their potential impact has received increasing attention. <u>These reports have had a tremendous impact on our understanding of these substances in the marine environment.</u>



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4. Plastics and Micro-Plastics in the Marine Environment

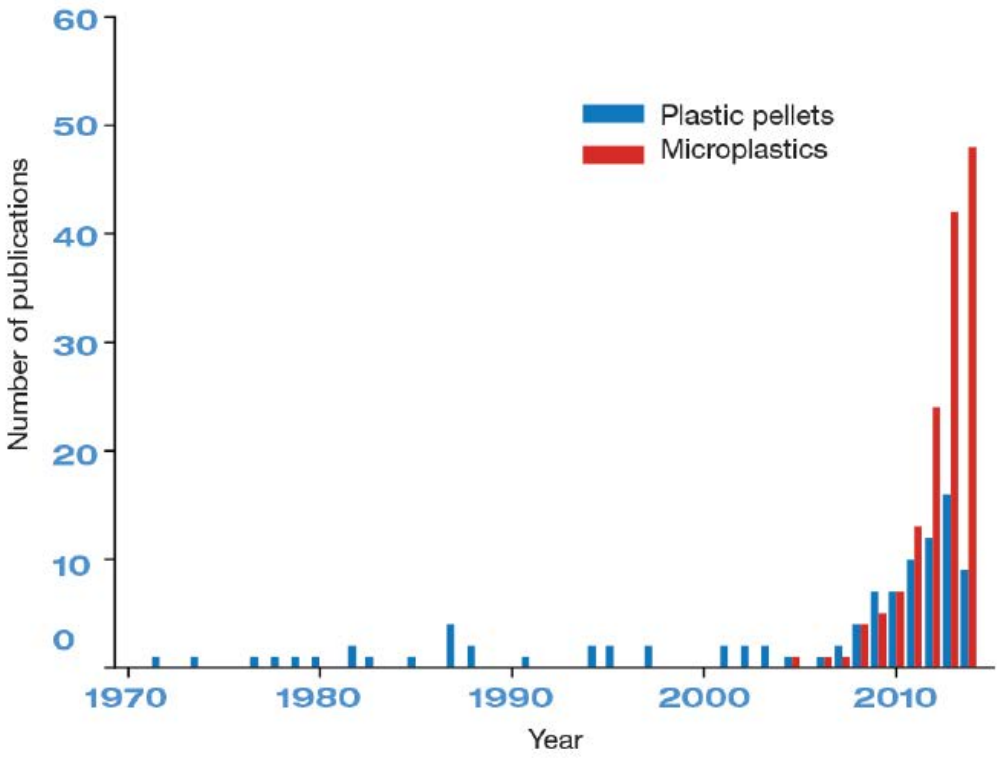

Figure 1.1 *Publications by year, 1970 – July 2014, using the search terms 'plastic pellets' and 'microplastics' – compiled by Sarah Gall, Univ. Plymouth, UK.*

