US BGC-Argo Data Management Update

Slides prepared by
Tanya Maurer & Josh Plant (MBARI); Claudia Schmid (AOML)

9th BGC Argo Meeting, ADMT 21
November 30 – December 1, 2020
Virtual

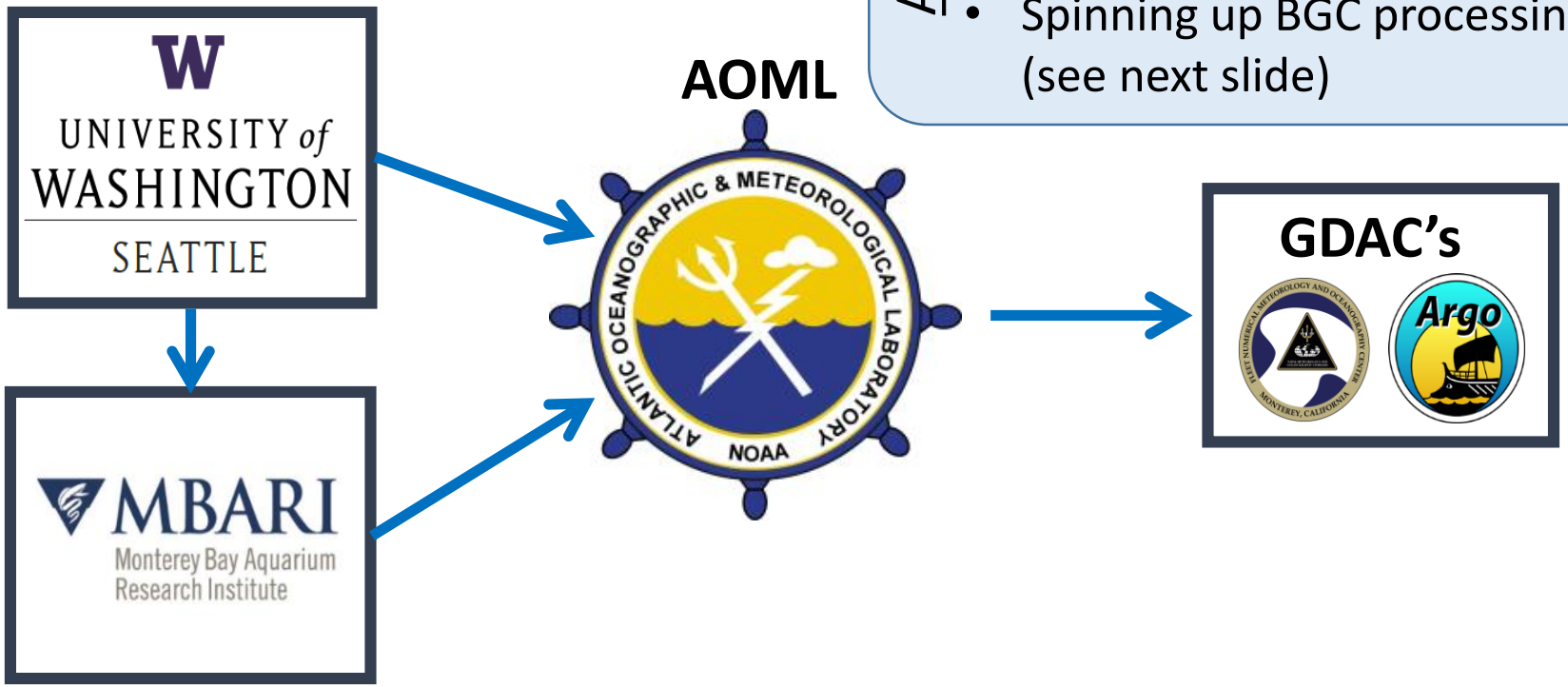
US BGC float data transfer workflow

UW

- Satellite data telemetry
- RT production of intermediate msg files for AOML
- DM for core data (T & S)
- UW historical oxygen floats (Matt Alkire)

AOML

- RT production of tech, meta, core traj and core R files
- Other historical oxygen floats
- Spinning up BGC processing capabilities! (see next slide)



