pomor
MASTER PROGRAM
for polar and marine sciences

MASTER THESES 2017

1. Format & structure

2. Submission

3. Deadlines

4. Check list

5. Samples

- **Cover sheet**
- **Abstract in English**
- **Abstract in Russian**
- **Statement on the thesis' originality**

1. Format & structure

- Paper format A4
- Upper and lower margin 2cm
- Measure 15cm
- Left margin 4cm, right margin 2cm
- Line space 18Pt (1,5 space) for the text area
- Font size 12 Pt. Font: no Script, Symbol or similar
- The master thesis has to be bound in one item

Please use the bounding machine in the POMOR office.

➢ First page

The cover is the first page.

The cover may be designed individually. The following information must be included:

- Title of the master thesis without quotation marks " "
- Candidate's name (your name, e.g. Ivan Ivanov)
- Study program (Master Program for Polar and Marine Sciences POMOR)
- University (Saint Petersburg State University, Hamburg University)
- Place of submission
- Date of submission

NB: The hard copies submitted to the SPbU must contain the signature of your Russian supervisor on the cover sheet.

➢ Second page

The second page must contain information about your scientific supervisors:

- Full name with academic degree

Please do not translate Russian academic degrees into English. Use Prof. & Dr.

- Affiliation

Write the full name of the institution your supervisor is working for (Saint Petersburg State University, GEOMAR Helmholtz Centre for Ocean Research Kiel etc.)

➢ Table of contents

- Abstract in English
- Abstract in Russian

Concise synopsis of the thesis' content, providing information about the scientific problem/aim, methods, material, results and the important conclusions.

The format is strictly defined.

- Introduction

In the introduction, the motivation for the scientific paper is explained. That includes the information about the actual state of research (by means of literature) and, based on that, the derivation of a clearly defined scientific problem. Finally, the approach to the problem has to be mentioned. At the end of the introduction the reader should be aware about the following:

1. What is the scientific problem (the aim)?
2. Why is this scientific problem of interest?
3. How is this scientific problem approached ("strategy")?

If it is not mentioned somewhere else, name the working group which supported the thesis.

- Material and methods

In this part, the methods applied (and possibly their selection criteria) and the material have to be described as concisely as necessary and as shortly as possible. Use flowcharts if applicable. You are not supposed to repeat textbook information for pages! (Volume: about 25% of the total.)

- Results

Concise description of your own results, as far as they are relevant to the following discussion. Please avoid long-winded description of data and use diagrams, graphics and tables where applicable (raw data are documented in the appendix). Graphics should be self-explaining and of sufficient size. Every graphic and table has to be accompanied by a legend explaining the illustration. Mention the possible sources of error also. (Volume: about 25% of the total.)

- Discussion

The discussion of the results is the vital part of the thesis! Your own results have to be assessed and discussed in the context of other works in relation to the scientific problem. (Volume: about 30% of the total.)

- Conclusions

This part should begin with a summary of the discussion. After that, the conclusions arising from the scientific work should be stated clearly. Also appropriate is a specific outlook (not trivial ones like „more data" ...).

- Literature/References

In the framework of a scientific paper it is fundamental to assess own results in the context of the existing literature. Part of that is the concise citation of the literature.

Examples how to cite:

Paper (one author):

Berger, A., 1992. Astronomical theory of paleoclimates and the last glacial-interglacial cycle. Quaternary Science Reviews, 11: 571-581.

Paper (several authors):

Hay, W.W., Shaw, C.A. und Wold, C.N., 1989. Mass-balanced paleogeographic reconstructions. Geologische Rundschau, 78: 207-242.

Chapter of a book:

Schreiber, B.C., 1986. Arid shorelines and evaporites. In: H.G. Reading (Ed.), Sedimentary environments and facies. Oxford, Blackwell Sci. Pub., 189-228.

Book:

Pettijohn, F.J., Potter, P.E. und Siever, R., 1987. Sand and sandstone. Berlin, Springer, 553 p.

Doctoral Thesis:

Altenbach, A.V., 1992. Verbreitungsmuster benthischer Foraminiferen im Arktischen Ozean und in glazialen und interglazialen Sedimenten des Europäischen Nordmeeres. PhD thesis, Univ. Kiel, 111 p.

- Appendix

It is common practice to document your data in a way that other scientists can follow and reconstruct the results. You have to list the measured (raw) data, which constitutes the basis of derived quantities and graphics.

For an extensive amount of data an electronic appendix is advisable (e.g. CD). In this case please specify that the content of the appendix is written on a DVD enclosed to your thesis and add the list of the data folders/tables etc. in this chapter.

- Acknowledgements

Please feel free to mention institutions, universities as well as people supporting you. Acknowledgements might be placed between "Conclusions" and "Literature".

