

Interactive comment on “Bio-chemostratigraphy of the Barremian–Aptian shallow-water carbonates of the southern Apennines (Italy): pinpointing the OAE1a in a Tethyan carbonate platform” by M. Di Lucia et al.

H. Weissert (Referee)

helmut.weissert@erdw.ethz.ch

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Di Lucia et al present a new C-isotope data set on the Aptian derived from shallow-water carbonate successions in S. Italy. The main outcome of this paper is an improved correlation between biostratigraphic data from platform carbonates and the Barremian–Aptian C-isotope stratigraphy. The manuscript presented contributes to the literature on Barremian–Aptian C-isotope stratigraphy and on questions concerning response of carbonate systems to past environmental change.

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As a reviewer I am somewhat surprised about the way, earlier literature concerning this topic is dealt with. The area investigated (S. Apennine carbonate platforms) was investigated by the group of Bruno d’Argenio in collaboration with the ETH group since the 1990ties. In an early study published in 1997, Ferreri et al have tested if C-isotope stratigraphy can be used as a correlation tool between pelagic and shallow-water carbonate succession (Terra Nova, 1997). They have documented in their rather low-resolution study how chemostratigraphy can be extended from Tethyan pelagic settings into the shallow-water environments. These shallow-water settings in the S. Apennines are now revisited by Di Lucia et al. The Ferreri et al paper has to be cited by Di Lucia et al. since it is the first paper dealing with chemostratigraphy in these carbonate platforms. In a follow-up study, Wissler et al (2004, SEPM Spec. Publ) have refined the C-isotope stratigraphy of the Monte Raggetto locality. They present a detailed C-isotope stratigraphy across the Barremian–Aptian, which they could correlate with corresponding pelagic successions. Based on this correlation they could identify 12m of dark-coloured limestones as OAE1a equivalent. The Raggetto curve presented in the Wissler et al. paper perfectly well matches the new data set from Monte Croce. As a reviewer, I am astonished that the authors forgot to a) cite and discuss the Wissler et al paper and b) that they did not add the curve to their own data set. This addition would have confirmed that the Monte Croce is indeed a rather complete section with a solid chemostratigraphy (at least into the mid-Aptian). The comparison would also have confirmed that the correlation between S. Apennines and the Cismon locality proposed by Wissler et al was quite good already. In addition, such a correlation would have helped to identify gaps in the two other sections (Mte Motola, Monte Coccovello) occurring in parts of the Aptian succession. In both of these sections, typical +4 permil peak values of the first positive C-isotope excursion in the Aptian are not at all reached (+3 values as maximum values > chemostratigraphy suggests that part of the sections are missing). > The authors need to include the relevant available data from the Raggetto section, a section, which is only a few tens of kilometers away from the new sections presented in this study.

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Detailed comments:

p. 16, please cite the precursor work from your region p. 19 The Monte Croce +4permil excursion matches well with the excursions documented in Wissler et al from the Monte Raggetto, please refer to this and I highly recommend, that you add the Raggetto curve to your summary figure. p. 19 I have quite some problems with the correlations Croce-Motola-Coccovello. The amplitude of the prominent Aptian excursion is expected to about 4 permil (Croce, Raggetto). In the other sections you just reach about 3 permil or less. This indicates that either you are missing positive excursion (and also the corresponding negative spike) or that you correlate the Aptian excursion with an older Barremian/Aptian C-isotope excursion (most of them peak around +3permil). If you maintain your correlation you have to discuss the significant difference in amplitude of the curves. You may refer to d'Argenio et al. and Wissler et al, if you discuss emersion events in the studied sections. p. 19 if we look at the S. Appenine data sets, it looks as if Croce and Raggetto are the most complete records. The Aptian positive excursion, seems, however, not complete in both localities (Raggetto is marked by emersion horizon cutting the end of the peak, is this also observed at the Mte Croce locality?). The positive excursions covers around 30-40m, in extended and more complete localities (like the Basque-Cantabrian Basin, see Millan et al., EPSL, 2009) the excursion covers a few hundred meters.

p. 19 mark in figure what you consider as negative spike

p. 26 Conclusions

"The first step to unlock this archive is the precise chronostratigraphic dating and correlation of shallow-water carbonate successions with deep-water successions, which represent the reference record of palaeoceanographic events. In this paper we fulfill this task". This first step was attempted in the mid 90ties by d'Argenio and colleagues. Please refer to this.

Line 20 Wissler et al describe this OAE1a interval as characterized by thin-bedded

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dark limestones. Do you recognize comparable facies trends as in the Mte Raggetto locality?

Even if the paper presented is not entering new terrane, the paper deserves to be published: > An improved chemostratigraphy-biostratigraphy allows identifying mismatches in earlier correlations. (Possibly Serra Sbragavitelli chemostrat- biostrat correlation by d'Argenio et al., 2004) could be revised, if *Orbitolina* levels turn out to be good stratigraphic markers... which is not always the case. >The resolution of the new study is, of course better than the one in the earlier studies made from sediments of the same carbonate platform. >The paper is of considerable importance for biostratigraphers, because the authors present much more precise correlations between biostrat and chemostrat than most if not all of the earlier investigators have done. (Interesting side result: the available scattered data on platform magnetostratigraphy cited in Wissler et al., 2004, seem to be correctly interpreted).

If the authors refer to the earlier work done in the region, if they integrate these data properly into their new study, the paper by Di Lucia et al will be of value in OAE 1 research.

Helmut Weissert

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