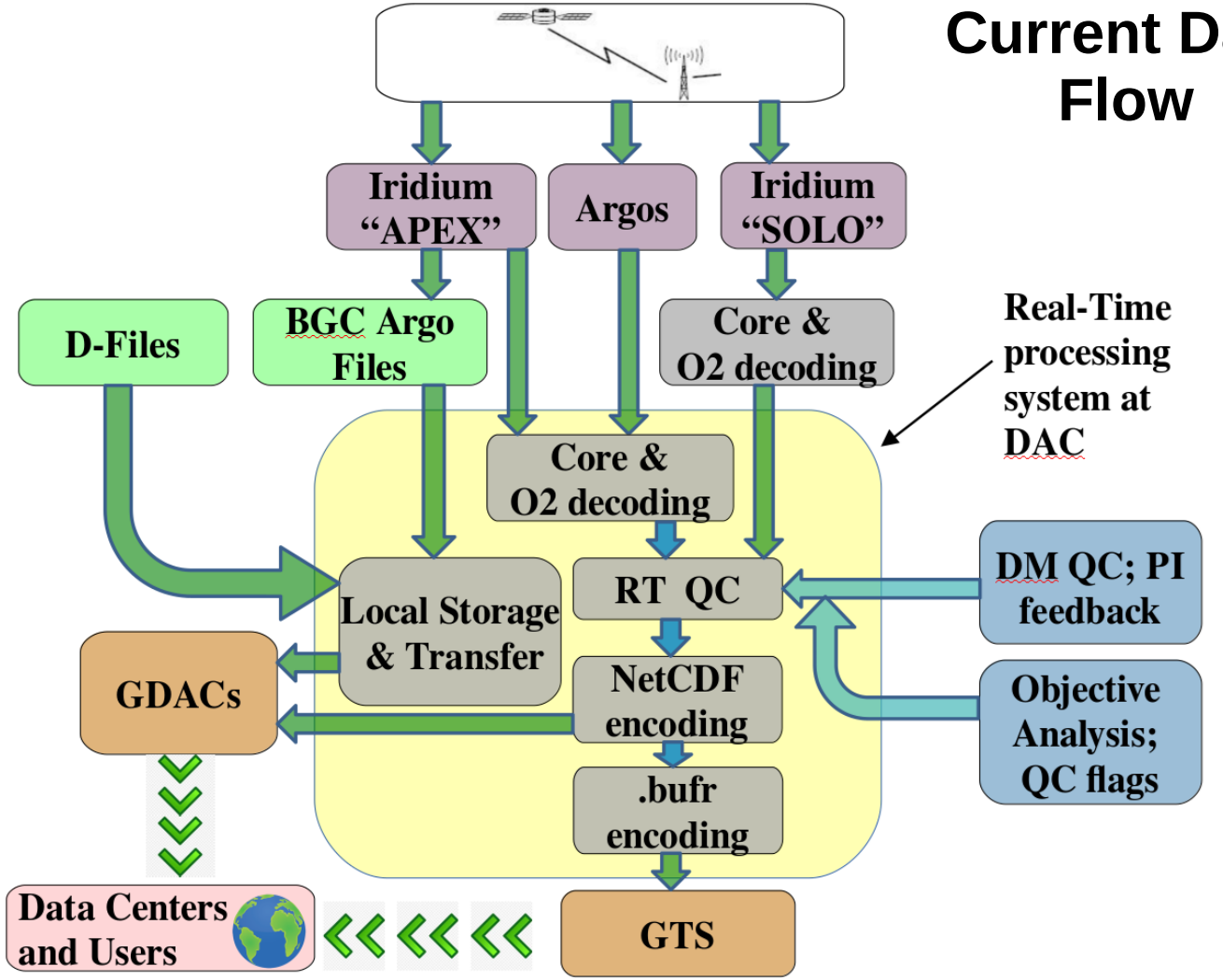
MBARI

- Scientific Processing of SOCCOM and pre-SOCCOM BGC float data (total 267 floats)
- RT production of BR-files
- 'A' and 'D' mode adjustments

