BSPN17010-146-11

지구환경변화에 대한 남극의 반응과 취약성 다학제 기초 연구

2018. 02. 13

한국해양과학기술원부설
극지연구소

과학기술정보통신부

보안과제[ ] 일반과제[○]

국제화기반조성사업 제3차 연도 최종보고서

BSPN17010-146-11
2014K1A3A1A17073326

지구환경변화에 대한 남극의 반응과 취약성; 다학제 기초 연구

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제 출 문

과학기술정보통신부 장관 귀하

'지구환경변화에 대한 남극의 반응과 취약성; 다학제 기초 연구'과제(연구개발 기간 : 2015.1.1. ~ 2017.12.31.)의 최종보고서를 제출합니다.

2018. 2. 13.

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주관연구기관책임자 : 신형철

보고서 요약서

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연구사업명	중사업명	국제화기반조성사업			
	세부사업명	한-오세아니아 협력기반확충			
연구과제명	대과제명	-			
	세부과제명	지구환경변화에 대한 남극의 반응과 취약성: 다학제 기초 연구			
연구책임자	신형철	해당단계 참여연구원 수	총: 7명 내부: 5명 외부: 2명	해당단계 연구개발비	정부: 70천원 민간: 천원 계: 70천원
		총 연구기간 참여연구원 수	총: 14명 내부: 12명 외부: 4명	총 연구개발비	정부: 210천원 민간: 천원 계: 210천원
연구기관명 및 소속 부서명	극지연구소 정책협력부			참여기업명: 해당사항 없음	
국제공동연구	상대국명: 뉴질랜드			상대국 연구기관명: -University of Canterbury, New Zealand(Gateway New Zealand) -New Zealand Antarctic Research Institute(NZARI)	
위탁연구	연구기관명: 해당사항 없음			연구책임자: 해당사항 없음	

※ 국내·외의 기술개발 현황은 연구개발계획서에 기재한 내용으로 갈음

연구개발성과의 보안등급 및 사유	해당사항 없음

9대 성과 등록·기탁번호

구분	논문	특허	보고서 원문	연구시설·장비	기술요약 정보	소프트웨어	화합물	생명자원		신품종	
								생명정보	생물자원	정보	실물
해당사항 없음											

국가과학기술종합정보시스템에 등록한 연구시설·장비 현황

구입기관	연구시설·장비명	규격 (모델명)	수량	구입연월일	구입가격 (천원)	구입처 (전화)	비고 (설치장소)	NTIS 등록번호
해당사항 없음								

	보고서 면수: 30

요약문

연구의 목적 및 내용	지구환경변화에 대한 남극의 반응과 취약성’ 을 주제로 4개 분야에 대하여 기초조사를 수행하고 다른 연구과제와 공개된 출처에서 수집된 정보를 집대성함으로 향후 대형 공동연구사업의 기획을 위한 자료 및 기반 마련
연구개발성과	○선행 한-뉴질랜드 남극 협력의 결과로 양국 남극연구자들의 인적 네트워크가 확보되고 공동 관심사와 잠재적인 협력분에 대한 상호이해와 공감대가 마련되었음 ○이를 근거로 양국의 연구 활동과 공개된 출처에서 수집된 정보를 종합함 ○ ‘지구환경변화에 대한 남극의 반응과 취약성’ 을 중심 주제로 다음 3개 주요주제와기타 주제에 대해 다학제 기초연구를 수행함 1) 로스해와 빅토리아 랜드의 생태계 모니터링 연구 2) 빙붕 영향권 해역에서 해양-빙권 상호작용 3) 과거 지구 온난화 사건에 대한 빙상과 남극해의 반응 이해 4) 심화가 필요한 다른 남극 공동연구분야 ○기초적인 현장조사 결과를 로스해와 빅토리아 랜드에서 정기적인 모니터링 프로그램을 정착시키기 위한 목적으로 활용하며 해당 지역에서 양국의 과거와 현행 남극활동에서 산출 되는 다학제 정보를 취합함
연구개발성과의 활용계획 (기대효과)	○한국-뉴질랜드 남극협력을 주성분으로 하는 대형 공동연구를 분야별로, 혹은 다학제 기획형태의 연구제안서 작성 ○로스해와 빅토리아 랜드의 생태계와 대기-해양-빙권 복합체계에 대한 종설형 논문(synthesis paper) ○로스해와 빅토리아 랜드의 과학적 가치, 보전적 가치를 증진하는 각종 국제활동과 지침설정, 정책조언 마련에 필요한 기초자료 축적 ○로스해와 빅토리아 랜드 지역의 모니터링 체계수립과 정착

국문핵심어 (5개 이내)	남극	지구환경변화	해양-빙권 상호작용	생태계 모니터링	로스해
영문핵심어 (5개 이내)	Antarctica	global change	ice-ocean interaction	ecosystem monitoring	Ross Sea

〈 목 차 〉

<별첨> 주관연구기관의 자체평가 의견서

1. 연구개발과제의 개요

가. 우리나라는 2014년 2월 남극 장보고과학기지를 개소하고 뉴질랜드를 비롯한 이탈리아, 미국 등의 국가들과 더불어 로스해 연구를 시작하며 뉴질랜드를 남극 관문으로 활용하고 있음

나. 뉴질랜드는 1957년 남극대륙에 스코트 기지(장보고과학기지와 370km 거리)를 건설하고 우리나라보다 30여년 먼저 남극연구를 수행하여 왔다. 현재 남극과학기지(1개소), 쇄빙연구선(1척)을 운영하고 있으며, 헬리콥터와 스노우모빌 등 다양한 운송 네트워크를 보유하여 장보고과학기지 인근의 남극 로스해 지역에서 이탈리아, 미국과 함께 로지스틱 풀(Logistic Pool)을 운영 중에 있음

다. 우리나라 정부는 2012년 8월 뉴질랜드와 정부 간 극지분야 협정을 체결한 바 있으며, 극지연구소는 장보고 기지를 짓기 시작한 2012년부터 꾸준히 한-뉴질랜드 극지과학 분야 협력 네트워크를 강화한 바 그 성과들을 활용하여 국제공동연구협력 내실화와 네트워크 내실화를 추진하고자 하였음

라. '지구환경변화에 대한 남극의 반응과 취약성'을 중심 주제로 다음 3개 주요주제와 기타 주제에 대해 다학제 기초연구를 수행하고자 함

(1) 로스해와 빅토리아 랜드의 생태계 모니터링 연구

(2) 빙붕 영향권 해역에서 해양-빙권 상호작용

(3) 과거 지구 온난화 사건에 대한 빙상과 남극해의 반응 이해

(4) 심화가 필요한 다른 남극 공동연구분야

마. 로스해와 빅토리아 랜드에서 정기적인 모니터링 프로그램을 정착시키기 위한 목적으로 기초적인 항목을 수행할 수 있는 발판을 마련하고 해당 지역에서 양국의 과거와 현행 남극활동에서 산출되는 다학제 정보를 취합함

2. 연구수행내용 및 성과

가. 아라온호 선상에서 해양-대기 상호작용 연속관측 시범 운영, 극지연구소 자체 사업으로 뉴질랜드 연구진도 참여하는 퇴적물 시료 수집과 계류 장비 활용 해양관측 자료 수집

