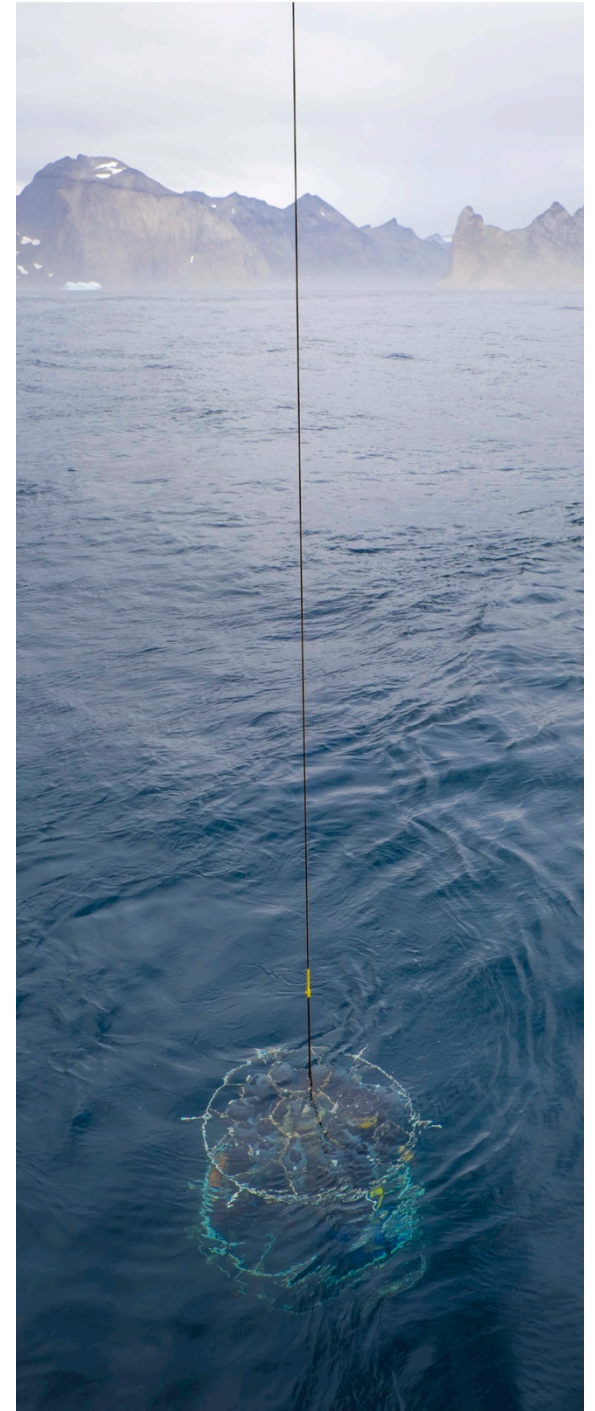# Understanding and Assessing CTD Data Quality:
better data for better science

