

Reply to comments of Anonymous Referee #1

We thank referee #1 for his useful feedback, and have applied suggested changes and clarifications in the text. Detailed responses can be found in the following:

1. Replacement of measurement instruments:

Measurement techniques to determine the parameters discussed in the paper only changed for a few parameters once and stayed constant throughout the whole period for example for oxygen. Old and new methods were calibrated, so we do not expect any shifts in the trends due to the rare changes in methods.

We added a reference to Table 1 and included the calibration in the text at p. 7618, l. 12.

“Measurement techniques changed only once for temperature, salinity, phosphate and chlorophyll a (Table 1), all of which were calibrated so that no shifts in the trends due to a change in measurement techniques is expected.”

2. “shifting to the 15th of each month” (p. 7619, l. 15)

Shifting to the 15th of each month means that no matter at what date during the month the sampling took place, the result was assumed to be representative for the whole month. To ensure regular spacing, the corresponding date was chosen to be the middle of the month, the 15th. No interpolation was done at this stage. To address this in the paper, we changed the following sentence:

“The measurements were averaged in cases of several dates per month (<5%) and shifted to the 15th of each month” (p.7619, l. 14-15)

was changed to

“The measurements were averaged in cases of several dates per month (<5%) and assumed to be representative for the whole month. Therefore, the corresponding date was chosen to be the middle of the month (15th).”

3. Data availability during breaks in time series

The time series has two major breaks, where no data is available: December 1975-March 1979 and December 1982-January 1986. In between and after that, data availability was sparse, e.g. data only every 3rd month. As indicated correctly by the referee, further clarification and a reference to the figure is missing in the text. We addressed this further in the text and added the corresponding reference (p.7618, l. 8):

“..., and has been operated until present on a monthly base with only two major breaks in 1975-1979 and 1983-1985, where no data is available (Fig. 2).”

4. Averaging of data

For the Mann-Kendall-Test, it is possible to use irregular spacing, so data was only averaged in very little cases where several measurements took place (<5%). We do not expect any significant changes in the results due to that averaging. For the methods where regular spacing was needed (e.g. quantile regression and bootstrapping), the data was not interpolated/averaged but assumed to be representative for the whole month, no matter at which date of the month it was taken. Compared to interpolated time series, mean and variance of the time series varied only by less than 1%, so we do not assume any significant changes due to the applied method to space the dates regular.