

General Comments:

In general, this is a well-written paper that uses isotopic techniques that are quite rare in the literature. There are very few papers using CSIA on plant pigments. I do think the overall quality of the science is very good. The application of this method for current questions concerning pigment diagenesis in coastal margins is something that could be very useful in future carbon studies. The location of their site seems like a logical place to start with redox regime being conducive for preservation. So, while I do like the approach there are a number of critical issues that the authors need to address, but I do feel that this work should eventually be published here.

Specific Comments:

- 1) The introduction does not really spell-out the overall goals of this work. On line 12, page 3, there is an attempt to do this but I would suggest a new paragraph with a more explicit statement of goals to end the introduction section.
- 2) On page 4 the method section on pigment extraction and purification makes no reference to any prior literature (e.g., Sachs et al., 1999), does this mean that all of these techniques are original? If so, I would like to see a chromatogram. Also, on page 5, line 10, please elaborate on what is meant by “unprocessed”, does this mean they were not decarbonated?
- 3) On page 6, they refer to a large assumption they make which involves radiocarbon input from river and atmospheric sources - they assume they are equal. Does this affect some of the issues that arise in section 4.2 where they refer to 3 possible explanations on why the chlorophyll-a and pheophytin C-14 are much lower than the DIC-14? If not, they still need to better justify this assumption. Now, back to explanation on why the pigment and DIC differ in radiocarbon. I am not convinced that by comparing the bivalve number, which agrees with the DIC C-14, that this eliminates the possibility of a different aged DIC source being used by phytoplankton. It is always assumed that calcareous bivalves use similar sources of DIC as phytoplankton in a region? If so, please provide references. Why was Chlorophyll b and its degradation products not measured, this is a better source for higher plants and something that could be quite useful when they make reference to the terrestrially-derived sources in a paper that we cannot at this time review in GCA? This again is highly relevant to explanation on possible sources of pigments from vascular plants that are older than the DIC.
- 4) On page 10, line 28, they make references to the role of flooding in releasing plant leaves, any data for flooding events in this region to cite?
- 5) On page 11, the statement about possible blank carbon, which they “cannot accurately determine” hits the reader like “a ton of bricks.” This just comes out of nowhere and adds considerable skepticism about the validity of the data. Now, they do make an adjustment of roughly 1 to 11 μg ^{14}C -free for samples 30 to 230 μg . Where does this number come from? Once they apply, the

numbers seems to come in range with the DIC14C, but without any source or justification for this correction the reader is left with no basis for accepting this correction factor.

- 6) Section 4.3 is very confusing and the arguments are not convincing. For example, on page 12 from line 27 to page 13, line 5, there is this confusing argument about the role of seasonality that may be affecting the availability of old versus young DIC, also thrown into this is the location of where phytoplankton might spend time in the water column. First of all, I have no idea when these samples were even taken so I do not know if it is spring or fall. Secondly, the domination of one pheopigment in a particular season (e.g., pry. mass flux with autumn bloom) should not decouple with its parent chlorophyll, and how does the assumption about 14Riv? Moreover, the discussion continues with speculation about how C14 DIC can vary seasonally in the ocean but that there is no seasonal information for the Black Sea, I am not sure how constructive this discussion is? Also, if the pycnocline is such a barrier how much sediment flux to water affects this seasonality of DIC? This seems to be inferred here, at least to me; or is there something else occurring over different seasonal timescales with DIC?
- 7) Table one is essentially not discussed in the paper and more importantly, as I mentioned earlier it does not provide the month samples were taken.

Corrections:

- 1) Page 2, line 10, should state “much of the sustaining life” when considering the deep vent communities, just as one notable example.
- 2) Page 2, Eliminate “the” on line 22
- 3) Page 2, Add “be” before overwhelmingly...
- 4) Page 2, New paragraph should start with “primary degradation....”, this is a problem throughout the text, there are huge paragraphs that go on too long...
- 5) Page 3, line 5, insert “to” between 30-50.
- 6) Page 3, line 8, should be Sun et al., 1993a,b
- 7) Page 3, start new paragraph around line 10 to include goals as stated earlier.
- 8) Page 3, line 22, multicore has a hyphen, and what season in 2008, this is really important!
- 9) Page 3, line 24, in “to” between both number ranges
- 10) Page 3, line 28, use upper-case for liters (L)

- 11) Page 3, line 33, it is important to report the type of sonicator and frequency used, the time means nothing when considering the variability in the power of these devices.
- 12) Page 4, eliminate "The " on line 8
- 13) Page 4, inset spaces between "x" and numbers for dimensions of the columns
- 14) Insert new paragraph starting on line 15 with "To achieve..."
- 15) Use superscripts to describe flow to be consistent with units throughout manuscript
- 16) Page 4, line 30, eliminate "The" and add "s" to composition
- 17) Page 5, line 3, no new paragraph...
- 18) Page 5, line 13, insert "and" after sufficient...
- 19) Page 5, line 17, Stuver et al., 2010 not listed in refs.
- 20) Page 5, equation on line 30 needs to be numbered "1"
- 21) Page 5, line 34, insert comma after (Godwin, 1962)
- 22) Page 6, line 14, insert comma after "where"
- 23) Page 6, line 30, delete "an"
- 24) Page 7, reword line 12 to be "at the mouth of the..." "in front of" is not appropriate
- 25) Page 7, line 22, Same as on line 12
- 26) Page 8, line 22, insert "the" after In
- 27) Page 8, line 23, omit "potential small"
- 28) Page 8, line 32, eliminate "the" before nitrogenous and make source plural
- 29) Page 8, line 33, eliminate "be", change reflected to reflect and add an "and" after values, change resulting to result and in line 34, change from to in
- 30) Page 9, line 7, change to mouth not in front of
- 31) Page 9, line 20 insert hyphen into timescales
- 32) Page 9, line 35, any idea about the age of these carbonaceous rocks, and delete "the"
- 33) Page 10, line 1, insert comma after phytoplankton
- 34) Page 10, line 6 omit "area"
- 35) Page 10, line 7, start new paragraph with Aggregation...
- 36) Page 11, line 2, omit "area"
- 37) Page 11, line 13, insert comma after (Tab 1)
- 38) Page 11, line 14, replace have with "are"

- 39) Page 11, line 21, Insert new paragraph starting with “the modeled...”
- 40) Page 11, line 27, delete “also”
- 41) Page 11, line 31, insert “to” between number range
- 42) Page 12, line 2, insert “and” after quantity
- 43) Page 12, line 5, delete “the” both times
- 44) Page 12, line 28, reword sentence that begins with “However, ...
- 45) Page 13, line 4, insert 4 after (Chu et al., 2005
- 46) Page 13, line 6, insert “in the Danube delta” after “pigments”
- 47) Page 13, line 10, insert comma after “pathway”
- 48) Page 13, line 18, delete “apparently” and insert comma after Sea
- 49) Page 13, line 34, delete “the”