나. 장보고 기지 해수 인입구에서 모니터링 용도 생물 채집, 해양환경 관측 장비 설치

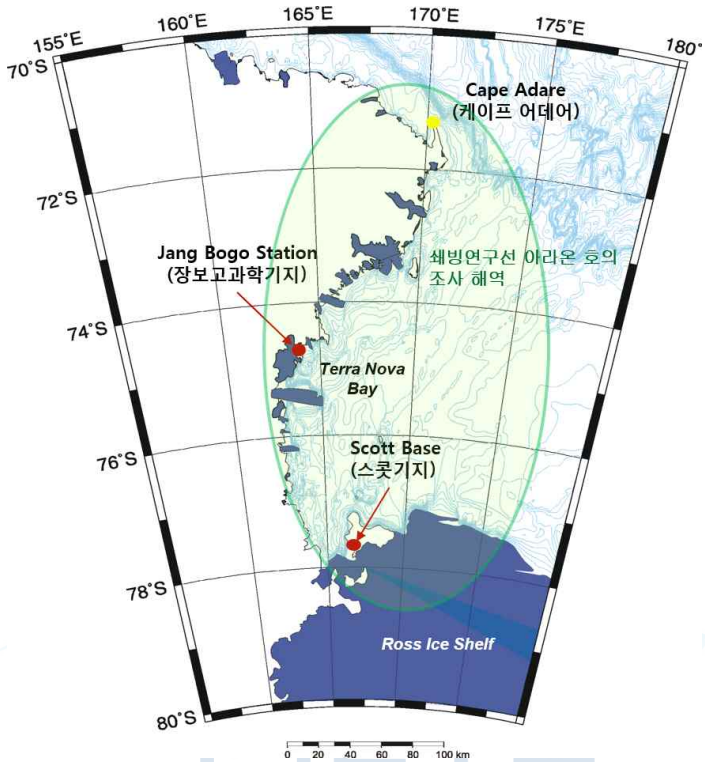


그림 1. 전체 연구대상 구역 개관

2-1. 로스해 해양관측 조사 과거 자료 도식화

- 과거 논문과 기타 자료에서 추출

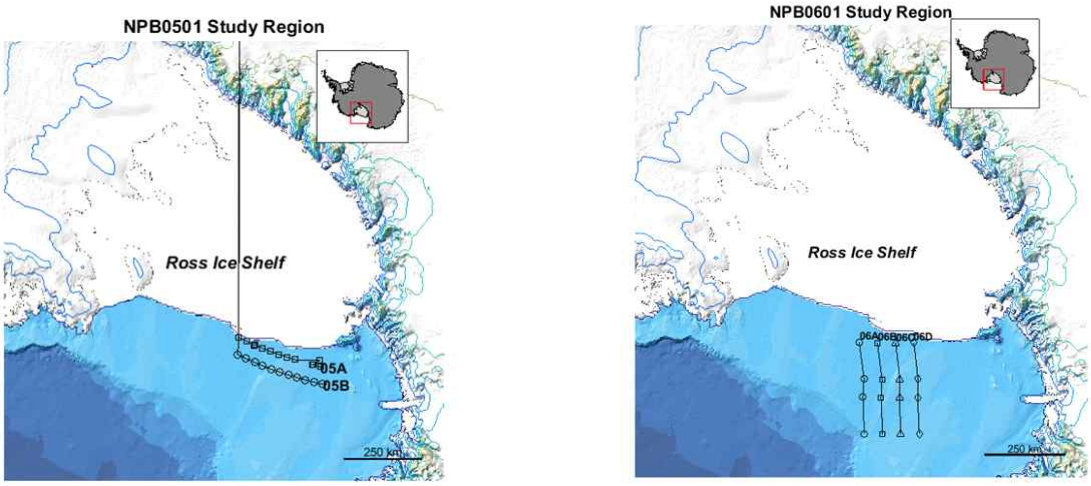


그림 2. 로스해 미국 조사선 과거 조사 자료 예비 분석 위한 정점 재배열

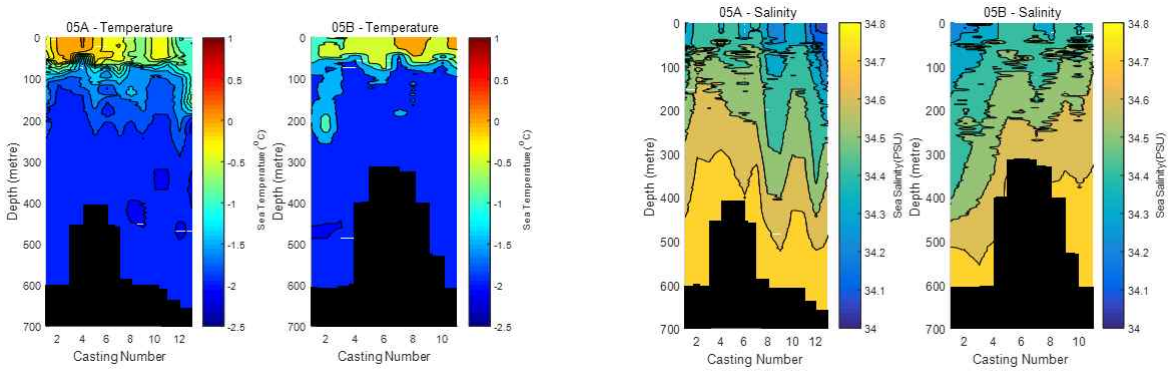


그림 3. 측선 5A와 B의 수온 염분 분포

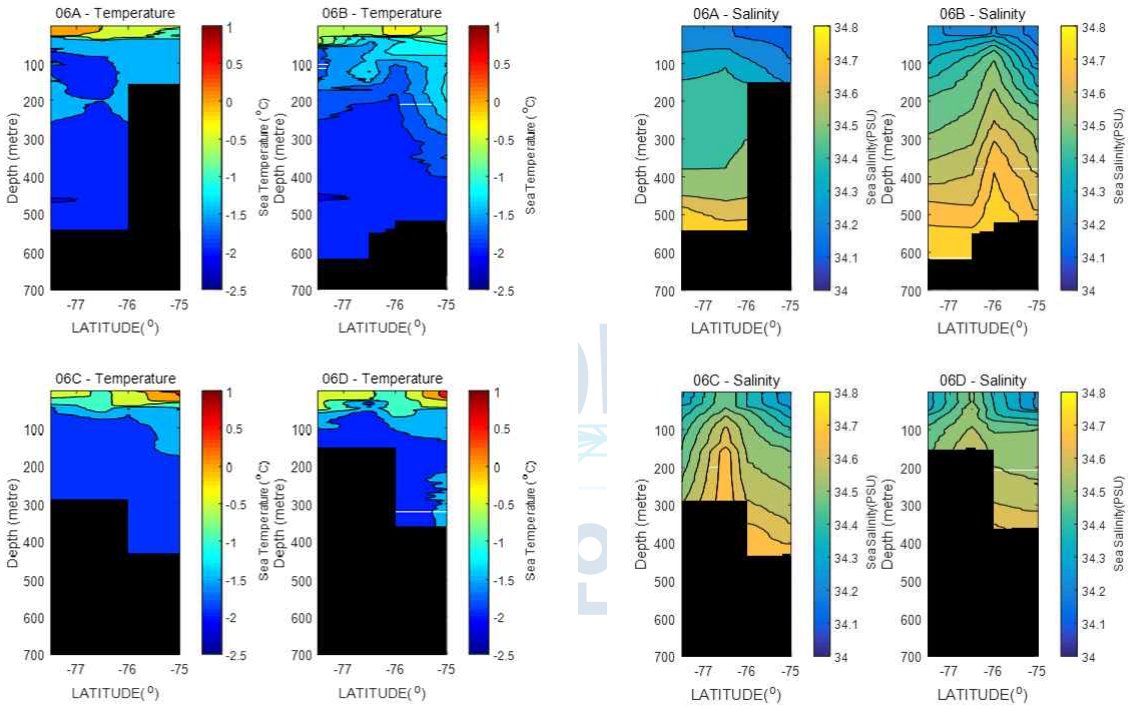


그림 4. 측선 6 A와 B의 수온 염분 분포

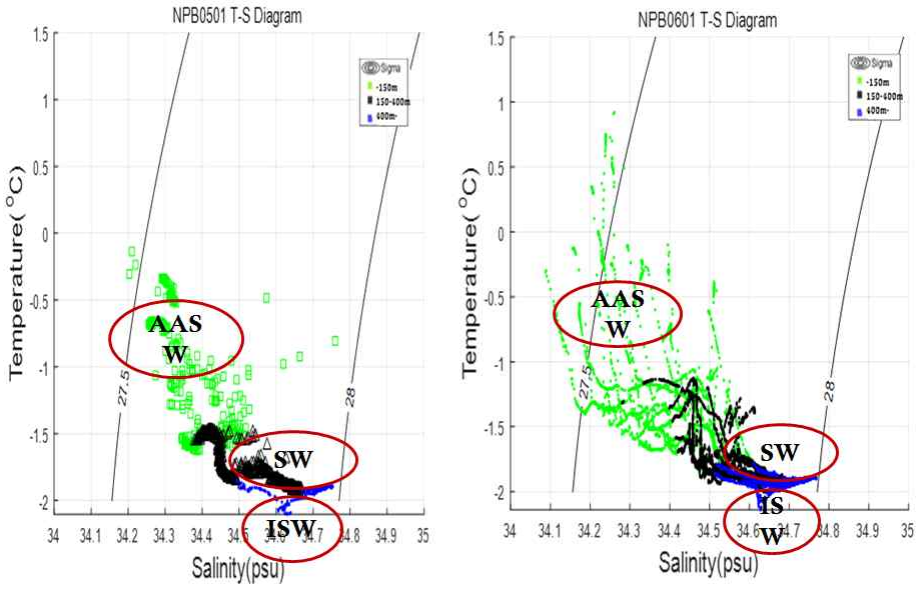


그림 5. 재복원한 TS 다이어그램

2-2 로스해와 장보고기지 인근 테라노바베이 해양관측

- 복수의 우리나라 연구과제들과 뉴질랜드 프로그램의 종합적인 기여로 로스해 특히 장보고 기지 인근 테라노바 베이에서 그림과 같은 해양조사 정점이 구성되어 기회가 되는대로 수온, 염분과 해류 관측이 이루어지고 있음

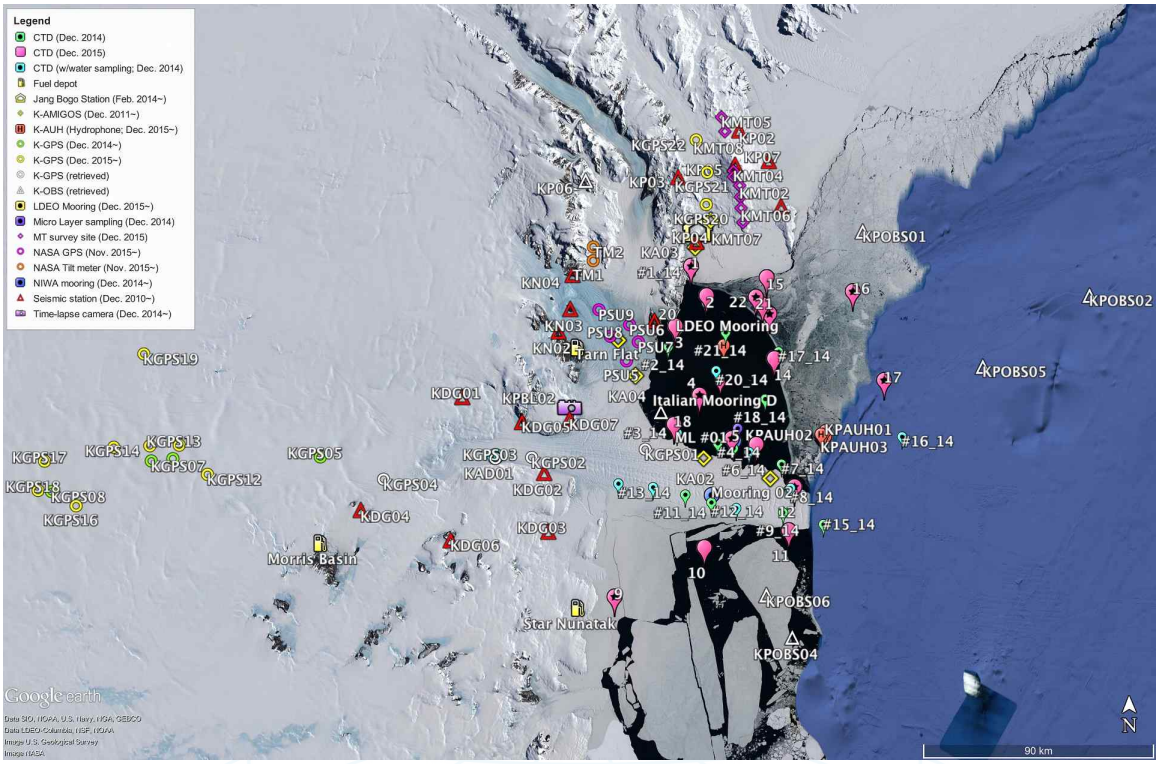


그림 6. 로스해와 테라노바베이와 드라이갈스키 빙설 주변 해양 관측 정점

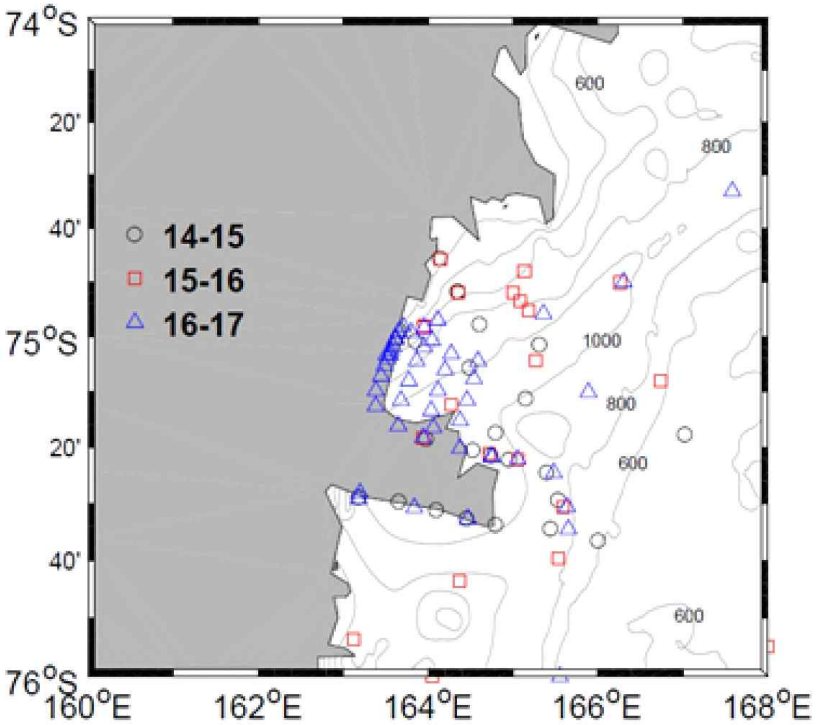


그림 7. 2015년 말부터 2017년 초반까지 3년간 조사 정점

○ 중장기 관측 자료가 구성된 단계는 아니지만 다음과 같은 예비분석이 가능함

- 과냉각 고염분수의 출현이 반복적으로 관측됨 (그림 8)
- 테라노바베이 해역에서 규칙적으로 발생하는 개구부 (폴리니아) 형성 현상과 관련성이 있으며 추후 심층연구의 대상이 되어야 함
- 서남극처럼 극적이고 현저하지 않으나 로스해 인근에서도 보이기 시작하는 빙상 붕괴의 조짐은 해수 특성 변화와 연결되어 있음

