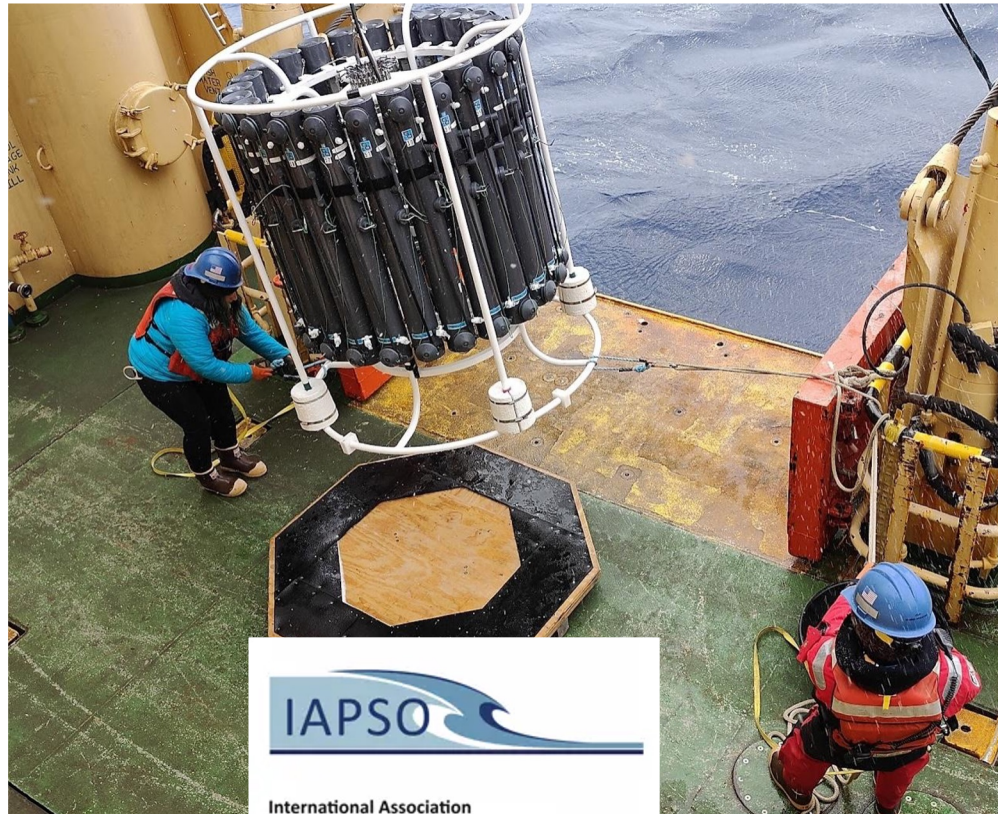




# THE IAPSO WORKGROUP - CTDO<sub>2</sub> DATA PROCESSING

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# THE IAPSO CTDO<sub>2</sub> WORKGROUP



International Association  
for the Physical Sciences of the Oceans

## Acronyms

- IAPSO - International Association for the Physical Sciences of the Oceans
- CTDO<sub>2</sub> – Instrument package that continuously measures conductivity, temperature, depth, and oxygen

## What this project is

- International workgroup of GO-SHIP level scientists and technicians
  - Led by Bernadette Sloyan at CSIRO
- 2-year goal of assembling a forum capable of assessing global CTDO<sub>2</sub> data processing status and routines
- Intercomparing CTDO<sub>2</sub> data processing between labs/institutions/countries



# MOTIVATION

1. CTDO<sub>2</sub> data is important
2. GO-SHIP Hydro Manual turns 14
  - How has technology changed?
  - Exploring algorithms
  - Group divergence
3. Unknown differences in how data is processed around the world
  - Numerous “wrangler” international programs
4. Is there a “best” or “better” procedure for data processing for producing high-quality (GO-SHIP) data?



# Results so far

## Survey of 33 participants

- Antarctica only continent w/o representation

## CTD intercomparison project

- 18 international participants
- Process GO-SHIP line A02
- Statistical analyses
- Reported methods

## Other experiments

- $\text{CTD}\underline{\text{O}}_2$  relative to bottle oxygen
- Changing step order



