Wind and weather data from the Joubin and Wauwerman Islands acquired between January 01 and March 11 2020.

Website: https://www.bco-dmo.org/dataset/865098
Data Type: Other Field Results
Version: 1
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Project
» Collaborative Research: Physical Mechanisms Driving Food Web Focusing in Antarctic Biological Hotspots (Project SWARM)

Contributors	Affiliation	Role
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Abstract
Wind and weather data from the Joubin and Wauwerman Islands acquired between January 01 and March 11 2020.

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Coverage

Spatial Extent: **N**:-64.787 **E**:-64.049 **S**:-64.918 **W**:-64.3607
Temporal Extent: 2020-01-01 - 2020-03-11

Acquisition Description

Wind data were collected in 1 minute intervals at two weather stations on the Joubin and Wauwerman Islands on the west and east flanks of Palmer Deep Canyon. Data were sampled at 1 minute intervals.

Processing Description

Data were averaged hourly to produce an hourly timeseries of wind speeds to match High Frequency Radar sampling intervals.

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Related Publications

Hudson, K., Oliver, M. J., Kohut, J., Dinniman, M. S., Klinck, J. M., Moffat, C., … Fraser, W. (2021). A Recirculating Eddy Promotes Subsurface Particle Retention in an Antarctic Biological Hotspot. Journal of Geophysical Research: Oceans, 126(11). doi:10.1029/2021jc017304
https://doi.org/10.1029/2021JC017304
Results

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Parameters

Parameter	Description	Units
site	Site where data was collected. Joub = Joubin Island; Wauw = Wauwerman Islands	unitless
latitude	latitude of site in decimal degrees	decinal degrees
longitude	longitude of site in decimal degrees	decinal degrees
Sample_DateTime	Date and time (UTC)	unitless
datetime	Same as column 2	unitless
yr	Year of sample	unitless
month	Month of sample	unitless
day	Date of sample	unitless
hr	Hour of sample	unitless
Unit_Id	The location of the weather station: BASE = a ridge behind station; AWS1 = Wauwerman Islands Lat: -64.918 deg Long: -64.049 deg; AWS2 = Joubin Island #1 Lat: -64.786987 deg Long: -64.360658; AWS3 = Gossler Island #412 Lat: -64.712916 Long: -64.348396	units
WS_Avg_2min	Wind speed, 2 min average	m/sec
WD_Avg_2min	Wind direction for 2 min average	unitless
WGS_10min	Wind gust speed, 10 min	m/sec
WGD_10min	Wind gust direction	unitless
Air_Temp	Air temperature (Rotronic, HC2S3, Hygroclip 2 Temp/RH))	degrees Celsius (°C)
Rel_Humidity	Relative humidity (Rotronic, HC2S3, Hygroclip 2 Temp/RH)	percent (%)
Dew_Point	Dew point, calculated from temp and RH	degrees Celsius (°C)
Pyranometer	Solar irradiance (Licor, LI-200R)	W/m^2
Quantum	Photosynthetically active radiation (Licor, LI-190)	uMol/sec/m^2
Air_Pressure	Atmospheric pressure (Honeywell, HPA200)	mbar (millibar)

Snow_Level	No sensor installed	unitless
Rainfall	Melted precipitation. Mesotech MT-PA01D 8" heated tipping rain bucket. Measures rainfall and melted snow/sleet. Each tip of the bucket corresponds to 0.254mm of precipitation.	mm (millimeters)
PW_Current	Present weather	unitless
Visibility	Visibility (Optical Scientific, Inc. OWI-430 WIVIS), maximum reange is 10km	m (meters)
CBase_1	Cloudbase, lower level. Mesotech ceilometer, CBME80. This device measures cloud height using LIDAR. A pulsedlight beam is directed vertically and the return signal is detected. Depending on the nature of that return, distinct cloud layers may be detected: lower, middle and upper. If there is no distinct return (due to fog, for instance), vertical visibility is reported.	feet
CBase_2	Cloudbase, middle level	feet
CBase_3	Cloudbase, upper level	feet
Vert_Vis	Vertical visibility	feet

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Instruments

Dataset-specific Instrument Name	Rotronic, HC2S3, Hygroclip 2
Generic Instrument Name	Rotronics
Dataset-specific Description	Air temperature and relative humidity measured by Rotronic, HC2S3, Hygroclip 2
Generic Instrument Description	Rotronics used to measure Air Temperature

Dataset-specific Instrument Name	RM Young, Model 05108-45
Generic Instrument Name	Anemometer
Dataset-specific Description	RM Young, Model 05108-45
Generic Instrument Description	An anemometer is a device for measuring the velocity or the pressure of the wind. It is commonly used to measure wind speed. Aboard research vessels, it is often mounted with other meteorological instruments and sensors.

Dataset-specific Instrument Name	Licor, LI-190
Generic Instrument Name	LI-COR LI-190SA PAR Sensor
Generic Instrument Description	The LI-190SA Quantum Sensor is used to accurately measure (non-aquatic) Photosynthetically Active Radiation (PAR) in the range of 400-700 nm. Colored glass filters are used to tailor the silicon photodiode response to the desired quantum response. The LI-190SA is also used as a reference sensor for comparison to underwater PAR measured by the LI-192SA or LI-193 Underwater Quantum Sensors.

Dataset-specific Instrument Name	Honeywell, HPA200
Generic Instrument Name	Pressure Sensor
Dataset-specific Description	Air pressure
Generic Instrument Description	A pressure sensor is a device used to measure absolute, differential, or gauge pressures. It is used only when detailed instrument documentation is not available.