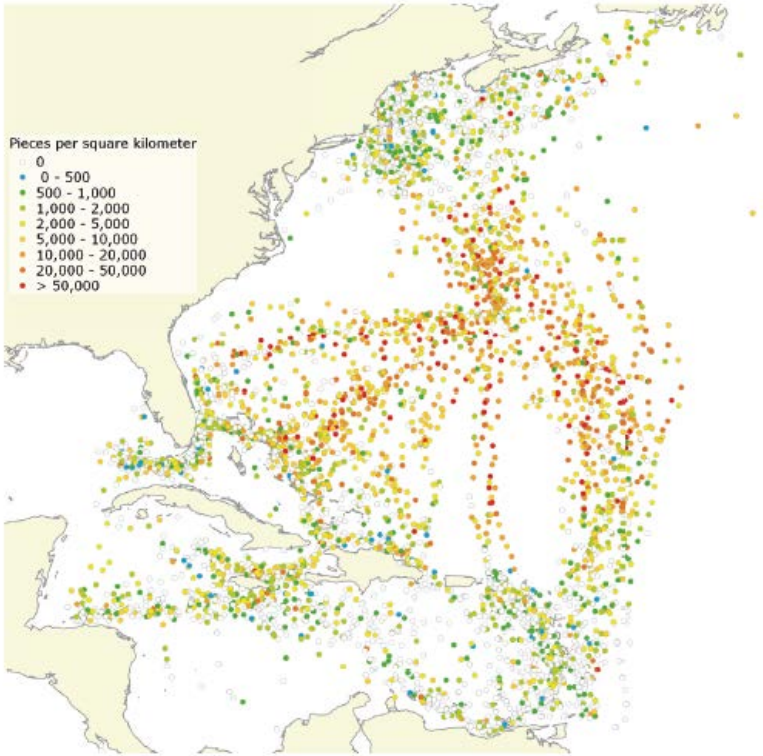

Figure 3.8 *(a) Distribution of microplastics in the western North Atlantic, 1986-2008. Sea Education Centre, Woods Hole, MA (downloaded from: http://onesharedocean.org/open_ocean/pollution/floating_plastics)*

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5. The Air/Sea Exchange of Chemicals

Four working groups have lead to nine Reports and Studies documents

Working Group 14: Interchange of pollutants between the atmosphere and the oceans

- R&S 13 "Interchange of Pollutants between the Atmosphere and the Oceans" (1980)
- R&S 23 "Interchange of Pollutants between the Atmosphere and the Oceans (Part II)" (1985)
- R&S 26 "Atmospheric Transport of Contaminants into the Mediterranean Region" (1985)
- R&S 36 "Pollutant Modification of Atmospheric and Oceanic Processes and Climate" (1989)
- R&S 38 "The Atmospheric Input of Trace Species to the World Ocean" (1989)

Working Group 32: Global change and the air/sea exchange of chemicals

- R&S 48 "Global Change and the Air/Sea Exchange of Chemicals "(1991)

Working Group 34: The sea surface microlayer

- R&S 59 "The Sea Surface Microlayer and its Role in Global Change" (1995)

Working Group 38: The atmospheric input of chemicals to the ocean

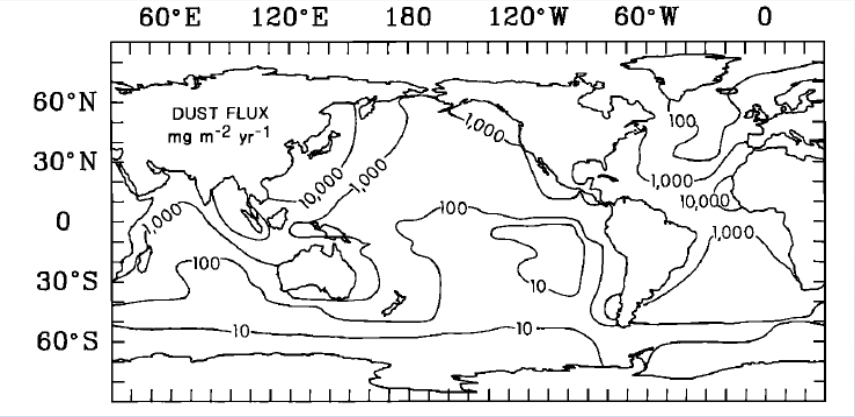
- R&S 84 "The Atmospheric Input of Chemicals to the Ocean" (2012)
- R&S 97 "The Magnitude and Impacts of Anthropogenic Atmospheric Nitrogen Inputs to the Ocean" (2018)

These WG efforts have led to 26 peer-reviewed papers and one book in the scientific literature, with 2 more papers being submitted this month, and 3 more being written!

