General comments:

This paper describes changes in iodate and iodide concentrations over the entire growth cycle in cultures of various species of phytoplankton, in order to better understand the purpose and mechanism of iodate to iodide reduction in marine phytoplankton, which would help with the development of process-based models of inorganic iodine cycling in the oceans. It clearly falls within the scope of the journal biogeosciences and it is a clearly written, well-organised manuscript. However, I feel they should have tried to determine what the 'missing iodine' was in this study, since this is an issue that was already discussed in previous papers, and needs to be resolved. Knowing what this missing iodine is will help to achieve a better understanding of the purpose and mechanism of iodate reduction. Also, I do not entirely agree with their conclusion that I^--production is a result of cell scenescence. Although this process does seem to occurr, the observation that I^--production rate was often higher during the log phase clearly indicates that (an)other mechanism(s) must be at least as important (see specific comments).

Specific comments:

l. 220-222, 'Media used...in this nutrient'. Since they did not measure nitrate in the culture media at the end of the experiment, nor C:N ratio in the phytoplankton, they cannot state that nitrogen was not limiting. Moreover, 2.5 µM is not a high concentration of nitrate for microalgal cultures and since cultures stopped growing, some element (or light) must have become limiting, although not necessarily nitrogen.

l. 315-316, 'Some cultures…in the post-log phase.' I would say that in 6 of the 10 phytoplankton cultures I^--production rate was higher in the log phase than in the post-log phase.

l. 325-326, 'It has been established...Bluhm et al., 2010)' Also Van Bergeijk et al., 2013 (J. Phycol. 49:640-647).

l. 387-393, 'Overall our findings...during active growth.'

In my opinion, I^- production mainly as a result of cell scenescence is not evident from Figs. 2-5. Although an increase in I^- is seen with a decrease in viable cells at the end of the cultures in Fig. 2b, d, e, 3b and f, in several cases I^- concentration was higher at the end of the log phase (Figs 1b, c, 4b, d) than at the end of the scenescent phase, and in most cases, I^- production rate was higher during the log phase than during post-log phases. It is highly unlikely thas this was due to the presence of scenescent cells, as they suggest.

The fact that more IO_3^- was consumed than I^- produced could also indicate that IO_3^- reduced to I^- was stored as I^- inside the cells, which was only released when cells lysed. I^- has been described as an inorganic antioxidant in macroalgae, and although probably present at lower intracellular concentrations in microalgae, it could be used as an intracellular antioxidant during active growth. My point is that although in most cases at the end of the microalgae culture experiments, when cells were lysing, an increasing I^- concentration was observed, this clearly was not the only or most important process for I^- production.

Please comment.

l. 412-413, 'These findings suggest...highest iodide concentrations.' It would be more correct, based on their findings, that highest iodide concentrations will be observed during later stages of phytoplankton blooms, not production rates.

l. 428-430, 'Furthermore,...in marine systems.' Here also, it would be more correct to say maximum iodide concentrations, instead of production rates.

Technical corrections:

l. 39, 'O'Dowd et al., 2002' should be O'Dowd et al., 2010.

l. 71 (and rest of the ms), 'Kupper' should be 'Küpper'.

l. 102, 'Javier et al., 2018' should be 'Hernández et al., 2018', and l. 525, 'Javier, L. H.' should be 'Hernández Javier, L.'

l. 186, 'less than events 1,000 per second' should be 'less than 1,000 events per second'.

l. 288, ‘With our estimated I:C ratios lieing...’ should be ‘With our estimated I:C ratios lying...’
l. 340-341, ‘...Fig. 8Fehler!...werden.’ Delete phrase in German.