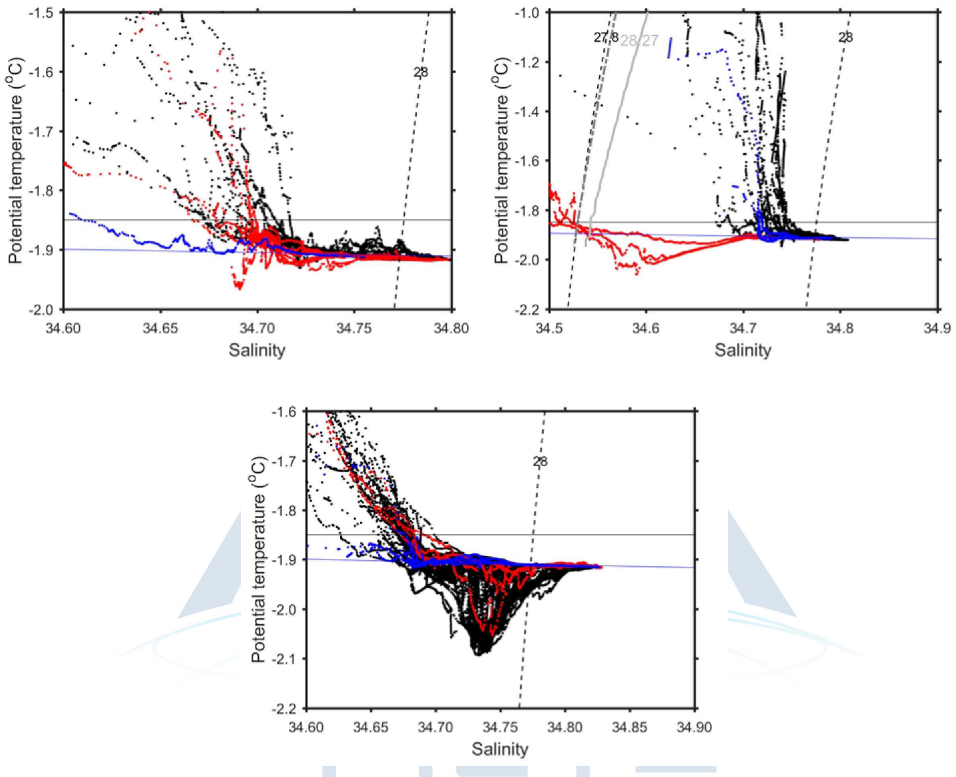


그림 8. 3년 해양관측 해수 수온 염분 다이어그램이 보여주는 과냉각 고염분수

2-3. 장보고기지 기반 시설 활용 생태계 모니터링 프로그램 발굴 사례

○ 해수 인입구에서 주변 저서 생태계 모니터링 반정량 생물 시료 수집
○ 해수 유량 간접 계산 계절별 주요 우점 종 교대와 풍도 모니터

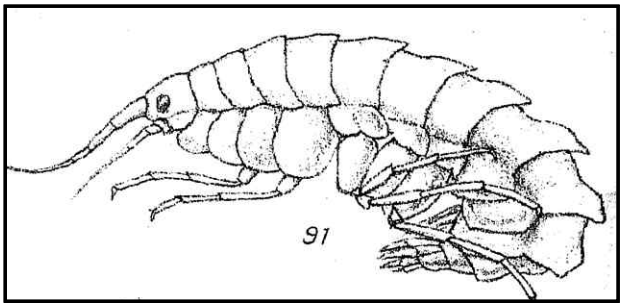


그림 9. 장보고 기지 해수인입 시설에서 채집되는 단각류 대표종

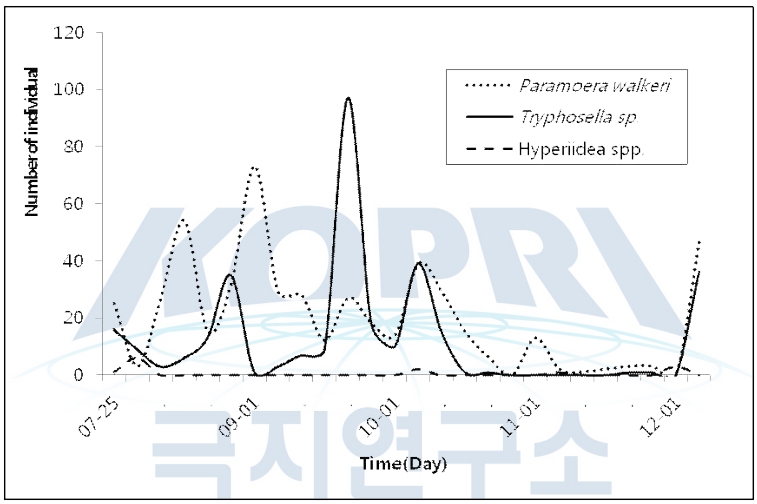


그림 10. 장보고 기지 해수인입 시설에서 채집되는 단각류 대표종의 풍도 변화

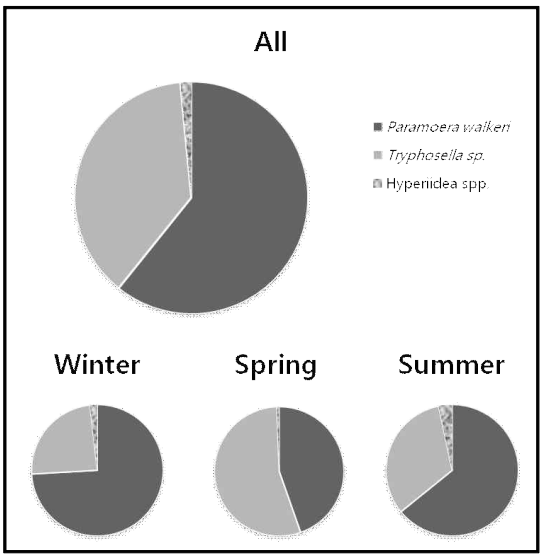


그림 11. 장보고 기지 해수인입 시설에서 채집되는 단각류 우점도의 계절 변화

2-4. 2017 한-뉴질랜드 과기 공동위원회 발표 자료

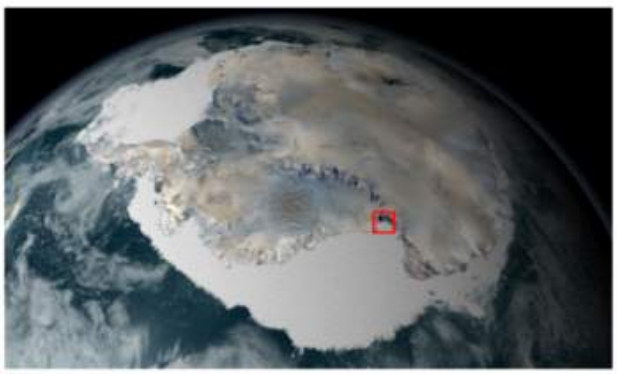
Korea New Zealand Antarctic research cooperation;

A tale of two programs (with different assets)

Gary Wilson (NZARI, U Otago)
Hyoung Chul Shin (KOPRI)

Kora New Zealand Joint Sci Tech Com, Seoul, Korea, 2017 September 15

The Antarctic challenge



- Understanding and managing changes that will impact the rest of the world
- Melting ice in Antarctica leads to rising global sea levels
- Warming in Antarctica leads to changes in ocean circulation and climate systems
- The changes will impact species across Antarctica's marine and terrestrial environments

Together New Zealand and Korea are undertaking a program of research to help to conserve the Antarctic and to inform global policy on its environments and living species

Korea and New Zealand in the Antarctic;

Both active members of SCAR (Scientific Committee on Antarctic Research) and the Antarctic Treaty System

Overlapping interests, particularly in the Ross Sea and Northern Victoria Land (where Jang Bogo Station and Scott Base are)

Different but complementary assets and strength (expertise, research vessel, ease of access to the region and so on)

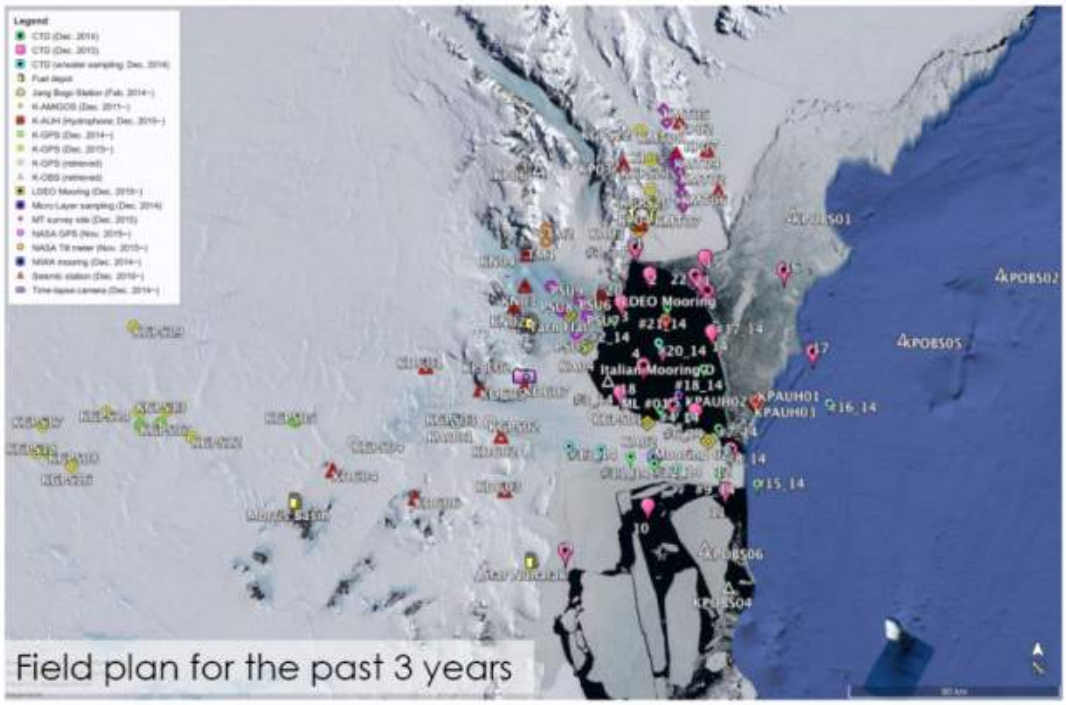
Pooling Resources, Expertise and Access




- Oceanography
- Ecology
- Microbiology
- Penguin Biology
- Paleoceanography
- Paleoclimatology
- Marine Biology
- Ice Sheet Dynamics
- Ice Ocean Interactions

Ice ocean interaction

- Collaborative fieldwork has been undertaken in Robertson Bay (Cape Adare), the Drygalski Ice Tongue (Terra Nova Bay) and on the Ross Ice Shelf
- The IBRV Aaron Icebreaker had deployed moorings around the Drygalski Ice Tongue and in Robertson Bay.
- The main objective is to understand how the warm water interacts with floating ice. Our scientists are modeling the circulation and heat transfer in the cavity beneath the ice and linking this to the nearby Polynia (winter ice free area).
- The research is also linked with US and Australian collaborators and the team are looking to deploy remotely operated vehicles under the ice in future years.
- Early findings are that there is a northward flowing Victoria Land current that passes underneath the Drygalski ice tongue which affects the Terra Nova Bay Polynia and the production of saline bottom water (formed from sea ice freezing).
- This work is support SCAR / SCOR oceanography programmes and helping build the understanding of the processes of bottom water formation and melting of floating ice.



A long term monitoring transect for Northern Victoria Land

- Over the past 2 years, we have undertaken joint field seasons at Cape Adare and Cape Hallett and this coming season we will work at Cape Hallett and Terra Nova Bay.
- Northern Victoria Land is an important because it provides and opportunity to monitor changes in the Southern Ocean and their propagation into the Ross Sea and impacts on Antarctica's landscape.
- We have identified a number of places and species that are ideally placed to detect early changes in ocean temperature and climate conditions – and started the first Antarctic Nearshore and Terrestrial Observing System site at Cape Adare.
- Northern Victoria Land is also home to a number of important penguin colonies – top predators that are linked both to the health of the ecosystem and the availability of sea ice for winter foraging.
- Warming ocean conditions are a real threat to the melting of Antarctic ice from the bottom up rather than the top down.
- This work should support SCAR programmes concerned with changing ocean and climate, the ATCM environmental management plans and underpin and support the new Ross Sea MPA (Marine Protected Area) agreed by CCAMLR.

Study area for the newly launched MPA relevant Korean research project

Ice Sheet and Ocean response to past warming

- Sediment cores collected from the IBRV Aaron have been jointly analysed at facilities at KOPRI, Otago University and GNS Science.
- Analyses are allowing us to track the changing extent of ice in the Ross Sea during the last deglaciation of Antarctica.
- Analyses are also being used to track the changing ocean front and circulation in the Southern Ocean and the Antarctic Circumpolar Current.
- Both Korea and New Zealand have hosted workshops to discuss finding and develop papers for publication
- A joint workshop was also held at the SCAR Open Science Conference in Malaysia and also at the upcoming SCAR Past Antarctic Ice Sheets Conference to be held in Italy.
- Early findings are that ice sheet retreat in the western Ross Sea at the last deglaciation was dominated by East Antarctic Ice implying the west Antarctic ice retreated more quickly than previously thought. Ocean temperature gradients were also less than half the current 6 degrees.

Results to Date

- *Very successful joint research programmes supported by Antarctica New Zealand and KOPRI including field camps at Cape Adare and Cape Hallett, 3 research cruises of the IBRV Aaron, and fieldwork in Terra Nova Bay supported from Jang Bogo Station.*
- *Regular exchange of scientists between Korea and New Zealand for sample parties, sample analysis and discussion meetings to develop ideas and planning for upcoming field seasons.*
- *Joint Presentations at the American Geophysical Union, the SCAR Open Science Conference, the International Glaciological Society*
- *Joint Publications:*

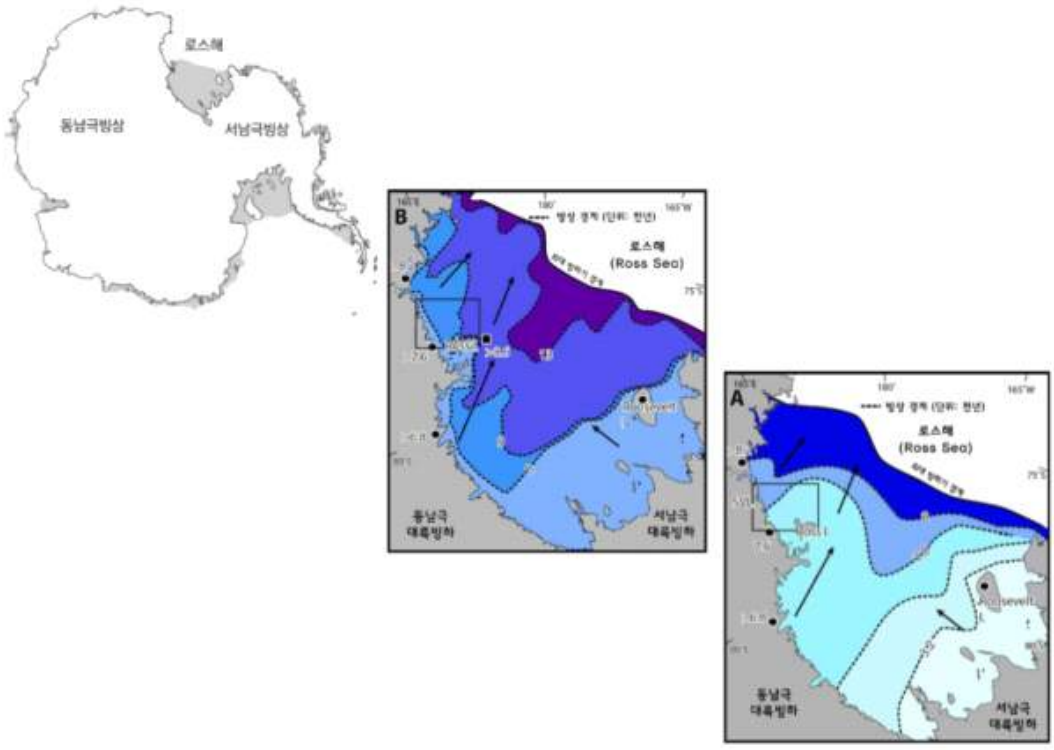
Stevens C; Lee WS; Fusco G; Yun S; Grant B; Robinson N; Hwang C Y. 2017. The influence of the Drygalski ice Tongue on the local ocean, in revision Annals of Glaciology

Wilson, G, Cary, C, Cummings, V., Hawes, I, Coleman, M., Hong, S.G., Katurji, M., Stevenes, C., Shanhun, F., 2017. Cape Adare – A sentinel for change in Antarctica – *SCAR Biology Symposium*, Leuven, Belgium.