Dust and Iron Transport to the Ocean

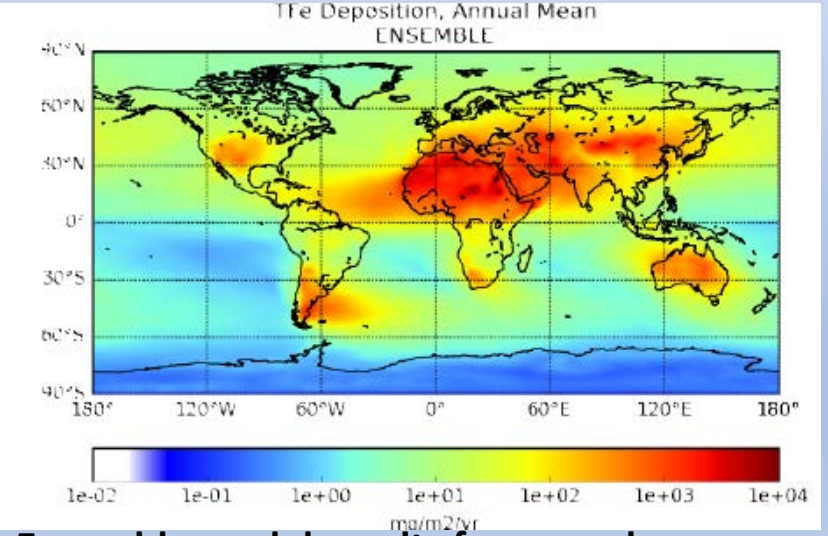
Duce, R.A., P.S. Liss, J.T. Merrill, E.L. Atlas, et al., "The atmospheric input of trace species to the world ocean," Global Biogeochemical Cycles, 5, 193-259 (1991).

~2000 citations



Global fluxes of mineral aerosol to the ocean, in mg/m²/yr

Myriokefalitakis, S., A. Ito, M. Kanakidou, A. Nenes, M. C. Krol, et al., "The GESAMP atmospheric iron deposition model intercomparison study", Biogeosciences, 15, 6659-6684. (2018).



Ensemble model results for annual deposition fluxes of total iron in mg/m²/yr

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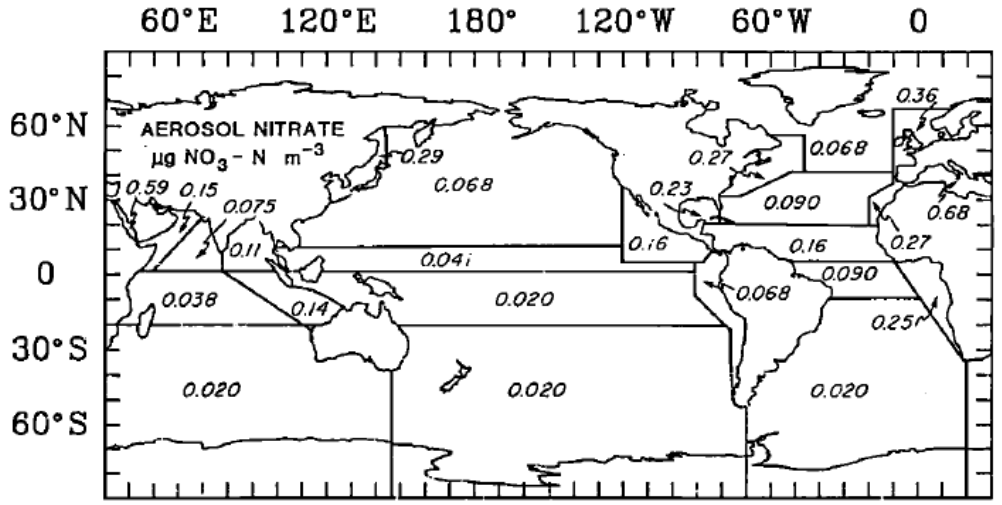
Nitrogen Transport to the Ocean

Duce, R.A., P.S. Liss, J.T. Merrill, E.L. Atlas, et al., "The atmospheric input of trace species to the world ocean," Global Biogeochemical Cycles, 5, 193-259 (1991).

~2000 citations



Jickells, T.D., Buitenhuis, E., Altieri, K., et al. "A reevaluation of the magnitude and impacts of anthropogenic nitrogen inputs on the ocean", Global Biogeochem. Cycles, 31 (2017).

