An External Review of US GO-SHIP

Purpose, Process, and Recommendations

Presented by Frederick Bingham (UNCW)

On behalf of the Review Committee

August 7, 2019 – US CLIVAR Summit 2019

US CLIVAR

GO-SHIP

OCB Ocean Carbon & Biogeochemistry

Review Purpose

WHY? To **assess effectiveness** of US GO-SHIP in collecting and providing high-quality oceanographic data sets that **support and advance the scientific research** of the US Climate Variability and Predictability (CLIVAR) and OCB communities

WHY NOW? To **inform US GO-SHIP renewal proposals** in 2020

SCOPE? US GO-SHIP represents the US contribution to international GO-SHIP, a sustained observing component of the Global Ocean Observing System (GOOS). This was a **review of the US program only**, facilitated by US CLIVAR and OCB

US GO-SHIP Evaluation Components

- Planning and implementation
- Data synthesis and outcomes
- Leveraging
- Work force
- Leadership
- Training and mentoring
- Ships and instrumentation
- Coordination and communication

Review Process

PHASE 1. Review committee selection (summer 2018)

Fred Bingham (UNCW), Laurie Juranek (OSU), Matt Mazloff (SIO), Galen McKinley (LDEO/Columbia), Norm Nelson (UCSB), Susan Wijffels (WHOI)

Thanks to Mike Patterson and Heather Benway for their strong support!

