Rasmus Swalethorp - DTU Orbit (12/02/2018)

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Organisations

Arctic Section
23/11/2016 → 31/03/2017 Former
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Section for Marine Ecology and Oceanography
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Section for Oceans and Arctic
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Publications:

A carbon budget for the Amundsen Sea Polynya, Antarctica: Estimating net community production and export in a highly productive polar ecosystem

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Rutgers University, University of Colorado, Columbia University, Georgia Institute of Technology, Bangor University, Stanford University, University of Georgia, University of Copenhagen, Uppsala University, Institute of Marine Science (CSIC), Florida Atlantic University
Authors: Yager, P. L. (Ekstern), Sherrell, R. M. (Ekstern), Stammerjohn, S. E. (Ekstern), Ducklow, H. W. (Ekstern), Schofield, O. M. E. (Ekstern), Ingall, E. D. (Ekstern), Wilson, S. E. (Ekstern), Lowry, K. E. (Ekstern), Williams, C. M. (Ekstern), Riemann, L. (Ekstern), Bertilsson, S. (Ekstern), Alderkamp, A. C. (Ekstern), Dinasquet, J. (Ekstern), Logares, R. (Ekstern), Melara, A. J. (Ekstern), Mu, L. (Ekstern), Newstead, R. G. (Ekstern), Post, A. (Ekstern), Swalethorp, R. (Intern), van Dijken, G. (Ekstern)
Publication date: 2016
Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1
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10.12952/journal.elementa.000140
Links:
https://www.elementascience.org/articles/140/tabs/article_info
Publication: Research - peer-review › Journal article – Annual report year: 2016

Calanus finmarchicus egg production at its northern border
How the distribution of Calanus finmarchicus and its potential northward expansion will be affected by climate changes depends on the mechanisms and processes constraining their reproduction, recruitment and survival. Here we present measurements of C. finmarchicus egg production rates during the spring bloom in 2008, 2010 and 2011 in Disko Bay,
West Greenland and validate four independently derived metabolic models to predict egg production rates. The spring bloom in 2008 was short and intense and supported lower cumulated specific egg production of C. finmarchicus than the longer blooms with lower peak biomass in 2011 and 2012. The models predicted different timing of initialization and development of egg production rates based on phytoplankton biomass and temperature and model performance varied from ‘poor’ to ‘very good’. Phytoplankton biomass controlled the changes in egg production rates during the spring in Disko Bay, while the low temperature in the Bay explained why the egg production rate here is much lower than at more southerly localities despite high food concentrations. This study suggests that an increase in magnitude of the Arctic phytoplankton spring bloom will not result in increased copepod egg production, whereas a longer bloom and increasing temperatures will

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, University of Southern Denmark, Greenland Climate Research Centre, Aarhus University
Authors: Møller, E. F. (Ekstern), Bohr, M. (Ekstern), Kjellerup, S. (Intern), Maar, M. (Ekstern), Møhl, M. (Intern), Swalethorp, R. (Intern), Nielsen, T. G. (Intern)
Pages: 1206-1214
Publication date: 2016
Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1
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BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.92 SJR 1.098 SNIP 0.848
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.025 SNIP 0.796 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.095 SNIP 1.255 CiteScore 2.24
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.289 SNIP 1.109 CiteScore 2.39
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Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.158 SNIP 1.045 CiteScore 1.99
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.186 SNIP 0.98
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.922 SNIP 1.046
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Early life of an inshore population of West Greenlandic cod Gadus morhua: spatial and temporal aspects of growth and survival

Understanding the processes that affect fish larval survival and recruitment is a fundamental tenant of fisheries science. Small, isolated fjords are ideal study systems for elucidating early life history processes, as population dynamics are well traced in these partially closed systems. We examined the distribution, growth and mortality of eggs and larvae of a fjord population of cod during a 5 mo field campaign in the fjord Kapisigdlit, West Greenland. Cod mainly spawned early in the season in the innermost shallow region of the fjord. Egg survival was generally high in the fjord. The high survival may have been driven by relatively high temperature and/or low predation in the inner region. Early in the season, the distribution of eggs and young larvae was mostly restricted to the spawning area. Later in the season, larger larvae had become more evenly distributed in the fjord. This shift in distribution was observed after the seasonal pulse in freshwater outflow following the ice break-up in Kapisigdlit River. There was a positive correlation between the amount of food in a larval stomach and growth, and larval growth was greater in the outer fjord where prey availability was higher. The timing between spawning and freshwater input may be essential for survival and recruitment, this ensuring low dispersal of eggs and younger stages and high dispersal of older, actively feeding stages. Therefore, cod in this area could be vulnerable to future climate change affecting the timing and magnitude of freshwater outflow, by changes in precipitation, temperature or prey availability.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, University of California, NOAA
Authors: Swalethorp, R. (Intern), Nielsen, T. G. (Intern), Thompson, A. R. (Ekstern), Møhl, M. (Intern), Munk, P. (Intern)
Pages: 185-202
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Main Research Area: Technical/natural sciences

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Meso- and macro-zooplankton community structure of the Amundsen Sea Polynya, Antarctica (Summer 2010–2011)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Arizona State University, Columbia University, University of Georgia, Bangor University, University of Gothenburg
Authors: Wilson, S. E. (Ekstern), Swalethorp, R. (Intern), Kjellerup, S. (Intern), Wolverton, M. A. (Ekstern), Ducklow, H. W. (Ekstern), Yager, P. L. (Ekstern)
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Elementa
No barrier to emergence of bathyal king crabs on the Antarctic shelf