Lee, J.I., McKay, R.M., Golledge, N.R., Yoon, H.I., Yoo, K.-C., Kim, H.J., Hong, J.K., 2017. Widespread persistence of expanded East Antarctic glaciers in the southwest Ross Sea during the last deglaciation. *Geology*, 45(5): 403-406.

Future Plans / Needs

- Symposium and joint publication / special issue
- Many of the programmes will need to run long-term (e.g. 5 years) yet to have the impact required in the IPCC, SCAR, ATCM and CCAMLR

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3. 목표 달성도 및 관련 분야 기여도

3-1. 목표

○ 대형공동연구 기획안 심화·완성
○ 로스해 해역의 연구 성과를 남극 다른 해역과 비교· 검토

3-2. 목표 달성여부

○ 뉴질랜드 연구진과 향후 계획서 작성과 프로시딩 형태의 공동 연구 성과 작성계획을 세웠으나 2018년 뒤로 미뤄졌음
○ 현재 뉴질랜드 연구진과 협의한 교류 일정 등이 뉴질랜드 측 제안으로 2018년 뒤로 미뤄졌으며 뉴질랜드 연구비 지원 기관은 이를 인정한 상태
○ 수개월에 걸쳐 양측 연구진이 부재중 상태가 될 수 밖에 없는 남극조사 일정과 현장 연구를 직접 여러 차례 나누어 지휘하는 뉴질랜드 연구책임자의 사정이 있었고 이를 융통성 있게 대하는 뉴질랜드 체계가 연구 수행의 속도를 공조화하기 매우 어려웠음

3-3. 목표 미달성 시 원인(사유) 및 차후대책(후속연구의 필요성 등)

○ 계획을 같이 세운 교류와 협의가 남극조사 일정과 뉴질랜드측 연구 책임자 사정으로 크게 지연되고 예정대로 수행하지 못함, 뉴질랜드 연구비지원기관의 연구수행체계는 대단히 탄력적이라 이를 용인함
○ 2018년 중반으로 연기한 교류와 성과를 사후 보고할 수 있기를 희망함

4. 연구개발성과의 활용 계획 등

○ 예년에 비해 수개월에 걸쳐 신장된 뉴질랜드 남극프로그램 현장 일정을 감안 2018년 중반으로 미뤄진 뉴질랜드 연구진과 협의를 남극 로스해구역 미래 연구 제안서를 완성하고자 함, 아래는 축약된 개념 제안서임

남극 로스해구역 미래 연구 제안 축약

지구환경변화에 대한 남극의 취약성과 반응 연구에서 로스해의 의미

○ 전지구 대양순환의 출발점인 냉수괴의 발원지로 지구 기후 조절 작용
○ 남극 빙상 후퇴와 전진의 과거 기록을 담고 있는 구역
○ 약한 냉각 경향을 보이는 로스해는 현재 온난화와 빙상 후퇴가 급격하게 진행되고 있는 남극반도와 비교 연구 가능
○ 남극해에서 상대적으로 생물생산력이 높으면서도 어획의 대상이 된 경우는 제한적이라 먹이사슬이 비교적 온전하게 보존된 생태계

남극 로스해를 둘러싼 상황

○ 지금은 온난화가 더디게 진행되고 있거나 오히려 약한 냉각 상태이지만 해빙 면적의 상당한 축소가 수십년 안에 예상됨 (Smith 등 2012, Smith 등 2014)
○ 로스해의 상당 부분이 남극해양생물보존위원회에 의해 해양보호구역으로 지정되고 어획 활동은 시간적 공간적으로 훨씬 더 제약을 받고 생태계 감시와 연구조사에 대한 압력은 강해지고 있음
○ 중국이 로스해 구역의 Inexpressible Island에 연중 상주 기지를 건설하기로 하면서 해당 구역의 남극연구 판도를 크게 바꿔놓을 것임

현재 진행 중인 한국과 뉴질랜드 연구

○ 한국;
- 아라온호의 정기적인 운항, 장보고 기지의 연중 상설 운영으로 하계 연구의 거점으로 활용
- 빙상 후퇴의 배경에 있는 해양과 빙권 상호작용 연구
- 퇴적층을 대상으로 하는 고기후 연구
- 연구선 궤적을 활용하는 일상적 해양관측
- 로스해 설치 해양보호구역 연구, 아델리 펭귄 포식자와 먹이 생물 상호작용 연구
- 천부 빙하코어를 이용한 고기후 복원 연구
- 내륙 진출로 개척과 빙저호 예비 연구
- 장보고 기지 거점 생태계 모니터링 연구

○ 뉴질랜드
- 장보고 기지에서 약 350킬로미터 떨어진 지점에 스코트 기지 운영
- 연구선 운영은 제한적, 뉴질랜드 수권대기권 연구소(NIWA)의 연구선 Tangaroa 호가 비정기적으로 연구항해 수행

- 빙상 후퇴와 전진 관련 퇴적층 고기후 연구
- 로스해 해양 물리 연구
- 아델리 펭귄 개체군 동태 연구
- 로스해 구역 북쪽에 위치한 케이프 어데어 (Cape Adare) 거점 생태계 모니터링 연구
- 빙하코어를 이용한 고기후 복원 연구

한-뉴질랜드 양측 공동연구 수렴 영역과 미래 연구 제안

○ 수렴 분야;
- 해양과 빙권 상호작용
- 빙상 동태와 고기후 복원을 염두에 둔 고기후, 지구물리 연구
- 로스해 생태계 보전 연구
- 빙하 코어를 활용한 고기후 연구
- 연안과 육상 생태계 장기 모니터링 연구

○ 지리적 수렴 혹 보완 영역
- 뉴질랜드 스코트 기지와 장보고 기지, 최근에 우리가 펭귄 생태 연구에 착수한 Cape Hallett, 뉴질랜드의 생태계 감시 관심 구역인 케이프 어데어를 연결하는 것으로 남북 구배선이 형성됨
- 장보고 기지와 스코트 기지, Cape Adare에서 동일한 방법을 이용한 생태계 모니터링 가능
- Drygalski Ice Tongue 주변의 해양환경과 빙상 상호작용

○ 미래 연구 제안
- 빙상의 후퇴와 진전을 과거 현재 미래를 관통해서 설명할 수 있는 빙권과 해양권 상호작용 주제형 연구 필요, 이는 고기후, 빙하학, 해양학, 지구물리, 기후모델 분야를 모두 관통하는 연구가 되어야 함
- 로스해 해양생태계와 양측의 과학기지와 연구 거점을 활용한 중장기 생태계 모니터링 체제는 모범 사례가 될 것임

한-뉴질랜드 공동연구 시행계획 (안)

○ 핵심 연구
- 퇴적물 코어, 빙하 코어, 모델링 기법을 이용한 로스해 과거 기후 복원 연구
- 테라노바베이 일대에서 대기, 해양과 빙상 상호작용 연구
- 케이프 어데어와 케이프 할렛 장기생태관측 네트워크와 해양보호구역 연구

○ 중점 연구 구역 설치 (그림 12 참조)
- 동남극 빙상의 grounding line 의 시대별 위치를 감안한 퇴적물 코어 연구 구역과 빙항 코어 연구 거점을 로스해 빙상 구역에 설치
- 테라노바베이 일대에 드라이갈스키 빙설을 중심에 두고 200 킬로미터 * 150 킬로미터 규모로 해양과 빙상 상호작용 조사구역 설치
- 케이프 어데어와 케이프 할렛 인근에 ‘육상생태계 변화 관측 거점’과 ‘아델리 펭귄과 먹이생물 관측’ 박스 설치

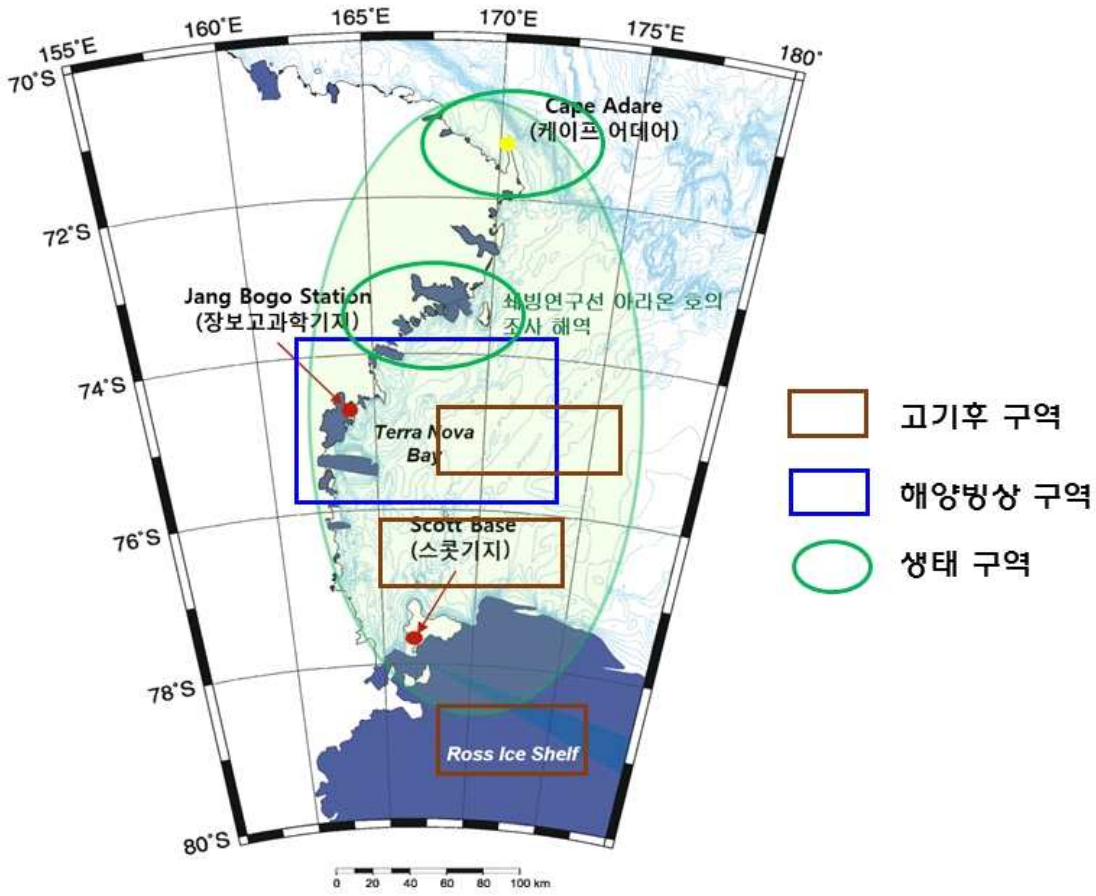

그림 12 한뉴질랜드 공동 연구 중점 구역

○ 1단계 이행 계획 주요 이정표 (2018-2022)
- 중점 구역에 필드 캠프 등 필요 기반시설 설치, 시범 조사와 관측 실시
- 뉴질랜드 NIWA 연구선 Tangaroa 관측 프로그램과 아라온호 프로그램 조율
- 케이프 어데어와 케이프 할렛을 정부간 기구인 남극해양생물자원보존위원회 (CCAMLR) 생태계 모니터링 거점과 민간학술기구인 남극과학위원회(SCAR)의 ANTOS (Antarctic near-shore and terrestrial observation system) 네트워크에 합류하게 함
- 환남극 해양생태관측 프로그램 MEASO에 참여

○ 2단계 이행 계획 주요 이정표 (2023-2027)
- 모델링 기법을 통한 회고적 (retrospective) 연구를 현생 자료와 연계
- 3대 중점 연구의 공통 연구 가설 수립
- 로스해 연구를 온난화가 더 급속하게 진행되는 서남극, 남극반도 구역 연구와 비교

붙임. 참고문헌

Abram, Nerilie J, Eric W.Wolff, Mark A.J.Curran (2013) A review of sea ice proxy information from polar ice cores. Quaternary Science Rev. **79**:168-183

Ainley, David G. (2009) A history of the exploitation of the Ross Sea, Antarctica. Cambridge core polar record **46**(3):233-243

Ainley, David G., Grant Ballard, Katie M. Dugger (2006) Competition Among Penguins And Cetaceans Reveals Trophic Cascades In The Western Ross Sea, Antarctica. Ecol. 87(8):2080-2093

Ainley DG, Ballard G, Weller J (2010) Ross sea biodiversity part 1: Validation of the 2007 CCAMLR bioregionalization workshop results towards including the Ross Sea representative network of marine protected areas in the Southern Ocean. 1-62

Ainley David, Joellen Russell, Stephanie Jenouvrier, Eric Woehler, Philip O'B. Lyver, William R. Fraser, Gerald L. Kooyman (2010) Antarctic penguin response to habitat change as Earth's troposphere reaches 2° C above preindustrial levels. Ecol Monog **80**(1):49-66