Carolina Nobre, Cyndy Chandler, Bob Arko, Laura Stolp, Andy Maffei
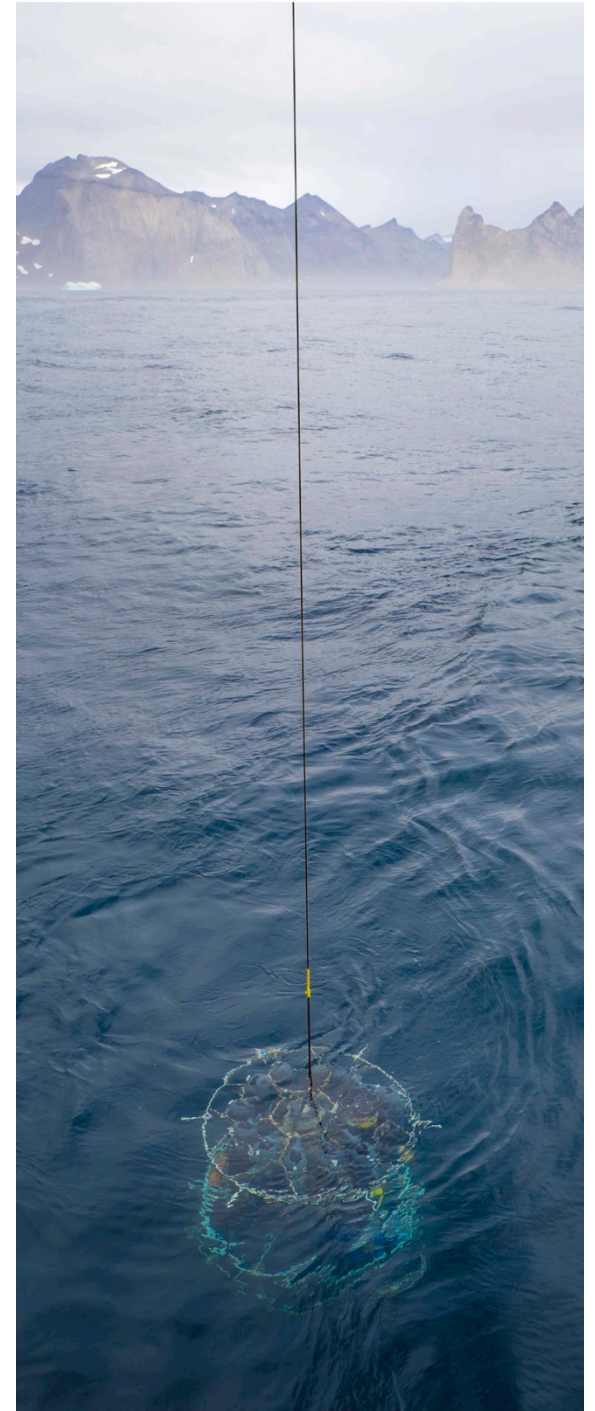
+ Questions (and answers)

