Examination of Observed Chlorophyll Concentration and Temperature in Chesapeake Bay and Tributaries

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Conclusions

The results from discrete observations at individual stations show a great deal of variance. Individual stations can be found which demonstrate different patterns. There is no evidence, however, that chlorophyll concentration increases indefinitely as temperature increases. The predominant behavior is that the maximum chlorophyll concentration drops off when temperature exceeds 31^{o}C to 32^{o}C.

Part I – Observed Chlorophyll Concentrations vs. Temperature

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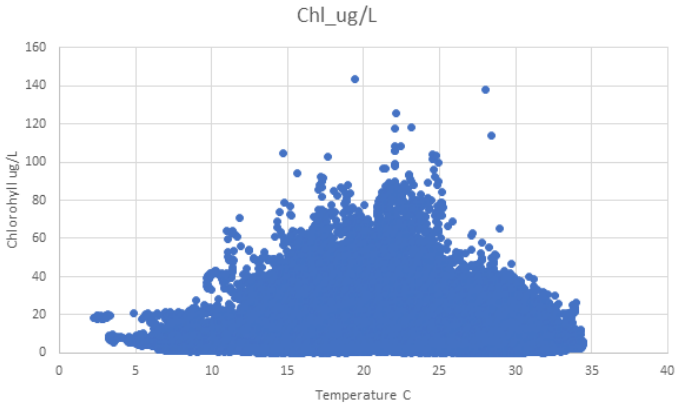
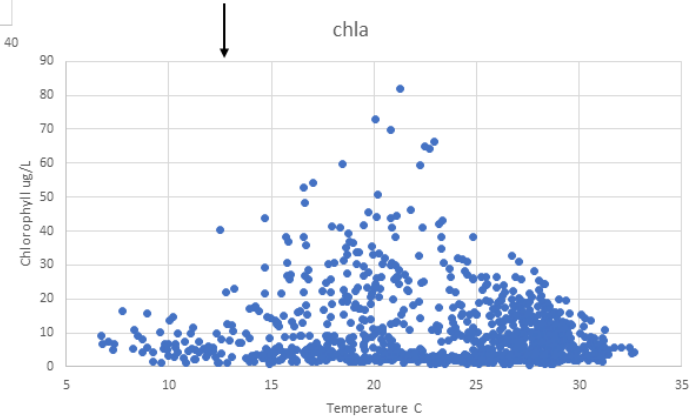


Discrete Data

Daily Average



Piscataway, Potomac River

Appendix – Observed Chlorophyll vs. Temperature at Additional Stations

Part II – Piecewise Quantile Regression Analysis on Continuously Monitored Chlorophyll and Temperature to Inform the Chesapeake Bay Algal Growth Rate-Temperature Model

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Part II – Piecewise Quantile Regression Analysis on Continuously Monitored Chlorophyll and Temperature to Inform the Chesapeake Bay Algal Growth Rate-Temperature Model

Station	Segment	Year Range	Relationship at temps <= 32°C		Relationship at temps > 32°C		Sample size >32°C	Maximum temperature observed (°C)
			50th	90th	50th	90th		
JMS099.00	JMSTFU	2006-2008	+	+	-	-	5181	36.2
JMS073.37	JMSTFL	2006-2008	+	+	-	-	675	35.5
JMS048.78	JMSOH	2006-2008	+	-	ns	ns	426	34.8
CHK015.12	CHKOH	2006-2008	+	+	-	-	121	34.0
JMS018.23	JMSMH	2006-2008	+	+	ns	+	426	34.8
JMS002.55	JMSPH	2006-2008	+	+	+	-	55	33.6
HUN001.29	POCMH	2013-2015	ns	+	-	-	196	34.6
BBY002.74	LYNPH	2019-2020	+	+	ns	-	79	33.5
OCH001.60	CB7PH	2016-2018	-	-	ns	+	398	33.9
TSK000.23	YRKMH	2020-2022	+	+	-	-	1201	35.1
Bush River-Otter Cr	BSHOH	2010-2022	ns	-	+	ns	5570	37.2
Wicomico-Little Monie Cr	WICMH	2010-2022	+	+	+	+	3124	35.2
Patuxent R.	PAXTF	2010-2022	+	+	ns	-	125	33.5
Back R. - Riverside	BACOH	2014-2022	+	+	-	-	317	34.2
Bush R. -Church Pt	BSHOH	2008-2010	+	-	ns	-	250	34.2
Susquehanna Flats	CB1TF	2007-2017	+	+	-	-	773	34.2
Gratitude Marine	CB3MH	2009-2011	+	+	-	-	201	34.0
Tilgman Island	CB4MH	2017-2019	-	-	+	+	115	33.7
Chester R. - Deep Landing	CHSTF	2003-2006	+	+	+	-	620	34.4
Choptank R. - Mulberry Pt	CHOMH1	2001-2003	+	+	-	-	399	35.3

Thirty-one of the forty analyses at temperatures above 32C^{o} indicate that chlorophyll declines or levels off as temperature increases.

Discussion

The weight of the evidence generated by this analysis leans in support of the assumptions of the recommended algal growth rate model. There is strong support for the assumption that chlorophyll increases at temperatures up to 32°C. At temperatures greater than 32°C, the results are more mixed and show more negative than positive responses. This supports the assumption of stable growth and decline at very high temperatures.

Where do we find it?

https://www.chesapeakebay.net/what/publications/examination-of-observed-chlorophyll-concentration-and-temperature-in-chesapeake-bay-and-tributaries

Questions?