

SATURN-04 Turbidity Data QA/QC

September 2009 - May 2016

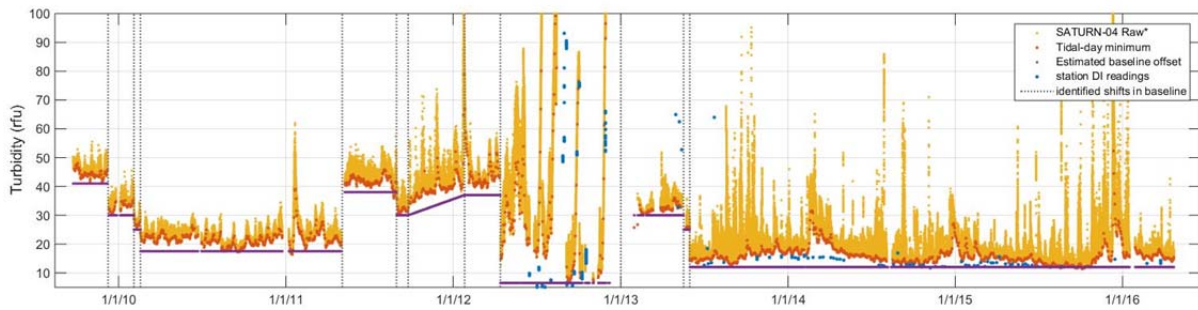
BASELINE OFFSET CORRECTIONS:

A Turner Designs Cyclops 7 turbidity sensor was deployed at SATURN-04 in the fall of 2009. While the same sensor has been deployed at the station through the beginning of 2016, the type of flow cell changed in mid-2013. The original flow cell had issues where the slightest change in positioning of the sensor would affect the sensor baseline due to the sensor 'seeing' the far end of the flow-cell. This sensitivity resulted in abrupt shifts in data and many periods of discontinuous baseline in the first several years of data. The new flow-cell design fits the flow cell more consistently and the shifting baseline has not been an issue since its installment.

Tidal-day minimum values (average of the lowest three non-bad data values) were calculated (orange points in the plot below) were calculated. In addition, in-situ readings of DI water began being collected in mid-2013 (blue points in the plot below). These data were used to identify shifts in baseline and estimate sensor offset. Between deployment in late 2009 and early 2016, twelve distinct periods of baseline offset have been identified. During these periods the baseline offset is stable, with the exception of one period in late 2011 where baseline drift was observed.

The following estimated baseline offsets were subtracted from the raw data:

Start time	End time	Estimated Offset
9/23/09	12/09/09	41 rfu
12/09/09	2/03/10 10:00	30 rfu
2/03/10 10:00	2/17/10 12:00	25 rfu
2/17/10 12:00	5/4/11	17.5 rfu
5/4/11	8/30/11 11:30	38 rfu
8/30/11 11:30	9/25/11	30 rfu
9/25/11	1/25/12 22:02	30 – 37 rfu (*linear drift)
1/25/12 22:02	4/13/12	37 rfu
4/13/12	1/1/13	6.5 rfu (* This period is fouled for much of the time but CWO data helped identify the baseline)
1/1/13	5/18/13	30 rfu
5/18/13	5/31/13 12:00	25 rfu
5/31/13 12:00	5/1/16	12 rfu

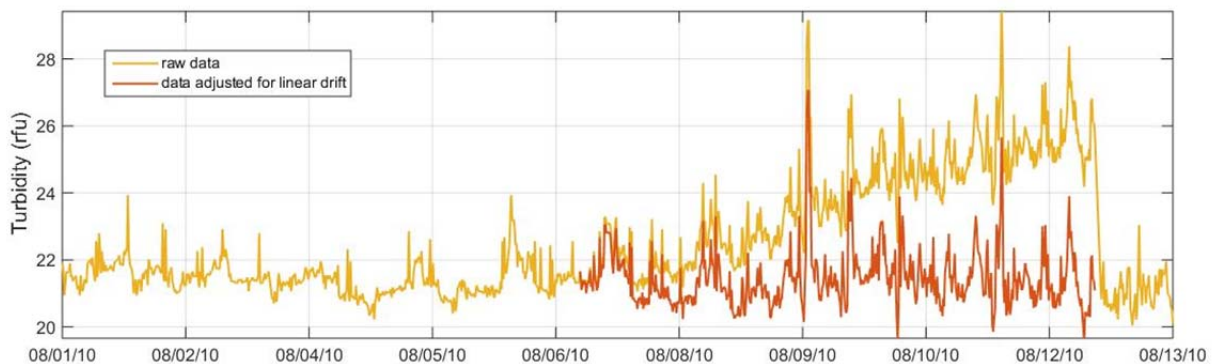


**note that periods of fouling have not been precluded from this plot & those data were not used in estimating baseline values*

CORRECTIONS FOR SENSOR FOULING/DRIFT

In addition the baseline offset corrections, there are several periods of sensor fouling, typically resulting in a rising baseline which returns to the pre-fouling levels following sensor cleaning. Approximate corrections for these periods of fouling were applied to the data unless fouling was too extensive.

Prior to mid-2012 the maximum extent of sensor drift was estimated by quantifying the shift in data following sensor cleaning. After mid-2012 the on-station DI readings were used to identify and quantify sensor drift and offset. In the figure below, the yellow data are the raw data and the red data have been corrected based on the assumption of linear drift:



It should be noted that these corrections are only approximate as drift may not have been completely linear and because any additional effects of fouling, such as signal attenuation, are unknown and have not been corrected for.

The following periods of sensor fouling were identified and corrected for:

Onset (start)	End	Maximum offset at endpoint
2/17/10 12:00	3/18/10 12:26	2.5 rfu
6/12/10	6/17/10 09:24	2.588 rfu
7/7/10	7/12/10 13:40	4.913 rfu

7/21/10	7/29/10 11:15	1.702 rfu
8/7/10	8/12/10 14:00	4.649 rfu
9/4/10	9/10/10 11:30	3.061 rfu
3/13/11	3/28/11 12:48	2.445 rfu
7/3/12	7/13/12	sensor extensively fouled resulting in bad data
8/3/12	9/5/12	sensor extensively fouled resulting in bad data
9/22/12	10/2/12 15:00	sensor extensively fouled resulting in bad data
11/20/12	12/1/12	sensor extensively fouled resulting in bad data

CALIBRATION:

Units are relative fluorescence units (RFUs) only. No additional calibration is currently available for this sensor. Data may not be directly comparable to turbidity sensors deployed at other stations. See turbidity QA/QC information page for additional information:

http://www.stccmop.org/book/qaqc_information/qaqc_turbidity