Ocean Networks Canada

Ferry Maintenance Report – Queen of Alberni

Date: September 12, 2014

Arrival: 12:45PM sailing to Tsawassen. We signed in at terminal supervisor at Duke Point.

Reporter: Chris Sundstrom (Servicing), Akash Sastri (Science Analysis)

Attending Personnel: Chris Sundstrom (ONC-Operations), Jeremy Krogh (ONC-Science/MEOPAR)

Reason for Visit

Regular instrument servicing

Observations

1. There were no signs of moisture or leaks In the Instrument Box.
2. The AADI optode was dirty with sediment/biofilm growth within the housing.
3. The BBFL2 had a partial layer of sediment in the housing and fouling on the sensing surface. Fouling was noticed on the “bottom” surface of the horizontal housing.
4. The Seabird 45 CT sensor very dirty, with to mussels approximately 3/8” long found growing within the housing on the sensor outlet port.
5. The flex tubing was in good shape, having been replaced on the previous trip.
6. The sea chest showed no signs of leaks.
7. The inline filter (sea strainer) was checked and was found to be dirty and required cleaning. Mussel growth was found inside the strainer basket.

Actions Taken

1. Opened both boxes and observed function. Both were working well, no leaks anywhere.
2. Powered down and disassembled instruments in lower assembly.
3. Cleaned and checked over instruments in Engineering room. Cleaned CT sensor connector to remove sediment and biofouling growth. Removed four mussels from interior of housing.
4. Ran pre- and post- calibration with standard solutions and with Orange test stick and blue test stick for CDOM fluorescence and Chl fluorescence.
5. Re-assembled the instruments in the lower box.
6. Checked over Sea chest and valves, no leaks apparent.

7. Checked and cleaned the sea strainer. Removed mussels, biofilm and sediment fouling from the strainer. Mussel growth was significant and the longest was nearly ½" long.
8. Turned ON the system.
9. No leaks in instrument housing and checked flow output at sea strainer. Flow was good. Visually confirmed flow direction at the BBFL2 and confirmed the volume filled with water and began draining correctly.
10. Signed out at Engineering room.

Future Actions

1. Potentially replace CT connector (shipboard connector will need to be re-soldered).
2. Monitor growth of Mussels within the system.
3. November refit, replace all metallic connectors on upper boxes with plastic glands.

Discussion of Test Procedures and Results

The test procedures used are documented in the supplemental report, which also provides preliminary analysis of the data and its consequences.

ADDENDUM/NOTE: There was no sign of crab inhabitation this trip. One small crab was found in the Sea Strainer on last trip (not noted).