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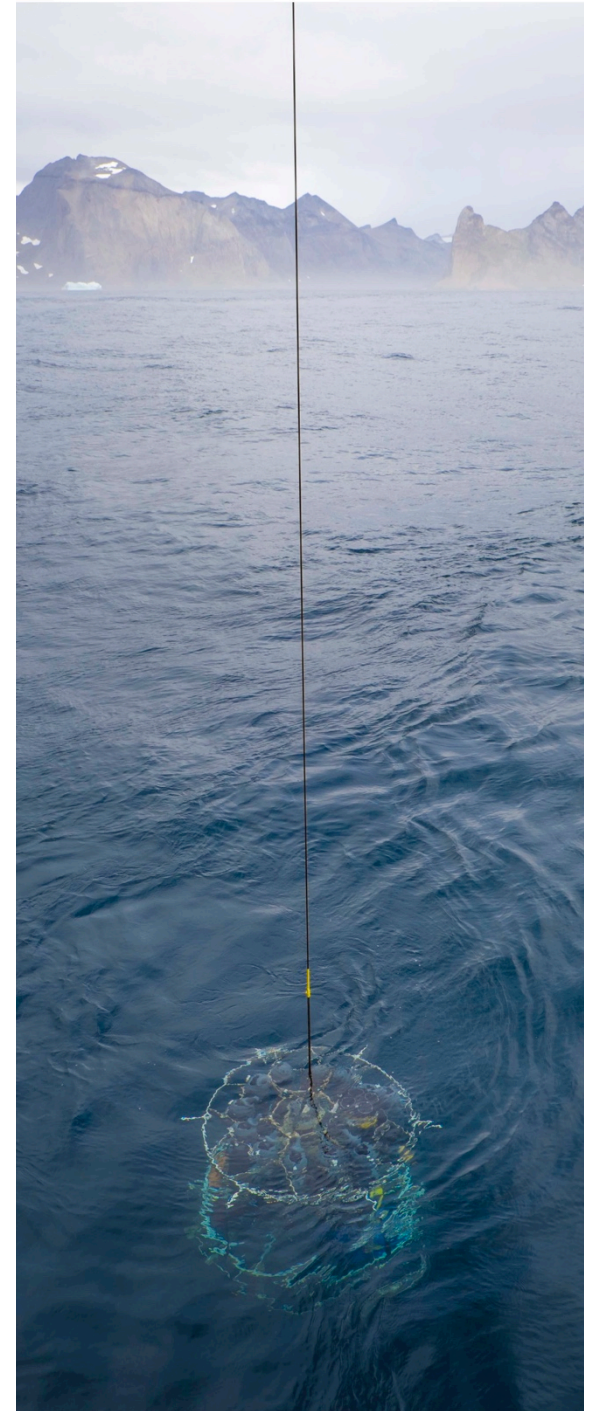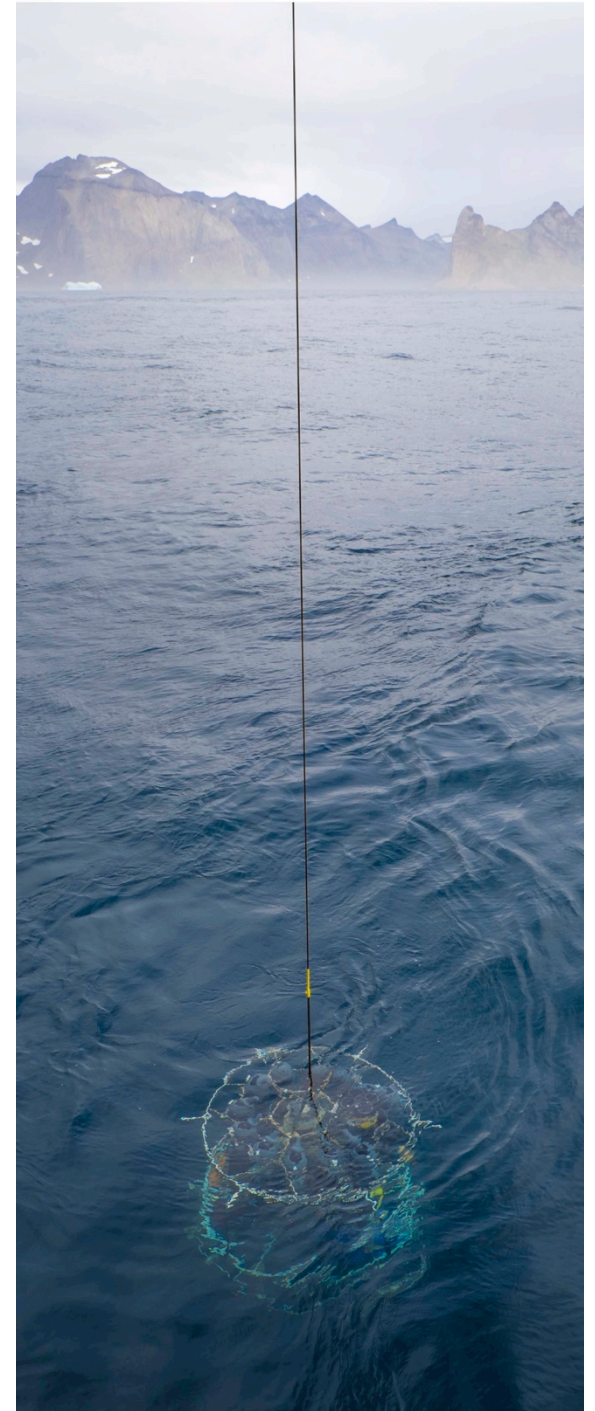
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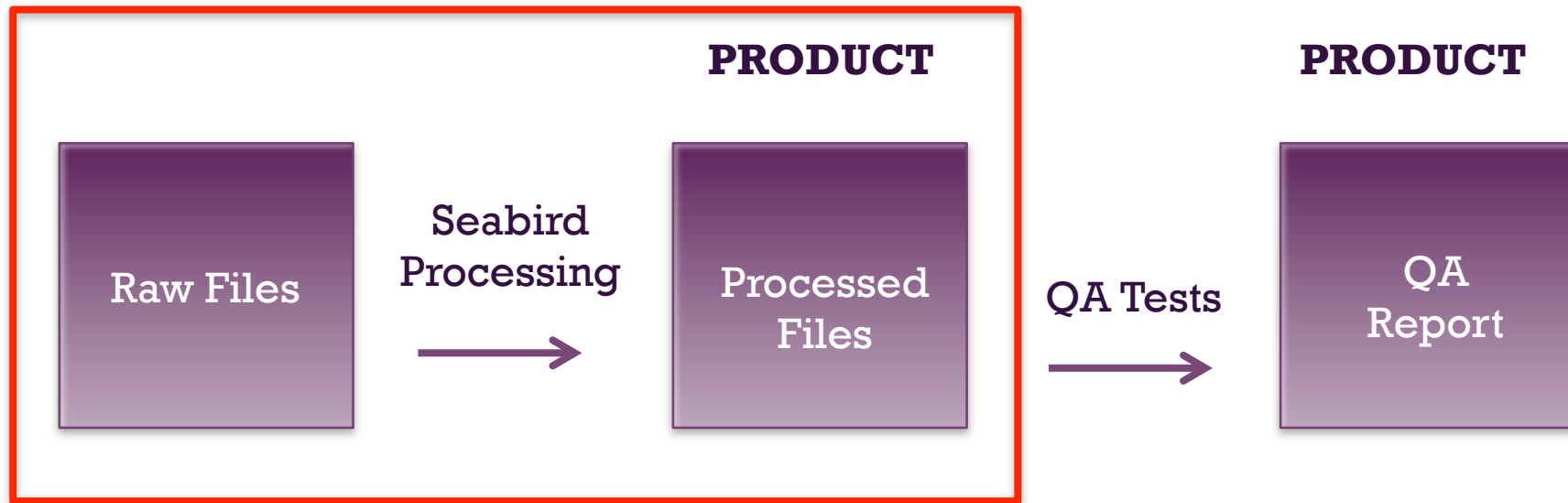- **Results**: **Processed CTD Data Product**