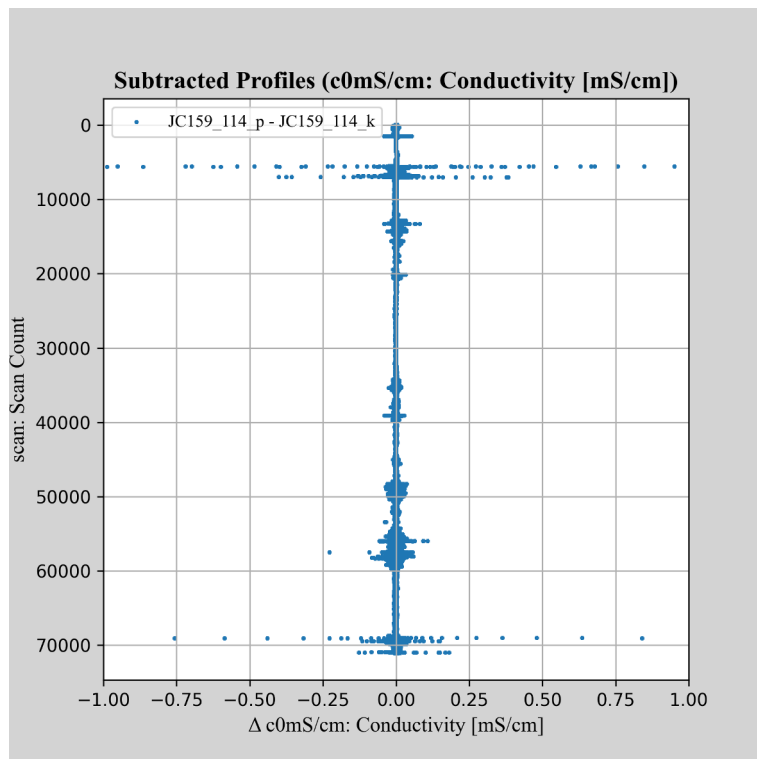
# Results so far

## CTD intercomparison project

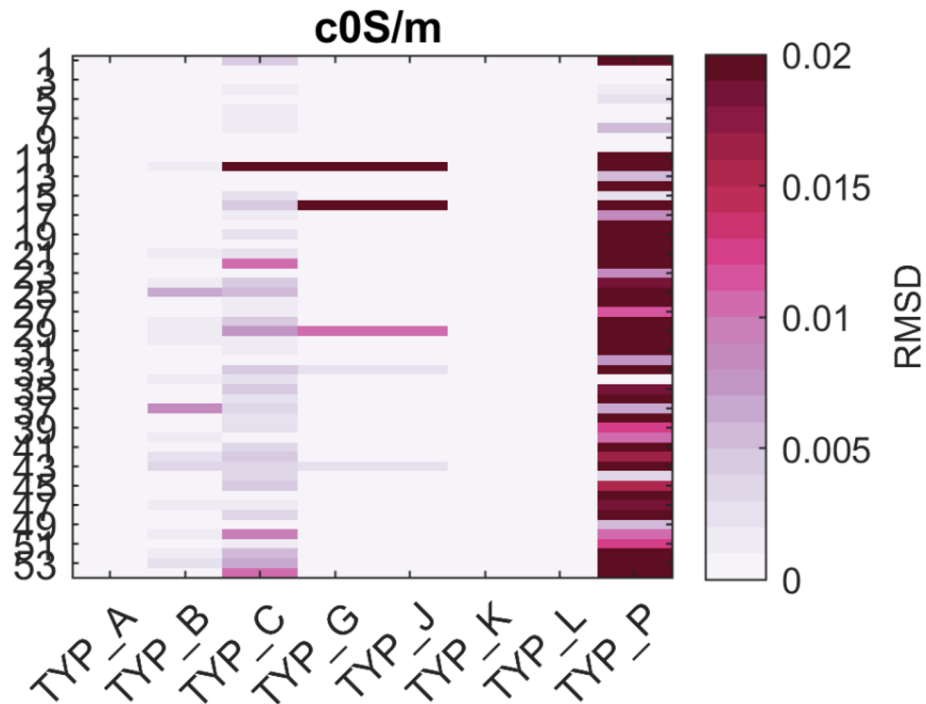
- Each group processes it differently
- Most participants inherited their routine and have not derived it themselves
- No one follows SeaBird or GO-SHIP recommended series of steps (“typologies”)
- Statistically, the most “average” groups run two processing typologies
  - A, B, C
  - H, J
  - Unprocessed typology is “P”

Typology	A	B	C	H	J
# Part.	2	1	2	1	1
Steps order	# datcnv	# datcnv	# datcnv	# datcnv	# datcnv
	# wildedit	# wildedit	# wildedit	# filter	# alignctd
	# filter	# filter	# filter	# alignctd	# filter
	# alignctd	# celltm	# alignctd	# celltm	# loopedit
	# celltm	# loopedit	# celltm	# loopedit	# celltm
	# loopedit	# wfilter	# loopedit	# wfilter	# binavg
	# binavg	# binavg	# binavg	# binavg	# file
	# file	# file	# wfilter	# file	
			# file		5

