

University of Groningen

Cycles in the ocean

Gerringa, Loes J. A.; Rijkenberg, Micha J. A.; Laan, Patrick; Timmermans, Klaas R.

Published in:
Marine Chemistry

DOI:
[10.1016/j.marchem.2015.08.006](https://doi.org/10.1016/j.marchem.2015.08.006)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2015

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Gerringa, L. J. A., Rijkenberg, M. J. A., Laan, P., & Timmermans, K. R. (2015). Cycles in the ocean. *Marine Chemistry*, 177(Part 3), 409-410. <https://doi.org/10.1016/j.marchem.2015.08.006>

Copyright

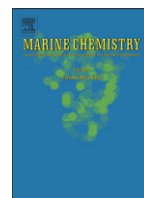
Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.



Editorial

Cycles in the ocean



This special issue was brought together to celebrate the long and impressive oceanographic career of Hein de Baar at the occasion of his retirement in November 2014.

The theme of this Marine Chemistry Special Issue is “Cycles in the Ocean” reflecting the broad scientific interest of Hein and his colleague oceanographers. Hein de Baar is a chemical oceanographer who investigated the oceans with the conviction that only true integration of biology, chemistry, and physics is pivotal to understand the inner workings of the oceans. He was one of the initiators of the Joint Global Ocean Flux Study (JGOFS) and of GEOTRACES.

Hein started his career with a master thesis titled: “On the Behaviour of Trace Metals in Sediments of the Wadden Sea,” after which he focused on the overlying water. Hein did his PhD with Peter Brewer in Woods Hole on “The Marine Geochemistry of the Rare Earth Elements.” In that time, Rare Earth Element (REE) was the interesting new field in marine science (De Baar et al., 1983). During his PhD work and subsequent stay as a post-doc at Cambridge University, Hein's interest also turned to more exotic marine environments like anoxic basins (De Baar et al., 1988) and broadened further after his return to the Netherlands to encompass the whole marine ecosystem, as shown by his involvement in the Joint Global Ocean Flux Study (JGOFS, De Baar et al., 1989).

In the late 1980s, Hein's interest was captured by two new emerging fields in oceanographic research: the storage of anthropogenic carbon dioxide in the oceans via the biological carbon pump (De Baar and Stoll, 1989) and the limitation of phytoplankton growth by iron (Fe) (De Baar et al., 1990). Both topics are strongly linked and needed a whole ecosystem approach coupling marine biology to chemistry. As a consequence, the chemist De Baar became a bio-geo-chemist as is best illustrated by his Inaugural lecture “Why is the World Ocean Not Much Greener?” (De Baar, 1993), presented when he became professor at the University of Groningen. His realizing that the ocean can only be studied from an interdisciplinary point of view is the reason that this special issue dedicated to a scientist with a hard-chemical background has so many biological orientated contributions. This interdisciplinary view became more apparent in the early nineties when Hein combined major nutrients and phytoplankton with his trace metal work (De Baar, 1994; De Baar et al., 1994). Hein's research in the Southern Ocean showed this same focus of the link between plankton communities and the fluxes of carbon and trace metals (De Baar and Boyd, 2000).

In the early 21st century, the chemist within Hein surfaced again with the further development of the worldwide research on iron in the oceans, however, without losing his interest in all interdisciplinary aspects of ecosystem research. In this time, the oceanographic scientific community was fascinated by iron fertilization experiments. Hein also played his part in this interesting phase that followed the discovery of the importance Fe limitation, it resulted in the paper with the stimulating title “Synthesis of Iron Fertilization Experiments: From the Iron Age in the Age of Enlightenment” (De Baar et al., 2005).

As a member of the SCOR working group that initiated the international GEOTRACES project aiming to map the distribution of trace elements and their isotopes in the global oceans, he realized that large sample volumes handled with extreme care would be needed to be able to measure all trace metals and their isotopes without contamination. This resulted in the construction of the trace metal clean Titan sampling system (De Baar et al., 2008) as used successfully during the GEOTRACES research cruises in the Arctic and Antarctic Oceans.

The diversity of the contents of this special issue, including the contributions of 15 of his students, reflects the interests and career of Hein de Baar. By presenting this special issue, we show our respect and gratitude for Hein. We wish him all the best in his retirement.

Acknowledgments

We thank Frank Millero for giving us the opportunity to dedicate a special issue of Marine Chemistry to the retirement of Hein de Baar. We also thank Marcie Henderson for her relentless help allowing four inexperienced guest editors to finish it all within the deadlines.