PICTURES

Figure 1: System upon arrival

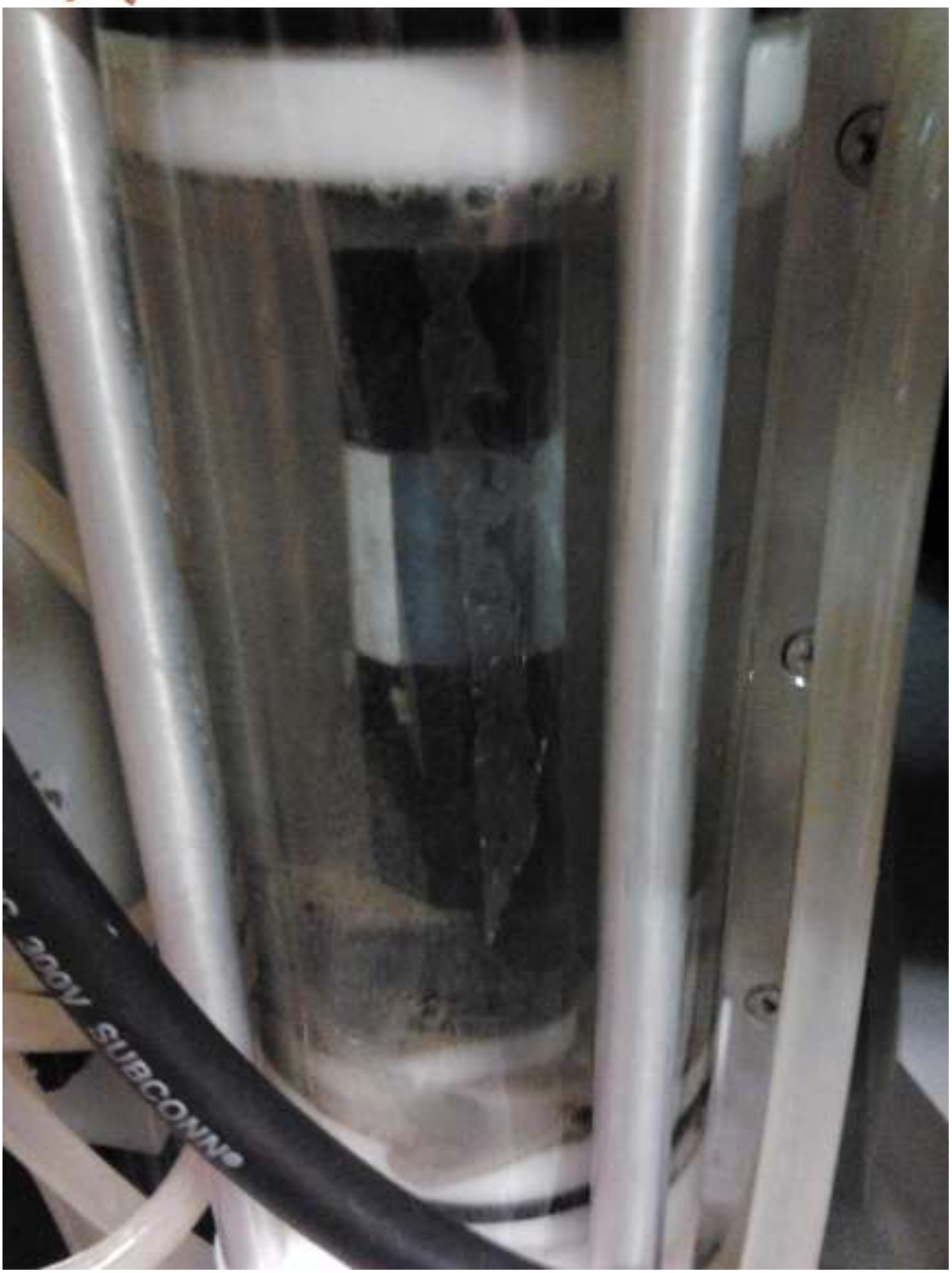

Figure 2: CT Sensor fouling

Figure 3: CT Sensor fouling

Figure 4: CT Sensor fouling

Figure 5: BBFL2 Fouling

Figure 6: Optode fouling

Figure 7: Mussel growth and fouling in Sea Strainer

Figure 8: System upon completion

In situ CDOM and Chlorophyll fluorescence (BBFL2) corrections
Sept 12, 2014

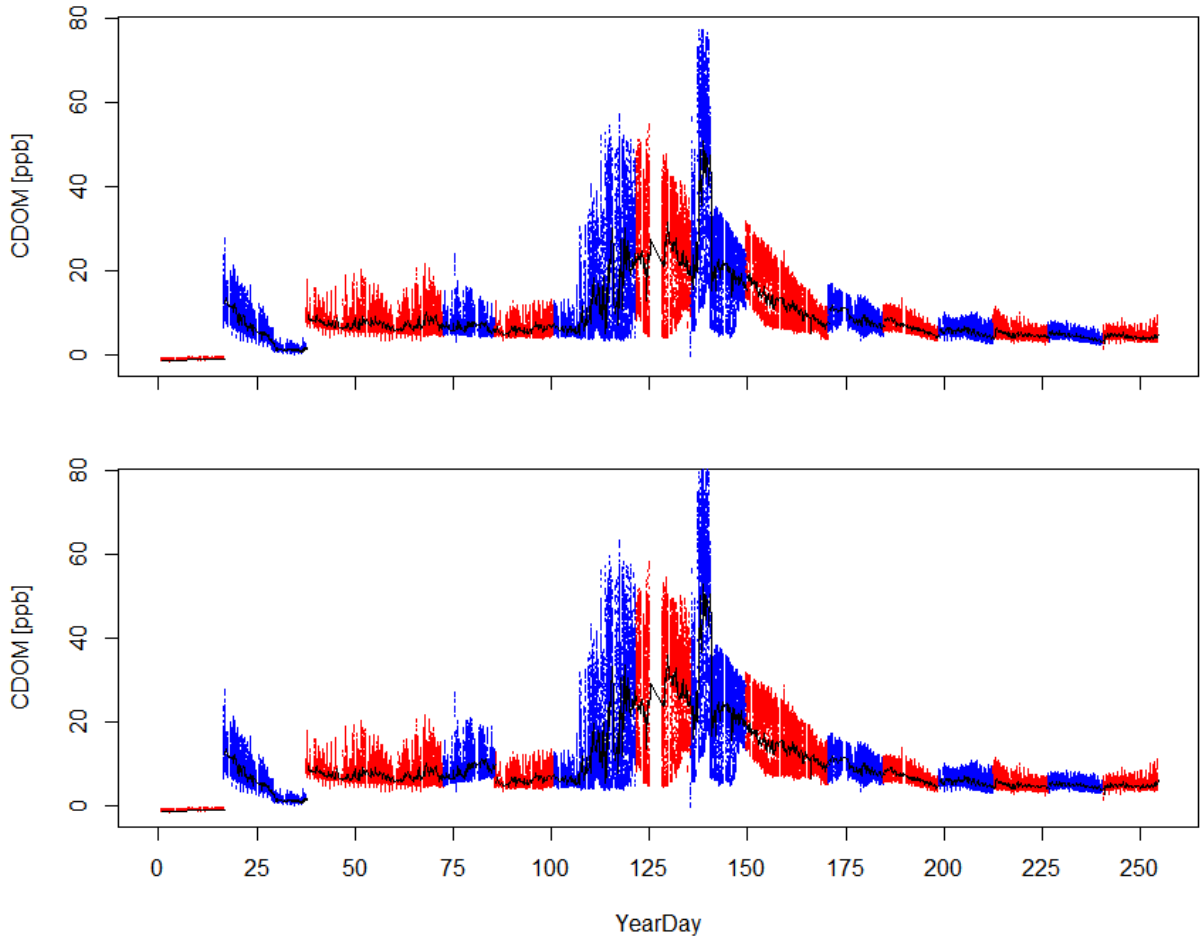

Figure 1. Time series of a) un-corrected; and b) corrected CDOM fluorescence measured en route between Duke Point (Vancouver Island) and Tsawwassen (Mainland, BC) by the BBFL2 unit of the SeaKeeper 1000 instrument suite on board the BC ferry, the Queen of Alberni. Red and blue symbols are used to distinguish between instrument cleaning dates. The difference between pre- and post-cleaning fluorescence of diluted tonic water was typically used to calculate a correction factor (%) which was applied as a linear correction retrospectively between cleaning dates. The most recent cleaning event took place on September 12, 2014. Pre- and post- values for both Tonic water and Sprite Zero were near zero and no corrections to CDOM between August 29, 2014 and September 12, 2014 were applied. Note: an instrument inter-calibration applied to all data following day 149 when BBFL2-786 was swapped out for BBFL2-787.