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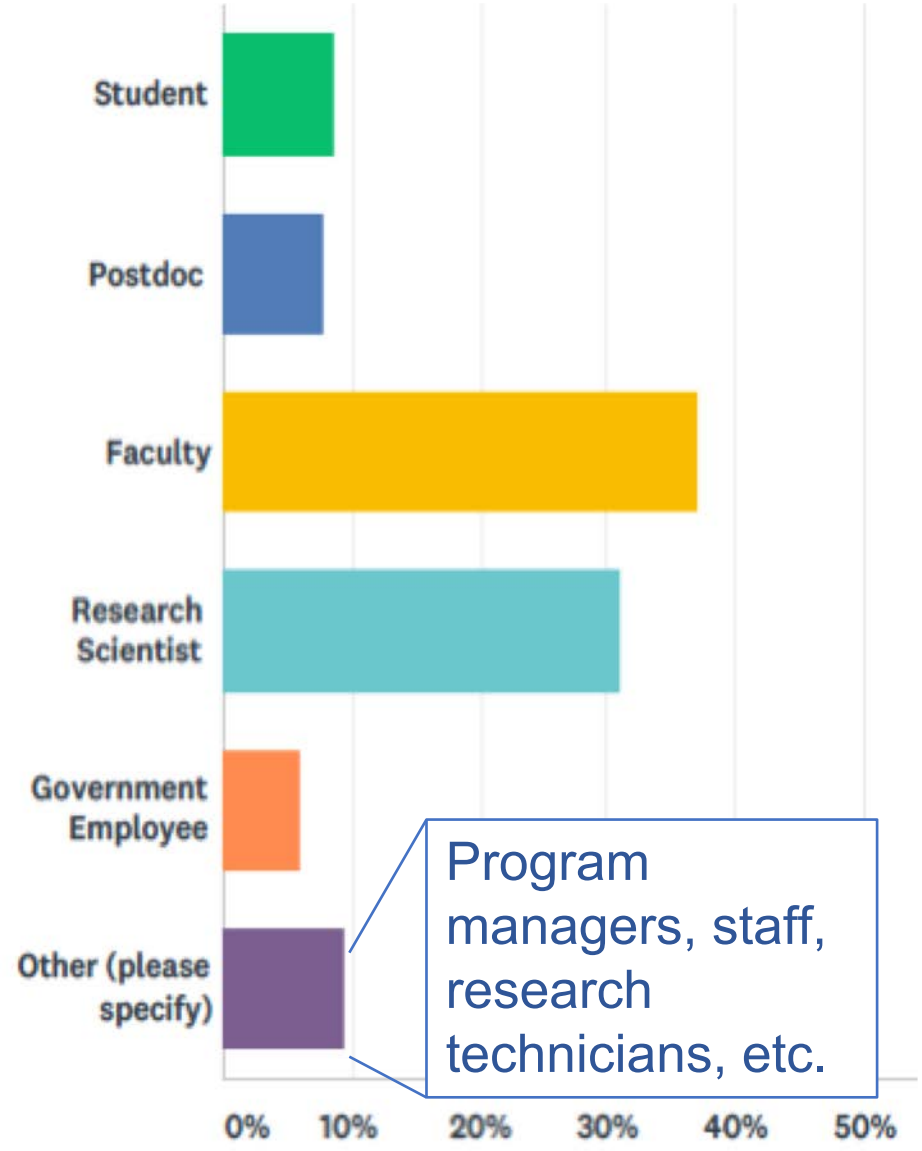