Armanda Leanne K., Xavier Crostab Oscar Romeroc Jean-Jacques Pichon (2005) The biogeography of major diatom taxa in Southern Ocean sediments: 1. Sea ice related species. Palaeo **223**(1-2):93-126

Aronson Richard B., Sven Thatje, James B. McClintock, Kevin A. Hughes (2011) Anthropogenic impacts on marine ecosystems in Antarctica. The Year in Ecology and Conservation Biol **1223**:82-107

Assmann Karen M. , Ralph Timmermann (2005) Variability of dense water formation in the Ross Sea. Ocean Dynamics **55**:68-87

Borges V., B. Delille, M. Frankignoulle (2005) Budgeting sinks and sources of CO2 in the coastal ocean: Diversity of ecosystems counts. Geophy Res Letters **32**(14): doi:10.1029/2005GL023053

Boyd P. W., S. C. Doney, R. Strzep다, J. Dusenberry, K. Lindsay, I. Fung (2008) Climate-mediated changes to mixed-layer properties in the Southern Ocean: assessing the phytoplankton response. Biogeosci, European Geosciences Union **5**(3):847-864

Cummings Vonda, Simon Thrush, Alf Norkko, Neil Andrew, Judi Hewitt, Greig Funnell And Anne-Maree Schwarz (2006) Accounting for local scale variability in benthos: implications for future assessments of latitudinal trends in the coastal Ross Sea. Antarctic Science **18**:633-644

Delmonte Barbara, Carlo Baroni, Per S. Andersson, Hans Schoberg, Margareta Hansson, Sarah Aciego, Jean-Robert Petit, Samuel Albani, Claudia Mazzola, Valter Maggi, Massimo Frezzotti (2010) Aeolian dust in the Talos Dome ice core (East Antarctica, Pacific/Ross Sea sector): Victoria Land versus remote sources over the last two climate cycles. JQS **25**(8):1327-1337

Depoorter M. A., J. L. Bamber, J. A. Griggs, J. T. M. Lenaerts, S. R. M. Ligtenberg, M. R.

van den Broeke & G. Moholdt (2013) Calving fluxes and basal melt rates of Antarctic ice shelves. Nature **502**:89-92

Dinniman, Michael S., John M.Klinck, Walker O.Smith Jr. (2011) A model study of circumpolar deep water on the West Antarctic Peninsula and Ross Sea continental shelves. Deep-Sea Res Pt II **56**:1508-1523

Emslie Steven D. , Larry Coats, Kathy Licht (2007) A 45,000 yr record of Adélie penguins and climate change in the Ross Sea, Antarctica. GEOLOGY **35**:61-64

Frenot Yves, Steven L. Chown, Jennie Whinam, Patricia M. Selkirk, Peter Convey, Mary Skotnicki, Dana M. Bergstrom (2005) Biological invasions in the Antarctic: extent, impacts and implications. Cambridge Univ. Press Biol. Rev. **80**(1):45-72

Golledge N. R., L. Menviel, L. Carter, C. J. Fogwill, M. H. England, G. Cortese & R. H. Levy (2014) Antarctic contribution to meltwater pulse 1A from reduced Southern Ocean. Nature Com **5**: AN5107. doi:10.1038/ncomms6107

Griffiths Huw J. (2010) Antarctic Marine Biodiversity - What Do We Know About the Distribution of Life in the Southern Ocean? PLOS **5**(8): doi.org/10.1371/journal.pone.0011683

Gutt Julian, Iain Barratt, Eugene Domack, Cédric d' Udekem d' Acoz, Werner Dimmler, Antoine Grémare, Olaf Heilmayer, Enrique Isla, Dorte Janussen, Elaina Jorgensen, Karl-Hermann Kock, Linn Sophia Lehnert, Pablo López-Gonzáles, Stephanie Langner, Katrin Linse, Maria Eugenia Manjón-Cabeza, Meike Meißner, Americo Montiel, Maarten Raes, Henri Robert, Armin Rose, Elisabet Sañé Schepisi, Thomas Saucède, Meike Scheidat, Hans-Werner Schenke, Jan Seiler, Craig Smith (2011) Biodiversity change after climate-induced ice-shelf collapse in the Antarctic. Deep-Sea Res Pt II **58**(1-2):74-83

Hall Brenda L., George H. Denton, Andrew G. Fountain, Chris H. Hendy, and Gideon M. Henderson (2010) Antarctic lakes suggest millennial reorganizations of Southern Hemisphere atmospheric and oceanic circulation. PNAS **107**(50):21355-21359

Hall Brenda L., George H. Denton, Stephanie L. Heath, Margaret S. Jackson & Tobias N. B. Koffman (2015) Accumulation and marine forcing of ice dynamics in the western Ross Sea during the last deglaciation. Nature Geosci **8**:625-628

Lescroël Amélie, Grant Ballard, David Grémillet, Matthieu Authier, David G. Ainley (2014) Antarctic Climate Change: Extreme Events Disrupt Plastic Phenotypic Response in Adélie Penguins. PLOS ONE **9**(1):1-9, e85291

Lorenzini Sandra, Carlo Baroni, Ilaria Baneschi, Maria Cristina Salvatore, Anthony E. Fallick, Brenda L. Hall (2013) Adélie penguin dietary remains reveal Holocene environmental changes in the western Ross Sea (Antarctica). Palaeo **395**:21-28

Massom Robert A., Sharon E. Stammerjohn (2010) Antarctic sea ice change and variability - Physical and ecological implications. Polar Sci **4**(2):149-186

McKay Robert, Tim Naish, Lionel Carter, Christina Riesselman, Robert Dunbar, Charlotte Sjunneskog, Diane Winter, Francesca Sangiorgi, Courtney Warren, Mark Pagani, Stefan

Schouten, Veronica Willmott, Richard Levy, Robert DeConto, and Ross D. Powell (2011) Antarctic and Southern Ocean influences on Late Pliocene global cooling PNAS **109**(17):6423-6428

Nicol Stephen, Anthony Worby and Rebecca Leaper (2008) Changes in the Antarctic sea ice ecosystem: potential effects on krill and baleen whales. Marine and Freshwater Res **59**(5):361-382

Orr James C., Victoria J. Fabry, Olivier Aumont, Laurent Bopp, Scott C. Doney, Richard A. Feely, Anand Gnanadesikan, Nicolas Gruber, Akio Ishida, Fortunat Joos, Robert M. Key, Keith Lindsay, Ernst Maier-Reimer, Richard Matear, Patrick Monfray, Anne Mouchet, Raymond G. Najjar, Gian-Kasper Plattner, Keith B. Rodgers, Christopher L. Sabine, Jorge L. Sarmiento, Reiner Schlitzer, Richard D. Slater, Ian J. Totterdell, Marie-France Weirig, Yasuhiro Yamanaka & Andrew Yool (2005) Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. Nature **437**:681-686

Pritchard H. D., S. R. M. Ligtenberg, H. A. Fricker, D. G. Vaughan, M. R. van den Broeke & L. Padman (2012) Antarctic ice-sheet loss driven by basal melting of ice shelves. Nature **484**:502-505

Simon Thrush, Paul Dayton, Riccardo Cattaneo-Vietti, Mariachiar Chiantore, Vonda Cummings, Neil Andrew, Ian Hawes, Stacy Kim, Rikk Kvitek, Anne-Maree Schwarz (2006) Broad-scale factors influencing the biodiversity of coastal benthic communities of the Ross Sea. Deep-Sea Res. Pt II **53**(8-10):958-971

Casimir de Lavergne, Jaime B. Palter, Eric D. Galbraith, Raffaele Bernardello & Irina Marinov (2014) Cessation of deep convection in the open Southern Ocean under anthropogenic climate change. Nature Climate Change **4**:278-282

Matthew H. Pinkerton, Janet M. Bradford-Grieve (2014) Characterizing foodweb structure to identify potential ecosystem effects of fishing in the Ross Sea, Antarctica. ICES Journal of Marine Science **71**(7): 1542-1553

Jessica Melbourne-Thomas, Stuart P. Corney, Kevin R. Arrigo, Christophe Barbraud, David K. A. Barnes, Nathaniel L. Bindoff, Philip W. Boyd, Angelika Brandt, Daniel P. Costa, Andrew T. Davidson, Hugh W. Ducklow, Louise Emmerson, Mitsuo Fukuchi, Julian Gutt, Mark A. Hindell, Eileen E. Hofmann, Graham W. Hosie, Takahiro Iida, Sarah Jacob, Nadine M. Johnston, So Kawaguchi, Nobuo Kokubun, Philippe Koubbi, Mary-Anne Lea, Azwianewi Makhado, Rob A. Massom, Klaus Meiners, Michael P. Meredith, Eugene J. Murphy, Stephen Nicol, Keith Reid, Kate Richerson, Martin J. Riddle, Stephen R. Rintoul, Walker O. Smith Jr, Colin Southwell, Jonathon S. Stark, Michael Sumner, Kerrie M. Swadling, Kunio T. Takahashi, Phil N. Trathan, Dirk C. Welsford, Henri Weimerskirch, Karen J. Westwood, Barbara C. Wienecke, Dieter Wolf-Gladrow, Simon W. Wright, Jose C. Xavier, Philippe Ziegler (2014) Climate change and Southern Ocean ecosystems I: how changes in physical habitats directly affect marine biota. Golbal Change Biol. **20**(10):3004-3025

Scott C. Doney, Mary Ruckelshaus, J. Emmett Duffy, James P. Barry, Francis Chan, Chad A.

English, Heather M. Galindo, Jacqueline M. Grebmeier, Anne B. Hollowed, Nancy Knowlton, Jeffrey Polovina, Nancy N. Rabalais, William J. Sydeman, and Lynne D. Talley (2012) Climate Change Impacts on Marine Ecosystems. Annual Review of Marine Science **4**:11-37

Michelle A. LaRue , David G. Ainley, Matt Swanson, Katie M. Dugger, Phil O′ B. Lyver, Kerry Barton, Grant Ballard (2013) Climate Change Winners: Receding Ice Fields Facilitate Colony Expansion and Altered Dynamics in an Adélie Penguin Metapopulation. PLOS ONE **8**(4):doi.org/10.1371/journal.pone.0060568

D. M. Roche , T. M. Dokken , H. Goosse, H. Renssen1 nd S. L. Weber (2007) Climate of the Last Glacial Maximum: sensitivity studies and model-data comparison with the LOVECLIM coupled model. Clim. Past **3**:205-224

John Marshall & Kevin Speer (2012) Closure of the meridional overturning circulation through Southern Ocean upwelling. Nature Geoscience **5**:171-180

Grant Ballard, Dennis Jongsomjit, Samuel D. Veloz, David G. Ainley (2012) Coexistence of mesopredators in an intact polar ocean ecosystem: The basis for defining a Ross Sea marine protected area. Biological Conserv. **156**:72-82

Samuel Albani, Natalie M. MahowaldBarbara DelmonteValter MaggiGisela Winckler (2011) Comparing modeled and observed changes in mineral dust transport and deposition to Antarctica between the Last Glacial Maximum and current climates. Climate Dynamics **38**(9-10):1731-1755

K.G. Ryan, E.N. Hegseth, A. Martin, S.K. Davy, R. O'Toole, P.J. Ralph, A. McMinn, C.J. Thorn (2006) Comparison of the microalgal community within fast ice at two sites along the Ross Sea coast, Antarctica. Antarctic Sci. **18**(4):583-594

Jaume Forcada, P. N. Trathan, K. Reid, E. J. Murphy, J. P. Croxall (2006) Contrasting population changes in sympatric penguin species in association with climate warming. Global Change Biol. 12(3):411-423

Letterio Guglielmo, Giacomo Zagami, Vincenzo Saggiomo, Giulio Catalano, Antonia Granata (2007) Copepods in spring annual sea ice at Terra Nova Bay (Ross Sea, Antarctica). Polar Biol **30**:747-758

David G. Ainley, Elizabeth D. Clarke, Kevin Arrigo, William R. Fraser, Akiko Kato, Kerry J. Barton, Peter R. Wilson (2005) Decadal-scale changes in the climate and biota of the Pacific sector of the Southern Ocean, 1950s to the 1990s. Antarctic Science **17**(2):171-182

Stéphanie Jenouvrier, Hal Caswell, Christophe Barbraud, Marika Holland, Julienne Strœve, and Henri Weimerskirch (2008) Demographic models and IPCC climate projections predict the decline of an emperor penguin population. PNAS **106**(6):1844-1847

Karel Janko, Guillaume Lecointre, Arthur DeVries, Arnaud Couloux, Corinne Cruaud and Craig Marshall (2007) Did glacial advances during the Pleistocene influence differently the demographic histories of benthic and pelagic Antarctic shelf fishes? – Inferences from intraspecific mitochondrial and nuclear DNA sequence diversity. BMC Evolutionary

Biology **7**:220 doi.org/10.1186/1471-2148-7-220

Chuangneng Lou Xiaodong Liu Wenqi Liu, Libin Wu, Yaguang Nie, Steven D.Emslie (2016) Distribution patterns and possible influencing factors of As speciation in ornithogenic sediments from the Ross Sea region, East Antarctica. Science of The Total Environment **553**:466-473