➢ **Last page**

The last page of the thesis must include a statement on the thesis' originality, which has to be signed in handwriting. The candidate has to declare the following:

a) He/she wrote the thesis independently and did not use any other resources than those named in the bibliography,

b) And, in particular, did not use any internet resources except for those named in the bibliography;

c) The master's thesis has not been used previously as part of an examination;

d) The master's thesis has not been previously published.

2. Submission

➢ Hamburg University

WHEN? August 28, 2017 15:00

WHERE? POMOR secretariat at the Saint Petersburg State University

WHAT? 4 hard copies (+1 if you have two supervisors from the German side)

4 soft copies (+1 if you have two supervisors from the German side)

Label your CD correctly (Master program, your name, Title or just Master thesis, 2017)

Please email your abstracts in English and in Russian (.rtf and .pdf) to nkakhro@geomar.de.

➢ Saint Petersburg State University

WHEN? August 28, 2017

WHERE? Department of Academic Affairs (1 hard copy + 1 soft copy)

POMOR secretariat (1 hard copy + 1 soft copy)

WHAT? 2 hard copies

2 soft copies

NB: The hard copies submitted to the SPbU must contain the signature of your Russian supervisor on the cover sheet.

Please check the official website of the Institute of Earth Sciences for details of upload of your master thesis into SPbU repository: http://earth.spbu.ru/education/graduate/

Label your CD correctly (Master program, your name, Title or just Master thesis, 2017).

Please email your abstracts in English and in Russian (.rtf) to pomor@spbu.ru (subject: POMOR_MSc thesis_your_name), otherwise your master thesis will not be accepted.

3. Deadlines

- August 28, 2017, 15:00

Submission of the master theses to the University of Hamburg (POMOR secretariat at the SPbU) and their further shipment to Germany

Electronic submission of the abstracts to nkakhro@geomar.de

- August 28, 2017, 15:00

Submission of the master theses to the Saint Petersburg State University (Department of Academic Affairs, POMOR secretariat)

Electronic submission of the abstracts to pomor@spbu.ru (subject: POMOR_MSc thesis_your_name)

- September 12, 2017

Submission of the reviews to nkakhro@geomar.de and to the POMOR secretariat at the SPbU by the supervisors / reviewers

- September 22, 2017 – open end

Master theses defence at the Saint Petersburg State University

4. Check list

GENERAL REQUIREMENTS	✓ **OK**
a. Did my Russian supervisor sign the cover page?	
b. Did I write a statement on the thesis' originality? Did I sign it?	
c. Does my thesis contain an abstract in English?	
d. Does my thesis contain an abstract in Russian?	
e. Do my abstracts in English and in Russian have the required format?	
SUBMISSION	
Hamburg University / 28.08.2017	
Hard copies 1 2 3 4 5	
Soft copies 1 2 3 4 5	
f. Have I labeled my soft copies properly?	
g. Have I emailed my abstracts (.rtf and .pdf) to Nadezhda Kakhro nkakhro@geomar.de?	
Saint Petersburg State University / 28.08.2017	
Hard copies 1 2	
Soft copies 1 2	
h. Have I labeled my soft copies properly?	
i. Have I emailed my abstracts (.rtf) to the POMOR secretariat pomor@spbu.ru?	
j. The subject of my email with enclosed abstracts is POMOR_MSc_thesis_my_name	
k. Have I uploaded my master thesis to the portal (repository) of the SPbU?	
REVIEWS	
l. Review by the Russian supervisor (in Russian)	
m. Review by the Russian reviewer (in Russian)	
n. Review by the Russian supervisor (in English)	

o. Review by the German supervisor (in English)*	

5. Samples

- Cover sheet
- Abstract in English
- Abstract in Russian
- Statement on the thesis' originality

* The reviews by both supervisors in English are usually sent to the program coordinator directly.

RECONSTRUCTION OF SURFACE OCEAN CONDITIONS IN THE WESTERN NORWEGIAN SEA DURING MIS 5E USING INTRA-INTERGLACIAL VARIABILITY OF PLANKTIC FORAMINIFERA

Master Thesis

M.Sc. Program for Polar and Marine Science POMOR

Saint Petersburg State University / Hamburg University

by

Ivan Ivanov

Saint Petersburg / Hamburg, 2017

COLD WATER CARBONATES IN THE BAY OF BISCAY

Max Boxleitner

Master Program for Polar and Marine Sciences POMOR / 022000 Ecology and environmental management

Supervisors:
Prof. Dr. W.-Chr. Dullo, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
Dr. V. Liebetrau, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
Prof. Dr. V. Kuznetsov, Saint Petersburg State University, Faculty of Geography and Geoecology, Russia