Development of BGC processing system at AOML

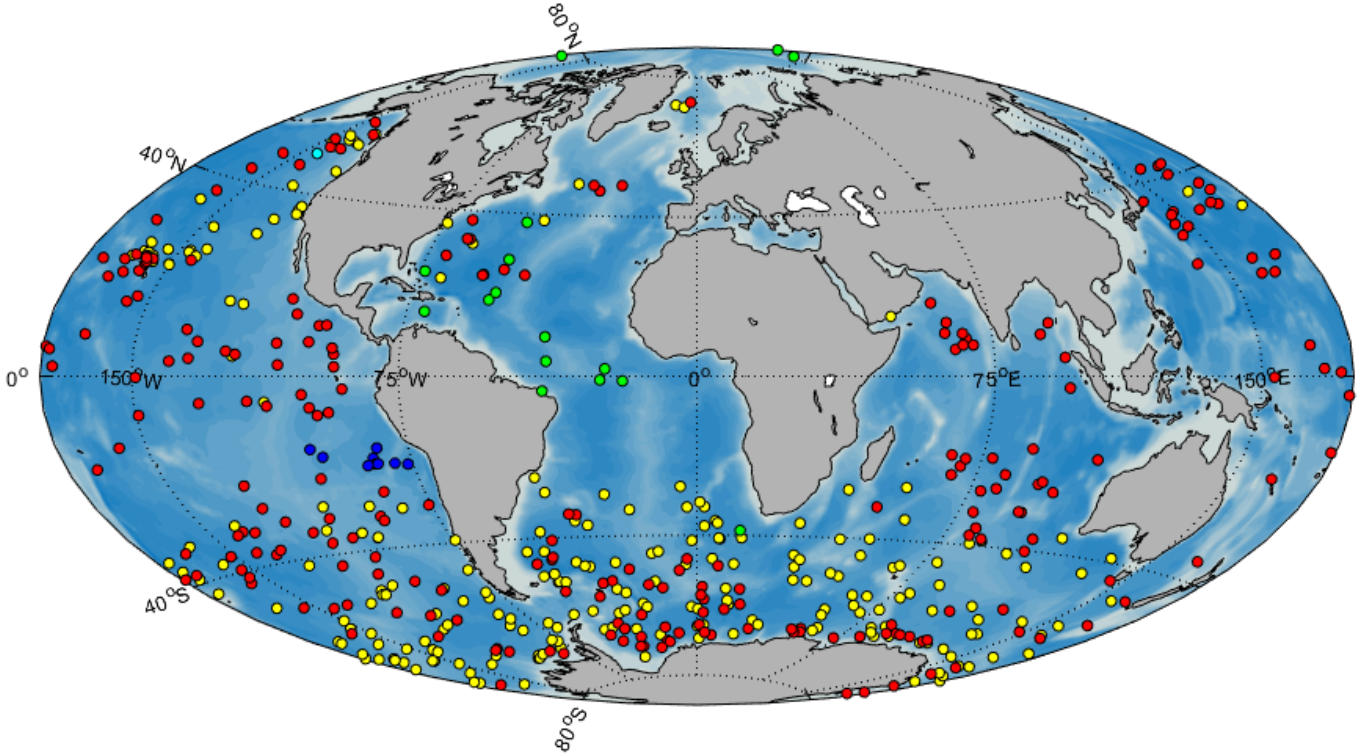
- Finished development of BGC decoding software for NAVIS and APEX iridium floats (following cookbook instructions).
- Currently working on writing output files & QC modules.
- Outlook: ready to implement in 2-3 months; start working on processing of SOLO-type BGC floats once format is specified.

Current Data Flow



Main US BGC DAC team: Jodi Brewster, Bo Yang, Claudia Schmid
With assistance from: Jaya Nair (QC), Charita Atluri (decoding)

AOML BGC Argo Floats



14 November 2020

- Riser & Johnson (245)
- Riser (242)
- Owens (21)
- Weller (10)
- Fassbender (1)