Carys P. Cook, Tina van de Flierdt, Trevor Williams, Sidney R. Hemming, Masao Iwai, Munemasa Kobayashi, Francisco J. Jimenez-Espejo, Carlota Escutia, Jhon Jairo González, Boo-Keun Khim, Robert M. McKay, Sandra Passchier, Steven M. Bohaty, Christina R. Riesselman, Lisa Tauxe, Saiko Sugisaki, Alberto Lopez Galindo, Molly O. Patterson, Francesca Sangiorgi, Elizabeth L. Pierce, Henk Brinkhuis, Adam Klaus, Annick Fehr, James A. P. Bendle, Peter K. Bijl, Stephanie A. Carr, Robert B. Dunbar, José Abel Flores, Travis G. Hayden, Kota Katsuki, Gee Soo Kong, Mutsumi Nakai, Matthew P. Olney, Stephen F. Pekar, Jörg Pross, Ursula Röhl, Toyosaburo Sakai, Prakash K. Shrivastava, Catherine E. Stickley, Shouting Tuo, Kevin Welsh & Masako Yamane (2013) Dynamic behaviour of the East Antarctic ice sheet during Pliocene warmth. Nature Geoscience **6**:765-769

Nicholas R. Golledge, Christopher J. Fogwill, Andrew N. Mackintosh, and Kevin M. Buckley (2012) Dynamics of the last glacial maximum Antarctic ice-sheet and its response to ocean forcing. PNAS **109**(40):16052-16056

S. Passchier G. Browne B. Field C.R. Fielding L.A. Krissek K. Panter S.F. Pekar and ANDRILL-SMS Science Team (2011) Early and middle Miocene Antarctic glacial history from the sedimentary facies distribution in the AND-2A drill hole, Ross Sea, Antarctica. GSA Bulletin **123**:2352-2365

Hal W. Hackett (2016) Early Pliocene Ross Sea paleoclimate and a new application of the diatom oxygen isotope proxy. Northern Illinois University, ProQuest Dissertations Publishing: PQ 10158891

Camille Parmesan (2006) Ecological and Evolutionary Responses to Recent Climate Change. Annual Review of Ecology, Evolution, and Systematics **37**:637-669

Langdon B. Quetin, Robin M. Ross, Christian H. Fritsen and Maria Vernet (2007) Ecological responses of Antarctic krill to environmental variability: can we predict the future? Antarctic Science **19**(2):253-266

Yaguang Nie, Xiaodong Liu, Liguang Sun, Steven D.Emslie (2012) Effect of penguin and seal excrement on mercury distribution in sediments from the Ross Sea region, East Antarctica. Science of The Total Environment 433:132-140

Gerald L. Kooyman, David G. Ainley, Grant Ballard and Paul J. Ponganis (2007) Effects of giant icebergs on two emperor penguin colonies in the Ross Sea, Antarctica. Antarctica Science **19**(1):31-38

Edward Ayres, Johnson N. Nkem,Diana H. Wall,Byron J. Adams,J. E. Barrett,Emma J. Broos,Andrew N. Parsons,Laura E. Powers,Breana L. Simmons,Ross A. Virginia (2008) Effects of Human Trampling on Populations of Soil Fauna in the McMurdo Dry Valleys,

Antarctica. Conservation Biology **22**(6):1544-1551

R.Bargagli (2008) Environmental contamination in Antarctic ecosystems. Science of The Total Environment **400**(1-3):212-226

Linda C. Ivany Stefaan Van Simaeys Eugene W. Domack Scott D. Samson (2006) Evidence for an earliest Oligocene ice sheet on the Antarctic Peninsula. Geology **34**(5):377-380

Alexis M. Janosik, Andrew R. MahonKenneth M. Halanych (2010) Evolutionary history of Southern Ocean Odontaster sea star species (Odontasteridae; Asteroidea). Polar Biology **34**(4):575-586

Kelly M. Proffitt, Robert A. Garrott, Jay J. Rotella, Donald B. Siniff, J. Ward Testa (2007) Exploring Linkages between Abiotic Oceanographic Processes and a Top-trophic Predator in an Antarctic Ecosystem. Ecosys. **10**:119-126

B. Stenni, D. Buiron, M. Frezzotti, S. Albani, C. Barbante, E. Bard, J. M. Barnola, M. Baroni, M. Baumgartner, M. Bonazza, E. Capron, E. Castellano, J. Chappellaz, B. Delmonte, S. Falourd, L. Genoni, P. Iacumin, J. Jouzel, S. Kipfstuhl, A. Landais, B. Lemieux-Dudon, V. Maggi, V. Masson-Delmotte, C. Mazzola, B. Minster, M. Montagnat, R. Mulvaney, B. Narcisi, H. Oerter, F. Parrenin, J. R. Petit, C. Ritz, C. Scarchilli, A. Schilt, S. Schüpbach, J. Schwander, E. Selmo, M. Severi, T. F. Stocker & R. Udisti (2011) Expression of the bipolar see-saw in Antarctic climate records during the last deglaciation. Nature Geoscience **4**:46-49

Robert A. Massom, Sharon E. Stammerjohn, Raymond C. Smith, Michael J. Pook, Richard A. Iannuzzi, Neil Adams, Douglas G. Martinson, Maria Vernet, William R. Fraser, Langdon B. Quetin, Robin M. Ross, Yuko Massom, and H. Roy Krouse (2006) Extreme Anomalous Atmospheric Circulation in the West Antarctic Peninsula Region in Austral Spring and Summer 2001/02, and Its Profound Impact on Sea Ice and Biota. Journal of Climate **19**:3544-3571

Louise K. Blight, David G. Ainley, Stephen F. Ackley, Grant Ballard, Tosca Ballerini, Robert L. Brownell Jr6, C.-H. Christina Cheng, Mariachiara Chiantore, Daniel Costa, Malcolm C. Coulter, Paul Dayton, Arthur L. Devries, Robert Dunbar, Sylvia Earle, Joseph T. Eastman, Steven D. Emslie, Clive W. Evans, Robert A. Garrott, Stacy Kim, Gerald Kooyman, Amélie Lescroël, Michael Lizotte, Melanie Massaro, Silvia Olmastroni, Paul J. Ponganis, Joellen Russell, Donald B. Siniff, Walker O. Smith Jr., Brent S. Stewart, Ian Stirling, Jay Willis, Peter Wilson, Eric J. Woehler (2010) Fishing for Data in the Ross Sea. SCIENCE **330**(6009):1316, dio 10.1126/science.330.6009.1316

J.G.Bockheim (2008) Functional diversity of soils along environmental gradients in the Ross Sea region, Antarctica. Geoderma **144**(1-2):32-42

Martin Jakobsson John B. Anderson Frank O. Nitsche Julian A. Dowdeswell Richard Gyllencreutz Nina Kirchner Rezwan Mohammad Matthew O'Regan Richard B. Alley Sridhar Anandakrishnan Björn Eriksson Alexandra Kirshner Rodrigo Fernandez Travis Stolldorf Rebecca Minzoni Wojciech Majewski (2011) Geological record of ice shelf break-up and grounding line retreat, Pine Island Bay, West Antarctica. Geology

39(7):691-694

Claus-Dieter Hillenbrand Gerhard Kuhn James A. Smith Karsten Gohl Alastair G.C. Graham Robert D. Larter Johann P. Klages Rachel Downey Steven G. Moreton Matthias Forwick David G. Vaughan (2013) Grounding-line retreat of the West Antarctic Ice Sheet from inner Pine Island Bay. Geology **41**:35-38

T. G. A. Green, L. G. Sancho, R. Tu ¨ rk, R. D. Seppelt, I. D. Hogg (2011) High diversity of lichens at 84° S, Queen Maud Mountains, suggests preglacial survival of species in the Ross Sea region, Antarctica. Polar Biol **34**:1211-1220

Mark A. Moline, Nina J. Karnovsky, Zachary Brown, George J. Divoky, Thomas K. Frazer, Charles A. Jacoby, Joseph J. Torres, William R. Fraser (2008) High Latitude Changes in Ice Dynamics and Their Impact on Polar Marine Ecosystems. The Year in Ecology and Conservation **1134**:267-319

Paul G. Matson, Todd R. Martz, Gretchen E. Hofmann (2011) High-frequency observations of pH under Antarctic sea ice in the southern Ross Sea. Antarctic Science 23(6): 607-613

Seong-Joong Kim, Thomas J. Crowley, David J. Erickson, Bala Govindasamy, Phillip B. Duffy, Bang Yong Lee (2008) High-resolution climate simulation of the last glacial maximum. Climate Dynamics **31**(1):1-16

Brenda L. Hall, George H. Denton, John O. Stone and Howard Conway (2013) History of the grounded ice sheet in the Ross Sea sector of Antarctica during the Last Glacial Maximum and the last termination. Geological Society London **381**:167-181

Sandra Lorenzini, Silvia Olmastroni, Francesco Pezzo, Maria Cristina Salvatore, Carlo Baroni (2009) Holocene Adélie penguin diet in Victoria Land, Antarctica. Polar Biol **32**(7):1077-1086

B. L. Hall, A. R. Hoelzel, C. Baroni, G. H. Denton, B. J. Le Boeuf, B. Overturf, and A. L. Töpf (2006) Holocene elephant seal distribution implies warmer-than-present climate in the Ross Sea. PNAS **103**(27):10213-10217

Delphine Denis, Xavier Crosta, Sabine Schmidt, Damien S. Carson, Raja S. Ganeshram, Hans Renssen, Julien, Crespin, Olivier Ther, Isabelle Billy, Jacques Giraudeau (2009) Holocene productivity changes off Adélie Land (East Antarctica). Palaeo. **24**(3): doi:10.1029/2008PA001689

A. E. Shevenell, A. E. Ingalls, E. W. Domack & C. Kelly (2011) Holocene Southern Ocean surface temperature variability west of the Antarctic Peninsula. Nature **470**:250-254

Oscar Schofield, Hugh W. Ducklow, Douglas G. Martinson, Michael P. Meredith, Mark A. Moline, William R. Fraser (2010) How Do Polar Marine Ecosystems Respond to Rapid Climate Change? Science **328**(5985): 1520-1523

Anders E. Carlson (2011) Ice Sheets and Sea Level in Earth's Past. Nature Education Knowledge **3**(10):3

N.J. Robinson and M.J.M. Williams (2012) Iceberg-induced changes to polynya operation and regional oceanography in the southern Ross Sea, Antarctica, from in situ observations.

Antarctic Science **24**(5):514-526

Richard B. Alley, Peter U. Clark, Philippe Huybrechts, Ian Joughin (2005) Ice-Sheet and Sea-Level Changes. Science **310**(5747): 456-460

Ian Joughin, Richard B. Alley, David M. Holland (2012) Ice-Sheet Response to Oceanic Forcing. Science **338**(6111):1172-1176

H. Flores, A. Atkinson, S. Kawaguchi, B. A. Krafft, G. Milinevsky, S. Nicol, C. Reiss, G. A. Tarling, R. Werner, E. Bravo Rebolledo, V. Cirelli, J. Cuzin-Roudy, S. Fielding, J. J. Groeneveld, M. Haraldsson, A. Lombana, E. Marschoff, B. Meyer, E. A. Pakhomov, E. Rombola, K. Schmidt, V. Siegel, M. Teschke, H. Tonkes, Jean-Yves Toullec, P. N. Trathan, N. Tremblay, A. P. Van de Putte, J. A. Van Franeker, T. Werner (2012) Impact of climate change on Antarctic krill. Marine Ecology **458**:1-19

Kazuya Kusahara, Hiroyasu Hasumi & Guy D. Williams (2011) Impact of the Mertz Glacier Tongue calving on dense water formation and export. Nature Communications **2**(159): doi:10.1038/ncomms1156

Didier Swingedouw, T. FichefetH. GoosseM. F. Loutre (2009) Impact of transient freshwater releases in the Southern Ocean on the AMOC and climate. Climate Dynamics **33**(2-3):376-379

Victoria J. Fabry Brad A. Seibel Richard A. Feely James C. Orr (2008) Impacts of ocean acidification on marine fauna and ecosystem processes. ICES Journal of Marine Science **65**:414-432

R. Bintanja, G. J. van Oldenborgh, S. S. Drijfhout, B. Wouters & C. A. Katsman (2013) Important role for ocean warming and increased ice-shelf melt in Antarctic sea-ice expansion. Nature Geoscience **6**:376-379

Michael S. Dinniman,John M. Klinck,Walker O. Smith Jr. (2007) Influence of sea ice cover and icebergs on circulation and water mass formation in a numerical circulation model of the Ross Sea, Antarctica. Journal Of Geophysical Research **112**(C11):DOI: 10.1029/2006JC004036

Becky A.Ball, Diana H.Wall, J.E.Barrett, Andy N.Parsons, Ross A.Virginia (2009) Interactions between physical and biotic factors influence CO2 flux in Antarctic dry valley soils. Soil Biology and Biochemistry **41**(7):1510-1517

Y.Feng, C.E.Hare, J.M.Rose, S.M.Handy, G.R.DiTullio, P.A.Lee, W.O.Smith Jr., J.Peloquin, S.Tozzi, J.Sun, Y.Zhang, R.B.Dunbar, M.C.Long, B.Sohst, M.Lohan, D.A.Hutchins (2010) Interactive effects of iron, irradiance and CO2 on Ross Sea phytoplankton. Deep-Sea Res Pt I **57**(3):368-383

