

Cruise track from RVIB Nathaniel B. Palmer NBP0901 in the Southern Ocean, Pine Island Bay/Amundsen Sea Polynya from January to February 2009 (DynaLiFE project)

Website: <https://www.bco-dmo.org/dataset/631142>

Version: 07 January 2016

Version Date: 2016-01-07

Project

» [IPY: Shedding dynamic light on iron limitation: The interplay of iron limitation and dynamic irradiance in governing the phytoplankton distribution in the Ross Sea](#) (DynaLiFE)

Contributors	Affiliation	Role
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Dataset Description

Cruise track generated from MGDS:Nav files
Cruise Id, Date/Time UTC, Lat, Lon, SOG, COG
1 minute fixes

Data DOI: 10.1594/IEDA/312431

Methods & Sampling

Processed ship-based Navigation Data from the Amundsen Sea, Antarctica acquired during the Nathaniel B. Palmer expedition NBP0901 (2009)

This data set was acquired with a ship-based Navigation system during Nathaniel B. Palmer expedition NBP0901 conducted in 2009 (Chief Scientist: Dr. Stan Jacobs). These data files are of MGDS:Nav format and include Primary Navigation data and were processed after data collection. Data were acquired as part of the project(s): Collaborative International Research: Amundsen Sea Influence on West Antarctic Ice Sheet Stability and Sea Level Rise, Shedding dynamic light on iron limitation: The interplay of iron limitation and dynamic irradiance conditions in governing the phytoplankton distribution in the Ross Sea, and Collaborative Research: Sampling the ocean - sea ice interaction in the Pacific center of the Antarctic Dipole, and funding was provided by NSF grant(s): OPP06-32282.

Data Processing Description

Quality 1 - A level of processing has been undertaken, ensuring quality control (e.g. ping edited sonar data,

edited navigation data).

BCO-DMO Processing Notes

- Generated from NBP0901 Primary Navigation data (quality version 2) downloaded 6 February 2015 from the Marine GeoScience Data System (MGDS)
- Awk routine generated to reformat original files into BCO-DMO servable file format
- Awk routine: "MGDS_Nav_2_CruiseTrack.awk"
- Parameter names generated to conform to BCO-DMO naming convention found at [Choosing Parameter Name](#)
- Date/Time reformatted to ISO DateTime format
- Cruise Id added to data
- SOG and COG values not reported in original files
- SOG and COG (both set to 0.0) added to each data record for compatibility with other BCO-DMO cruise track datasets

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Data Files

File
CruiseTrack.csv (Comma Separated Values (.csv), 3.82 MB) MD5:4ed380615108215076d0ff8c6619b4c3
Primary data file for dataset ID 631142

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Parameters

Parameter	Description	Units
CruiseId	Official UNOLS cruise id	text
ISO_DateTime_UTC	ISO formatted UTC Date and Time	YYYY-MM-DDTHH:MM:SSZ
Latitude	Latitude Position (South is negative)	decimal degrees
Longitude	Longitude Position (West is negative)	decimal degrees
SOG	Instantaneous Speed-over-ground	meters/sec
COG	Instantaneous Course-over-ground [deg. clockwise from North]	decimal degrees

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Instruments

Dataset-specific Instrument Name	GPS
Generic Instrument Name	Global Positioning System Receiver
Dataset-specific Description	This data set was acquired with a ship-based Navigation system
Generic Instrument Description	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

