BioGeoChemical (BGC) Argo
the ocean in color

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Argo Footprint

Shipboard Profiles of Temperature and Salinity to 1,000 m in Past 100 years

Float Profiles of Temperature and Salinity from 1999 to Feb. 2021

One Argo Vision:
1,000 BGC (468)
2,350 Core (3,944)
1,250 Deep (179)

G.C. Johnson et al., 2021 - ARMS
BGC Argo: Observed Parameters

- Particle Backscatter ($b_{bp}$)
- Chlorophyll Fluorescence (Chl-f)
- Oxygen
- pH
- Nitrate
- *Downwelling Irradiance ($\lambda$)

Operational Floats (468)
- pH (201)
- Nitrate (174)
- Downwelling irradiance (67)
- Chlorophyll a (253)
- Oxygen (458)
- Full BGC Floats (13)
BGC Argo: Derived Variables

Derived Variables:
- dissolved inorganic carbon (DIC)
- particulate organic carbon
- anthropogenic carbon
- total alkalinity
- phosphate
- silicate
- $pCO_2$
- Chl-a
- $\Omega_{\text{Ar}}$

GPS & Iridium

Particle Backscatter ($b_{bp}$)

Chlorophyll Fluorescence (Chl-f)

CTD

Oxygen

pH

Nitrate

*Downwelling Irradiance ($\lambda$)
BGC Argo: Derived Variables

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• dissolved inorganic carbon (DIC)
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Particle Backscatter ($b_{bp}$)
Chlorophyll Fluorescence (Chl-f)

*Downwelling Irradiance ($\lambda$)

Carter et al., 2021

Float image credit: MBARI
BGC Argo: Capabilities

**Estimated Quantities & Data Products:**
- Air-sea carbon dioxide flux
- Air-sea oxygen flux
- Particle size differentiation
- Gross Primary Production
- Net Primary Production
- Net Community Production
- In situ particle sinking flux
- Data constrained models

**BGC float + SOCAT 2015-2017 CO₂ fluxes**

- SOCAT + SOCCOM
- SOCCOM-weighted

**Bushinsky et al. 2019**
BGC Argo: Capabilities

Estimated Quantities & Data Products:

• Air-sea carbon dioxide flux
• Air-sea oxygen flux
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BGC float + B-SOSE Monthly pH Climatology

monthly
$1^\circ \times 1^\circ$
42 depths

Mazloff et al., in prep
BGC Argo: Capabilities

**Estimated Quantities & Data Products:**
- Air-sea carbon dioxide flux
- Air-sea oxygen flux
- Particle size differentiation
- Gross Primary Production
- Net Primary Production
- Net Community Production
- In situ particle sinking flux
- Data constrained models

**BGC float + Satellite**
- Chl-a and POC
- Weekly data
- 0.25°×0.25° resolution
- 36 depths from 0-1000m

Claustre et al., 2020
after Sauzède et al., 2016
Growing the BGC Float Footprint

4+ Sensor BGC Argo Floats
04-Jun-2022

Floats with 4 sensors: 37
Floats with 5 sensors: 162
Floats with 6 sensors: 13
MBARI floats in yellow

June 2022

SOCCOM
Unlocking the mysteries of the Southern Ocean

GO-BGC
Global Ocean Biogeochemistry Array
GOMO Contributions to BGC Argo

Growing NOAA Capacity

Andrea Fassbender
PMEL

Emily Osborne
AOML

BGC Argo Pilot Arrays

Global Data Assembly Center

for archival and public access

US Data Assembly Center

May 2022 NASA MODIS-Aqua
GOMO Contributions to BGC Argo

Ensuring the Highest Quality Data Possible

BGC property estimations used routinely in BGC sensor data quality control

Seth Bushinsky
U. Hawaii

Lowering Barriers to Argo Data Access

OneArgo-Mat & OneArgo-R Toolboxes

Brendan Carter
CICOES/PMEL

Secondary quality control of BGC sensor data via ship-float crossovers
OneArgo Toolbox (Core, Deep, & BGC)

MATLAB

Hartmut Frenzel
Jon Sharp
Nina Buzby
Andrea Fassbender

R

Yibin Huang
Marin Cornec
& colleagues

OCB Highlight

Powerful new tools for working with Argo data

No single program has been as transformative for ocean science over the past two decades as Argo: the fleet of robotic instruments that collect measurements of temperature and salinity in the upper 2 km of the ocean around the globe. The Argo program has been
Next Steps and Opportunities

- Implement near real-time data QC for all BGC float types.
- Connect with NOAA fisheries, remote sensing, and carbon dioxide removal efforts.
- Conduct basic research.
- Grow the CCS and GOM BGC float arrays.
- Build capacity within the US Argo consortium.
- Develop dynamic data products and pave the way for a BGC Argo MIP.
- Engage with modelers assimilating BGC float data.

Jonathan Sharp
NOAA PMEL
Education and Outreach Opportunities

NOAA-Led Adopt-A-Float Program

recruit the next generation of ocean researchers through climate education
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2000 Oxygen Profiles

A. Fassbender

Float image credit: MBARI