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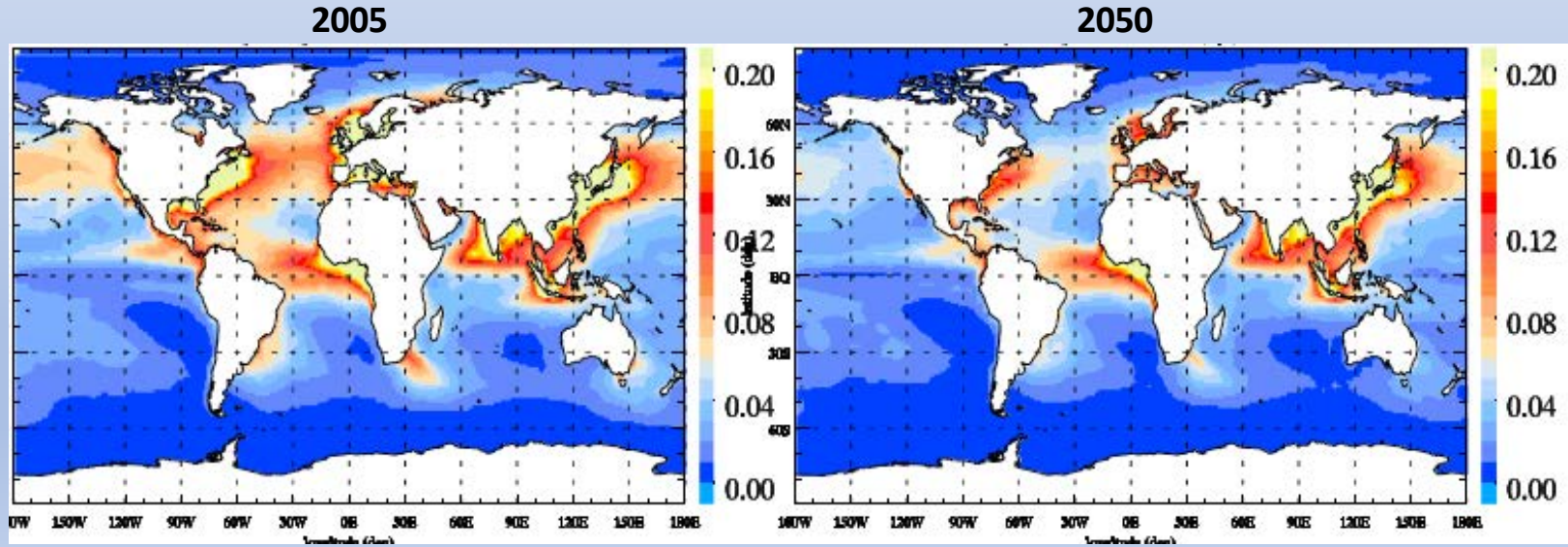

Oxidized nitrogen deposition to the ocean (g N/m^2/yr

Operational Achievements of GESAMP

Three achievements resulted directly or indirectly from an independent review of GESAMP that took place in 2001.

1. **Development of a New Strategic Vision for GESAMP**
2. **Development of a GESAMP Office**
3. **New External Support for GESAMP**
4. **Addition of UNDP, UNIDO, and ISA to GESAMP, and Return of FAO**
5. **Changing Term Length for Chairs of GESAMP**

The Review of GESAMP

The UN Commission on Sustainable Development (CSD) in the late 1990s recognized GESAMP as a "source of agreed, independent scientific advice", but invited GESAMP's Sponsoring Organizations to review GESAMP 30 years after its establishment "with a view to improving its effectiveness and comprehensiveness". In 2000 an independent and in-depth review was commissioned by the UN agencies to address CSD's concerns and determine whether GESAMP was still both relevant and necessary.

The review was completed in 2001, and it recommended strongly that GESAMP should be continued. But it also recommended that some aspects of GESAMP's *modus operandi* should be changed. These recommendations provided the foundation for a Strategic Vision that was completed in 2002

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UNITED NATIONS ENVIRONMENT PROGRAMME
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IOC UNESCO
INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

WORLD HEALTH ORGANIZATION
GENEVA

WORLD METEOROLOGICAL ORGANIZATION
GENEVA

INTERNATIONAL MARITIME ORGANIZATION
LONDON

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA

Independent and in-depth evaluation of GESAMP

IMO/FAO/UNESCO–IOC/WMO/WHO/IAEA/UN/UNEP
Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)

Report of the Evaluation Team, July 2001

1. Development of a New Strategic Vision for GESAMP

To fulfill its mission GEAMP will:

1. **Integrate and synthesize the results of regional and thematic assessments and scientific studies to support global assessments of the marine environment;**
2. **Provide scientific and technical guidance on the design and execution of marine environmental assessments;**
3. **Provide scientific reviews, analyses, and advice on specific topics relevant to the condition of the marine environment, its investigation, protection, and/or management.**
4. **Provide an overview of the marine environmental monitoring, assessment, and related activities of the UN agencies and advise on how these activities might be improved and better integrated and coordinated;**
5. **Identify new and emerging issues regarding the degradation of the marine environment that are of relevance to governments and sponsoring organizations.**