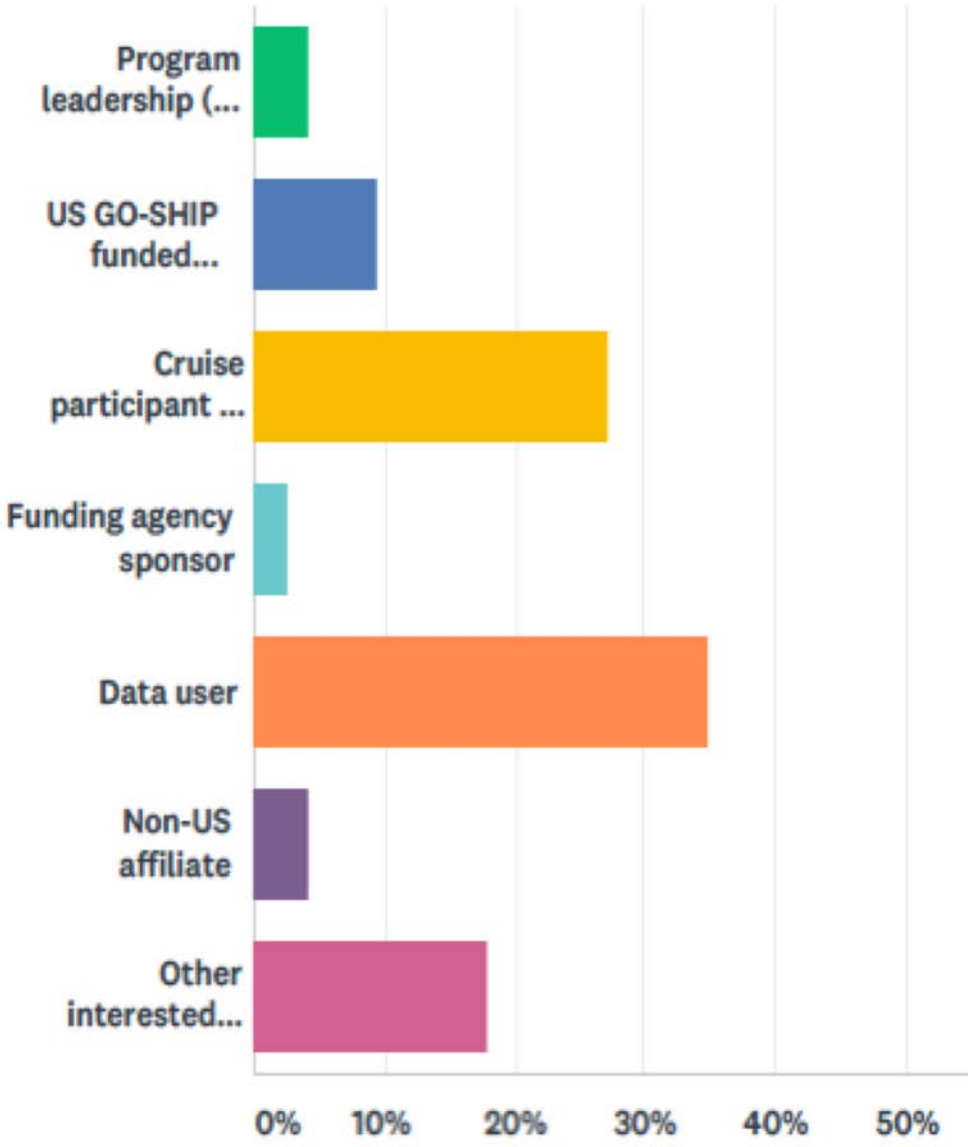
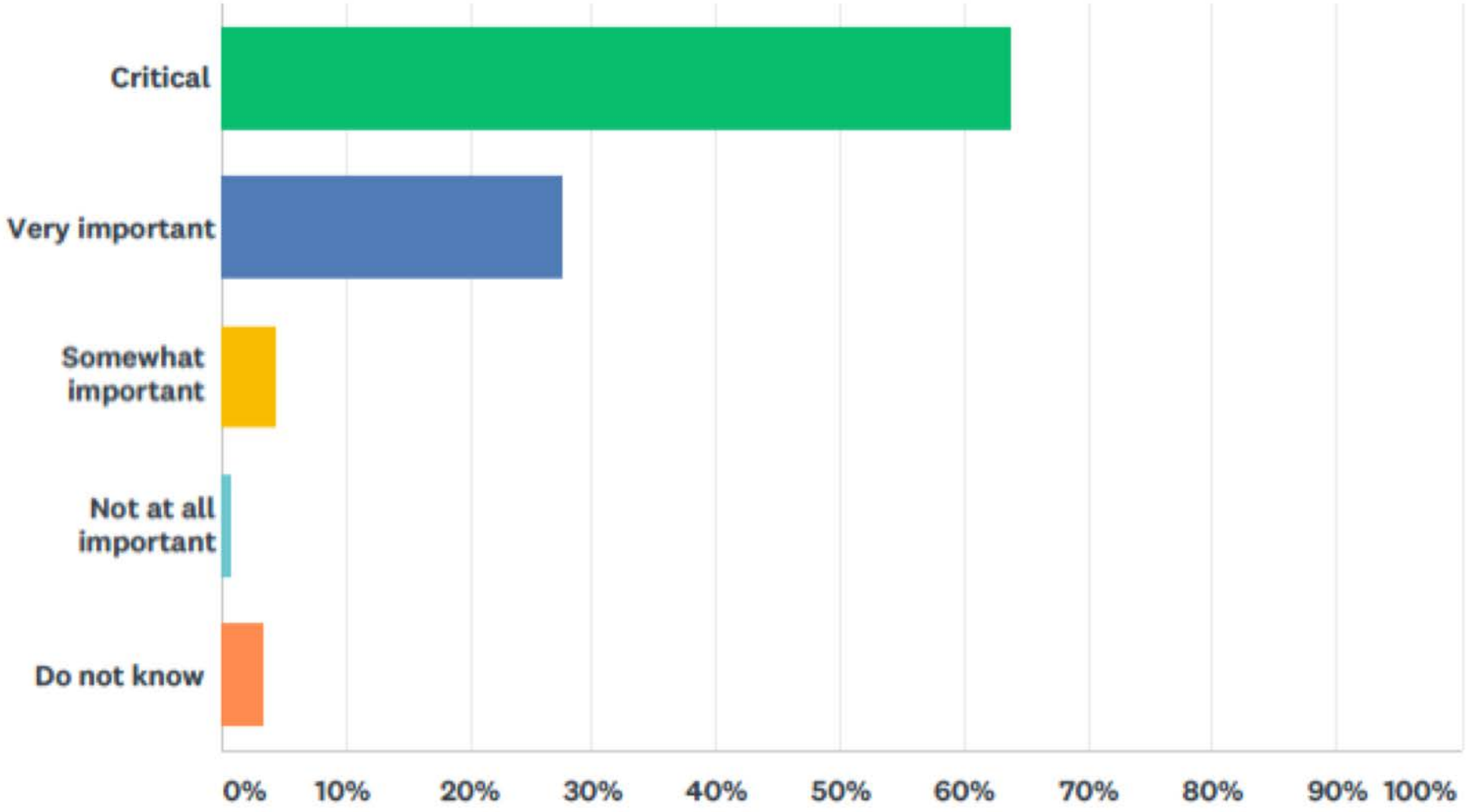
PHASE 2. Community survey (fall 2018) (n=118)

