

In response to the comment from reviewer 1

“As a major result, it is claimed that the seasonality of CHL has changed, but I cannot see it anywhere. One would guess that the time series in Figure 2 do not look stable, but that is not the way to present such evidence. One has to make a seasonal decomposition, allowing for a varying seasonality. This also affects the “observed decline in Spring chlorophyll-a” (line 311). These insufficient results are followed by a lengthy discussion in which the readers have to believe the statements instead of finding out themselves based on the presented evidence.”

We are disappointed that reviewer 1 did not like the way the evidence was presented or find it convincing. We feel we provided several approaches to examine the change in seasonality.

- 1) The first is a clear plot of the time series of the data for all four lakes and it is stated that one can see a change from a concave pattern (well defined spring growth, decline and summer increase) to a more convex pattern with lower spring and higher summer concentrations.
- 2) This is followed by Nonparametric Multiplicative Regression (NPMR) models that model the time series with output contour plots that show how the pattern of chlorophyll a has changed overtime. NPMR is a flexible method that does not make assumptions about data distribution and does not require the data to be stationary and has been found to be more sensitive than autoregressive modelling. For example, Nicolaou & Constandinou (2016) as cited in the paper, replaced autoregressive modelling approaches with NPMR and found it better at revealing structural relationships on artificial and real data for neuroscience applications at Imperial College London.
- 3) We calculated the maximum chlorophyll-a (June-May) and plotted the temperature at which it occurred over time (Fig.5). This indicated a shift to the maximum occurring at higher temperatures reflecting the shift from spring to summer peaks. The sen slopes of two lakes were significant.
- 4)

However we were troubled that this was not clear enough – so we would propose to include the table and text below. –

The occurrence of maximum chlorophyll-a was classified as occurring in either winter/spring or summer/autumn (Table x). During the period 2003-2008 the majority of peaks occurred in spring (brown shading) after which peaks during summer or autumn became more common (blue shading). The trends from a winter/spring to summer/autumn peak were tested for each lake using logistic regression and all slopes were positive with p ranging from 0.10 to 0.04 (Table x).

Table x Occurrence of chlorophyll-a maximum in either winter/spring (Nov-May, brown) or summer/autumn (June-October, blue) for the four lakes. Coefficient (β) and p are reported from the logistic regressions against year. Maximum values were calculated from June to May (trough to trough) the following year.

Lake/Year	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	β	p
Garda																0.27	0.10
Como																0.48	0.04
Maggiore																0.29	0.08
Iseo																0.41	0.06