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Interactive comment on "Upper Jurassic carbonate buildups in the Miechów Trough, Southern Poland – insights from seismic data interpretation" *by* Łukasz Słonka and Piotr Krzywiec

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Authors response to Reviewer 1 (RC1):

We would like to thank Jacek Matyszkiewicz for his valuable and constructive comments, they surely helped to finally shape our paper. Please find below response to all the issues raised in your review.

Comment from referee (RC1):

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RC1: “Terminology - The authors use the term "sponge megafacies" (lines 105, 153-158, 383) according to Matyja & Wierzbowski (2006). The widespread appearance of calcified siliceous sponges in all Upper Jurassic successions of the northern Tethyan shelf commonly leads to the opinion that these organisms were the principal rock-forming components. Consequently, all these diversified facies are categorized into the far simplified term “sponge megafacies” (Matyja, 1976 fide Trammer, 1982; Matyja & Pisera, 1991). As the principal rock-forming components of these rocks are microbial structures (what Gwinner, 1971 has already pointed out) the term “microbial-sponge facies” or even “microbial facies” seems to be more adequate.”

Authors response: We used term “sponge megafacies” in the description of the general geological background for our results that are based on interpretation of seismic data. This term was derived from the literature as our data are of course of absolutely different resolution and do not allow for discriminating, directly or indirectly, any rock-forming components. Our intention was to treat term “sponge megafacies” as a general term, coined in the literature, with certain stratigraphic connotations. However, we do understand and do agree that it is being used as general, partly informal descriptive term for the Upper Jurassic carbonate rocks. Our understanding is that this term does not automatically imply that sponges were the principal rock-forming component, with microbial structures playing also very important role; therefore, we rephrased our text (line 105) in order to clearly emphasize that carbonate buildups deposits are built of sponges and microbialites. Detailed discussion regarding intricacies of local versus regional stratigraphy, primary and secondary rock constituents etc. of the Upper Jurassic succession should be had between specialists working with appropriate data, and having appropriate know-how and experience. Seismic data could provide very interesting, sometime novel insight regarding various aspects of structure and evolution of this carbonate succession but such problems are clearly beyond its reach.

Comment from referee (RC1):

RC1: “Literature - In 2019, the PhD of A. Urbaniec was defended. It is an admittedly

unpublished work, but the second author (PK) was reviewer. The dissertation concerns identical issues of seismic data interpretation in the Carpathian Foredeep. This work must be quoted and discussed."

Authors response: In the submitted version of the paper, we followed widely accepted and adhered to by many journals rule that unpublished studies, including PhD theses, should not be cited. In our paper we made just one exception – we cited unpublished well reports for wells used to calibrate seismic data from our study area, as they contain crucial information absolutely necessary to properly illustrate various aspects of seismic data interpretation. Archive industry reports in most cases remain indefinitely unpublished hence our decision. On the other hand, we do not have any problems with citing this particular PhD thesis as it certainly is relevant to our results. We have consulted this with Solid Earth editors, and, following their approval, remarks on this unpublished work was added to our paper (lines 53 and 367). It should be also stressed that this study is based on 3D seismic data (we used a bit more regional 2D seismic coverage) from different part of the basin with partly different geological history, and does not provide any crucial information that would in any way alter our own results.

Comment from referee (RC1):

RC1: "There is no basic work here of Olszewska et al. (2012) containing a critical analysis of previous work. This is a necessary item for quotation and brief discussion."