Significance For tens of millions of years, cold conditions have excluded shell-crushing fish and crustaceans from the continental shelf surrounding Antarctica. Rapid warming is now allowing predatory crustaceans to return. Our study of the continental slope off the western Antarctic Peninsula showed that abundant, predatory king crabs comprise a reproductively viable population at 841- to 2,266-m depth. Depth profiles of temperature, salinity, habitat structure, food availability, and predators indicate that there are no barriers to prevent king crabs from moving upward onto the outer shelf at 400–550 m. A cold-water barrier above 200 m could be breached within the next few decades. Emergence of king crabs on the shelf could have catastrophic consequences for the unique seafloor communities of Antarctica.
Structuring of zooplankton and fish larvae assemblages in a freshwater-influenced Greeniandic fjord— influence from hydrography and prey availability

The recent increase in temperature and freshwater runoff in the Arctic will influence the functioning of the plankton ecosystem and hence the life of the fish larvae residing in these areas. Here, we studied the strength of physical–biological linkages and the adaptability of individual larval fish species to changing hydrographical and feeding environments in a sub-Arctic area in Greenland. The study was carried out along a transect covering a wide range of physical conditions from the deep ocean to the icecap in the Godthaabsfjord on the south-western Greenland coast. Along the transect, we identified a series of distinct zooplankton and larval fish assemblages which showed linkage to water mass characteristics, to the presence of frontal structures and to availability of preferred prey. Spawning site location and water circulation was also likely to influence distributional patterns of the individual larval fish species. Larvae were feeding on a variety of prey taxa and sizes; some larval species were generalists, while others were more specialized or fed on alternative prey taxa. Differences in feeding strategies might have the consequence that the species will be differently affected by changes in the plankton community. Accordingly, fish larvae that have a greater feeding flexibility and that are more adaptable to environmental variability may cope better with climate related changes.
Feeding opportunities and growth of larval cod (Gadus morhua) in a Greenlandic fjord

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Authors: Swalethorp, R. (Intern), Munk, P. (Intern), Kjellerup, S. (Intern), Malanski, E. (Intern), Nielsen, T. G. (Intern)
Publication date: 2014
Event: Poster session presented at Ocean Science Meeting 2014, Honolulu, United States.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2014

Feeding opportunities of larval and juvenile cod (Gadus morhua) in a Greenlandic fjord: temporal and spatial linkages between cod and their preferred prey

Feeding of fish depends on a spatial and temporal match with prey, and since larval and juvenile feeding can be highly selective, their preferences for given prey sizes and taxa should be considered when quantifying the actual availability of potential prey. We investigated the diet and prey preferences of the early-life stages of Atlantic cod (Gadus morhua) to quantify the availability of prey during a spring-summer season in a West Greenlandic fjord. We hypothesized that abundances of larval and juvenile cod at size were synchronized to optimal availability of preferred prey in space and time. The present analysis is based on nine cruises each covering 5 stations visited between 24 May and 5 August 2010 comparing zooplankton abundance, cod gut content and distribution patterns. Cod 4–25 mm in length preferred prey of about 5 % of their own length. During ontogeny, their preferences changed from calanoid nauplii towards Pseudocalanus spp. and Calanus spp. copepodites. The larvae/juvenile had an exceptionally high dietary contribution from cladocerans, which were highly preferred by cod larger than 9 mm, while the abundant Metridia longa and the non-calanoid copepods contributed less. These findings stress the importance of focusing on abundance of preferred prey when assessing the actual prey availability to young fish. We found a spatio-temporal overlap between cod and their preferred prey, and observations suggest that advection of both zooplankton and cod contributed to this overlap. Hence, the larval feeding opportunities might be sensitive to climate-related changes affecting the circulation patterns in this fjord.

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Authors: Swalethorp, R. (Intern), Kjellerup, S. (Intern), Malanski, E. (Intern), Munk, P. (Intern), Nielsen, T. G. (Intern)
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Population dynamics and production of the small copepod Oithona spp. in a subarctic fjord of West Greenland

The small cyclopoid copepod Oithona is widely occurring in polar areas; however, knowledge of its biology and ecology is very limited. Here, we investigate the population dynamics, vertical distribution, and reproductive characteristics of Oithona spp. from late winter to summer, in a subarctic fjord of West Greenland. During winter–early spring, the abundance of Oithona spp. was low (1.8 ± 103 ind. m-2) and the population was mainly composed of late copepodites and adults, whereas in summer, abundance peaked and younger stages dominated (1.1 ± 106 ind. m-2). In general, all stages of Oithona spp. remained in the upper 100 m, with nauplii exhibiting a shallower distribution. Although no general seasonal migration was found, a deeper distribution of the adult females in winter was observed. The mean clutch size of Oithona spp. varied from 16 to 30 eggs per female, peaking in summer. Egg production rates (EPR) were low in winter–early spring (0.13 ± 0.03 eggs female-1 day-1) and reached maximum values in summer (1.6 ± 0.45 eggs female-1 day-1). EPR of Oithona spp. showed a significantly positive relationship with both temperature and protozooplankton biomass, and the development of the population seemed to be appreciably affected by temperature. Oithona spp. remained active throughout the study, stressing the key importance of these small copepods in high-latitude ecosystems, especially in periods when larger copepods are not present in the surface layer.
The Mystery of Microsetella – Combination of egg- and broadcast spawning in an Arctic fjord?