Picture: taken by Johann Bown, Hein de Baar at Rothera Station



References

- De Baar, H.J.W., 1993. Waarom is de WereldZee niet Groener? Why is the World Ocean not much Greener? Inaugural lecture University of Groningen (11 May 1993: 55p.)
- De Baar, H.J.W., 1994. von Liebig's law of the minimum and plankton ecology (1899–1991). *Prog. Oceanogr.* 33, 347–386.
- De Baar, H.J.W., Boyd, P.M., 2000. The role of iron in plankton ecology and carbon dioxide transfer of the global oceans Chapter 4 In: Hanson, R.B., Ducklow, H.W., Field, J.G. (Eds.), *The Dynamic Ocean Carbon Cycle: A Midterm Synthesis of the Joint Global Ocean Flux Study/International Geosphere Biosphere Programme Book Series Vol. 5*. Cambridge University Press. ISBN: 0 521 65603 6, pp. 61–140.

- De Baar, H.J.W., Stoll, M.H.C., 1989. Storage of carbon dioxide in the oceans. In: Okken, P.A., Zwart, S.J., Zwerver, S. (Eds.), *Climate and Energy: The Feasibility of Controlling CO₂ Emissions*. Kluwer Academic Publishers, Dordrecht, pp. 143–177.
- De Baar, H.J.W., Bacon, M.P., Brewer, P.G., 1983. Rare earth distributions with a positive Ce anomaly in the Western North Atlantic. *Nature* 301, 324–327.
- De Baar, H.J.W., German, C.R., Elderfield, H., van Gaans, P., 1988. Rare earth element distributions in anoxic waters of the Cariaco Trench. *Geochim. Cosmochim. Acta* 52, 1203–1219.
- De Baar, H.J.W., Franz, H.G., Ganssen, G.M., Gieskes, W.W.C., Mook, W.G., Stel, J.H., 1989. Towards a joint global ocean flux study: rationale and objectives. In: Ayala-Castanares, A., Wooster, W.S., Yanez-Arancibia, A. (Eds.), *Oceanography 1988. Proceedings of the Joint Oceanographic Assembly, Acapulco, Mexico*, pp. 11–31.
- De Baar, H.J.W., Buma, A.G.J., Nolting, R.F., Cadeé, G.C., Jacques, G., Tréguer, P.J., 1990. On iron limitation of the Southern Ocean: experimental observations in the Weddell and Scotia Seas. *Mar. Ecol. Prog. Ser.* 65, 105–122.
- De Baar, H.J.W., Saager, P.M., Nolting, R.F., Van der Meer, J., 1994. Cadmium versus phosphate in the world ocean. *Mar. Chem.* 46, 261–281.
- De Baar, H.J.W., Boyd, P.W., Coale, K.H., Landry, M.R., Tsuda, A., Assmy, P., Bakker, D.C.E., Bozec, Y., Barber, R.T., Brzezinski, M.A., Buesseler, K.O., Boyé, M., Croot, P.L., Gervais, F., Gorbunov, M.Y., Harrison, P.J., Hiscock, W.T., Laan, P., Lancelot, C., Law, C., Levasseur, M., Marchetti, A., Millero, F.J., Nishioka, J., Nojiri, Y., van Oijen, T., Riebesell, U., Rijkenberg, M.J.A., Saito, H., Takeda, S., Timmermans, K.R., Veldhuis, M.J.W., Waite, A., Wong, C.S., 2005. Synthesis of iron fertilization experiments: from the iron age in the age of enlightenment. In: Orr, J.C., Pantoja, S., Pörtner, H.-O. (Eds.), *The Oceans in High CO₂ World, Special Issue of J. Geophys. Res. (Oceans)* 110, p. C09S16.
- De Baar, H.J.W., Timmermans, K.R., Laan, P., De Porto, H.H., Ober, S., Blom, J.J., Bakker, M.C., Schilling, J., Sarthou, G., Smit, M.G., Klunder, M., 2008. Titan: a new facility for ultraclean sampling of trace elements and isotopes in the deep oceans in the international GEOTRACES program. *Mar. Chem.* 111, 4–21.

Loes J.A. Gerringa
Micha J.A. Rijkenberg
Patrick Laan*
Klaas R. Timmermans

* Corresponding author.

E-mail address: Loes.gerringa@nioz (L.J.A. Gerringa).