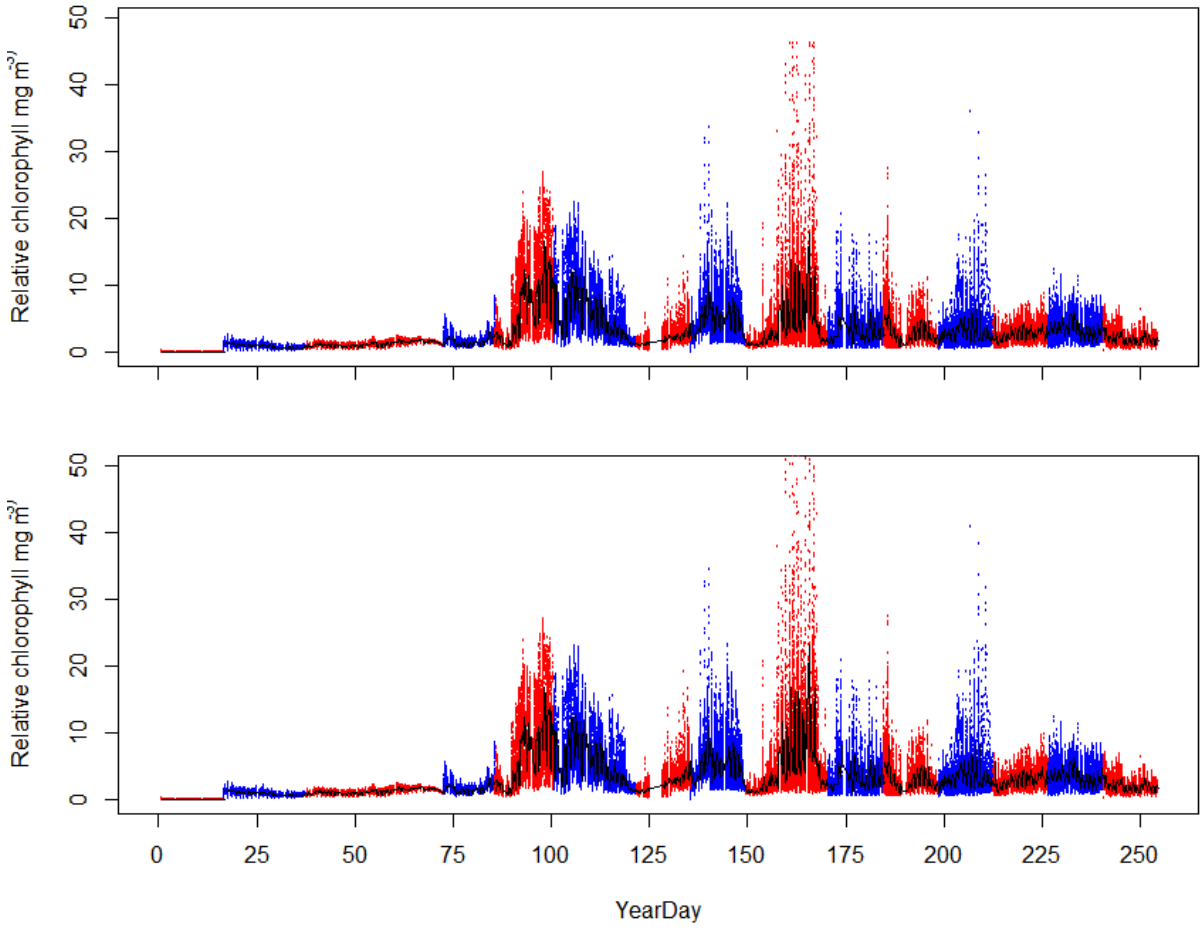

Figure 2. Time series of a) un-corrected; and b) corrected Chl fluorescence measured en route between Duke Point (Vancouver Island) and Tsawwassen (Mainland, BC) by the BBFL2 unit of the SeaKeeper 1000 instrument suite on board the BC ferry, the Queen of Alberni. Red and blue symbols are used to distinguish between instrument cleaning dates. The difference between pre- and post-cleaning fluorescence of diet coke was used to calculate a correction factor (%) which was applied as a linear correction retrospectively between cleaning dates. The most recent cleaning event took place on September 12, 2014. On this date, we measured a negative response in Chl fluorescence of diet coke to cleaning (see Table 1). No correction was applied to the most recent period (August 29, 2014-September 12, 2014). Note: an instrument inter-calibration applied to all data following day 149 when BBFL2-786 was swapped out for BBFL2-787.

Table 1. September 12, 2014. Mean (±standard error) values of pre- and post-cleaning fluorescence for solutions/fluorescent sticks specific to CDOM and Chlorophyll fluorescence. 'Δ fluor' values for Diet Coke (Chl) and diluted tonic water (CDOM) have been used at every cleaning since March 14, 2014 to assess the degree of signal decay between cleanings. Neither the pink fluorescent stick nor Diet Coke (standards for Chlorophyll fluorescence) responded in a positive fashion to cleaning. The response of the pink stick can be attributed to variability of this approach, however, this is the second instance in which we have noted a negative response for Diet Coke. It is not clear why, however the negative difference is close to zero, suggesting little or no bio-fouling.

CDOM/Chl Fluorescence	Method	Pre- (mean± SEM)	Post- (mean± SEM)	Δ fluor (%)
CDOM	Diluted tonic water	149.56±0.031	143.61±0.016	-0.04
CDOM	Sprite Zero	49.42±0.018	49.64±0.018	0.004
CDOM	Blue fluorescent stick	68.61±0.02	111.61±0.097	0.39
Chl	Diet Coke	5.57±0.005	5.26±0.008	-0.06
Chl	Pink fluorescent stick	0.90±0.002	0.84±0.002	-0.07