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Deployments

NBP0901

Website	https://www.bco-dmo.org/deployment/630669
Platform	RVIB Nathaniel B. Palmer
Report	http://dmoserv3.whoi.edu/data_docs/DynaLiFE/CruiseReport_NBP0901-1.pdf
Start Date	2009-01-05
End Date	2009-02-26
Description	Three international science projects were accommodated on NB Palmer cruise 09-01. O-274, entitled 'Amundsen Sea Influence on West Antarctic Ice Sheet Stability and Sea Level Rise,' (S Jacobs, A Jenk- ins & H Hellmer, PIs) seeks to better understand ocean forcing on ice shelf, ice stream and sea ice change, and the sources of ocean freshening. Its several related subcomponents included setting out time series moorings to record temperature, salinity and currents over a period of two years; repeat profiling of water column properties on and near the Amundsen continental shelf; using the UK 'Autosub' to map thermoha- line properties, currents and dimensions of the Pine Island Ice Shelf cavity; modeling the ocean circulation; sampling the sea ice, setting out drifters and mass balance buoys and recording sea ice properties underway; swath-mapping the sea floor; and outreach photography and video. B-244, 'Shedding Dynamic Light on Iron Limitation,' (K Arrigo, PI), a US/Netherlands/Canada project, sampled surface and subsurface waters to 300 m with trace metal clean equipment/methods to assess the influence of iron and light on phytoplankton productivity and species distribution. The goal of O-261, 'Sampling the ocean-sea ice interaction in the Pacific center of the Antarctic Dipole,' (X Yuan and J Sprintall, PIs) was to set a deep mooring northwest of the Amundsen Sea continental shelf to monitor the upper ocean role and response in ENSO teleconnections, complemented by German work near the Atlantic Dipole in the Weddell Sea. CruiseTrack and Stations Image

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Project Information

IPY: Shedding dynamic light on iron limitation: The interplay of iron limitation and dynamic irradiance in governing the phytoplankton distribution in the Ross Sea (DynaLiFE)

Website: <http://ocean.stanford.edu/dynalife>

Coverage: Antarctica - Pine Island Bay, Amundsen Sea Polynya

IPY: Shedding dynamic light on iron limitation: The interplay of iron limitation and dynamic irradiance in governing the phytoplankton distribution in the Ross Sea

The Southern Ocean plays an important role in the global carbon cycle, accounting for approximately 25% of total anthropogenic CO₂ uptake by the oceans, mainly via primary production. In the Ross Sea, primary production is dominated by two taxa that are distinct in location and timing. Diatoms dominate in the shallow mixed layer of the continental shelf, whereas the colony forming *Phaeocystis antarctica* (Prymnesiophyceae) dominate in the more deeply mixed, open regions. Significantly, both groups have vastly different nutrient utilization characteristics, and support very different marine food webs. Their responses to climate change, and the implications for carbon export, are unclear. Previous studies show that light availability and the quality of the light climate (static versus dynamic) play a major role in defining where and when the different phytoplankton taxa bloom. However, iron (Fe) limitation of the algal communities in both the sub-Arctic and the Southern Ocean is now well documented. Moreover, phytoplankton Fe demand varies as a function of irradiance. The main hypothesis of the proposed research is: The interaction between Fe limitation and dynamic irradiance governs phytoplankton distributions in the Ross Sea. Our strategy to test this hypothesis is three-fold: 1) The photoacclimation of the different phytoplankton taxa to different light conditions under Fe limitation will be investigated in experiments in the laboratory under controlled Fe conditions. 2) The photophysiological mechanisms found in these laboratory experiments will then be tested in the field on two cruises with international IPY partners. 3) Finally, data generated during the lab and field parts of the project will be used to parameterize a dynamic light component of the Coupled Ice Atmosphere and Ocean (CIAO) model of the Ross Sea. Using the improved model, we will run future climate scenarios to test the impact of climate change on the phytoplankton community structure, distribution, primary production and carbon export in the Southern Ocean. The proposed research complies with IPY theme "Understanding Environmental change in Polar Regions" and includes participation in an international cruise. Detailed model descriptions and all of the results generated from these studies will be made public via a DynaLiFe website. Improving the CIAO model will give us and other IPY partners the opportunity to test the ecological consequences of physiological characteristics observed in Antarctic phytoplankton under current and future climate scenarios. Outreach will include participation in Stanford's Summer Program for Professional Development for Science Teachers, Stanford's School of Earth Sciences high school internship program, and development of curriculum for local science training centers, including the Chabot Space and Science Center.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

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A-C. Alderkamp, H.J.W. de Baar, R.J.W. Visser, K.R. Arrigo. "Can Photoinhibition control phytoplankton abundance in deeply mixed water columns of the Southern Ocean?," *Limnology and Oceanography*, v.55, 2010, p. 1248.

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Funding

Funding Source	Award
NSF Antarctic Sciences (NSF ANT)	ANT-0732535

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