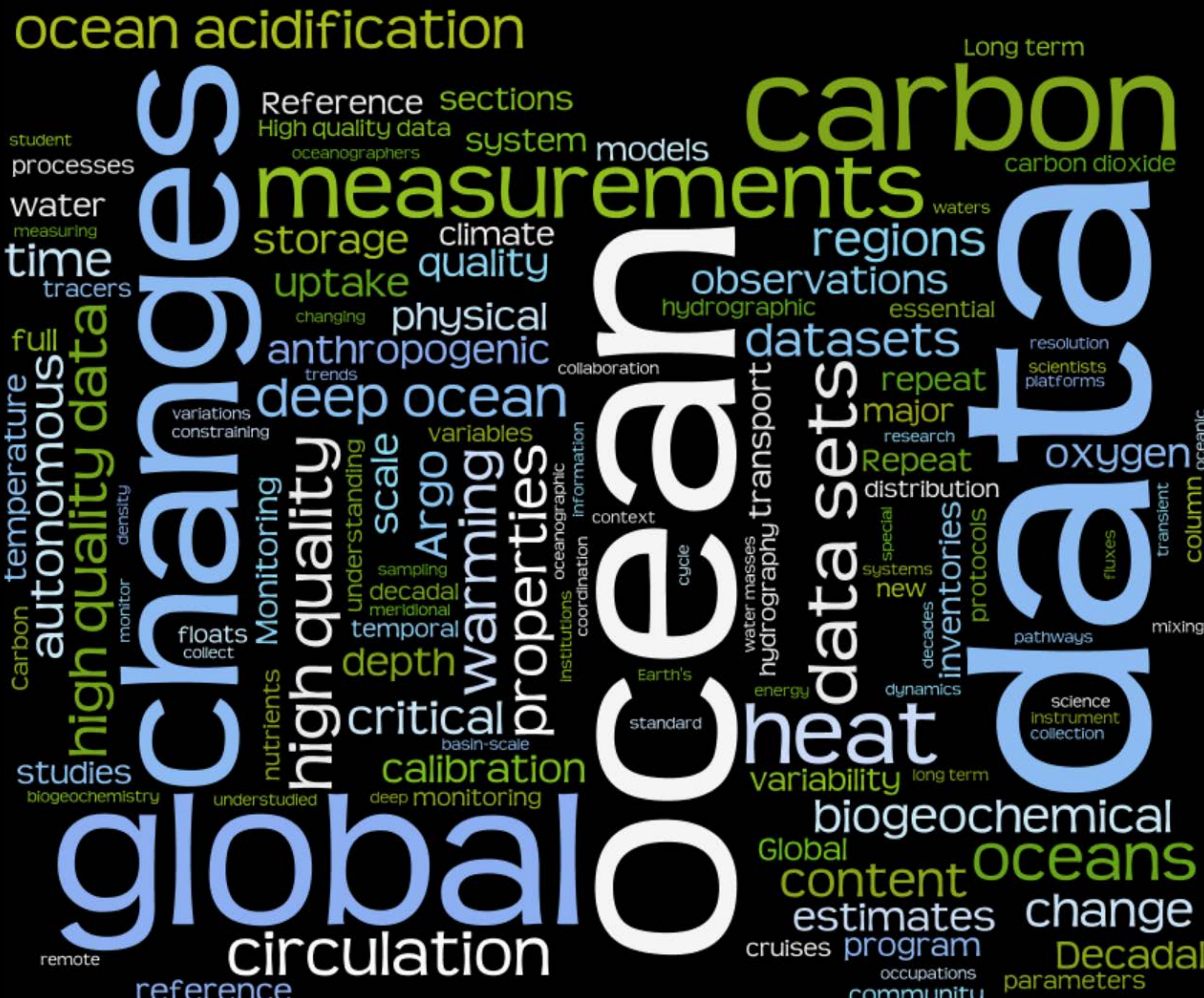
Demographics & Connections to US GO-SHIP