Michael E. Weber, Peter U. Clark, Werner Ricken, Jerry X. Mitrovica, Steven W. Hostetler, Gerhard Kuhn (2011) Interhemispheric Ice-Sheet Synchronicity During the Last Glacial Maximum. Science **334**(6060):1265-1269

Alessandro Tagliabue, Kevin R. Arrigo (2005) Iron in the Ross Sea: 1. Impact on CO2 fluxes via variation in phytoplankton functional group and non-Redfield stoichiometry. JGR

110(C3):DOI: 10.1029/2004JC002531

T.A. Stern A.K. Baxter P.J. Barrett (2005) Isostatic rebound due to glacial erosion within the Transantarctic Mountains. Geology **33**(3):221-224

W. T. Pfeffer, J. T. Harper, S. O'Neel (2008) Kinematic Constraints on Glacier Contributions to 21st-Century Sea-Level Rise. Science **321**(5894):1340-1343

Stanley S. Jacobs and Claudia F. Giulivi (2010) Large Multidecadal Salinity Trends near the Pacific-Antarctic Continental Margin. AMS **23**: doi:org/10.1175/2010JCLI3284.1

Francesca De Domenico, Mariachiara Chiantore, Sabrina Buongiovanni, Maria Paola Ferranti, Serena Ghione, Simon Thrush, Vonda Cummings, Judi Hewitt, Kerstin Kroeger, Riccardo Cattaneo-Vietti (2006) Latitude versus local effects on echinoderm assemblages along the Victoria Land coast, Ross Sea, Antarctica. Antarctic Science 18(4):655-662

Stephanie Jenouvrier, Christophe Barbraud, Henri Weimerskirch (2005) LONG-TERM CONTRASTED RESPONSES TO CLIMATE OF TWO ANTARCTIC SEABIRD SPECIES Ecology **86**(11):2889-2903

Joseph S. Levy Tammy M. Rittenour Andrew G. Fountain Jim E. O'Connor (2017) Luminescence dating of paleolake deltas and glacial deposits in Garwood Valley, Antarctica: Implications for climate, Ross ice sheet dynamics, and paleolake duration. GSA Bulletin **129**(9-10):1071-1084

Michele Rebesco Angelo Camerlenghi Riccardo Geletti Miquel Canals (2006) Margin architecture reveals the transition to the modern Antarctic ice sheet ca. 3 Ma. Geology **34**(4):301-304

C. Howard-Williams, D. Peterson , W.B. Lyons, R. Cattaneo-Vietti , S. Gordon (2006) Measuring ecosystem response in a rapidly changing environment: the Latitudinal Gradient Project. Antarctic Science **18**(4):465-471

Heidi N. Geisz, Rebecca M. Dickhut, Michele A. Cochran, William R. Fraser, And Hugh W. Ducklow (2008) Melting Glaciers: A Probable Source of DDT to the Antarctic Marine Ecosystem. Environmental Science & Technology **42**(11):3958-3962

David L. Kirchman, Xosé Anxelu G. Morán & Hugh Ducklow (2009) Microbial growth in the polar oceans — role of temperature and potential impact of climate change. Nature Reviews Microbiology **7**:451-459

Stefanie Moorthi, David A. Caron, Rebecca J. Gast, Robert W. Sanders (2009) Mixotrophy: a widespread and important ecological strategy for planktonic and sea-ice nanoflagellates in the Ross Sea, Antarctica. AQUATIC MICROBIAL ECOLOGY **54**:269-277

David G. Ainley, Dennis JongsomjitGrant BallardDeborah ThieleWilliam R. FraserCynthia T. Tynan (2011) Modeling the relationship of Antarctic minke whales to major ocean boundaries. Polar Biology **35**(2):281-290

S. L. Hill, E. J. Murphy, K. Reid, P. N. Trathan, A. J. Constable (2006) Modelling Southern Ocean ecosystems: krill, the food-web, and the impacts of harvesting. Cambridge Univ. Press Biol Rev. **81**(4):581-608

Lucas K. Zoet, Sridhar Anandakrishnan, Richard B. Alley, Andrew A. Nyblade & Douglas A. Wiens (2012) Motion of an Antarctic glacier by repeated tidally modulated earthquakes. Nature Geoscience **5**:623-626

Sunke Schmidtko, Karen J. Heywood, Andrew F. Thompson, Shigeru Aoki (2014) Multidecadal warming of Antarctic waters. Science **346**(6214):1227-1231

N. G. Wilson, R. L. HunterS. J. LockhartK. M. Halanych (2007) Multiple lineages and absence of panmixia in the "circumpolar" crinoid Promachocrinus kerguelensis from the Atlantic sector of Antarctica. Marine Biol **152**(4):895-904

John Turner, Josefino C. Comiso, Gareth J. Marshall, Tom A. Lachlan-Cope, Tom Bracegirdle, Ted Maksym, Michael P. Meredith, Zhaomin Wang, Andrew Orr (2009) Non-annular atmospheric circulation change induced by stratospheric ozone depletion and its role in the recent increase of Antarctic sea ice extent. Geophysical Research Letters **36**(8): DOI: 10.1029/2009GL037524

Christian B. Rodehacke, Hartmut H. Hellmer, Oliver Huhn, Aike Beckmann (2006) Ocean/ice shelf interaction in the southern Weddell Sea: results of a regional numerical helium/neon simulation. Ocean Dynamics **57**(1):1-11

A. Atkinson, V. Siegel, E. A. Pakhomov, P. Rothery, V. Loeb, R. M. Ross, L. B. Quetin, K. Schmidt, P. Fretwell, E. J. Murphy, G. A. Tarling and A. H. Fleming (2008) Oceanic circumpolar habitats of Antarctic krill. Marine Ecology **362**:1-23

Christopher C. Sorlien Bruce P. Luyendyk Douglas S. Wilson Robert C. Decesari Louis R. Bartek John B. Diebold (2007) Oligocene development of the West Antarctic Ice Sheet recorded in eastern Ross Sea strata. Geology **35**(5):467-470

S.Passchier, L.A.Krissek (2008) Oligocene-Miocene Antarctic continental weathering record and paleoclimatic implications, Cape Roberts drilling Project, Ross Sea, Antarctica, Palaeo. **260**(1-2):30-40

S. Craig Cary, Ian R. McDonald, John E. Barrett & Don A. Cowan (2010) On the rocks: the microbiology of Antarctic Dry Valley soils. Nature Reviews Microbiology **8**:129-138

Timothy Watson, Andrew Nyblade, Douglas A. Wiens, Sridhar Anandakrishnan, Margaret Benoit, Patrick J. Shore, Donald Voigt, John VanDecar (2006) P and S velocity structure of the upper mantle beneath the Transantarctic Mountains, East Antarctic craton, and Ross Sea from travel time tomography. Geochemistry, Geophysics, Geosystems **7**(7): DOI:10.1029/2005GC001238

Jonathan T. Overpeck, Bette L. Otto-Bliesner, Gifford H. Miller, Daniel R. Muhs, Richard B. Alley, Jeffrey T. Kiehl (2006) Paleoclimatic Evidence for Future Ice-Sheet Instability and Rapid Sea-Level Rise. Science **311**(5768):1747-1750

Sophie Warny Rosemary A. Askin Michael J. Hannah Barbara A.R. Mohr J. Ian Raine David M. Harwood Fabio Florindo the SMS Science Team (2009) Palynomorphs from a sediment core reveal a sudden remarkably warm Antarctica during the middle Miocene. Geology **37**(10):955-958

David Ainley, Grant Ballard, Steve Ackley, Louise K. Blight, Joseph T. Eastman, Steven D. Emslie, Amélie Lescroël, Silvia Olmastroni, Susan E. Townsend, Cynthia T. Tynan, Peter Wilson, Eric Woehler (2007) Paradigm lost, or is top-down forcing no longer significant in the Antarctic marine ecosystem? Antarctic Science **19**(3):283-290

Stephen Nicol, John Croxall, Phil Trathan, Nick Gales, Eugene Murphy (2007) Paradigm misplaced? Antarctic marine ecosystems are affected by climate change as well as biological processes and harvesting. Antarctic Science **19**(3):291-295

Stefanie Kaise, Simone N. Brandão, Saskia Brix, David K. A. Barnes, David A. Bowden, Jeroen Ingels, Florian Leese, Stefano Schiaparelli, Claudia P. Arango, Renuka Badhe, Narissa Bax, Magdalena Blazewicz-Paszkowycz, Angelika Brandt, Nils Brenke, Ana I. Catarino, Bruno David, Chantal De Ridder, Philippe Dubois, Kari E. Ellingsen, Adrian G. Glover, Huw J. Griffiths, Julian Gutt, Kenneth M. Halanych, Charlotte Havermans, Christoph Held, Dorte Janussen, Anne-Nina Lörz, David A. Pearce, Benjamin Pierrat, Torben Riehl, Armin Rose, Chester J. Sands, Anna Soler-Membrives, Myriam Schüller, Jan M. Strugnell, Ann Vanreusel, Gritta Veit-Köhler, Nerida G. Wilson, Moriaki Yasuhara (2013) Patterns, processes and vulnerability of Southern Ocean benthos: a decadal leap in knowledge and understanding. Marine Biology 160(9):2295-2317

Jaume Forcada, Philip N. Trat (2009) Penguin responses to climate change in the Southern Ocean. Global Change Biology **15**(7):1618-1630

J. E. Barrett,R. A. Virginia,D. H. Wall,P. T. Doran,A. G. Fountain,K. A. Welch,W. B. Lyons (2008) Persistent effects of a discrete warming event on a polar desert ecosystem. Golbal Change Biology **14**(10):2249-2261

Heidi M. Dierssen (2010) Perspectives on empirical approaches for ocean color remote sensing of chlorophyll in a changing climate. PNAS **107**(40):17073-17078

Jill A. Peloquin, Walker O. Smith Jr. (2007) Phytoplankton blooms in the Ross Sea, Antarctica: Interannual variability in magnitude, temporal patterns, and composition. JOURNAL OF GEOPHYSICAL RESEARCH **112**(C8):DOI: 10.1029/2006JC003816

T. Tamura, G.D. Williams, A.D. Fraser & K.I. Ohshima (2012) Potential regime shift in decreased sea ice production after the Mertz Glacier calving. Nature Communications **3**(826): doi:10.1038/ncomms1820

Tosca Ballerini, Giacomo Tavecchia, Francesco Pezzo, Stéphanie Jenouvrier and Silvia Olmastroni (2015) Predicting responses of the Adélie penguin population of Edmonson Point to future sea ice changes in the Ross Sea. Front. Ecol. Evol. **13**: doi.org/10.3389/fevo.2015.00008

Eileen Y. Koh, Nof Atamna-Ismaeel, Andrew Martin, Rebecca O. M. Cowie, Oded Beja, Simon K. Davy, Elizabeth W. Maas and Ken G. Ryan (2010) Proteorhodopsin-Bearing Bacteria in Antarctic Sea Ice. Appl. Environ. Microbio **76**(17):5918-5925

Michael P. Meredith, John C. King (2005) Rapid climate change in the ocean west of the Antarctic Peninsula during the second half of the 20th century. Geophysical Research Letters **32**(19):DOI: 10.1029/2005GL024042

Craig D. Rye, Alberto C. Naveira Garabato, Paul R. Holland, Michael P. Meredith, A. J. George Nurser, Chris W. Hughes, Andrew C. Coward & David J. Webb (2014) Rapid sea-level rise along the Antarctic margins in response to increased glacial discharge. Nature Geoscience **7**:732-735

B. W. J. Miles, C. R. Stokes, A. Vieli & N. J. Cox (2013) Rapid, climate-driven changes in outlet glaciers on the Pacific coast of East Antarctica. Nature **500**:563-566

Eric Rignot, Jonathan L. Bamber, Michiel R. van den Broeke, Curt Davis, Yonghong Li, Willem Jan van de Berg & Erik van Meijgaard (2007) Recent Antarctic ice mass loss from radar interferometry and regional climate modelling. Nature Geoscience **1**:106-110

Robert Mulvaney, Nerilie J. Abram, Richard C. A. Hindmarsh, Carol Arrowsmith, Louise Fleet, Jack Triest, Louise C. Sime, Olivier Alemany & Susan Foord (2012) Recent Antarctic Peninsula warming relative to Holocene climate and ice-shelf history. Nature **489**:141-144

Andrew Shepherd, Duncan Wingham, David Wallis, Katharine Giles, Seymour Laxon, Aud Venke Sundal (2010) Recent loss of floating ice and the consequent sea level contribution. geophysical research letters **37**(13): DOI: 10.1029/2010GL042496

Andrew Shepherd, Duncan Wingham (2007) Recent Sea-Level Contributions of the Antarctic and Greenland Ice Sheets. Science **315**(5818):1529-1532

Benjamin E. Smith, Charles R. Bentley, Charles F. Raymond (2005) Recent elevation changes on the ice streams and ridges of the Ross Embayment from ICESat crossovers. Geophysical Research Letters **32**: doi:10.1029/2005GL024365