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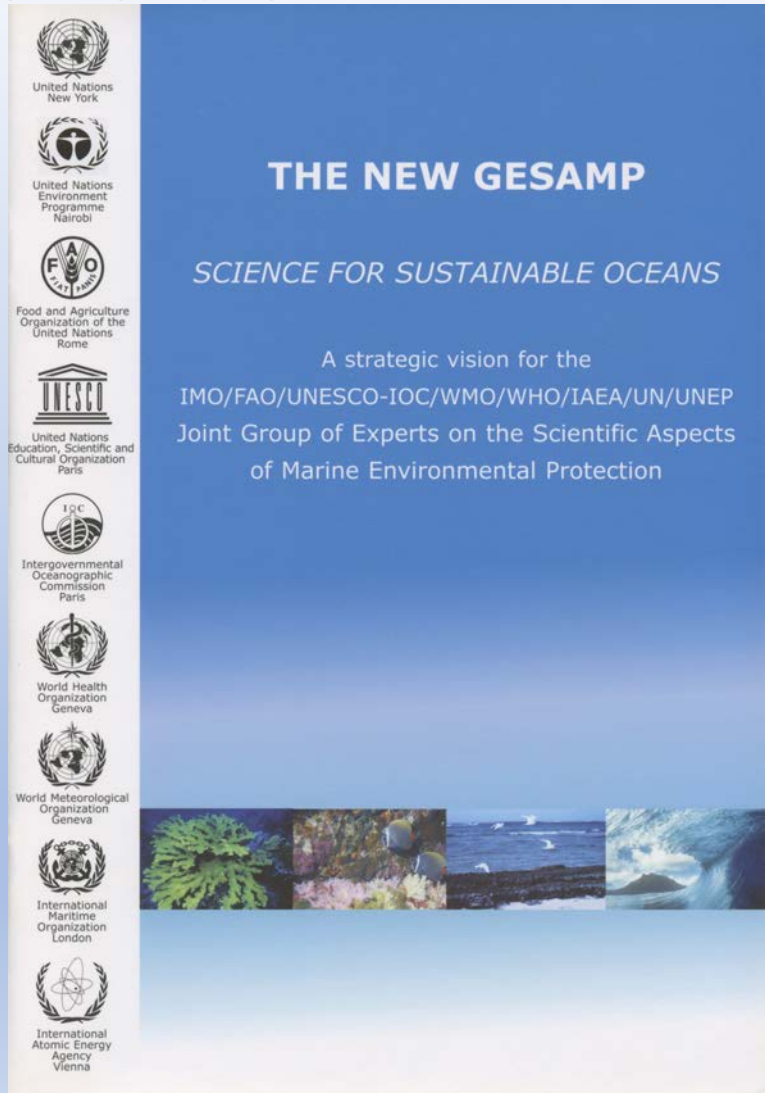

2. Development of a GESAMP Office

Personally I believe the formation of a GESAMP Office is one of the greatest achievements of the past 50 years operationally!! Chrysanthe Kolia has done an outstanding job as a full time person in this position, with the GESAMP Administrative Secretary and the IMO Technical Secretary putting in a percentage of their time as well to support the Office.

Some of its Responsibilities:

- **Maintain a well-functioning and up to date website as a central communication tool for GESAMP, including the Pool of Experts.**
- **Manage the central archive of GESAMP.**
- **Support and assist in the finalization of the reports of the annual sessions of GESAMP.**
- **Coordinate the publication of GESAMP outputs, making sure that they follow the new design styles of GESAMP and maintain the mailing lists for the distribution of GESAMP products.**
- **Promote GESAMP's activities and products to mainstream stakeholders and other potential users.**
- **Coordinate administrative and logistic support to GESAMP, its Executive Committee, its Chairman and Vice-Chairman, and its Working Groups.**
- **Facilitate the work of GESAMP by liaising with its Sponsoring UN Organizations.**

2. Development of a GESAMP Office

The GESAMP Office has been instrumental in one of the most obvious improvements of the New GESAMP - the quality of the GESAMP publications, both in terms of their review and their visual image.