Importance of US GO-SHIP in supporting science goals of US CLIVAR and OCB?




ocean acidification
Long term
carbon
Reference
sections
High quality data
system
models
student
oceanographers
processes
carbon dioxide
measurements
water
waters
measuring
storage
climate
regions
time
quality
tracers
uptake
observations
hydrographic
essential
changing
physical
full
anthropogenic
datasets
resolution
collaboration
scientists
trends
platforms
repeat
deep ocean
major
variations
constraining
research
temperature
autonomous
high quality data
changes
ocean
data
data sets
transport
oxygen
oceanic
variables
Repeat
distribution
density
Monitoring
understanding
scale
Argo
warming
properties
oceanographic
information
context
hydrography
water masses
cycle
special
inventories
protocols
transient
column
fluxes
sampling
systems
decadal
new
meridional
coordination
institutions
decades
monitor
carbon
floats
collect
temporal
pathways
mixing
depth
Earth's
nutrients
high quality
energy
dynamics
science
instrument
collection
critical
standard
heat
basin-scale
studies
calibration
variability
long term
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cruises
program
Decadal
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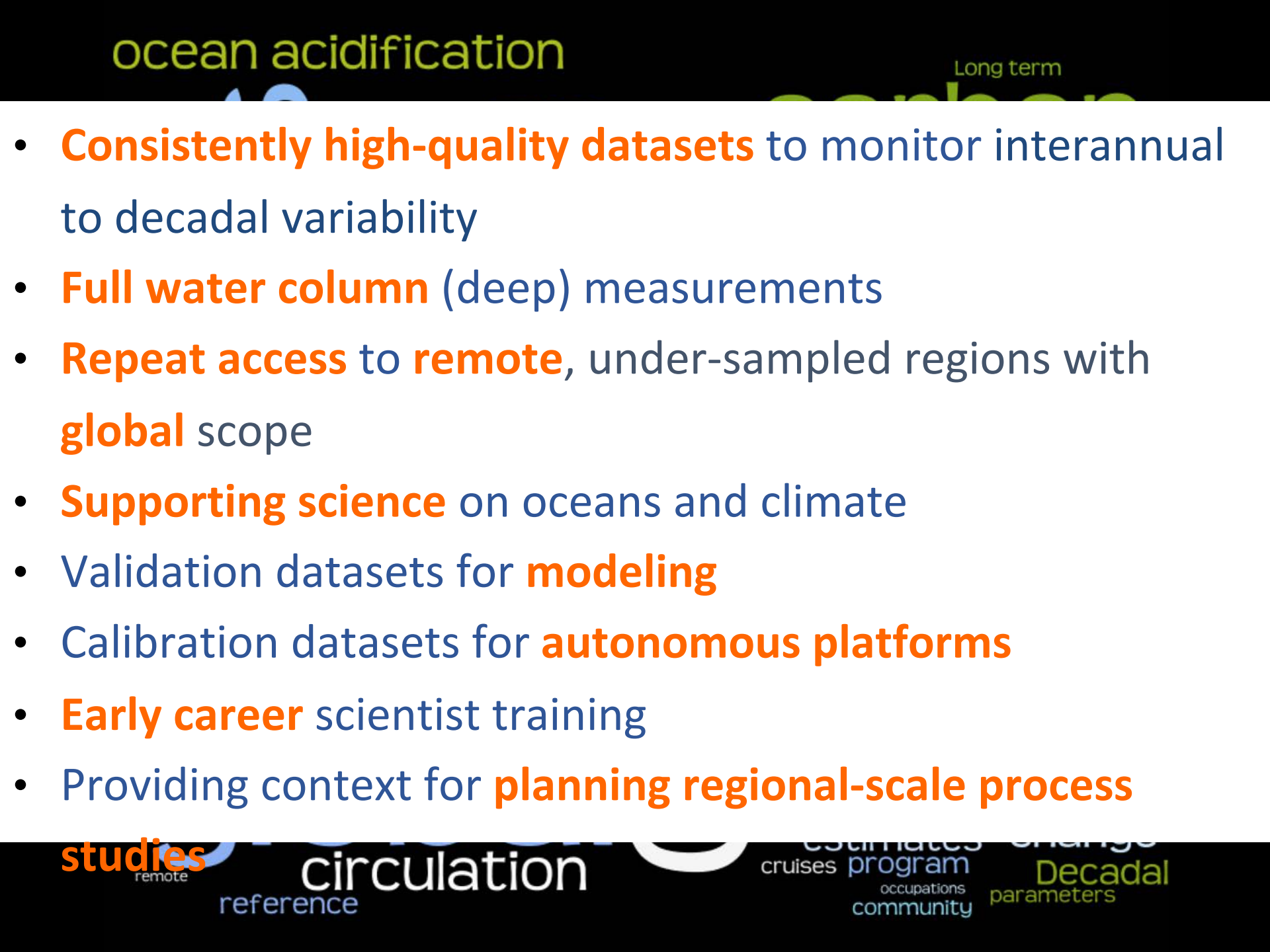
occupations
parameters
reference
community