Marine carbonates are widely used archives for paleoceanographic and climatic reconstructions. The cold-water carbonates investigated in this study are skeletal remains of the two cold-water coral (CWC) species *Lophelia pertusa* and *Madrepora oculata*. These framework-building scleractinian coral species are widespread on the continental slopes of the world's oceans and their aragonitic skeletons can be precisely dated with radiometric techniques, which makes them an interesting archive. In the northeast Atlantic CWCs are known to build different ecosystems. While reefs in Norway, mound structures off the coast of Ireland and CWC occurrences in the Gulf of Cadiz are relatively well studied, comparably little is known about the Bay of Biscay, a region that connects the eastern temperate Atlantic with the more northern regions. In order to examine the CWC distribution and its history in the Bay of Biscay, this study analyzes coral samples from six sediment cores that were retrieved during METEOR Cruise M84/5 in June 2011 along a depth transect (539mbsl - 980mbsl) in the St. Nazaire canyon in the northern Bay of Biscay. In this setting CWCs currently occur in patches and thickets and not in large reefs like they are e.g. known from the Norwegian coast.

The aim of this study is to examine the CWC growth in the St. Nazaire canyon, determine how long CWCs have been growing in this setting and reconstruct under which environmental conditions they lived.

For this purpose the coral samples were mechanically and chemically cleaned, dated via the U/Th-decay chain and analyzed for their skeletal stable isotope and element ratios. The measurement of these ratios was carried out on a Quadrupole Inductively Coupled Plasma Mass Spectrometer (Q ICP-MS).

The dating of the samples revealed coral ages from 12,5 kyBP to present-day ages. This shows that since the end of the last glacial the St. Nazaire canyon represented a suitable setting for CWC growth. While other CWC ecosystems further south, e.g. in the Gulf of Cadiz, seem to have thrived only during glacial times, the dated coral samples of this study indicate, that the St. Nazaire canyon rather belongs to the CWC ecosystems that flourish during interglacial times like in regions further north. Moreover, the dating of the coral samples documents numerous inversions in the sediment cores that complicate the reconstruction of the deposition history, but at the same time emphasize the special geological character of the canyon setting.

Given the time frame, some of the measured element ratios could be used as proxies to reconstruct environmental parameters that characterized the CWC ecosystem in former times: Paleotemperature reconstruction, based on a Mg/Li-proxy calibrated for *L. pertusa,* showed that seawater temperatures throughout the Holocene were in the range of ~9-10°C. Similarly stable were the pH-conditions during the Holocene. The pH-values were reconstructed by applying a U/Ca-proxy that has only recently been defined and so far has

not been used for fossil corals. The pH-values during the last 12,5 ky fluctuated slightly (±0,2) around the modern pH-value of 8. In contrast to pH and temperature, coral Ba/Ca ratios, interpreted as an indicator for paleoproductivity, showed an almost linear decrease of around 40%. The underlying reasons could include changes in the current regime and/or changes in the surface productivity, probably triggered by decreasing terrigenous input. This could be one of the factors, why current CWC growth only occurs relatively sparsely.

Physical and geochemical boundary conditions of CWC growth are a topic of ongoing research. The reconstructed environmental parameters are important factors, but only in the context with other parameters like current velocities and sedimentation rates that influence and constrain CWC distribution too. Hence, along with others, the reconstructed factors temperature, pH and nutrient supply seem to create a generally favorable setting for CWC growth in the St. Nazaire canyon since ~12,5 kyBP.

ХОЛОДНОВОДНЫЕ КАРБОНАТЫ В БИСКАЙСКОМ ЗАЛИВЕ

Боксляйтнер Макс

Магистерская программа «Полярные и морские исследования» («ПОМОР») / 022000 «Экология и природопользование»

Выпускная квалификационная работа магистра

Научные руководители:
Профессор Дулло В.-К., ГЕОМАР Центр исследований Мирового океана им. Гельмгольца в г. Киле, Германия
Д-р Либетрау Ф., ГЕОМАР Центр исследований Мирового океана им. Гельмгольца в г. Киле, Германия
Профессор, д.г.н. Кузнецов В.Ю., Санкт-Петербургский государственный университет, факультет географии и геоэкологии, Россия

Морские карбонаты широко используются в качестве архивов для палеоокеанографических и климатических реконструкций. Исследованные в данной работе холодноводные карбонаты представляют собой окаменелые останки двух видов кораллов: *Lophelia pertusa* и *Madrepora oculta*. Данные рифообразующие кораллы широко распространены на континентальных склонах Мирового океана. С помощью радиометрического анализа можно провести точное датирование по окаменелым останкам кораллов, что делает их важнейшими архивами информации. Известно, что в северо-восточной Атлантике глубоко водные кораллы образуют различные экосистемы, и в то время как рифы Норвегии, побережья Ирландии и Кадисского залива относительно подробно изучены, сравнительно мало известно о кораллах Бискайского залива, важного региона, который соединяет восточную Атлантику с более северными районами. В данной работе изучены кораллы из шести осадочных колонок, описывающие различные глубины, от 539 метров до 1080 метров ниже уровня моря, поднятые в июне 2011 со дна каньона Сен-Назер во время круиза M84/5 судна METEOR на севере Бискайского залива. Для данного местоположения характерно очаговое скопление холодноводных кораллов, в отличии от коралловых рифов, которые распространены вдоль побережья Норвегии.