Different life-history stages of the pelagic harpacticoid Microsetella norvegica were sampled in a Greenland fjord, to investigate how this slowly growing species can achieve high abundances at low temperatures. We expected low but continuous reproduction coupled with a low mortality, but observed the opposite: a short reproductive period with high estimated weight-specific egg production and egg mortality, and indication of a life-history strategy combining the advantages of egg carrying with egg production rates independent of temperature.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Koski, M. (Intern), Swalethorp, R. (Intern), Kjellerup, S. (Intern), Nielsen, T. G. (Intern)
Pages: 259-264
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Main Research Area: Technical/natural sciences

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Trophic role and top-down control of a subarctic protozooplankton community

Plankton succession was investigated in the subarctic Godthåbsfjord, Western Greenland, from March to August 2010. The trophic role of protozooplankton (ciliates and heterotrophic dinoflagellates) was evaluated with emphasis on their seasonal succession and as prey for the copepod community. The integrated protozooplankton biomass ranged between 0.1 and 4.0 g C m⁻², and was dominated by ciliates. Over the 6 mo study period, maximum potential ingestion rates of the protozooplankton ranged from 0.02 to 1.2 g C m⁻² d⁻¹, corresponding to 30 to 194% of primary production d⁻¹ or 0.5 to 37% of phytoplankton biomass d⁻¹. The highest copepod biomass (24 g C m⁻²) occurred in spring, with Metridia longa alone contributing up to 92% of the biomass. A grazing experiment with M. longa feeding on a natural plankton assemblage confirmed that this species cleared cells in the size range 10 to 60 μm with an average clearance rate of 2.4 ml μg C⁻¹ d⁻¹. The copepod community, dominated by the genera Calanus, Metridia, Pseudocalanus, Oithona, Micromedus and Trichodia/Oncia, accounted for 72 to 93% of the copepod biomass in the spring. After the large calanoid copepod species left the surface layer, the protozooplankton increased numerically and were the most important grazers for some weeks until a late summer copepod community, dominated by cyclopoids Oithona spp., controlled the protist community.

Our study indicated that protozooplankton succession is regulated by copepod grazing during most of the season, and that these protists provide an essential source of nutrition for the copepod populations.
Early life of inshore fishes in Greenland: With emphasis on Atlantic cod (Gadus morhua)

During their early life stages, the fishes face a range of challenges. To sustain the development of the pelagic eggs and larvae spawning needs to occur where the offspring is retained in optimal environmental conditions. The larvae rely on a spatial and temporal match to their prey in order to ensure fast growth and avoid starvation. Inshore areas may provide such favorable conditions, as these are sheltered from offshore currents and act as physical barriers that restrict dispersal and drift of eggs and larvae. Even though inshore spawning grounds of e.g. Atlantic cod (Gadus morhua) has been reported from numerous fjords in Norway, Canada and Greenland, very little is known about their early life history and the physical-biological mechanisms impacting their survival in such inshore areas.

To better understand the processes of importance to the early life success of fish, I carried out a seasonal study on a West Greenlandic inshore population of Atlantic cod. I followed the distribution, development and mortality of eggs and larvae in relation to the physical conditions and the prey availability.

The spawning of this population of cod was restricted to a shallow inshore area located at the innermost part of the fjord branch Kapisigdlit, in the Godthåbsfjord system. This shallow area was characterized by elevated temperatures within the upper part of the water column, which increased the development rate of the pelagic eggs. The morality in the immediate spawning area was low and egg dispersal from the area was limited. Later, the seasonal breakup of ice in a connecting river resulted in an increased freshwater outflow, then enhancing the dispersal of the older larvae. Throughout the study, marked spatial and temporal differences in the zooplankton community composition were observed. The distribution of larvae generally overlapped the distribution of their preferred prey. Although no direct relationship could be found between prey availability and cod larval growth, the otolith growth rate was significantly improved in larvae that dispersing away from the spawning area. This was despite lower temperatures, suggesting that prey availability had some influence on the growth pattern. The relatively low mortality rates of eggs and larvae, and larval growth rates compared to other studies, indicate that this fjord affords especially favorable conditions for the early life stages of cod. These conditions may result in a strong recruitment, which again might be the background of the relatively high cod spawning stock biomass found in Kapisigdlit.

Since different species of fish may vary in their spawning strategies and adaptations to physical and biological conditions, the larval assemblages in inshore areas with variable physical and biological characteristics are likely to be strongly structured. Therefore, I assessed the distributional patterns of larval fish assemblages comparing distributions to the variability in hydrography and prey availability. This was carried out across the West Greenlandic Godthåbsfjord system and the offshore Fyllas Bank, which encompass different oceanographic regimes, and which harbor different zooplankton communities in specific regions. Significantly different patterns of distribution were shown for the fish larvae and these appeared linked to the specific hydrographical conditions and the availability of preferred prey. Generally few larvae were found close to the glacier suggesting that this was a poor habitat for most species, while habitats at the entrance and in other branches of the fjord was relatively rich in species of fish larvae.