    + QA Report

The Assembly Line

PRODUCT　　　　　**PRODUCT**

Raw Files　→ Seabird Processing →　Processed Files　→ QA Tests →　QA Report

Generating the Processed CTD Product

Raw Files -> Seabird Processing -> Processed CTD Product

- **Raw Files**
  - .hex/.dat
  - .con/.xmlcon
  - .hdr
  - .bl
  - .NAV
  - ,,,

- **Seabird Modules**
  - DatCnv
  - BinAvg
  - LoopEdit
  - …

- **Parameters/units to extract:**
  - Temperature
  - Conductivity
  - Oxygen
  - Altimeter
  - …

- **.cnv Files**
  - No. of Stations
  - .Bottles Fired
  - Max/min cast depth
  - Sensor Configuration
  - …

Generating the QA reports
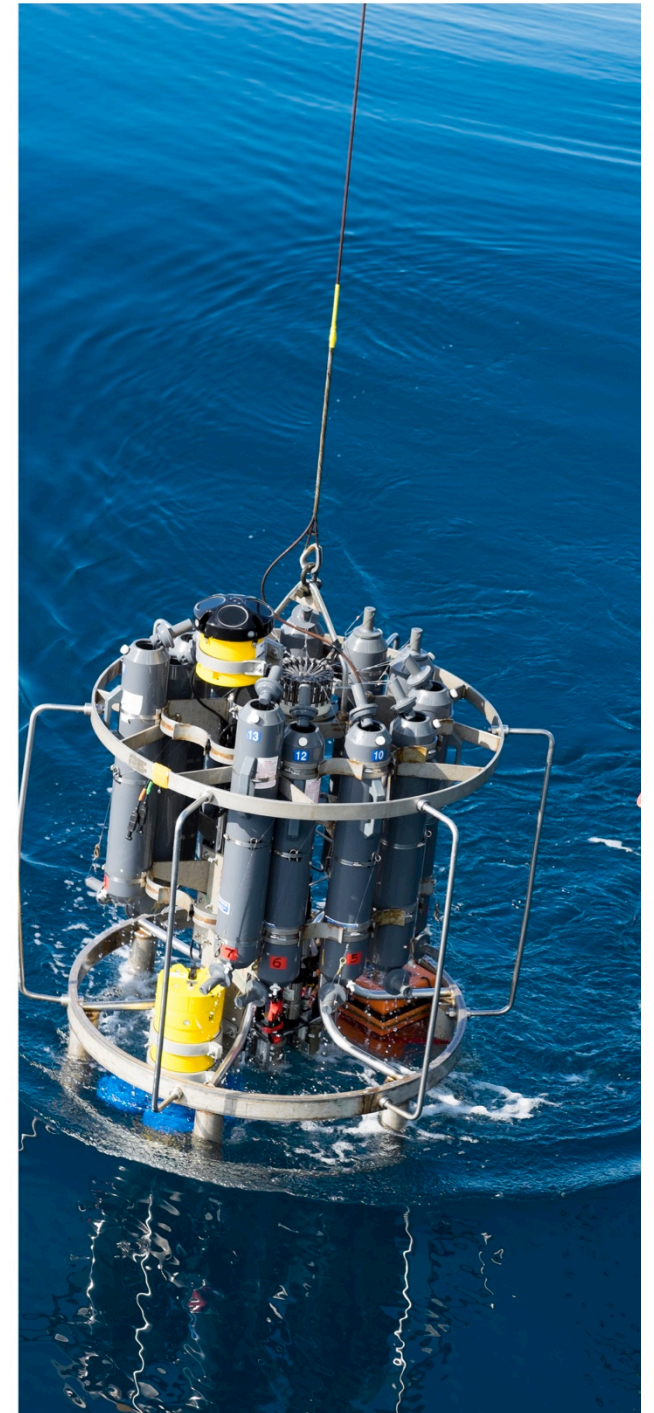
PRODUCT

PRODUCT

Raw Files → Seabird Processing → Processed Files → QA Tests → QA Report

QA – Metadata, Sensors, Data Coverage

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- Cruise metadata
    - Accuracy of the GPS data
    - Presence of all expected raw SeaBird files
    - Presence/accuracy of date/time entries