Craig R. Smith, Sarah Mincks, David J. DeMaster (2006) A synthesis of bentho-pelagic coupling on the Antarctic shelf: Food banks, ecosystem inertia and global climate change. Deep-Sea Res Pt II **53**:875-894

Raymond C. Smith, Douglas G.Martinson, Sharon E.Stammerjohn, Richard A.Iannuzzi, KirkIreson (2008) Bellingshausen and western Antarctic Peninsula region: Pigment biomass and sea-ice spatial/temporal distributions and interannual variability. Deep-Sea Res Pt II **55**(18-19):1949-1963

Sharon Stammerjohn, Robert Massom, David Rind, Douglas Martinson (2012) Regions of rapid sea ice change: An inter-hemispheric seasonal comparison. 39(6): DOI: 10.1029/2012GL050874

Enrique Isla, Dieter Gerdes, Albert Palanques, Núria Teixidó, Wolf Arntz, Pere Puig (2005) Relationships between Antarctic coastal and deep-sea particle fluxes: implications for the deep-sea benthos. Polar Biol **29**:249-256

Alexander J. P. Houben, Peter K. Bijl, Jörg Pross, Steven M. Bohaty, Sandra Passchier, Catherine E. Stickley, Ursula Röhl, Saiko Sugisaki, Lisa Tauxe, Tina van de Flierdt, Matthew Olney, Francesca Sangiorgi, Appy Sluijs, Carlota Escutia, Henk Brinkhuis, and the Expedition 318 Scientists (2013) Reorganization of Southern Ocean Plankton Ecosystem at the Onset of Antarctic Glaciation. Science **340**(6130):341-344

Grant Ballard, Viola Toniolo, David G. Ainley, Claire L. Parkinson, Kevin R. Arrigo, Phil N. Trathan (2010) Responding to climate change: Adélie Penguins confront astronomical and ocean boundaries. Ecology **91**(7):2056-2069

Irene R. Schloss, Doris Abele, Sébastien Moreau, Serge Demers, A.Valeria Bers, Oscar González, Gustavo A. Ferreyra (2012) Response of phytoplankton dynamics to 19-year (1991-2009) climate trends in Potter Cove (Antarctica). Journal of Marine Systems **92**(1):53-66

Jaume Forcada, Philip N. Trathan, Peter L. Boveng, Ian L.Boyd, Jennifer M. Burns, Daniel P. Costa, Michael Fedak, Tracey L. Rogers, Colin J. Southwell (2012) Responses of Antarctic pack-ice seals to environmental change and increasing krill fishing. Biological Conservation **149**(1):40-50

R. M. McKay, G. B. Dunbar, T. R. Naish, P. J. Barrett, L. Carter, M. Harper (2008) Retreat history of the Ross Ice Sheet (Shelf) since the Last Glacial Maximum from deep-basin sediment cores around Ross Island. Palaeo **260**(1-2):245-261

Andrew Mackintosh, Nicholas Golledge, Eugene Domack, Robert Dunbar, Amy Leventer, Duanne White, David Pollard, Robert DeConto, David Fink, Dan Zwartz, Damian Gore & Caroline Lavoie (2011) Retreat of the East Antarctic ice sheet during the last glacial termination. Nature Geoscience **4**:195-202

P. Convey, R. Bindschadler, G. Di Prisco, E. Fahrbach, J. Gutt, D.A. Hodgson, P.A. Mayewski, C.P. Summerhayes, J. Turner And The Acce Consortium (2009) Antarctic climate change and the environment. Antarctic Science **21**(6):541-563

S. Kawaguchi, A. Ishida, R. King, B. Raymond, N. Waller, A. Constable, S. Nicol, M. Wakita and A. Ishimatsu (2013) Risk maps for Antarctic krill under projected Southern Ocean acidification. Nature Climate Change **3**:843-847

John B. Anderson, Howard Conway, Philip J. Bart, Alexandra E. Witus, Sarah L. Greenwood, Robert M. McKay, Brenda L. Hall, Robert P. Ackert, Kathy Licht, Martin Jakobsson, John O. Stone (2014) Ross Sea paleo-ice sheet drainage and deglacial history during and since the LGM. Quaternary Science Reviews **100**:31-54

David J. Suggett, Jason M. Hall-Spencer, Riccardo Rodolfo-Metalpa, Toby G. Boatman, Ross Payton, D. Tye Pettay, Vivienne R. Johnson, Mark E. Warner, Tracy Lawson (2012) Sea anemones may thrive in a high CO2 world. Global Change Biolog **18**(10):3015-3025

Louise Emmerson, Colin Southwell (2008) Sea Ice Cover And Its Influence On Ad lie Penguin Reproductive Performance. Ecology **89**(8):2096-2102

Sharon E. Stammerjohn, Douglas G. Martinson, Raymond C. Smith, Richard A. Iannuzzi (2008) Sea ice in the western Antarctic Peninsula region: Spatio-temporal variability from ecological and climate change perspectives. Deep Sea Research Part II: Topical Studies in Oceanography **55**(18-19):2041-2058

Wing SR, McLeod RJ, Leichter JJ, Frew RD, Lamare MD. (2012) Sea ice microbial production

supports Ross Sea benthic communities: influence of a small but stable subsidy. Ecology **93**: 314-323

Garrison DL, Gibson A, Coale SL, Gowing MM, Okolodkov YB (2005) Sea-ice microbial communities in the Ross Sea: autumn and summer biota. Marine Ecology Progress Series **300**:39-52

Christopher R.Fielding, Greg H.Browne, Brad Field, Fabio Florindo, David M.Harwood, Lawrence A.Krissek, Richard H.Levy, Kurt S.Panter, Sandra Passchier, Stephen F.Pekar (2011) Sequence stratigraphy of the ANDRILL AND-2A drillcore, Antarctica: A long-term, ice-proximal record of Early to Mid-Miocene climate, sea-level and glacial dynamism. Palaeo **305**(1-4):337-351

Jonathan D. Toner, Ronald S. Sletten, Michael L. Prentice (2013) Soluble salt accumulations in Taylor Valley, Antarctica: Implications for paleolakes and Ross Sea Ice Sheet dynamics. Journal of Geophysical Research: Earth Surface **118**(1):198-215

Amelia E. Shevenell And Steven M. Bohaty (2012) Southern Exposure: New Paleoclimate Insights From Southern Ocean and Antarctic Margin Sediments. Oceanography **25**(3):106-107

Stefanie Kaiser and David K. A. Barnes (2008) Southern Ocean deep-sea biodiversity: sampling strategies and predicting responses to climate change. Climate Research **37**(2-3):165-179

J. B. Charrassin, M. Hindell, S. R. Rintoul, F. Roquet, S. Sokolovd, M. Biuw, D. Costa, L. Boehme, P. Lovell, R. Coleman, R. Timmermann, A. Meijers, M. Meredith, Y. H. Park, F. Bailleul, M. Goebel, Y. Tremblay, C. A. Bost, C. R. McMahon, I. C. Field, M. A. Fedak, and C. Guinet (2008) Southern Ocean frontal structure and sea-ice formation rates revealed by elephant seals. PNAS **105**(33):11634-11639

Ralph Timmermann, Hartmut H. Hellmer (2013) Southern Ocean warming and increased ice shelf basal melting in the twenty-first and twenty-second centuries based on coupled ice-ocean finite-element modelling. Ocean Dynamics **63**(9-10):1011-1026

Ian Joughin & Richard B. Alley (2011) Stability of the West Antarctic ice sheet in a warming world. Nature Geoscience **4**:506-513

Stanley S. Jacobs, Adrian Jenkins, Claudia F. Giulivi & Pierre Dutrieux (2011) Stronger ocean circulation and increased melting under Pine Island Glacier ice shelf. Nature Geoscience **4**:519-523

J.A. Dowdeswell D. Ottesen J. Evans C. Ó Cofaigh J.B. Anderson (2008) Submarine glacial landforms and rates of ice-stream collapse. Geology **36**(10):819-822

Adam R. Lewis David R. Marchant Douglas E. Kowalewski Suzanne L. Baldwin Laura E. Webb (2006) The age and origin of the Labyrinth, western Dry Valleys, Antarctica: Evidence for extensive middle Miocene subglacial floods and freshwater discharge to the Southern Ocean. Geology **34**(7):513-516

Walker O. Smith Jr, Michael S. Dinniman, Eileen E. Hofmann, John M. Klinck (2014) The

effects of changing winds and temperatures on the oceanography of the Ross Sea in the 21st century. Geophysical Research Letters **41**(5):1624-1631

David G. Ainley, Donald B. Siniff (2009) The importance of Antarctic toothfish as prey of Weddell seals in the Ross Sea. Antarctic Science **21**(4):317-327

Jens-Christian Svenning, Wolf L. Eiserhardt, Signe Normand, Alejandro Ordonez, and Brody Sandel (2015) The Influence of Paleoclimate on Present-Day Patterns in Biodiversity and Ecosystems. Annual Review of Ecology, Evolution, and Systematics **46**:551-572

Peter U. Clark, Arthur S. Dyke, Jeremy D. Shakun, Anders E. Carlson, Jorie Clark, Barbara Wohlfarth, Jerry X. Mitrovica, Steven W. Hostetler, A. Marshall McCabe (2009) The Last Glacial Maximum. Science **325**(5941):710-714

Anders Levermann, Peter U. Clark, Ben Marzeion, Glenn A. Milne, David Pollard, Valentina Radic, and Alexander Robinson (2013) The multimillennial sea-level commitment of global warming. PNAS **110**(34):13745-13750

Walker O. SmithJr.,1 David G. Ainley,2 Kevin R. Arrigo,3 and Michael S. Dinniman (2012) The Oceanography and Ecology of the Ross Sea. Annual Review of Marine Science **6**:469-487

Robin E. Bell (2008) The role of subglacial water in ice-sheet mass balance. Nature Geoscience **1**:297-304

Walker O. Smith Jr., Peter N. Sedwick, Kevin R. Arrigo, David G. Ainley, Alejandro H. Orsi (2012) The Ross Sea in a Sea of Change. Oceanography **25**(3):1-15

Phil O' B. Lyver, Mandy Barron, Kerry J. Barton, David G. Ainley, Annie Pollard, Shulamit Gordon, Stephen McNeill, Grant Ballard, Peter R. Wilson (2014) Trends in the Breeding Population of Adélie Penguins in the Ross Sea, 1981-2012: A Coincidence of Climate and Resource Extraction Effects. PLOS ONE **9**(3): doi.org/10.1371/journal.pone.0091188

S.M. Barber-Meyer, G.L. Kooyman and P.J. Ponganis (2008) Trends in western Ross Sea emperor penguin chick abundances and their relationships to climate. Antarctic Science **20**(1):3-11

Wayne Z. Trivelpiece, Jefferson T. Hinke, Aileen K. Miller, Christian S. Reissa, Susan G. Trivelpiece, and George M. Watters (2011) Variability in krill biomass links harvesting and climate warming to penguin population changes in Antarctica. PNAS **108**(18):7625-7628

Adriana Canapa, Marco Barucca, Stefania Gorbi, Maura Benedetti, Sara Zucchi, Maria Assunta Biscotti, Ettore Olmo, Marco Nigro, Francesco Regoli (2007) Vitellogenin gene expression in males of the Antarctic fish Trematomus bernacchii from Terra Nova Bay (Ross Sea): A role for environmental cadmium? Chemosphere **66**(7):1270-1277

Eric J. Steig, David P. Schneider, Scott D. Rutherford, Michael E. Mann, Josefino C. Comiso & Drew T. Shindell (2009) Warming of the Antarctic ice-sheet surface since the 1957 International Geophysical Year. Nature **457**:459-462

Hugh W.Ducklow, WilliamFraser, David M.Karl, Langdon B.Quetin, Robin M.Ross, Raymond

C.Smith, Sharon E. Stammerjohn, Maria Vernet, Robert M.Daniels (2006) Water-column processes in the West Antarctic Peninsula and the Ross Sea: Interannual variations and foodweb structure. Deep Sea Research Part II: Topical Studies in Oceanography **53**(8-10):834-852

P. A. Mayewski, K. A. Maasch, D. Dixon, S. B. Sneed, R. Oglesby, E. Korotkikh, M. Potocki, B. Grigholm, K. Kreutz, A. V. Kurbatov, N. Spaulding, J. C. Stager, K. C. Taylor, E. J. Steig, J. White, N. A. N. Bertler, I. Goodwin, J. C. Simões, R. Jaña, S. Kraus, J. Fastook (2012) West Antarctica's sensitivity to natural and human-forced climate change over the Holocene. JQS **28**(1):40-48

Maria Vernet, Douglas Martinson, Richard Iannuzzi, Sharon Stammerjohn, Wendy Kozloski, Karie Sines, Ray Smith, Irene Garibotti (2008) Primary production within the sea-ice zone west of the Antarctic Peninsula: I—Sea ice, summer mixed layer, and irradiance. Topical Studies in Oceanography **55**(18-19):2068 - 2085

Pippa L. Whitehouse, Michael J. Bentley, Glenn A. Milne, Matt A. King, Ian D. Thomas (2012) A new glacial isostatic adjustment model for Antarctica: calibrated and tested using observations of relative sea-level change and present-day uplift rates. Geophysical J. Int. **190**:1464-1482

주 의

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