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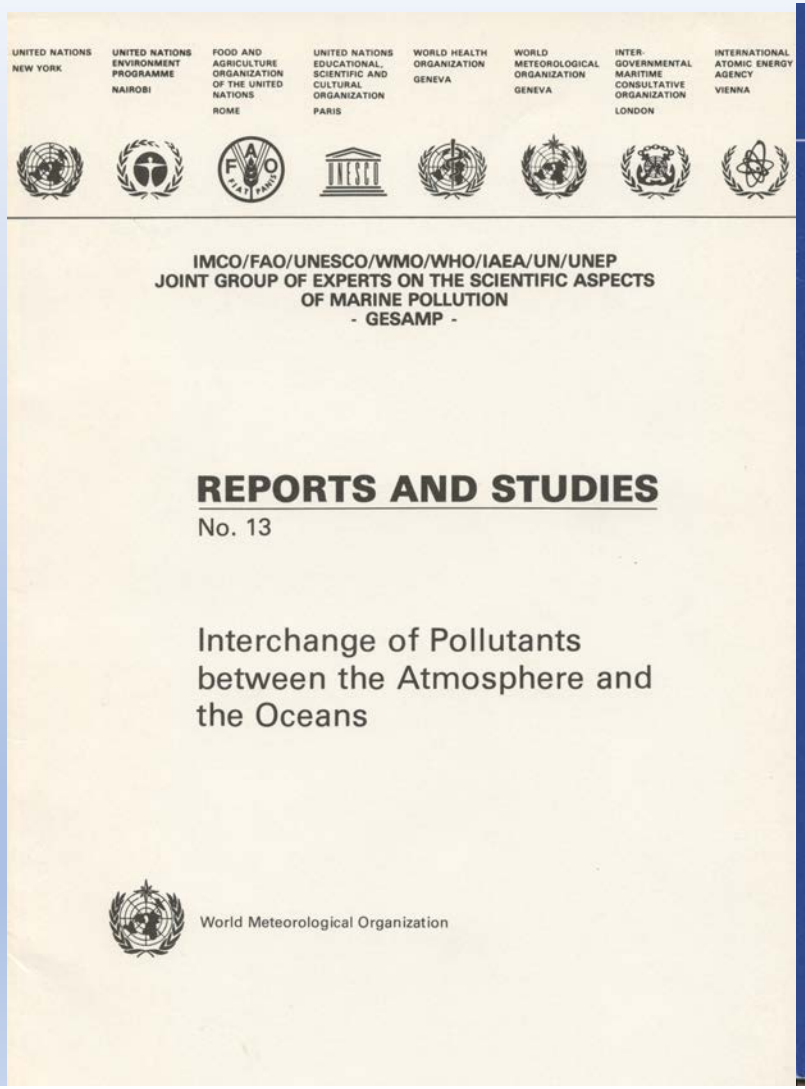
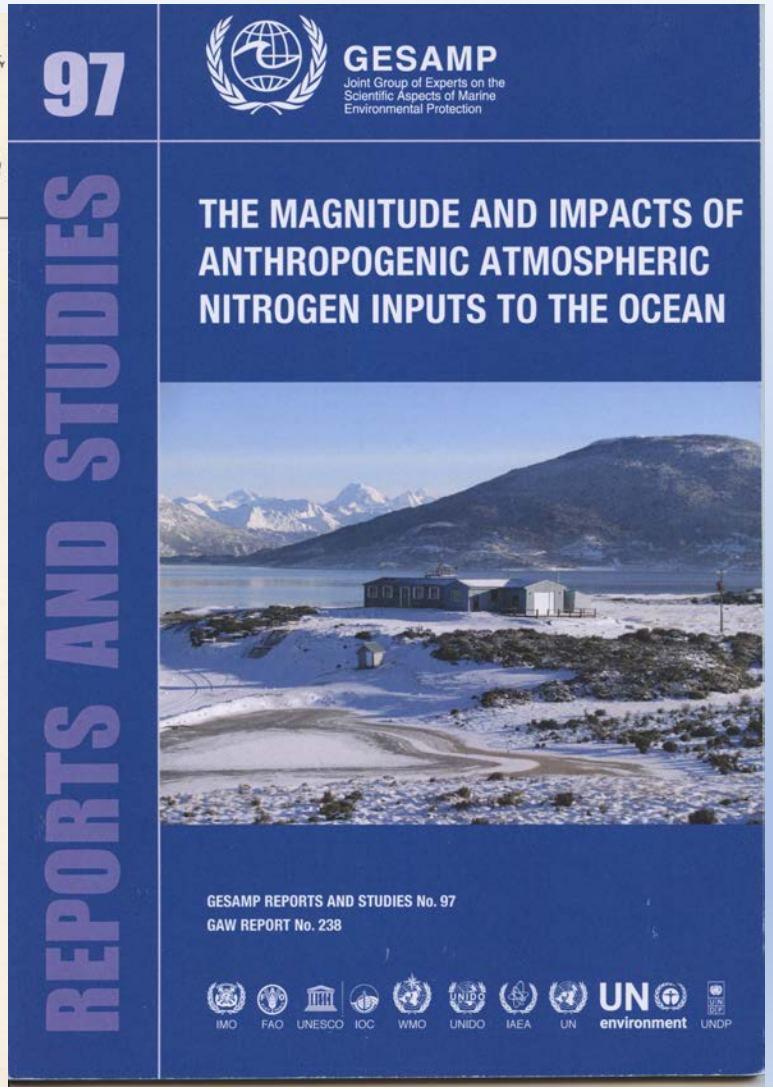