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- Sensors:
  - Presence of Redundant Sensors
  - Data Ranges (comparison with manufacturer specs for each sensor)
  - Sensor List and Calibration Dates
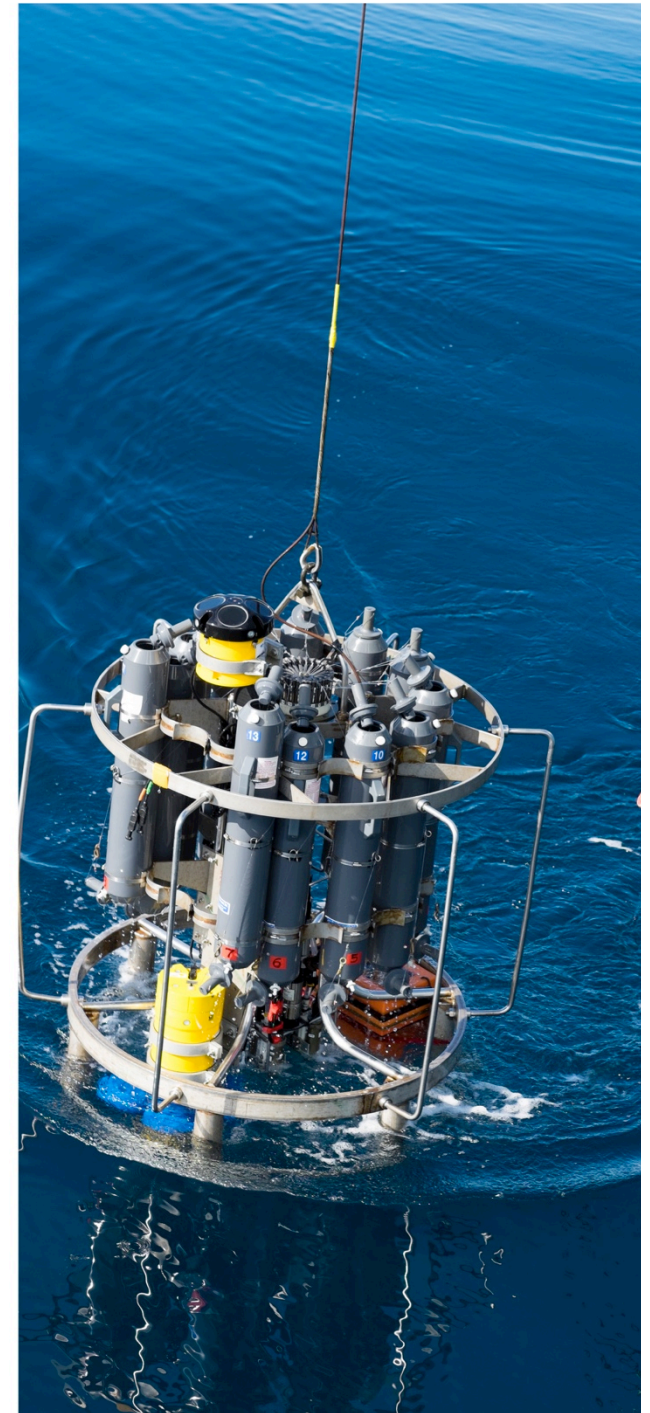