Instrument Pre-Deployment Procedure & Results

Document Number	Version	Title	
3305-00313-00252	1-03	OPTAA Pre-Deployment Procedure	
Author		**Approver**	**Effective Date**
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Instrument Make/Model	Instrument Class-Series	Instrument Serial Number
WET Labs / ac-s In-Situ Spectrophotometer	OPTAA-J	acs137
Conductor	**Quality Reviewer**	
M.J. Zirbel, 02-Mar-2021; RDesiderio	Jon Fram	

Scope & Description

This procedure applies to WET Labs ac-s units and will establish pure water baseline blank values for all its optical channels prior to deployment. It should be applied to the ac-s in the same final mounting orientation as it will be deployed, after all mounting adjustments have been made.

Reference Documents

Vendor Supplied Information: acs_users_guide.pdf, acs_protocol_document.pdf, acs_product_drawing.pdf, WETView7-RevF-Manual_0.pdf
OOI documentation: OPTAA_predeployment_procedure_protocol.docx, acs_calibration_kit_contents.pdf
An ACS_Calibration_Logsheet_Form is included as a separate tabbed sheet in the current document.

The above documents are all found in 3305-00313-A.zip

Required Tools & Equipment

ac-s calibration kit (includes cleaning kit) provided to OSU, UW, and WHOI (acs_calibration_kit_contents.pdf)
most recent ac-s device ("dev") file; OOI ac-s calibration logsheet, if desired.
Windows OS PC w/ USB or Serial port
RS-232 to USB adapter (if Test Computer does not contain a Serial port)
WETView7 RevF software
20 liters of pure water from a Barnstead water purification system or equivalent
20 ml spectroscopic or HPLC grade methanol.
5 gallon bucket for wastewater if necessary

OPTAA Pre-Deployment Procedure		OPTAA-J	acs137	3305-00313-00252
Step #	**Instructions**	**Checked / Initials**	**Results**	**Notes**
Important				
A	Calibration of the two optical channels of an ac-s is an involved process and requires following the procedure detailed in the *OPTAA_predeployment_procedure_protocol.docs* document. This procedure is here presented in abbreviated form.			

OPTAA Pre-Deployment Procedure		OPTAA-J	acs137	3305-00313-00252
Step #	**Instructions**	**Checked / Initials**	**Results**	**Notes**
B	Before the first calibration, set the pump's pressure relief valve to prevent carboy explosions, as explained in the document above.			
PROCEDURE				
1	If this ac-s is being re-deployed after mooring recovery without first being sent back to the factory for refurb, record the recovery protocol filename (3305-00513-XXXXX) to be filed in Vault from the instrument's previous deployment which should contain bio-fouling observations. The dev and calibration files contained in that 3305-00513 protocol will be identical to those in the present 3305-00313 protocol.	RAD	N/A	
2	Record the (possibly tentative) mooring S/N and platform on which this instrument is scheduled to be deployed (for example, CE01ISSP-00004 WLP-002).	RAD	ce02shsp_00019; wlp-001	
3	(i) Plug in ac-s test cable to (a) ac-s bulkhead connector (b) 13.8 VDC power supply and (c) serial com port of a Windows computer. (ii) Turn on the ac-s by turning on the power supply. (iii) Start up the WETView software and configure its display as described in the predeployment protocol document.	MJZ		
Calibrate first optical channel				
4	Within WETView, select 4 test wavelengths spaced about 70 nm apart spanning 440 nm to 650 nm for monitoring from the optical channel to be calibrated.	MJZ	See "calibration logsheet" tab	
5	Remove the flow tube of the optical channel to be calibrated and clean the inside of the flow tube and the two optical windows with water and methanol. Dry completely and re-install.	MJZ		
6	Set up water delivery system to ac-s as described and pictured in OPTAA_predeployment_procedure_protocol.docx.	MJZ		
7	Turn on pump to start flow of pure calibration water.	MJZ		
8	Eliminate bubbles from the water flow.	MJZ		
9	Slow water flow to a trickle.	MJZ		
10	If one or more test channel values are not stable (they are trending either upward or downward: |slope| > 0.001 m^-1/min) re-seat flow collars and check tubing connections for leaks.	MJZ		
11	If all test channel values are stable, continue to step 12. If not, turn off pump, de-pressurize system, and repeat steps 5-10.	MJZ		