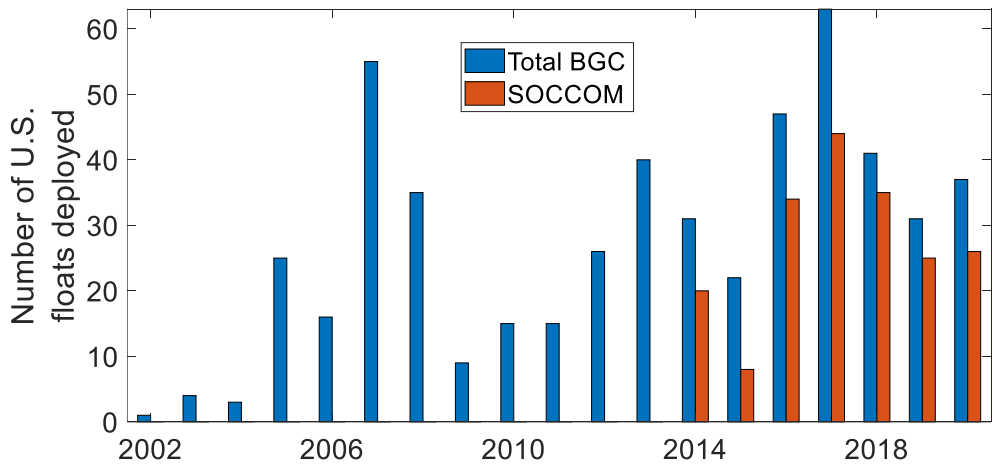
- **Total 519 Floats**
- **459 APEX, 29 Navis, 31 SOLO-1**
- **48 floats deployed since ADMT20**
  - **34 SOCCOM**
  - **3 CalCurrent (NOAA/PMEL)**
  - **11 NOAA TPOS**

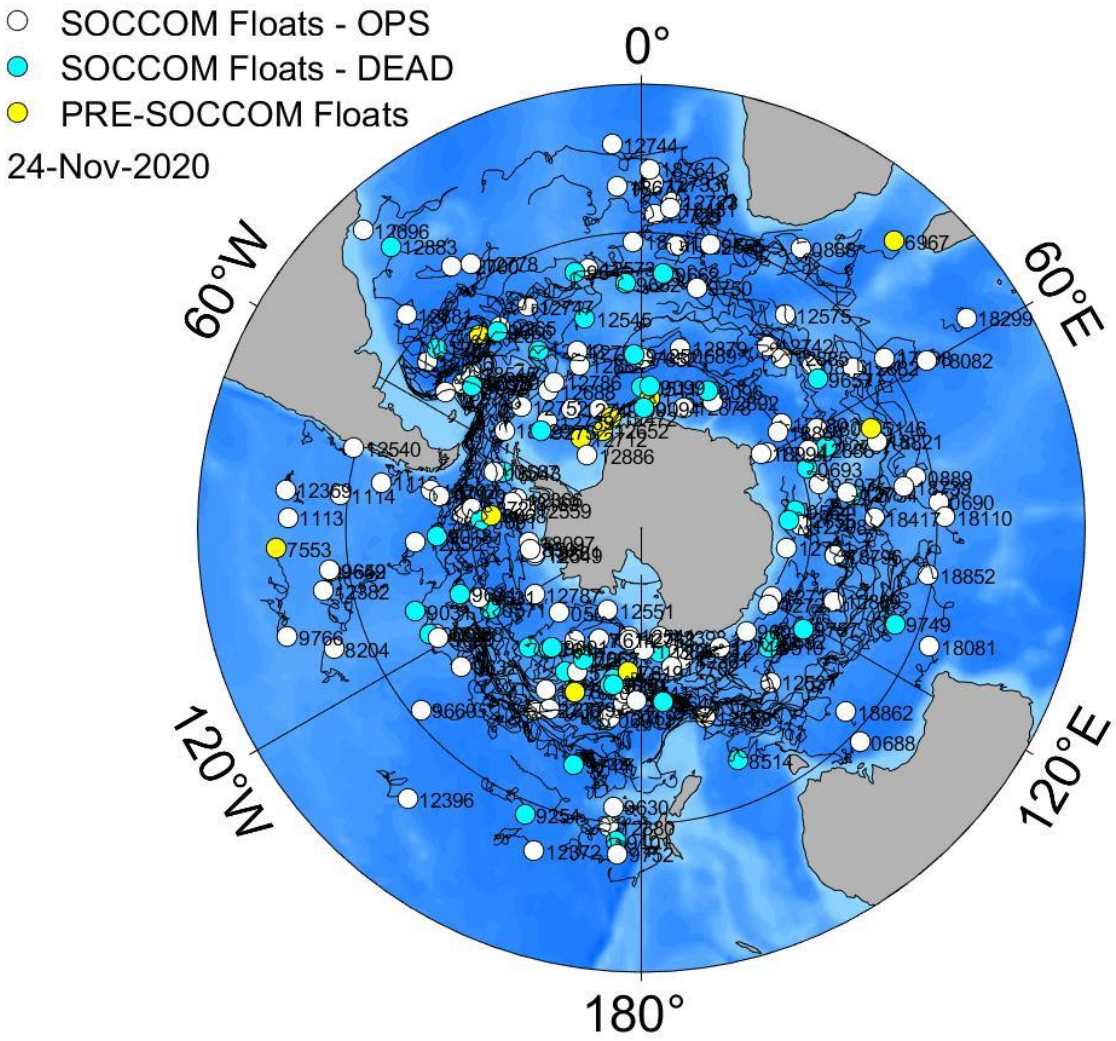
PARAMETER	N FLOATS
DOXY	519
NITRATE	245
PH_IN_SITU_TOTAL	215
CHLA	209
BBP	209
CDOM	28
DOWN_IRRADIANCE	0
UP_IRRADIANCE	0