3. New External Support for GESAMP

After the new strategic plan was developed SIDA (Swedish International Development co-operation Agency) was very instrumental in helping the NEW GESAMP get underway. SIDA's support started in 2006 and ended in 2010. It included both financial and human resources (three secondments) support. The funds were primarily used:

1. **to strengthen the GESAMP Network;**
2. **to support the participation of scientific experts from developing countries in the activities of GESAMP; and**
3. **to support GESAMP's role in the "UN Regular Process for global reporting and assessment of the state of the marine environment, including socio-economic aspects".**

As described earlier, national organizations submit their active substances to GESAMP Working Group 34 (the Ballast Water Working Group) for review. GESAMP charges a fee for each peer review, and these funds are set aside in a 'war chest', which GESAMP uses for special costs such as outreach, travel for the chair, etc.

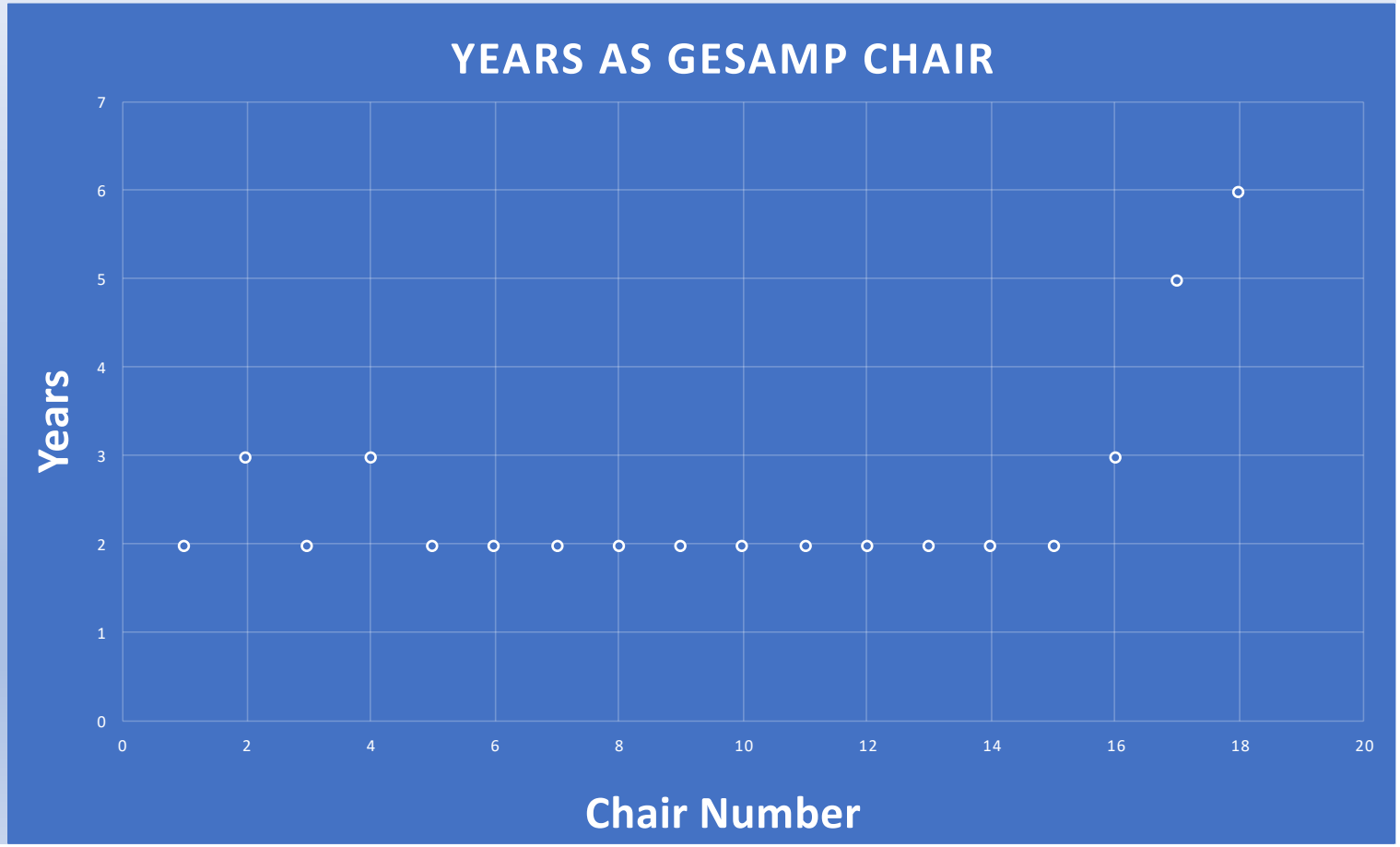
4. Addition of UNDP, UNIDO, and ISA to GESAMP and Return of FAO

During the first 36 years of its existence GESAMP was supported by IMO, UNESCO-IOC, WMO, FAO, IAEA, UN, UN Environment, and WHO. (The latter left GESAMP in 2006.) The first new agency to join in support of GESAMP was UNIDO, in 2006. UNDP joined in 2010, and ISA in 2018. These new agencies have expanded the abilities of GESAMP to support the UN ocean science efforts and have been a tremendous addition to GESAMP.

For a few years recently FAO was rather inactive in GESAMP, and one of the best pieces of news for me last year was the active return of FAO in 2018, and their hosting of the 2018 GESAMP meeting (GESAMP 45) in Rome.