Dataset-specific Instrument Name	Mesotech, MT-PA01D 8" heated, tipping rain bucket
Generic Instrument Name	Precipitation Gauge
Dataset-specific Description	Mesotech, MT-PA01D 8" heated, tipping rain bucket. Measures rainfall and melted snow/sleet. Each tip of the bucket corresponds to 0.254mm of precipitation.
Generic Instrument Description	measures rain or snow precipitation

Dataset-specific Instrument Name	Optical Scientific, Inc. OWI-430 WIVIS
Generic Instrument Name	OSi OWI-430 DSP-WIVIS Present Weather and Visibility Sensor
Dataset-specific Description	Optical Scientific, Inc. OWI-430 WIVIS
Generic Instrument Description	The Osi OWI-430 WIVIS is an optical weather and visibility sensor that measures visibility, rain, snow, drizzle, freezing and mixed precipitation conditions. It measures rain in dynamic range 0.1 to 3000 mm/hr; snow in dynamic range 0.01 to 300 mm/hr; visibility in dynamic range 0.001 to 10 km. It is designed to operate in temperatures from -40 to 50 degC, and humidity from 0 to 100 percent.

Dataset-specific Instrument Name	Mesotech ceilometer, CBME80
Generic Instrument Name	cloud cover quantifiers
Dataset-specific Description	his device measures cloud height using LIDAR. A pulsed light beam is directed vertically and the return signal is detected. Depending on the nature of that return, distinct cloud layers may be detected: lower, middle and upper. If there is no distinct return (due to fog, for instance), vertical visibility is reported.
Generic Instrument Description	Instruments that measure the proportion of the sky covered by cloud (cloud amount) and/or the height of the cloud above the ground (cloud base). Also called ceilometers.

Dataset-specific Instrument Name	Licor, LI-200R
Generic Instrument Name	LI-COR LI-200R Pyranometer
Dataset-specific Description	"Solar irradiance (Licor, LI-200R)
Generic Instrument Description	The LI-200R Pyranometer is meant to be used outdoors under unobstructed natural daylight conditions. It measures global solar radiation—the combination of direct and diffuse solar radiation—in the 400 to 1100 nm range. Measurement units are in watts per square meter (W m-2).

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Project Information

Collaborative Research: Physical Mechanisms Driving Food Web Focusing in Antarctic Biological Hotspots (Project SWARM)

Coverage: West Antarctic Peninsula

NSF Award Abstract:
Undersea canyons play disproportionately important roles as oceanic biological hotspots and are critical for our understanding of many coastal ecosystems. Canyon-associated biological hotspots have persisted for thousands of years Along the Western Antarctic Peninsula, despite significant climate variability. Observations of currents over Palmer Deep canyon, a representative hotspot along the Western Antarctic Peninsula, indicate that surface phytoplankton blooms enter and exit the local hotspot on scales of ~1-2 days. This time of residence is in conflict with the prevailing idea that canyon associated hotspots are primarily maintained by phytoplankton that are locally grown in association with these features by the upwelling of deep waters rich with nutrients that fuel the phytoplankton growth. Instead, the implication is that horizontal ocean circulation is likely more important to maintaining these biological hotspots than local upwelling through its physical concentrating effects. This project seeks to better resolve the factors that

create and maintain focused areas of biological activity at canyons along the Western Antarctic Peninsula and create local foraging areas for marine mammals and birds. The project focus is in the analysis of the ocean transport and concentration mechanisms that sustain these biological hotspots, connecting oceanography to phytoplankton and krill, up through the food web to one of the resident predators, penguins. In addition, the research will engage with teachers from school districts serving underrepresented and underserved students by integrating the instructors and their students completely with the science team. Students will conduct their own research with the same data over the same time as researchers on the project. Revealing the fundamental mechanisms that sustain these known hotspots will significantly advance our understanding of the observed connection between submarine canyons and persistent penguin population hotspots over ecological time, and provide a new model for how Antarctic hotspots function.

To understand the physical mechanisms that support persistent hotspots along the Western Antarctic Peninsula (WAP), this project will integrate a modeling and field program that will target the processes responsible for transporting and concentrating phytoplankton and krill biomass to known penguin foraging locations. Within the Palmer Deep canyon, a representative hotspot, the team will deploy a High Frequency Radar (HFR) coastal surface current mapping network, uniquely equipped to identify the eddies and frontal regions that concentrate phytoplankton and krill. The field program, centered on surface features identified by the HFR, will include (i) a coordinated fleet of gliders to survey hydrography, chlorophyll fluorescence, optical backscatter, and active acoustics at the scale of the targeted convergent features; (ii) precise penguin tracking with GPS-linked satellite telemetry and time-depth recorders (TDRs); (iii) and weekly small boat surveys that adaptively target and track convergent features to measure phytoplankton, krill, and hydrography. A high resolution physical model will generalize our field measurements to other known hotspots along the WAP through simulation and determine which physical mechanisms lead to the maintenance of these hotspots. The project will also engage educators, students, and members of the general public in Antarctic research and data analysis with an education program that will advance teaching and learning as well as broadening participation of under-represented groups. This engagement includes professional development workshops, live connections to the public and classrooms, student research symposia, and program evaluation. Together the integrated research and engagement will advance our understanding of the role regional transport pathways and local depth dependent concentrating physical mechanisms play in sustaining these biological hotspots.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1745009
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1744884
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NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1745018
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1745023
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1745081

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