With changes in wind regimes, relative inflow of Atlantic water, temperature increase, glacial melting and runoff from land, the environment off West Greenland will undergo significant changes in the future. This thesis points out that in fjord systems, where such processes might change the timing and magnitude of freshwater outflow and circulation patterns the distributional patterns and life of the early life stages of fishes can be markedly affected.

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Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Swalethorp, R. (Intern), Nielsen, T. G. (Intern), Munk, P. (Intern)
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Fish larvae community structuring by prey and environmental conditions within a glacial impacted Greenlandic fjord system

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Publication date: 2013
Event: Paper presented at 37th Annual Larval Fish Conference, Miami, United States.
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Food preferences in Atlantic cod larvae, Gadus morhua, in Godthåbsfjord, Greenlandic waters

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Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Malanski, E. (Intern), Swalethorp, R. (Intern), Munk, P. (Intern), Nielsen, T. G. (Intern)
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Forhøjet overlevelse og vækst gennem tidsmæssig og rumlig fordeling af torskeæg og larver fra en arktisk fjordpopulation af atlantisk torsk

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Authors: Swalethorp, R. (Intern), Munk, P. (Intern), Nielsen, T. G. (Intern)
Publication date: 2013
Event: Abstract from 17. Danske havforskermøde, Roskilde, Denmark.
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Importance of Protozooplankton in a future warmer arctic

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Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Arctic Section
Authors: Nielsen, T. G. (Intern), Riisgaard, K. (Intern), Swalethorp, R. (Intern), Kjellerup, S. (Intern), Rysgaard, S. (Ekstern)
Publication date: 2013
Event: Abstract from ASLO 2013 Aquatic Sciences Meeting, New Orleans, United States.
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Mesozooplankton abundance data from Disko Bay, West Greenland, 2008

The study site was located in the Disko Bay off Qeqertarsuag, western Greenland. Due to land-connected sea ice coverage during winter, 2 sampling sites were combined. At the first site in winter (21 February to 23 March 2008), sampling was conducted through a hole in the ice at ca. 65 to 160 m depth approximately 0.5 nautical mile (n mile) south of Qeqertarsuag (69° 14' N, 53° 29' W). In spring and summer (9 April to 18 July), sampling was done at a monitoring station 1 n mile south from Qeqertarsuag (69° 14' N, 53° 23' W) at 300 m depth. Sampling was carried out between 10:00 and 17:00 h. During sampling from the ice, mesozooplankton was collected using a modified WP-2 net (45 µm) equipped with a closing mechanism (Hydribios). Samples were collected in 3 depth strata (0-50, 50-100, and 100-150 m). During ship-based sampling, mesozooplankton was collected with a multinet (50 µm) equipped with a flow meter (Multinet, Hydribios type midi), and 2 additional depth strata (150-200m and 200-250 m) were included. In addition to the seasonal
study one diurnal investigation with sampling every 6 h was conducted from 29 April at 12:00 h to 30 April 30 at 12:00 h.
Samples were immediately preserved in buffered formalin (5% final concentration) for later analyses. Biomass values of the different copepod species were calculated based on measurements of prosome length, and length/weight relationships. Two regressions for Calanus spp. were established for biomass calculations: one applicable prior to and during the phytoplankton bloom until 4 May, and another from 9 May onwards.

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Publication: Research › Dataset – Annual report year: 2013

Mesozooplankton abundance data from the fjord branch Kapisigdlit located in the Godthaabsfjord system, West Greenland, 2010

Sampling was conducted from March 24 to August 5 2010, in the fjord branch Kapisigdlit located in the inner part of the Godthåbsfjord system, West Greenland. The vessel "Lille Masik" was used during all cruises except on June 17-18 where sampling was done from RV Dana (National Institute for Aquatic Resources, Denmark). A total of 15 cruises (of 1-2 days duration) 7-10 days apart was carried out along a transect composed of 6 stations (St.), spanning the length of the 26 km long fjord branch. St. 1 was located at the mouth of the fjord branch and St. 6 was located at the end of the fjord branch, in the middle of a shallower inner creek. St. 1-4 was covering deeper parts of the fjord, and St. 5 was located on the slope leading up to the shallow inner creek. Mesozooplankton was sampled by vertical net tows using a Hydrobios Multinet (type Mini) equipped with a flow meter and 50 µm mesh nets or a WP-2 net 50 µm mesh size equipped with a non-filtering cod-end. Sampling was conducted at various times of day at the different stations. The nets were hauled with a speed of 0.2-0.3 m s⁻¹ from 100, 75 and 50 m depth to the surface at St. 2 + 4, 5 and 6, respectively. The content was immediately preserved in buffered formalin (4% final concentration). All samples were analyzed in the Plankton sorting and identification center in Szczecin (www.nmfri.gdynia.pl). Samples containing high numbers of zooplankton were split into subsamples. All copepods and other zooplankton were identified down to lowest possible taxonomic level (approx. 400 per sample), length measured and counted. Copepods were sorted into development stages (nauplii stage 1 - copepodite stage 6) using morphological features and sizes, and up to 10 individuals of each stage was length measured.