SOCCOM

Southern Ocean Carbon and Climate Observations and Modeling

- **193 floats deployed!**
- **128 operational**
- **65 dead**
- **Program extended by NSF to 2014 (150 more floats)**
- **Largest US BGC program over the last 7 years (17,675 profiles on the GDAC)**



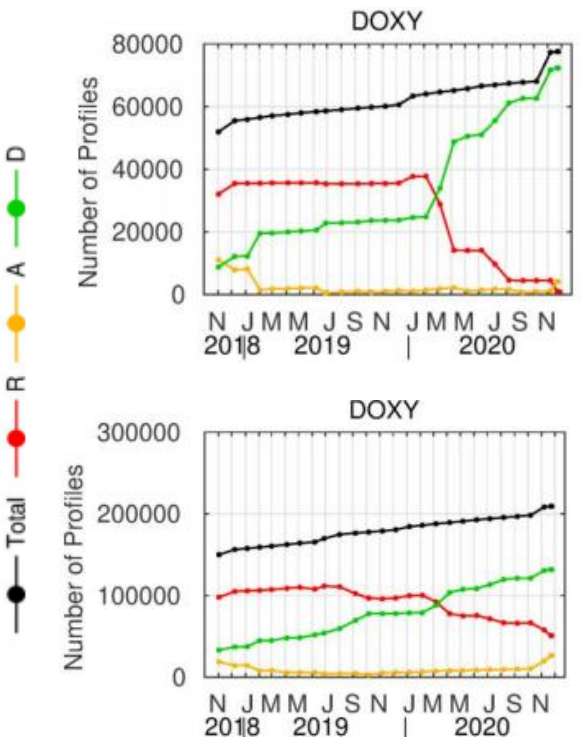


Increasing the level of BGC Adjusted data on the GDAC!!

DOXY Audit

ftp://ftp.mbari.org/pub/BGC_argo_audits/DOXY/

- MBARI-lead effort, developed by Josh Plant
- Identifies potentially bad profiles by comparing profile gains against global gain statistics for Argo array (all gains computed using WOA %sat reference)
- DACs are addressing anomalies and feeding back to the data system!
- Since July, 2020:
  - 14% increase in DOXY_ADJUSTED data (80% of total good DOXY profs are now adjusted!)
  - 16% reduction in anomalous profile count



