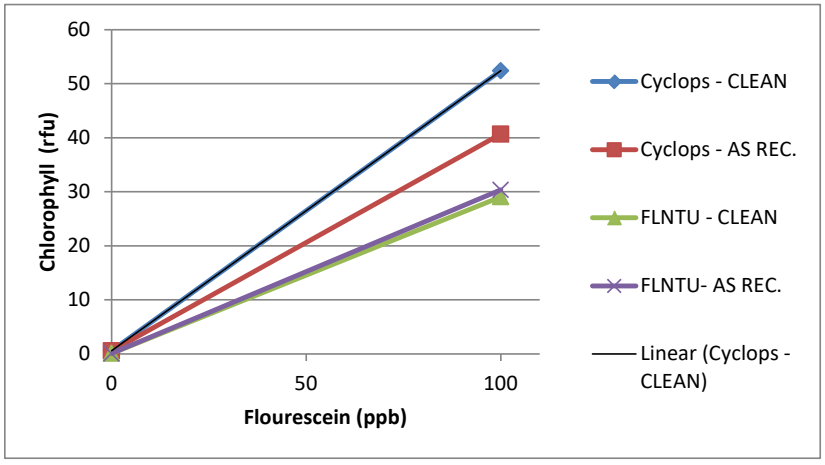
Scaling of SATURN-010 Chlorophyll data from 2016 deployment

Two fluorometers measured chlorophyll fluorescence at SATURN-10 during the 2016 deployment. A Turner Designs Cyclops 7 chlorophyll fluorometer was deployed on a buoy measuring water at 0.75m and 14m (via a pumping system). A WETLabs FLNTU was deployed on a neighboring buoy and measured water at 17m. The response curves of the two sensors were aligned using measurements of DI water and a fluorescent proxy solution (100ppb fluorescein), made following recovery of the two buoys. Readings were taken before (as recovered) and following cleaning of the sensors and are shown in the table and figure below:

Instrument	Fluorescein Concentraton (ppb)	Chl (rfu)	As Recovered or Clean	slope	intercept
Cyclops #218-0537	0	0.54	AR	0.401	0.540
Cyclops #218-0537	100	40.67	AR		
FLNTUSB #1619	0	0.06	AR	0.303	0.060
FLNTUSB #1619	100	30.35	AR		
Cyclops #218-0537	0	0.59	CL	0.518	0.590
Cyclops #218-0537	100	52.39	CL		
FLNTUSB #1619	0	0.08	CL	0.290	0.080
FLNTUSB #1619	100	29.07	CL		



There was no appreciable fouling on FLNTU over the course of the deployment. While the readings did reveal fouling on the Cyclops sensor, it was left in place on the buoy for a couple of months after the available data ends. The data do not reveal any apparent patterns of fouling (shifts in baseline, etc.) and it is likely that the fouling revealed in the 'as recovered' measurements occurred after the existing data were collected.

In order to scale the FLNTU output to the Cyclops output, the standard measurements made with clean instruments were used to generate the following equations:

- CYCLOPS (rfu) = 0.518*FS + 0.59
- FLNTU (rfu) = 0.290*FS + 0.08

which were used to define the following relationship between the two sensors:

CYCLOPS(rfu) = FLNTU(rfu)*1.787 +0.447

In addition to scaling the FLNTU output to the cyclops output, the data from both sensors was then corrected for the baseline offset of ~0.6 rfu (also measured during the pre-deployment check of the cyclops sensor). The following adjustments were made to the data:

- CYCLOPS (qc) = CYCLOPS(raw) – 0.59
- FLNTU (qc) = FLNTU*1.787 + 0.447 – 0.59

These corrections allow for direct comparison of these data sets, but should not be considered a calibration. Units are relative fluorescence units (RFUs) only. No additional calibration is currently available for this sensor.

The raw and quality controlled data from SATURN-10 are shown relative to quality controlled data from SATURN-03 in the figures below. While there is not any expectation that the data from these two station should be similar, SATURN-03 was used as a reference because those data are calibrated against field samples and represent actual concentration in ug/L and are therefor a good reference for scale.