OPTAA Pre-Deployment Procedure		OPTAA-J	acs137	3305-00313-00252
Step #	**Instructions**	**Checked / Initials**	**Results**	**Notes**
12	Acquire 30 seconds of data while recording calwater temperature reading at ac-s outflow to 2 decimal places at right.	MJZ	See "calibration logsheet" tab	
13	Stop data acquisition.	MJZ		
14	Turn off pump and de-pressurize system.	MJZ		
15	Enter filename and save data file.	MJZ	See "calibration logsheet" tab	
16	Record the median values for the 4 test channels to 3 decimal places by eye.	MJZ	See "calibration logsheet" tab	
17	Remove the flow tube of the optical channel from which data was just acquired and completely dry the inside of the flow tube and the two optical windows; re-install the flow tube.	MJZ		
18	Connect water delivery system.	MJZ		
19	Turn on pump to start flow of pure calibration water.	MJZ		
20	Eliminate bubbles from the water flow.	MJZ		
21	Slow water flow to a trickle.	MJZ		
22	If one or more test channel values are not stable (they are trending either upward or downward) re-seat flow collars and check tubing connections for leaks.	MJZ		
23	If all test channel values are stable, continue to step 24. If not, turn off pump, de-pressurize system, and repeat steps 17-22.	MJZ		
24	Acquire 30 seconds of data while recording cal water temperature reading at ac-s outflow at right.	MJZ	See "calibration logsheet" tab	
25	Stop data acquisition.	MJZ		
26	Turn off pump and de-pressurize system.	MJZ		
27	Enter filename and save data file.	MJZ	See "calibration logsheet" tab	
28	Record the median values for the 4 test channels.	MJZ	See "calibration logsheet" tab	
29	If the |difference| of the median values for each of the 4 test channels are all within the tolerance of 0.005 m^-1, go to step 30. If not, repeat steps 17-28 until two of the cals show reproducible median values within this tolerance for all 4 test channels.	MJZ	See "calibration logsheet" tab	
30	Completely dry tube and windows for the optical channel just calibrated and re-install. Cover ports with black caps (supplied by WETLabs with the instrument).	MJZ		
Calibrate second optical channel				

OPTAA Pre-Deployment Procedure		OPTAA-J	acs137	3305-00313-00252
Step #	**Instructions**	**Checked / Initials**	**Results**	**Notes**
31	Repeat steps 4-30 for the second optical channel.	MJZ	See "calibration logsheet" tab	
Documentation				
32	Gather all test files including the dev file and compress into a zip file named: ***3305-00313-XXXXX-A.zip*** where XXXXX is the last digits of this Results document.	RAD	3305-00313-00252-A.zip	acs137.dev acs137_cal_a01.dat acs137_cal_a02.dat acs137_cal_c01.dat acs137_cal_c02.dat
33	Update the Title Property of this document with the instrument Serial Number and Class-Series in the following format: **SN_<xxx>_Pre-Deployment_<CLASS-SERIES>**	RAD		
34	Post this results document and associated .zip file in Vault at: *Project_Files\Records\Instrument_Records*	RAD		

OOI AC-S (OPTAA) Calibration Log Sheet

SN#	acs-137	**Deployment**	ce02shsp_00019
Date	02-Mar-2021.	**Platform**	wlp-001
Name	Marnie Jo Zirbel	**Location**	OOC(OSU)

bottom mount type: cspp cup calibration type: PRE-deployment

Absorption Date 02-Mar-2021. Time is: local

	λ	A1	A2	A3	A4
λ 1:	440.7	-0.067	-0.068		
λ 2:	511.6	-0.048	-0.048		
λ 3:	581.5	-0.043	-0.043		
λ 4:	651.9	-0.041	-0.041		
	Water Temp	20.58	20.53		
	Time	14:04	14:17		
	Air Temp	21.56	20.69		
	leakrate	medium	minimal		

Comments: Wavelengths selected and values calculated by programmed algorithms.

```
wvl:  std_dev          ;     slope [m-1/min]
λ1:   0.00132  0.00141 ;     0.00028 -0.00013
λ2:   0.00044  0.00044 ;     0.00031 -0.00021
λ3:   0.00025  0.00025 ;     0.00012 -0.00011
λ4:   0.00025  0.00022 ;     0.00019 -0.00007
```

Beam 'c' Date 02-Mar-2021. Time is: local

	λ	C1	C2	C3	C4
λ 1:	443	-0.059	-0.059		
λ 2:	509	-0.014	-0.015		
λ 3:	580.3	-0.005	-0.005		
λ 4:	649.9	-0.004	-0.004		
	Water Temp	20.44	20.51		
	Time	14:34	14:48		
	Air Temp	20.95	20.72		
	leakrate	minimal	medium		

Comments: Wavelengths selected and values calculated by programmed algorithms.

```
wvl:  std_dev          ;     slope [m-1/min]
λ1:   0.00274  0.00278 ;     0.00057  0.00041
λ2:   0.00084  0.00090 ;     0.00025 -0.00005
λ3:   0.00043  0.00045 ;     0.00034  0.00013
λ4:   0.00030  0.00030 ;     0.00034  0.00008
```