AOML ONLY

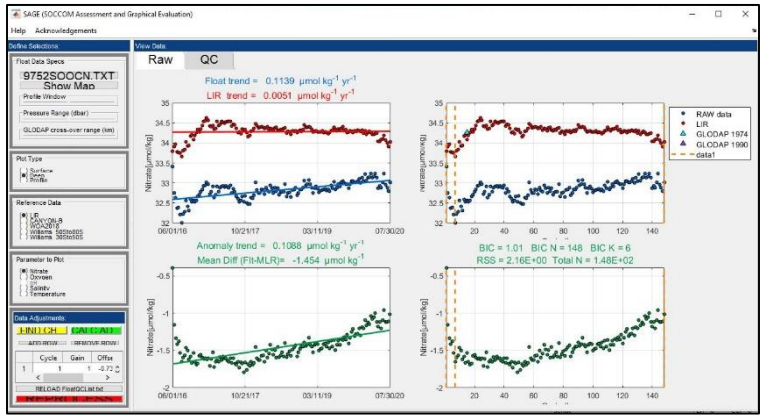
ALL DACs

Above plots from https://biogeochemical-argo.org/cloud/document/implementation-status/BGC_summary.pdf

SAGE-O2 & SAGE GUI for DMQC of DOXY, NITRATE, PH_IN_SITU_TOTAL

https://github.com/SOCCOM-BGCArgo/ARGO_PROCESSING

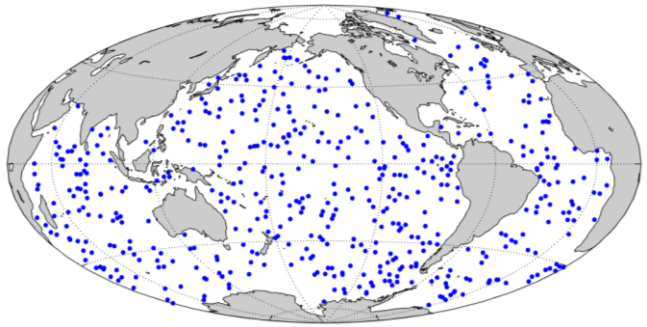
- MBARI-developed MATLAB GUIs for visualizing data in comparison to reference & deriving adjustment coefficients
- Adopted for use in DMQC by other DACs
- Enhancements and code porting efforts are expanding, ie:
  - Translation of SAGE-O2 code from MATLAB to Python (Chris Gordon)
  - Incorporation of CANYON-med (Fourrier et al, 2020) into SAGE forthcoming