Целью данной работы является изучение параметров роста холодноводных кораллов в каньоне Сен-Назер, установить продолжительность развития кораллов и реконструировать условия окружающей среды, при которых было возможно произрастание в прошлом.

Для достижения поставленной цели, пробы были механически и химически очищены, датированы с помощью уран-торий метода, проанализированы соотношения стабильных изотопов и соотношения концентраций элементов. Измерение соотношений производилось на плазменном масс спектрометре (Quadrupole Inductively Coupled Plasma Mass Spectrometer (Q ICP-MS)).

Результатом датирования проб стало получение возраста кораллов и окаменелых останков, присутствующих в каньоне, возраст различных останков составил от 12,5 тысяч лет до настоящего времени. Благодаря результатам датирования удалось установить, что с конца последнего оледенения в каньоне Сен-Назер установились благоприятные условия для развития и роста холодноводных кораллов, в то время как системы глубоководных кораллов Кадисского залива, к югу от исследуемой в данной работе территории, переживали расцвет лишь во время оледенений. Результаты датирования позволяют отнести каньон Сен-Назер к системам холодноводных кораллов, которые развиваются в межледниковое время, как и коралловые системы в регионах севернее. Датирование проб обнаружило присутствие многочисленных

инверсий, что соответствует геологическим особенностям каньонов, и это, в свою очередь, значительно усложняет реконструкцию последовательности отложений. Соотношения концентраций элементов могут быть использованы в качестве основы для реконструкции условий, которые были характерны для экосистем холодноводных кораллов. Реконструкция палеотемпературы основана на соотношении магния и лития с поправками для *L.pertusa,* показала, что в течение Голоцена температуры морской воды находились в пределах 9-10°C. Также стабильным оказался и уровень водородного показателя в течение Голоцена; реконструкция осуществлялась уран-калициевым методом, который не так давно стал использоваться в датировании окаменелых кораллов. Уровень водородного показателя за последние 12,5 тысяч лет претерпевал незначительные колебания (±0,2) в пределах современной величины 8 pH. В отличие от температуры и водородного показателя соотношение барий-кальций, что является показателем палеопродуктивности, показало линейный спад на 40%,. Причина может заключаться в смене режима течений и/или изменении продуктивности в поверхностном слое, что вызвано уменьшением количества поступавшего терригенного материала. В этом, возможно, заключается характер распределения холодноводных кораллов в настоящее время.

Критические физические и геохимические значения для развития кораллов являются предметом исследований. Параметры, которые реконструированы в данной работе наряду с учетом режима течений, осадконакопления и распространения кораллов, являются важнейшими факторами, влияющими на систему. Из результатов реконструкции следует, что температура, уровень водородного показателя и наличие питательных элементов создают благоприятные условия для произрастания глубоководных кораллов в каньоне Сен-Назер на протяжении 12,5 тысяч лет.

Statement on the thesis' originality

Herewith I, Your name (e.g. Ivan Ivanov), declare that I wrote the thesis independently and did not use any other resources than those named in the bibliography, and, in particular, did not use any internet resources except for those named in the bibliography. The master thesis has not been used previously as part of an examination. The master thesis has not been previously published.

References

1. Guidelines on writing a Master thesis. MSc programme Marine Geosciences, Department of Geosciences, University of Bremen (March 1, 2006) and Überarbeitete Leitlinien zur Abfassung von Masterarbeiten, Masterstudiengang Geowissenschaften und Marine Geosciences, Fachbereich Geowissenschaften, Universität Bremen (Beschluss des Masterprüfungsausschusses vom 03. Juni 2013): http://www.geo.uni-bremen.de/statisch/downloads/6/berarbeitete_Leitlinien_zur_Abfassung_von_Masterarbeiten_vom_03062013.pdf
2. http://www.wiso.uni-hamburg.de/fachbereiche/vwl/studium/pep-msc/information-for-students/information-on-your-masters-thesis/
3. http://www.wiso.uni-hamburg.de/fileadmin/sowi/journalistik/PDFs/ThesisGuidelines.pdf