# Results so far



Conductivity changes for unprocessed data vs typology “K” (GO-SHIP)



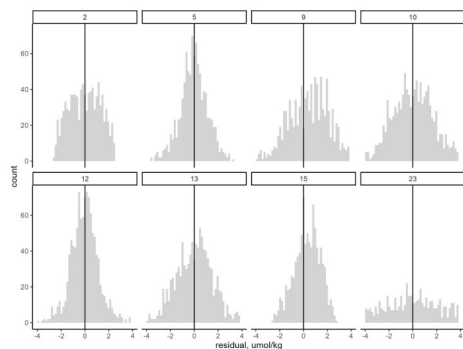
Visualizing root mean square deviation for different typologies against type A. Type P is unprocessed (Figure credit Dr. Berx, Scottish Marine Directorate)

# Results so far

## Oxygen comparisons

- 8 participants used Niskin bottles for oxygen analysis
- 3 different methods for calculating oxygen from voltage
- Some groups did not QC Niskin bottles
- Hysteresis correction is important

Histograms of residuals (all participants)

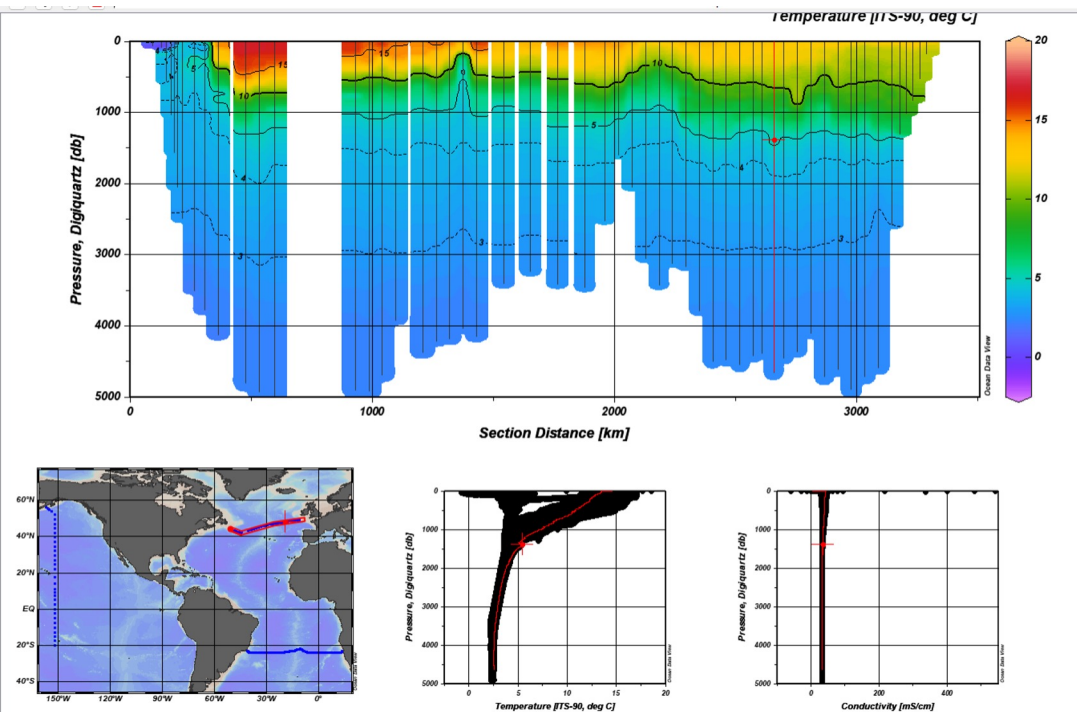


Participant	mean residual	RMSE
2	-0.005	1.3
5	-0.043	1.1
9	0.708	2.9
10	0.304	3.5
12	-0.009	1.2
13	0.016	1.6
15	0.306	1.1
23	3.9	6.0

## Finding “significant” steps

- Few groups did pressure adjustments external to SBEDataProcessing
- *# celltm* is a very minor improvement
- *# wfilter* placement matters
- Groups use *# alignctd* with different settings

# What's next



- Future tests
  - Looking into *step settings*, rather than just typologies
    - Disentangle statistical bias
  - Expanding to a meridional section
  - Oxygen optimizations
- Town hall at 2026 Ocean Sciences Meeting in Glasgow
- Build up the public Github to facilitate more collaboration and transparency
- At least two publications
  - Intercomparison findings
  - Oxygen processing



**THANK YOU**  
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