Authors response: Upper Jurassic succession in S Poland, similarly to rest of the Europe, has been intensively studied for more than 200 years. This certainly resulted in publication of huge number of various papers dealing with very different aspects of Jurassic stratigraphy etc. Over last couple of decades various opinions have been formulated in this context, and, as a result, we faced very complex task of selecting key papers that would best illustrate such diversity of opinions. In the process we surely we might have missed some papers that in other's eyes are very important. Therefore, without any hesitation, we followed advice of Jacek Matyszkiewicz and added

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Olszewska et al., 2012 to the references (lines 137 and 156). We would like to stress that discussion of very detailed Upper Jurassic stratigraphy was outside scope of our work, simply due to lack of adequately detailed well data from our study area. We had access to old wells with stratigraphy available in archive well reports based on divisions from many decades ago, and to two more recently drilled wells in which however no detailed stratigraphic studies have been performed. Therefore, we were forced to use rather simplified stratigraphic subdivisions, heavily relying on vertical lithological variations derived from well logs and rock cuttings. Hopefully, future stratigraphic studies will more fully clarify Jurassic stratigraphy and this knowledge could be used in future seismostratigraphic studies. Our conclusions of generic character would remain largely unchanged, only stratigraphic context might be partly different.

Comment from referee (RC1):

RC1: "The paper has not included issues related to differential compaction, although the authors devote a lot of space to it (lines 318-325; 380-381). This applies to publications Kochman & Matyszkiewicz (2013) – mechanical compaction and Matyszkiewicz & Kochman (2016) - chemical compaction. However, other works are cited (Matyszkiewicz et al., 2006, 2016 - line 381), in which only short paragraphs are devoted to the compaction."

Authors response: This is a problem partly similar to the problem with selection of papers devoted to Jurassic stratigraphy - we tried to select the best and most-to-the-point papers dealing with compaction of Jurassic carbonates but certainly we might have missed some of them. Following this suggestion, our reference list was supplemented.

Comment from referee (RC1):

RC1: "Figures - Figs. 8-15. In the lower parts the figures contain interpretations. This is not an interpretation from geological point of view because the vertical scale is given in seconds and not in meters. The interpreted seismic profiles should contain the vertical scale in meters. At least an additional explanation of the authors is required here."

Authors response: It really depends on what one defines as “geological interpretation of seismic data”. There are hundreds if not thousands of papers that contain interpreted seismic data in time domain, with vertical scale given in seconds of two-way travel time. Nowadays time seismic data still prevail although of course more and more frequently also depth data is available due to wider application of processing techniques such as PSDM etc. In this case however only time data was available so the only option was to present uninterpreted profiles and their interpreted equivalents in vertical time scale. This is standard approach that could be illustrated by a very large number of papers based on seismic data, and for us this is geological interpretation of seismic data, indeed. It should be also stressed that our interpreted data is not entirely depth-independent. Detailed time-depth relationships are clearly given on Figures 6 and 7 (cf. also Figures 11 and 12), and this information should be sufficient to properly asses an overall geometry of the studied carbonate buildups etc. and put our time interpretation in depth context.

Comment from referee (RC1):

RC1: “Fig. 16. In my opinion comparing of the wall of "Młynka” quarry (about 20 meters wide) with seismic profile with a length of about 5 km is inappropriate. Such a procedure can prove everything and negate everything.”

Authors response: Indeed, maybe this was a bit too long shot. All we wanted to achieve here was to show that some geometrical relationship between bedded and massive facies, although in different scales, could be observed both in outcrops and on seismic data. However, we agree that these might be different features, so detailed comparative study of outcrops and seismic profiles might require additional field work, possibly combined with seismic stratigraphic modelling studies, similar to the work of W. Schlager et al. in the Dolomites. Taking this into account, and also the fact that similar concerns have been raised by another Reviewer, we decided to remove this comparison from this paper. Accordingly, we removed relevant parts from the manuscript, i.e. lines 68–71 (Introduction), and lines 396–410 (Discussion). This change did not however

substantially influence any element of our interpretation and they all still hold valid.

Comment from referee (RC1):

RC1: “List of additional references (. . .).”

Authors response: All suggested references were added to the reference list (for detailed information please see the supplementary file).

Authors changes in manuscript: Please find attached the supplement file with listed specific changes in the manuscript.

We would like to thank again for all the comments and suggestions, they significantly helped us to refine our paper.

Łukasz Słonka (on behalf of the authors)

Please also note the supplement to this comment:
https://www.solid-earth-discuss.net/se-2019-178/se-2019-178-AC1-supplement.pdf

Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2019-178, 2019.

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