- **Consistently high-quality datasets** to monitor interannual to decadal variability
- **Full water column** (deep) measurements
- **Repeat access** to **remote**, under-sampled regions with **global** scope
- **Supporting science** on oceans and climate
- Validation datasets for **modeling**
- Calibration datasets for **autonomous platforms**
- **Early career** scientist training
- Providing context for **planning regional-scale process studies**

understanding
significant
networking
participate
recommend
Oceanography
Co-Chief Scientist
collected
collect
faculty
work
interact
collaborations
oceanography
experience
helped
graduate
samples
fieldwork
research
community
oceanographers
collection
early career
career
postdoc
field
sea
observations
understand
ideas
school
cruise
positive
chance
student
opportunities
onboard
co-chief scientist
scientific
scientists
program
new
critical
interest
connections
questions
impact
impacted
pursue
learned
component
ocean
logistical
improved
fellow
oceanographic
observational
taught
data
contacts

- Overwhelmingly **positive** feedback
- US GO-SHIP has been a **critical, career building** component for many, especially co-chief scientists
- Important **learning opportunity** for oceanographic data collection, QC, and science applications
- Cruises represent important **networking** opportunities
- Post-cruise **collaborations** lead to **high-level publications**

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PHASE 2. Community survey (fall 2018)

PHASE 3. Site visit to Scripps (January 17-18, 2019) – review committee, US GO-SHIP PIs and Executive Council

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PHASE 4. Report (spring/summer 2019)

- Executive Summary
- Background
- Review Process - Purpose, Scope, Goals, and Process
- Community Survey Results
- **Findings and Recommendations**

General Impressions of US GO-SHIP

- Critical platform for supporting **high-impact ocean and climate research**
- **Strong leader** in/contributor to international GO-SHIP
- Yields consistently **high-quality data** sets
- Field programs and data system are **well run** and make **good use of funds**
- Provides important training and leadership **opportunities for early career scientists**
- Supports development of **autonomous platforms/networks** but can't be replaced by them!

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Bottom line: Program should be continued and enhanced.

Succession Planning

Concerns

- Program leadership largely consists of mid-senior-level PIs, many of whom are approaching retirement
- Program lacks formalized mechanisms for leadership transition and requisite knowledge transfer

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Recommendations

- Develop a formal **training/apprenticeship** system for key program components (parameter sets, data QC and management, data analysis, etc.)
- Identify and **entrain new talent** (chief and co-chief scientists and other cruise participants) for important leadership roles

Broadening Opportunities

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Recommendations

- **More consistent and effective communication** of US GO-SHIP seagoing opportunities to **broaden participation** and entrain new talent and leadership
- **Formalize application/review process** for adding Level 3 activities/measurements to cruises

US GO-SHIP Vessels

Concerns

Global-class research vessels (GCRVs) are necessary for the operation of US GO-SHIP repeat hydrography (berth/deck/lab space and endurance). Many of the GCRVs in the current fleet are aging without viable replacements on the horizon.