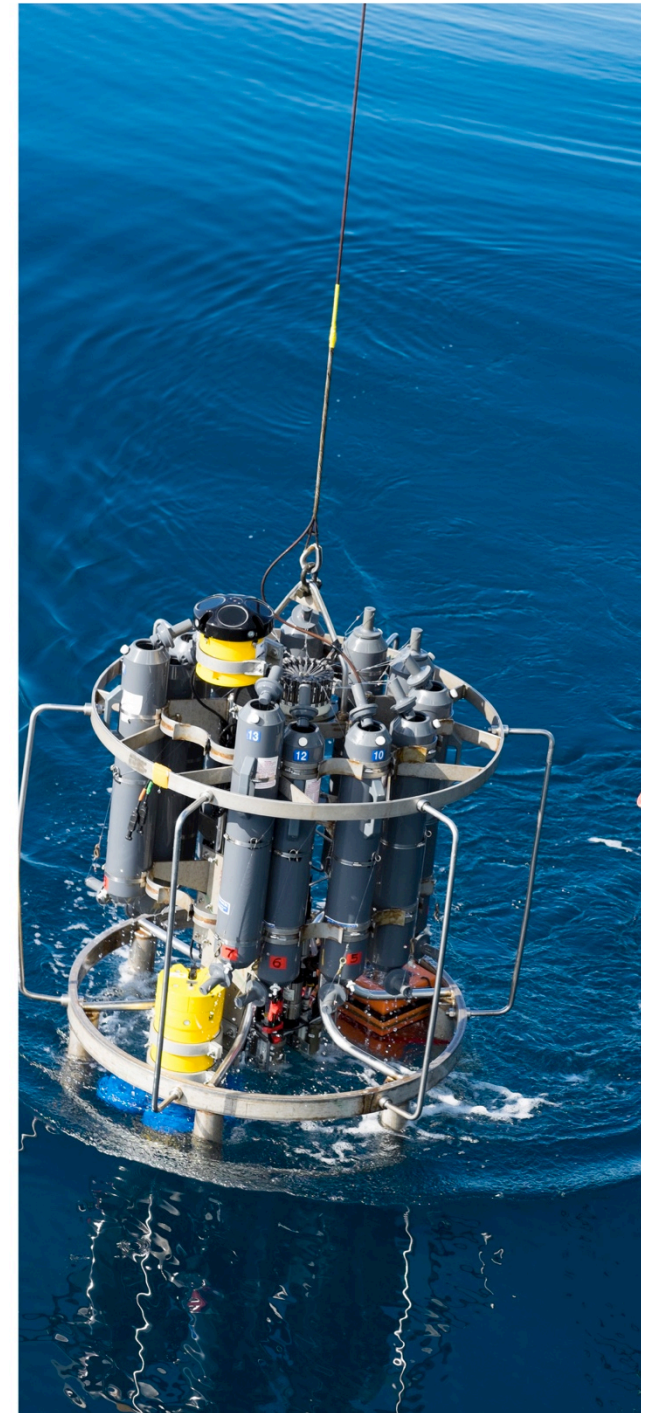
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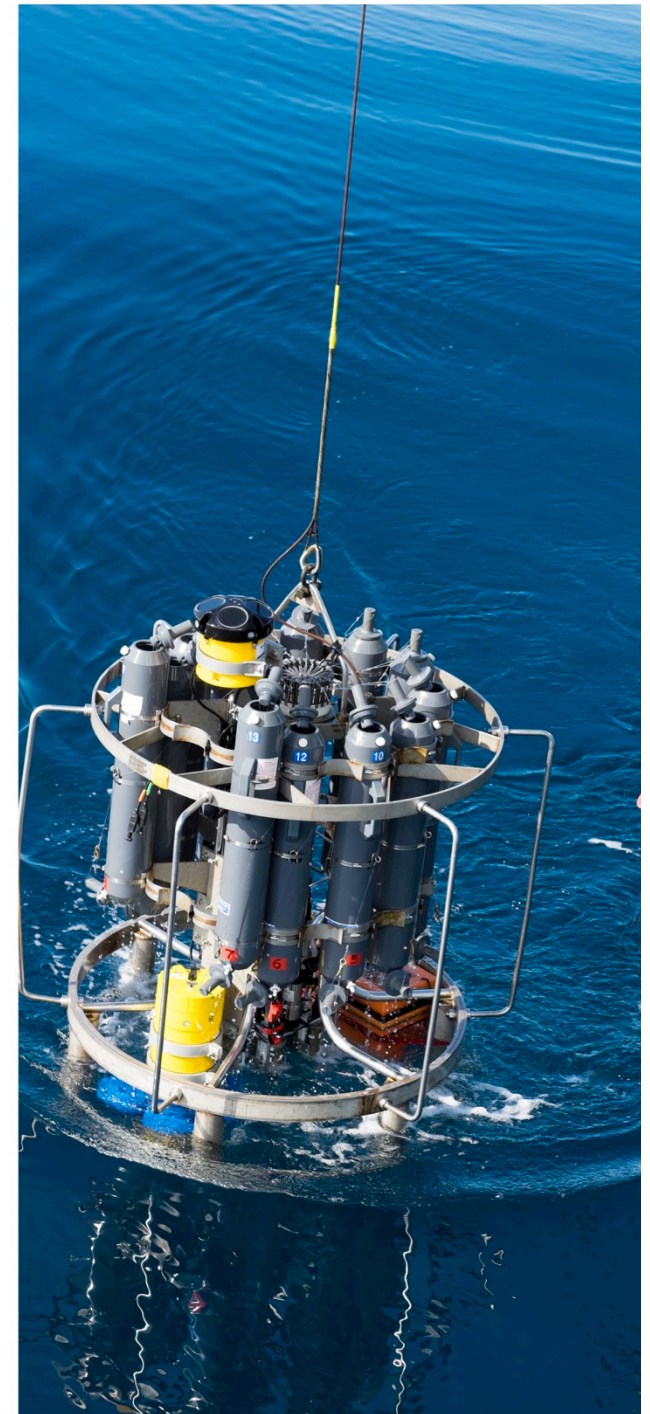 - Data Ranges (comparison with manufacturer specs for each sensor)
  - Sensor List and Calibration Dates