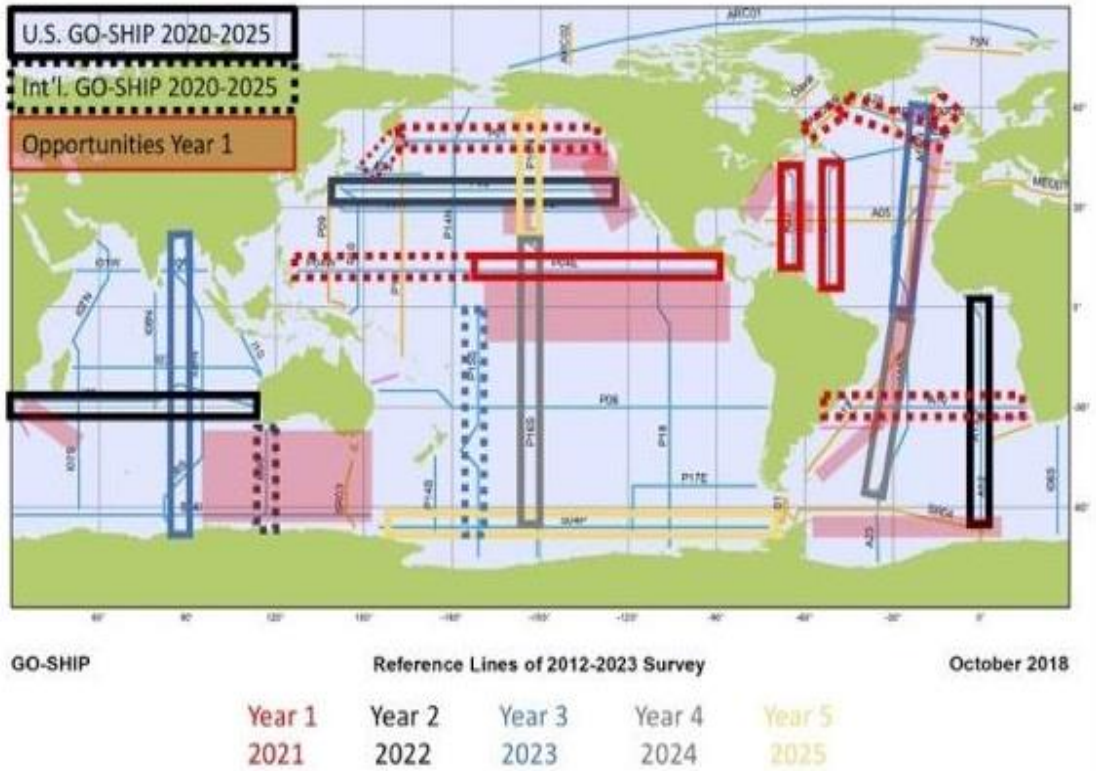


The Global Ocean Biogeochemistry (GO-BGC) array has been funded!!

Mid-scale RI-2 Consortium:
GO-BGC: A global robotic network to observe changing ocean chemistry and biology

- 500 BGC profiling floats deployed globally
- $52,900,000 over 5 yrs (no science funding)
- 5 institution consortium PI team
- MBARI to lead BGC Argo processing; core Argo processing managed by deployment institutions (ops proposal just submitted)
- Float deployment opportunities via US GO-SHIP





Ken Johnson	Lynne Talley	Steve Riser	Susan Wijffels	Jorge Sarmiento
MBARI	**SIO**	**Univ. of Wash.**	**WHOI**	**Princeton Univ.**
PI	Co-PI	Co-PI	Co-PI	Co-PI