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Recommendations

- EC should **engage with UNOLS** to plan and develop **new GCRVs**, as these will be critical to continued success of US GO-SHIP
- Factor **extra time into cruise schedules** (maintenance delays) for aging vessels to avoid disruption of sampling

Data Collection, QC, Reporting, and Access

Concerns

- Maintaining data quality - multiple ships, PIs, chief scientists, and rotating personnel
- Data that are served by multiple groups (e.g., ADCP) make it more challenging to access – underutilized?
- Cruise info compiled in hydro-table on website - vulnerable to becoming outdated
- CTD and O_2 data cumbersome to download (for full database analysis)
- Occasional delays in posting data sets due to incorrect formatting during data submission
- Lack of credit given to US GO-SHIP PIs/data collection

Data Collection, QC, Reporting, and Access

Recommendations

- Need formalized mechanisms for **transfer of knowledge** to ensure **uniformity of process** (continuous training and updates of hydro-manual, etc.)
- Need dedicated person/effort to continually update hydro-table to ensure **access to all cruise data**
- Publish a regularly updated concatenated **CTD and O_2 data product**
- Ensure that PIs adhere to **proper data formatting** guidelines during submission to avoid delays in posting
- **Assign DOIs** to US GO-SHIP data sets/products to increase data discoverability, track data usage, and credit data providers

Work Environment

Concerns

Substantial percentage of survey respondents (30%) indicated that they had experienced sexual harassment or misogynistic behaviors; unethical conduct; or the devaluation of science activities not related to Level 1 activities.

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Recommendations

- US GO-SHIP should work with its science parties, NOAA, and UNOLS to address work environment aboard cruises.
- Conduct briefings for members of the crew and science parties at the start of each expedition.
- Give clear procedures for reporting of misconduct, potential consequences, and encouragement to report episodes.

Strategic Planning

Concerns

- Level funding in the face of increasing costs and demands on the program
- Very limited support for the follow-up science and data analysis that greatly increase program impact
- Lack of cohesive vision for program

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Recommendations

A **strategic plan** that provides a compelling scientific and operational vision for the program is needed to justify increased support for science and data analysis, additional parameters, etc.

Program Implementation

Concerns

- Program operations rely heavily on a few very busy PIs and limited staff (many on soft money)
- Chief/Co-chief scientist compensation inadequate and includes no science support
- Program communication, coordination, and transparency are sometimes lacking or inconsistent
- Sustainability of CLIVAR & Carbon Hydrographic Data Office (CCHDO), which provides much of US GO-SHIP's data management, in providing data management for international GO-SHIP without additional funds

Program Implementation

Recommendations

US GO-SHIP should establish a **project officer** (0.5-1.0 FTE) to assist with administrative, coordination, and communication tasks:

- ***Chief/Co-chief scientist support*** – expectations/best practices, EEZ clearances, pre/post-cruise communications, sample shipping, cruise mob/demob, etc.
- ***Communications*** – website/media/outreach to raise profile and engage broader participation, Executive Council support, coordination with international GO-SHIP, program reporting/metrics, etc.
- ***Policies and procedures*** – formal L3 application/review process, leadership rotation, L1/2/3 measurement specifications/progression and continually updated protocols, harassment policies, cruise participant expectations, etc.

TAKE HOME MESSAGES

US GO-SHIP is a highly efficient LEAN MACHINE

- Succession planning needs attention
- We're building regional/ocean class vessels but what about GCRVs?
- Need centralized coordination/communication to better support US GO-SHIP PIs, chief/co-chief scientists, and leadership
- Need more consistent and transparent decision making (L3), protocols, and best practices
- Need overarching (international?) strategic plan to provide cohesive vision for national contributors
- Need communication strategy to broaden engagement to entrain new participation and leadership
- Increased capacity for PIs and participants to conduct the follow-up science and data analysis that make it so impactful