- Data Coverage:
  - Number of stations detected
  - Detection of bottles fired
  - Minimum pressure test (casts went below 5m)

Rating	Device	Cruise	Fileset ID	Vessel		Has Latitude and Longitude	Minimum Cast Depth	Presence of Raw Files	Redundant T and Cond Sensors	Sensor Data Ranges
🟢	CTD *Sea-Bird SBE-911plus*	AE0914	111612	Atlantic Explorer	QA Summary	🟢	🟢	🟢	🟢	🟢
🟢	CTD *Sea-Bird SBE-911plus*	CH0112	107840	Cape Hatteras	QA Summary	🟢	🟢	🟢	🟢	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH10-04	111728	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH10-07	111785	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH10-10	111733	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH10-14	111736	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH10-18	111739	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH10-25	111744	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🔺	CTD *Sea-Bird SBE-911plus*	BH11-03	111747	Blue Heron	QA Summary	🟢	🟢	🟢	🔺	🟢
🟥	CTD *Sea-Bird SBE-911plus*	CH0312	107790	Cape Hatteras	QA Summary	🟢	🟥	🟢	🟢	🟥

QA Test Details   **Close**

Test Name: *Minimum Cast Depth*
Description: *GREEN if all casts have a maximum pressure > 5m; else RED*
Values:
true

Rating	Device	Cruise	Fileset ID	Vessel		Latitude		Sensors	Sensor Data Ranges
🟢	CTD *Sea-Bird SBE-911plus*	AE0914	111612	Atlantic Explorer	QA Summary	🟢 🟢	🟢	🟢	🟢
🟢	CTD *Sea-Bird SBE-911plus*	CH0112	107840	Cape Hatteras	QA Summary	🟢 🟢	🟢	🟢	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH10-04	111728	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH10-07	111785	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH10-10	111733	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH10-14	111736	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH10-18	111739	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH10-25	111744	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
⚠️	CTD *Sea-Bird SBE-911plus*	BH11-03	111747	Blue Heron	QA Summary	🟢 🟢	🟢	⚠️	🟢
❗	CTD *Sea-Bird SBE-911plus*	CH0312	107790	Cape Hatteras	QA Summary	🟢 ❗	🟢	🟢	❗
	CTD	CH0500	103458	Cape Hatteras	QA Summary	🟢 ❗	🟢	🟢	