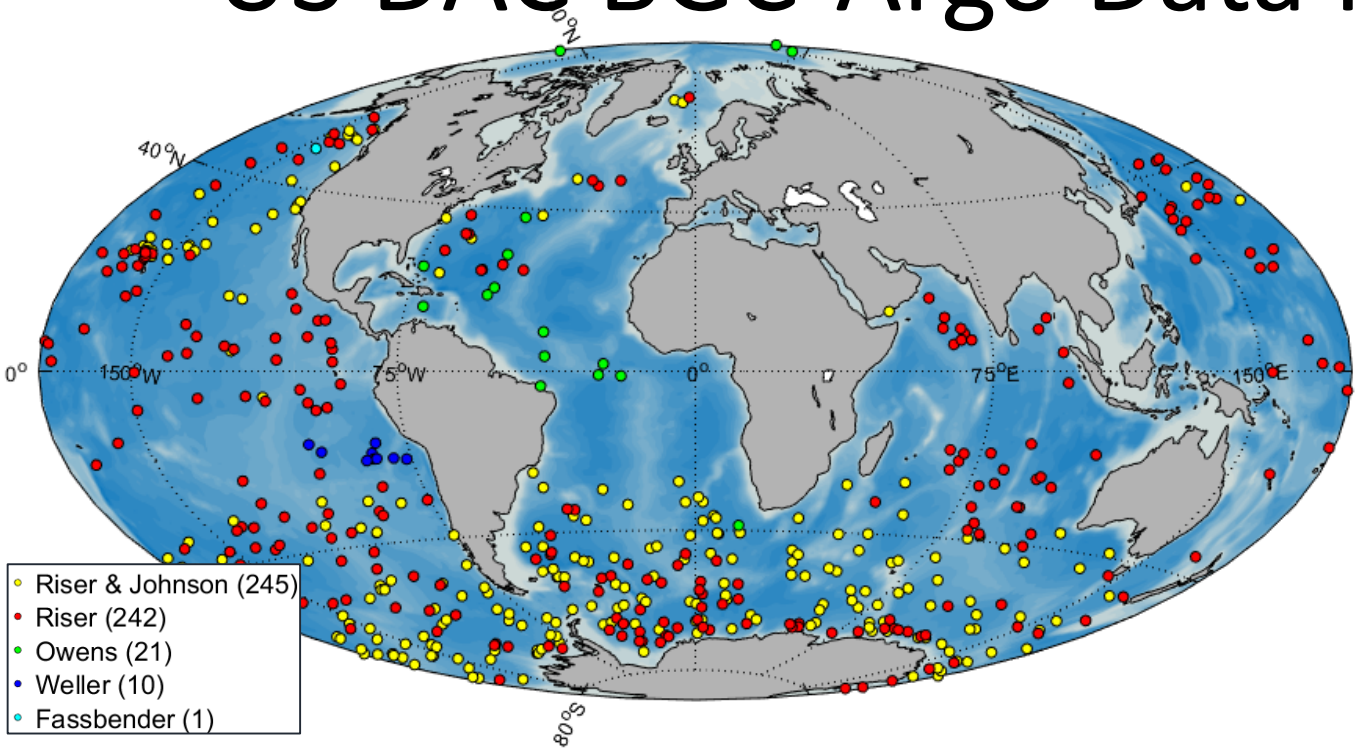
A Look Ahead…

		Year 1					Year 2					Year 3				Year 4				Year 5				All
Lab	**Float**	GO-BGC	NOAA NASA	NOPP	SOC COM	Total	GO-BGC	NOAA	NOPP	SOC COM	Total	GO-BGC	NOAA	SOC OM	Total	GO-BGC	NOAA	SOC OM	Total	GO-BGC	NOAA	SOC COM	Total	
UW	**APX**	40	5		30	75	40	5		30	75	40		30	70	40		30	70	40			40	320
	NAV	6		4		10	24	3	5		32	25			25	25			25	25			25	105
WHOI	**NAV**	10	5			15	15				15	25			25	30			30	35			35	120
SIO	**IDG SOL**			4		4																		4
	MRV SOL						5	2	1		8	15			15	30			30	30			30	83
Total						104					130				135				155				130	**654**

U.S. DAC to manage 654 more BGC floats over the next 5 years!

END

US DAC BGC-Argo Data Management: STATUS



- US BGC data management a collaboration between MBARI, UW, AOML
- BGC processing system at AOML is maturing
- DMQC of historical UW O2 floats lead by Matt Alkire (UW)
- MBARI-developed tools & reports help to increase level of adjusted data on the GDAC!
  - DOXY audit by Josh Plant (80% of total good DOXY profs are now adjusted!)
  - SAGE tools being utilized by other DACs

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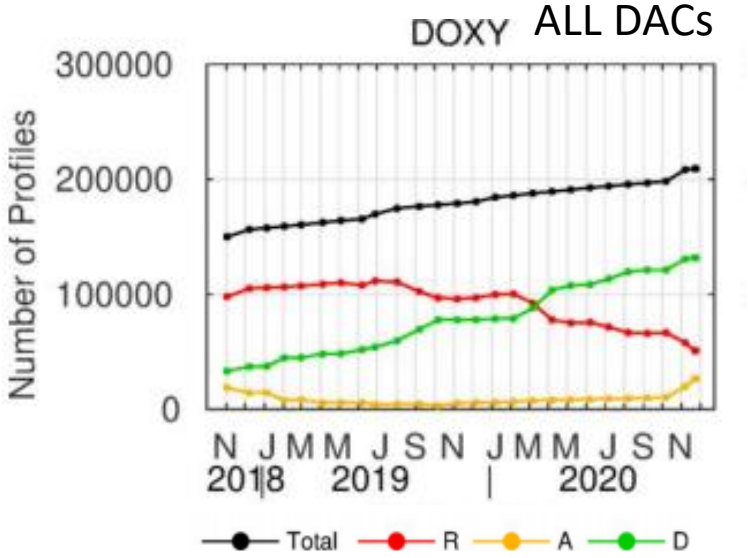

US DAC BGC-Argo Data Management: FUTURE

- SOCCOM project extended by NSF to 2014 (150 more floats)!
- The Global Ocean Biogeochemistry (GO-BGC) array has been funded!!
  - $52,900,000 & 500 floats (via US GO-SHIP)
  - 5 institution consortium PI team (MBARI, SIO, UW, Princeton, WHOI)
  - MBARI to process BGC data, core data managed by deployment institutions
- *654 more BGC floats managed by US DAC over the next 5 years!*

		Year 1					Year 2					Year 3				Year 4				Year 5				All
Lab	Float	GO-BGC	NOAA NASA	NOPP	SOCCOM	Total	GO-BGC	NOAA	NOPP	SOCCOM	Total	GO-BGC	NOAA	SOCOM	Total	GO-BGC	NOAA	SOCOM	Total	GO-BGC	NOAA	SOCCOM	Total	
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GO-BGC Global Ocean Biogeochemistry Array