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Publication: Research › Dataset – Annual report year: 2013

Mesozooplankton biomass data from Disko Bay, West Greenland, 2008

The study site was located in the Disko Bay off Qeqertarsuaq, western Greenland. Due to land-connected sea ice coverage during winter, 2 sampling sites were combined. At the first site in winter (21 February to 23 March 2008), sampling was conducted through a hole in the ice at ca. 65 to 160 m depth approximately 0.5 nautical mile (n mile) south of Qeqertarsuaq (69° 14' N, 53° 29' W). In spring and summer (9 April to 18 July), sampling was done at a monitoring station 1 n mile south from Qeqertarsuaq (69° 14' N, 53° 23' W) at 300 m depth. Sampling was carried out between 10:00 and 17:00 h. During sampling from the ice, mesozooplankton was collected using a modified WP-2 net (45 µm) equipped with a closing mechanism (Hydrobios). Samples were collected in 3 depth strata (0-50, 50-100, and 100-150 m). During ship-based sampling, mesozooplankton was collected with a multinet (50 µm) equipped with a flow meter (Multinet, Hydrobios type midi), and 2 additional depth strata (150-200m and 200-250 m) were included. In addition to the seasonal study one diurnal investigation with sampling every 6 h was conducted from 29 April at 12:00 h to 30 April 30 at 12:00 h.
Samples were immediately preserved in buffered formalin (5% final concentration) for later analyses. Biomass values of the different copepod species were calculated based on measurements of prosome length, and length/weight relationships. Two regressions for Calanus spp. were established for biomass calculations: one applicable prior to and during the phytoplankton bloom until 4 May, and another from 9 May onwards.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Swalethorp, R. (Intern), Kjellerup, S. (Intern), Nielsen, T. G. (Intern)
Publication date: 2013

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Publication: Research › Dataset – Annual report year: 2013

Mesozooplankton biomass data from the Kapisigdlit an inner fjord branch of the Godthaabsfjord system, West Greenland, 2010
Sampling was conducted from March 24 to August 5 2010, in the fjord branch Kapisigdlit located in the inner part of the Godthåbsfjord system, West Greenland. The vessel "Lille Masik" was used during all cruises except on June 17-18 where sampling was done from RV Dana (National Institute for Aquatic Resources, Denmark). A total of 15 cruises (of 1-2 days duration) 7-10 days apart was carried out along a transect composed of 6 stations (ST), spanning the length of the 26 km long fjord branch. ST. 1 was located at the mouth of the fjord branch and ST. 6 was located at the end of the fjord branch, in the middle of a shallower inner creek. ST. 1-4 was covering deeper parts of the fjord, and ST. 5 was located on the slope leading up to the shallower inner creek. Mesozooplankton was sampled by vertical net tows using a Hydrobios Multinet (type Mini) equipped with a flow meter and 50 µm mesh nets or a WP-2 net 50 µm mesh size equipped with a non-filtering cod-end. Sampling was conducted at various times of day at the different stations. The nets were hauled with a speed of 0.2-0.3 m s⁻¹ from 100, 75 and 50 m depth to the surface at ST. 2 + 4, 5 and 6, respectively. The content was immediately preserved in buffered formalin (4% final concentration). All samples were analyzed in the Plankton sorting and identification center in Szczecin (www.nmfri.gdynia.pl). Samples containing high numbers of zooplankton were split into subsamples. All copepods and other zooplankton were identified down to lowest possible taxonomic level (approx. 400 per sample), length measured and counted. Copepods were sorted into development stages (nauplii stage 1 - copepodite stage 6) using morphological features and sizes, and up to 10 individuals of each stage was length measured.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Swalethorp, R. (Intern), Kjellerup, S. (Intern), Nielsen, T. G. (Intern)
Publication date: 2013

Publication information
Original language: English
Main Research Area: Technical/natural sciences
DOIs:
10.1594/PANGAEA.810677
Links:
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Publication: Research › Dataset – Annual report year: 2013

Mesozooplankton size data from Disko Bay, West Greenland, 2008
The study site was located in the Disko Bay off Qeqertarsuaq, western Greenland. Due to land-connected sea ice coverage during winter, 2 sampling sites were combined. At the first site in winter (21 February to 23 March 2008), sampling was conducted through a hole in the ice at ca. 65 to 160 m depth approximately 0.5 nautical mile (n mile) south of Qeqertarsuaq (69° 14' N, 53° 29' W). In spring and summer (9 April to 18 July), sampling
was done at a monitoring station 1 n mile south from Qeqertarsuaq (69° 14' N, 53° 23' W) at 300 m depth. Sampling was carried out between 10:00 and 17:00 h. During sampling from the ice, mesozooplankton was collected using a modified WP-2 net (45 µm) equipped with a closing mechanism (Hydrobios). Samples were collected in 3 depth strata (0-50, 50-100, and 100-150 m). During ship-based sampling, mesozooplankton was collected with a multinet (50 µm) equipped with a flow meter (Multinet, Hydrobios type midi), and 2 additional depth strata (150-200m and 200-250 m) were included. In addition to the seasonal study one diurnal investigation with sampling every 6 h was conducted from 29 April at 12:00 h to 30 April at 12:00 h. Samples were immediately preserved in buffered formalin (5% final concentration) for later analyses. Biomass values of the different copepod species were calculated based on measurements of prosome length, and length/weight relationships. Two regressions for Calanus spp. were established for biomass calculations: one applicable prior to and during the phytoplankton bloom until 4 May, and another from 9 May onwards.