Rating	Device	Cruise	Fi
⬤	CTD *Sea-Bird SBE-911plus*	AE0914	1
⬤	CTD *Sea-Bird SBE-911plus*	CH0112	10
⚠	CTD *Sea-Bird SBE-911plus*	BH10-04	1
⚠	CTD *Sea-Bird SBE-911plus*	BH10-07	1
⚠	CTD *Sea-Bird SBE-911plus*	BH10-10	1
⚠	CTD *Sea-Bird SBE-911plus*	BH10-14	1
⚠	CTD *Sea-Bird SBE-911plus*	BH10-18	1
⚠	CTD *Sea-Bird SBE-911plus*	BH10-25	1

AE0914 QA Info ✕

QA Tests

🟢	**Presence of Raw Files:** Percent of Casts with all files: 100
🟢	Redundant T and Cond Sensors: *true*
🟢	Has Latitude and Longitude: *true*
🟢	Minimum Cast Depth: *true*
🟢	Sensor Data Ranges: *true*

GREEN if 100% of the casts
have .hex/.dat, .con and .hdr files; else RED

QA Info Blocks

[Get QA Info as XML] [Open in Separate Window] [Cancel]

	CTD *Sea-Bird SBE-911plus*	BH11-03	111747	Blue Heron	[QA Summary] 🟢 🟢 🟢 ⚠ 🟢
⚠					
🟥	CTD *Sea-Bird SBE-911plus*	CH0312	107790	Cape Hatteras	[QA Summary] 🟢 🟥 🟢 🟢 🟥
🟥	CTD *Sea-Bird SBE-911plus*	CH0509	102458	Cape Hatteras	[QA Summary] 🟢 🟥 🟢 🟢 🟢

Rating	Device	Cruise	Fi...
●	CTD *Sea-Bird SBE-911plus*	AE0914	1...
●	CTD *Sea-Bird SBE-911plus*	CH0112	10...
⚠	CTD *Sea-Bird SBE-911plus*	BH10–04	11...
⚠	CTD *Sea-Bird SBE-911plus*	BH10–07	11...
⚠	CTD *Sea-Bird SBE-911plus*	BH10–10	11...
⚠	CTD *Sea-Bird SBE-911plus*	BH10–14	11...
⚠	CTD *Sea-Bird SBE-911plus*	BH10–18	11...
⚠	CTD *Sea-Bird SBE-911plus*	BH10–25	11...

AE0914 QA Info ✕

QA Info Blocks

Total Raw Files: *9*

Total Processed Files: *9*

Bottles Fired: *True*

% of Casts with Bottles Fired: *100*

Number of Sensors Detected: *13*

Sensor Info: *['Sensor Name : TemperatureSensor SensorID="55" Calibration Date : 13-May-08', 'Sensor Name : ConductivitySensor SensorID="3" Calibration Date : 27-Jun-08 ', 'Sensor Name : PressureSensor SensorID="45" Calibration Date : 13-Feb-09', 'Sensor Name : TemperatureSensor SensorID="55" Calibration Date : 09-May-08 ', 'Sensor Name : ConductivitySensor SensorID="3" Calibration Date : 13May08', 'Sensor Name : FluoroChelseaAqua3Sensor SensorID="5" Calibration Date : 21-Jun-07', 'Sensor Name : OxygenSensor SensorID="38" Calibration Date : 23-May-09p', 'Sensor Name : OxygenSensor SensorID="38" Calibration Date : 28-Jul-08p', 'Sensor*
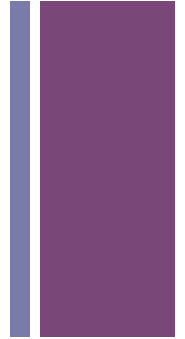
[Get QA Info as XML] [Open in Separate Window] [Cancel]

	CTD *Sea-Bird SBE-911plus*	BH11–03	111747	Blue Heron	QA Summary	● ● ● ⚠ ●
	CTD *Sea-Bird SBE-911plus*	CH0312	107790	Cape Hatteras	QA Summary	● ▣ ● ● ▣
	CTD *Sea-Bird SBE-911plus*	CH0509	102458	Cape Hatteras	QA Summary	● ▣ ● ● ●

Coming soon....
to a repository near you.

- Increased amount of derived parameters

- Over 300 cruises processed cruises in the R2R Database

- Sensor Range checks for a wider array of seabird sensors

- Specific Information on profiles that failed the test

That's all folks…