

## University of Groningen

### The organic ties of iron

Slagter, Hans Arent

**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:*

2018

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

*Citation for published version (APA):*

Slagter, H. A. (2018). *The organic ties of iron: Or the origin and fate of Fe-binding organic ligands*. Rijksuniversiteit Groningen.

**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.*

# The Organic Ties of Iron,

or the origin and fate of Fe-binding organic ligands

---

# Colophon

Work for this thesis was carried out with the great support of:

Royal Netherlands Institute for Sea Research  
P.O. Box 59  
1790 AB Den Burg, Texel  
The Netherlands

The research reported in this thesis was made possible by a grant from the Netherlands Organisation for Scientific Research (NWO) under contract number 822.01.018 to Loes Gerringa.

Printed by: Ridderprint BV | [www.ridderprint.nl](http://www.ridderprint.nl)

ISBN 978-94-6375-228-2



**university of  
 groningen**

**faculty of science  
 and engineering**



Royal Netherlands Institute for Sea Research



Netherlands Organisation for Scientific Research



rijksuniversiteit  
 groningen

# **The Organic Ties of Iron**

Or the origin and fate of Fe-binding organic ligands

## **Proefschrift**

ter verkrijging van de graad van doctor aan de  
Rijksuniversiteit Groningen  
op gezag van de  
rector magnificus prof. dr. E. Sterken  
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

maandag 10 december 2018 om 11.00 uur

door

**Hans Arent Slagter**

geboren op 29 augustus 1983  
te Smallingerland

**Promotores**

Prof. dr. ir. H.J.W. de Baar

Prof. dr. C.P.D. Brussaard

**Copromotor**

Dr. L.J.A. Gerringa

**Beoordelingscommissie**

Prof. dr. A.G.J. Buma

Prof. dr. K.R. Timmermans

Prof. dr. E. Achterberg

*Voor pa...*



# Table of contents

## **Chapter 1**

Introduction ..... 8

## **Chapter 2**

Methods ..... 18

## **Chapter 3**

Dissolved Fe and Fe-binding organic ligands in the Mediterranean Sea ..... 30

## **Chapter 4**

Dissolved Fe in the Deep and Upper Arctic Ocean with a Focus on Fe  
Limitation in the Nansen Basin ..... 62

## **Chapter 5**

Organic Fe speciation in the Eurasian Basins of the Arctic Ocean and its  
relation to terrestrial DOM ..... 86

## **Chapter 6**

Fe-binding Organic Ligands in the Humic-Rich TransPolar Drift in the  
Surface Arctic Ocean using Multiple Voltammetric Methods..... 118

## **Chapter 7**

Phytoplankton virus production negatively affected by iron limitation..... 140

## **Chapter 8**

Effects of viral lysis and dark-induced senescence of phytoplankton  
on Fe-binding organic ligand production and composition ..... 156

## **Chapter 9**

Synthesis..... 176

Nederlandse samenvatting (*Dutch summary*) ..... 189

Acknowledgements ..... 195

Biography ..... 197

References ..... 199