5. Changing Term Length for GESAMP Chairs

1. J. Wardley Smith, UK
2. Michael Waldichuk, Canada
3. G. Berge, Norway
4. Gunnar Kullenberg, Denmark
5. Velimir Pravdic, Yugoslavia
6. Alistair McIntyre, UK
7. Ed Gomez, Philippines
8. Gwyneth D. Howells, UK
9. Herbert Windom, USA
10. David Calimari, Italy
11. John Gray, Norway
12. Oladele Osibanjo, Nigeria
13. Helen Yap, Philippines
14. Peter Wells, Canada
15. Robert Duce, USA
16. Michael Huber, Australia
17. Tim Bowmer, Netherlands
18. Peter Kershaw, UK



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For Your Entertainment

Two interesting occurrences that I expect would not have happened if there had been a GESAMP Office in the past:

<u>Four working groups never had a working group number, and they produced 5 R&S reports</u>:

Working Group on the design and conduct of marine environmental assessments

Working Group on biological indicators and their use in the measurement of the condition of the marine environment

Working Group on opportunistic settlers

Working Group on marine environmental assessments

<u>On 2 occasions, two different working groups were given the same number</u>:
This occurred for WGs 32 and WGs 34. How or why this happened, I have no idea, but this included 2 of my WGs!
WORKING GROUP 32A Global change and the air/sea exchange of chemicals
WORKING GROUP 32B Oil Inputs

WORKING GROUP 34A Review of applications for "Active Substances" to be used in water management systems
WORKING GROUP 34B The sea surface microlayer

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