**General information**
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Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Swalethorp, R. (Intern), Kjellerup, S. (Intern), Nielsen, T. G. (Intern)
Publication date: 2013

**Publication information**
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Publication: Research › Dataset – Annual report year: 2013

**Mesozooplankton size data from the fjord branch Kapisigdlit located in the Godthaabsfjord system, West Greenland**
Sampling was conducted from March 24 to August 5 2010, in the fjord branch Kapisigdlit located in the inner part of the Godthåbsfjord system, West Greenland. The vessel "Lille Masik" was used during all cruises except on June 17-18 where sampling was done from RV Dana (National Institute for Aquatic Resources, Denmark). A total of 15 cruises (of 1-2 days duration) 7-10 days apart was carried out along a transect composed of 6 stations (St.), spanning the length of the 26 km long fjord branch. St. 1 was located at the mouth of the fjord branch and St. 6 was located at the end of the fjord branch, in the middle of a shallower inner creek. St. 1-4 was covering deeper parts of the fjord, and St. 5 was located on the slope leading up to the shallow inner creek. Mesozooplankton was sampled by vertical net tows using a Hydrobios Multinet (type Mini) equipped with a flow meter and 50 µm mesh nets or a WP-2 net 50 µm mesh size equipped with a non-filtering cod-end. Sampling was conducted at various times of day at the different stations. The nets were hauled with a speed of 0.2-0.3 m s**-1** from 100, 75 and 50 m depth to the surface at St. 2 + 4, 5 and 6, respectively. The content was immediately preserved in buffered formalin (4% final concentration). All samples were analyzed in the Plankton sorting and identification center in Szczecin (www.nmfri.gdynia.pl). Samples containing high numbers of zooplankton were split into subsamples. All copepods and other zooplankton were identified down to lowest possible taxonomic level (approx. 400 per sample), length measured and counted. Copepods were sorted into development stages (nauplii stage 1 - copepodite stage 6) using morphological features and sizes, and up to 10 individuals of each stage was length measured.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Authors: Swalethorp, R. (Intern), Kjellerup, S. (Intern), Nielsen, T. G. (Intern)
Publication date: 2013

**Publication information**
Original language: English
Main Research Area: Technical/natural sciences
DOIs: 10.1594/PANGAEA.810957
Links: http://doi.pangaea.de/10.1594/PANGAEA.810957
Effects of a future warmer ocean on the coexisting copepods Calanus finmarchicus and C. glacialis in Disko Bay, Western Greenland

The effects of temperature and food was examined for Calanus finmarchicus and C. glacialis during 3 phases of the phytoplankton spring bloom in Disko Bay, western Greenland. The 2 species were collected during pre-bloom, bloom, and post-bloom and exposed to temperatures from 0 to 10°C, combined with deficient or excess food. Fecal pellet and egg production were measured as indices for grazing and secondary production, respectively. Furthermore, changes in body carbon, nitrogen, and lipid content were measured. C. glacialis sampled before the bloom and incubated with excess food exhibited high specific egg production at temperatures between 0 and 2.5°C. Higher temperatures did not increase egg production considerably, whereas egg production for C. finmarchicus more than tripled between 2.5 and 5°C. Starved C. glacialis produced eggs at all temperatures stimulated by increasing temperatures, whereas starved C. finmarchicus needed temperatures above 5°C to produce eggs fueled by their lipid stores. Few C. finmarchicus had mature gonads at the initiation of the pre-bloom and bloom experiment, and egg production of C. finmarchicus therefore only increased as the ratio of individuals with mature gonads increased. During the bloom, both C. glacialis and C. finmarchicus used the high food availability for egg production, while refueling or exhausting their lipid stores, respectively. Finally, during the post-bloom experiment, production was low by C. finmarchicus, whereas C. glacialis had terminated production. Our results suggest that a future warmer ocean will reduce the advantage of early spawning by C. glacialis and that C. finmarchicus will become increasingly prevalent.

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Authors: Kjellerup, S. (Intern), Dünweber, M. (Intern), Swalethorp, R. (Intern), Nielsen, T. G. (Intern), Møller, E. (Ekstern), Markager, S. (Ekstern), Hansen, B. (Ekstern)
Pages: 87-108
Publication date: 2012
Main Research Area: Technical/natural sciences
From the offshore bank to the inner fjord, fish larvae communities from Fyllas Bank into Godthåbsfjord in West Greenland

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Authors: Munk, P. (Intern), Swalethorp, R. (Intern), Nielsen, T. G. (Intern)
Publication date: 2012
Event: Poster session presented at Arctic Science Partnership (ASP) Annual Meeting, Gimli, Manitoba, Canada.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2012

Growth of cod larvae in a West Greenlandic fjord – effect of location on larval development in a subarctic population

General information
State: Published
Organisations: National Institute of Aquatic Resources, Arctic Section, Section for Marine Ecology and Oceanography
Authors: Swalethorp, R. (Intern), Munk, P. (Intern), Nielsen, T. G. (Intern)
Publication date: 2012
Event: Abstract from Annual Larval Fish Conference, Os, Norway.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2012

Population dynamics and life strategy of the copepod Metridia longa in a Greenlandic fjord Arctic

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Authors: Kjellerup, S. (Intern), Swalethorp, R. (Intern), Nielsen, T. G. (Intern)
Publication date: 2012
Event: Poster session presented at Arctic Science Partnership (ASP) Annual Meeting, Gimli, Manitoba, Canada.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2012

The early life of a West Greenlandic inshore cod population (Gadus morhua)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Arctic Section, Section for Marine Ecology and Oceanography
Authors: Swalethorp, R. (Intern), Munk, P. (Intern), Nielsen, T. G. (Intern)
Publication date: 2012
Event: Poster session presented at Arctic Scientific Partnership annual meeting, Winnipeg, Canada.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2012

Effects of climate changes on the three coexisting Calanus species; C hyperboreus, C glacialis and C. finmarchicus during the productive season in Disko Bay, West Greenland

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Authors: Kjellerup, S. (Intern), Swalethorp, R. (Intern), Dünweber, M. (Intern), Jung-Madsen, S. (Intern), Henriksen, M. V. (Intern), Nielsen, T. G. (Intern), Hansen, B. W. (Ekstern), Möller, E. F. (Ekstern)
Publication date: 2011
Event: Poster session presented at 5th International Zooplankton Production Symposium, Púcon, Chile.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 277483
Publication: Research › Poster – Annual report year: 2011
Grazing, egg production, and biochemical evidence of differences in the life strategies of Calanus finmarchicus, C. glacialis and C. hyperboreus in Disko Bay, western Greenland

This is the first high temporal-resolution study in Disko Bay covering population dynamics, grazing, reproduction, and biochemical composition of 3 dominating copepod species (Calanus finmarchicus, C. glacialis and C. hyperboreus) from late winter to midsummer in 2008. C. finmarchicus and C. glacialis ascended to the surface layer at the onset of the spring phytoplankton bloom, followed by C. hyperboreus 2 wk later. C. finmarchicus spawning occurred during the bloom and post-bloom period, partially fueled by wax esters. C. glacialis commenced spawning before the bloom, yet it was greatly stimulated when food became available. However, feeding and reproduction was terminated after the main bloom despite the presence of food. In terms of feeding, this was also the strategy for C. hyperboreus. Between pre-bloom and post-bloom, C. finmarchicus showed an increase in carbon, nitrogen, and phospholipid content but a decrease in total lipid content. This was likely the result of protein synthesis, oocyte maturation, and spawning fueled by wax esters and by feeding. C. glacialis showed a similar pattern, although with an increasing total lipid content from pre-bloom to post-bloom, and an increasing wax ester and decreasing phospholipid content after reproduction was terminated. C. hyperboreus showed greatly increased content of carbon, nitrogen, and all lipid classes between the pre- and post-bloom periods. Hence, C. finmarchicus commenced feeding and spawning at the onset of the bloom and continued throughout the remaining study period. Both C. glacialis and C. hyperboreus females refueled their storage lipids (wax esters) during the bloom and post-bloom period, suggesting that they may spawn in an additional year.
Population dynamics and life strategy of the copepod Metridia longa in a Greenlandic fjord, 2010

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Authors: Kjellerup, S. (Intern), Swalethorp, R. (Intern), Riisgaard, K. (Intern), Nielsen, T. G. (Intern)
Number of pages: 69
Publication date: 2011
Event: Abstract from 5th International Zooplankton Production Symposium, Púcon, Chile.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 277481
Publication: Research › Conference abstract for conference – Annual report year: 2011
Retention of fish larvae in a fjord system - a seasonal study of the larval life in a West Greenlandic fjord

The Godthåbsfjord is the largest fjord system on the West Greenlandic coast and an important spawning site for several fish species. It houses the largest inshore stock of Atlantic cod (Gadus morhua) on the west coast but also key species like Capelin (Mallotus villosus) and American plaice (Hippoglossoides platessoides) are abundant. The innermost part of the fjord branch Kapisigdlit is the principal spawning site for the fjord population of Atlantic cod, and in 2010 a seasonal study was carried out on the early life of this population. Abundance and distribution of this and other occurring fish larval species was recorded from late March to early August along a 25 km transect covering the length of the fjord branch. Cod spawning started when the upper 20 m of the water column had reached a temperature of 2° C, and cod larvae abundances peaked on June 3rd (16 larvae per 100 m3) in the inner creek. Peak abundances of capelin and American plaice were 4 and 7 weeks later, respectively. Small yolk-sack and post yolk-sack cod larvae were only found on the innermost station. In late July early August larger cod larvae were found on all stations. Larval dispersal apparently was restricted in the early part of the spawning season, while later in the season we found larvae dispersing out through the fjord branch. Considering larval sizes and migratory ability these patterns could be due to seasonal changes in hydrography and tidal flow that may facilitate their dispersal.

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Authors: Swalethorp, R. (Intern), Munk, P. (Intern), Nielsen, T. G. (Intern)
Publication date: 2011
Event: Abstract from Annual Fish Larvae Conference, Wilmington, North Carolina, USA.
Main Research Area: Technical/natural sciences
Links:
Source: orbit
Source-ID: 282236
Publication: Research › Conference abstract for conference – Annual report year: 2011

Succession and fate of the spring diatom bloom in Disko Bay, western Greenland

Phytoplankton and copepod succession was investigated in Disko Bay, western Greenland from February to July 2008. The spring phytoplankton bloom developed immediately after the breakup of sea ice and reached a peak concentration of 24 mg chlor a m−3 2 wk later. The bloom was analyzed during 3 phases: the developing, the decaying, and the post-bloom phases. Grazing impact by the copepod community was assessed by 4 methods; gut fluorescence, in situ faecal pellet production, and egg and faecal pellet production from bottle incubations. Calanus spp. dominated the mesozooplankton community. They were present from the initiation of the bloom but only had a small grazing impact on the phytoplankton. Consequently, there was a close coupling between the spring phytoplankton bloom and sedimentation of particulate organic carbon (POC). Out of 1836 ± 180 mg C m−2 d−1 leaving the upper 50 m, 60% was phytoplankton based carbon (PPC). The composition and quality of the sedimenting material changed throughout the bloom succession from PPC dominance in the initial phase with a POC/PPN ratio close to 6.6 to a dominance of amorphous detritus with a higher POC/PPN ratio (>10) in the post-bloom phase. The succession and fate of the phytoplankton spring bloom was controlled by nitrogen limitation and subsequent sedimentation, while grazing-mediated flux by the Calanus-dominated copepod community played a minor role in the termination of the spring bloom of Disko Bay.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Authors: Düweber, M. (Intern), Swalethorp, R. (Intern), Kjellerup, S. (Intern), Nielsen, T. G. (Intern), Arendt, K. E. (Ekstern), Hjorth, M. (Ekstern), Tönnesson, K. (Ekstern), Møller, E. F. (Ekstern)
Pages: 11-29
Publication date: 2010
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Ecology - Progress Series
Volume: 419
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BFI (2018): BFI-level 2
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.4
Web of Science (2016): Indexed yes
Effects of different temperatures and food conditions on the production of Calanus finmarchicus and C. glacialis before, during and after the spring bloom in Disko Bay, West Greenland

General information
State: Published
Organisations: National Institute of Aquatic Resources, Arctic Section, Section for Marine Ecology and Oceanography, Aarhus University, Roskilde University
Authors: Kjellerup, S. (Intern), Swalethorp, R. (Intern), Dünweber, M. (Intern), Nielsen, T. G. (Intern), Møller, E. F. (Ekstern), Hansen, B. W. (Ekstern)
Publication date: 2009
Event: Abstract from ASLO Aquatic Sciences Meeting, Nice, France.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2009

Production of Calanus finmarchicus and C. glacialis during the spring in Disko Bay, Western Greenland

General information
State: Published
Projects:

Biochemical assessment of larval fish feeding ecology and the importance of protozoans (39271)

Growth and survival of early life stages of fish result from complex bio-physical processes. Availability of suitable prey is especially crucial during the early life where fish are most vulnerable to starvation and predation. However, the feeding ecology and importance of unicellular protozooplankton in the diet larval fish is still poorly understood.

This project will provide new insight into the trophic ecology of the ecologically and economically important Pacific sardine and Northern anchovy. To estimate trophic level, cutting edge biochemical tools such as Compound Specific Isotopic Analysis on Amino Acids will be applied. The observed differences in larval trophy relative to growth and to environmental conditions will help to determine their trophic flexibility.

Moreover, changes in larval trophy related to inter-annual and decadal changes in environmental conditions may explain the relationship between larval feeding opportunities and fluctuations in recruitment to the adult population. Therefore, the expected results will contribute to improved predictions of fish population size and changes in marine ecosystem structures.

This project is coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Marine Ecology and Oceanography
University of California, San Diego

National Oceanographic and Atmospheric Administration
Period: 01/01/2015 → 31/12/2016
Number of participants: 1
Research area: Ocenography and Climate
Project Coordinator:
Swalethorp, Rasmus (Intern)
Project

Physical-biological influence on the spawning and larval development for an inshore population of cod (Gadus morhua) in Greenland

National Institute of Aquatic Resources
Period: 01/02/2010 → 27/11/2013
Number of participants: 6
Phd Student:
Swalethorp, Rasmus (Intern)
Supervisor:
Nielsen, Torkel Gissel (Intern)
Main Supervisor:
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Examiner:
Støttrup, Josianne Gatt (Intern)
Folkvord, Arild (Ekstern)
Grønkjær, Peter (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD
Arctic plankton in a changing climate (38783)

Climate change impacts the marine arctic environment through changes in ice cover, ice thickness, irradiance, freshwater outflow, concentrations of nutrients and CO2 and the stratification. These factors determine the production, seasonality and fate of the planktonic primary production in the marine ecosystem. Plankton is fueling stocks of fish, marine birds and mammals and through that constitutes the base of the Greenlandic economy.

The aim of the project was to gain knowledge about the interaction between climate, oceanography and plankton in the vulnerable Greenlandic marine ecosystem trough field and laboratory experiments. The project was interdisciplinary and closely coordinated with the other projects under the Greenland Climate Research Centre.

The project was funded by the Commission for Scientific Investigations in Greenland (KVUG), Greenland Climate Research Centre, Danish Centre for Marine Research, and Carlsberg Foundation.

The project was coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Marine Ecology and Oceanography
Aarhus University
Greenland Institute of Natural Resources
Period: 01/01/2010 → 31/12/2014
Number of participants: 7

Research areas: Oceanography & Marine Populations and Ecosystem Dynamics

Project participant:
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Koski, Marja (Intern)
Dutz, Jörg (Intern)
Kjellerup, Sanne (Intern)
Swalethorp, Rasmus (Intern)
Munk, Peter (Intern)

Project Manager, academic:
Nielsen, Torkel Gissel (Intern)