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# ***Interactive comment on “Response of a low subsiding intracratonic basin to long wavelength deformations: the Palaeocene–early Eocene period in the Paris basin” by J. Briaïs et al.***

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Review Briaïs et al. Solid Earth Discussion

General comments

New sedimentological (deposition environments), stratigraphical (new refinements of the age attribution), sequential (definition of three 3-order cycles) and basin (thicknesses, distribution, geometry) data have been acquired for Thanetian-Ypresian deposits of the Paris Basin using outcrop and well observations. Number and quality of new data and interpretations suggest that this work has to be published in the Solid

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Earth Discussion. Several major, minor and editing suggestions are listed below.

### Specific comments

1. The study is about the Thanetian-Ypresian formations observed in the Paris Basin. Several times in the text (abstract, basin-scale data, part 5.2., ...), the Late Cretaceous-pre-Thanetian unconformity is considered although no new data is presented in this study (with the exception of 9 new stratigraphic re-evaluations). I suggest focusing the paper on the Thanetian-Ypresian interval and presenting this Cretaceous/Tertiary gap either in the geological setting or in the final discussion but not as an important point of this study. Section 4.4.1 should be moved to a later part of the discussion. I recommend also to remove figure 7A and 7B. Second part of the discussion might be focalized on the different orders of unconformity using data from Thanetian – Ypresian to characterize short, medium and long wavelength, the C/T unconformity being presented in parallel.

2. A stress is put on the crustal structure of the basement below the Paris Basin: ~30 lines in the geological setting, Figure 1B with P wave velocity at 150 km. Further in the text, the importance of the crustal structure is considered only in four lines: P3614/P3615 and no clear relationship is established. I recommend to simplify this section, to replace figure 1 by figure S1 (more focused on the sedimentary cover).

3. Estimating decompacted thickness: assuming large uncertainties in this procedure (erosion, lithology variation, calibration curves, ...) are you sure that this procedure is required and can be for these specific sediments which have been not much buried dismissed ?

4. Depositional model: add a figure to present a typical landscape with the associated facies. Table 1 may be in supplement.

5. Cycle Ct: the authors themselves use the term paradox to define this cycle. I do not understand how a smallest order surface (MFS T3) might correspond to a larger

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overlap of the coastal plain than the main MFS (T2). T3 goes more on the continental side than T2 but the authors have chosen T2 as the main surface of the sequence. Please give some constraints.

6. P3609 L3: it appears difficult to determine using present-day thickness the amount of deposition and further erosion if no data on the sedimentary geometry is available. An area with low amount of Ypresian might correspond to an area with low deposition or an area with high deposition and further erosion.

7. I suggest to place the section 4.4.3 in the results (4.2 or 4.3)

Numbering of the figures is not chronological: figure 4 is presented before figure 2 or 3, ... please reorder.

P3588 L8 (and several times in the text): intracratonic or intraplate as the Paris Basin basement and more widely the European basement is not defined as a craton P3588 L24: Africa-Eurasia convergence is recorded up to Scotland (Ziegler, 1990) P3589 L16: older phases of deformation exist. Rephrase please. P3589 L23: give references P3590 L17: introduce a more general paper on the variscan orogen (not only on Brittany) P3590 L18: northern part instead of southern P3592 L11: marly formations are observed during Liassic and Dogger. P3592 L18: give references P3594 L3 : why do you choose this ordering : x1 Myrs is usually 3rd order, x100 Kyr is 4th order. Please give references. "See below" is not clear. P3595 L22: explain more the sentence MFS has to be a warm peak. P3599 L23: Thanetian third order cycle: assuming a duration of 3.4 Myrs, I imagine difficult to associate your 3rd order cycle (~400 kyr) or ... Please explain. P3600 L8: where is this unconformity on figure 5 P3601 L9: are "coastal plain marshes" corresponding to "organic rich marshes" of figure 5? If yes please use the same definition P3601 L14: a sharp transition from what ? to subaqueous ... P3602 L16: strong time hiatus. I suggest to use diachronous surface P3603 L23: delete "Palaeodepths were estimated based on different facies. Open marine ... (Howard and Reineck, 1981)". This has already be mentioned. P3604 L9: using the

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example of Cuise la Motte, you might generate an error interval than you can add on the curves of figure 6. P3604 L14: regional instead of cumulated ? P3604 L18: regardless of the time slice analyzed: this shows that the present-day setting of the basin (stacked dishes) is already acquired at this period. P3604 L26: rephrase : The highest rate is poorly constrained as the basal surface corresponds to a diachronous surface. P3606 L1-6: please give elements to support these controls P3606 L14: you might cite the study of Lacombe and Obert (2000) who recognized brittle and fault structures in the Tertiary formations. P3606 L24: Danian sediments are from Middle Late Danian. P3607 L10: this is not correct for Thanetian as chalk thickness is high where no Thanetian sediments are observed. P3607 L15: define Artois anticline P3607 L17 : we need informations on these nine samples (if you still consider that this is important for the manuscript, which is not my opinion, see comment 1) P3607 L25: place Soissons on figure 8A P3610-11 : discussion on the different sea-level curves and the way they have been processed is beyond the scope of this paper. You might simply write: The different seal-level curves (Müller et al., 2008; Cramer et al., 2011; Rowley et al., 2013) agree for a mean level of approximately ... Miller et al. (2005) propose another trend but it might not be adapted to the present geological context. P3611 L16-19: this sentence might be introduced in the section 3.1. P3614/15: section 5.3. is not essential.

Technical corrections P3588 L11: low amplitude instead of relatively gentle P3588 L12: on well-dated outcrops P3591 L2: cadomian P3592 L1: is not well-characterized instead of remain unknown P3594 L22: for quantifying accommodation at high resolution P3595 L13: large variations occur in the different charts available P3595 L28: Dauteuil et al. (2015) is not in the reference list P3599 L10: This new lithostratigraphy ... and involves unfortunately large lacunae. P3600 L17: trend instead of cycle P3601 L26: reworking lateritic profiles P3603 L20: remove (sect 3.3) P3604 L22: during Ypresian Cy1 where the Bray and Belou faults ... P3609 L4 : remove (although T3 corresponds to the maximum onlap)

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Figures Figure 1: I prefer figure S1. If the authors keep figure 1, please add profile from figure 5 and remove ecors layout Figure 2: difficult to read, try to increase letter size Figure 3: this figure is not really used in the text and may be as supplementary. Wyns and Ducreux (1983) in the legend Figure 5: represent Belou and Bray faults. Figure 7: if the authors keep this figure, add Y3 to Aizy sand flooding, add Melun on figure 7b, define the term silcrete, is it really useful to put the volcanism ? Figure 9: if possible, label directly on the map the faults (Belou, Seine, Rambouillet, Valpuseaux, Bray). Figure 11: some words are still in French in figure A. Figure B: do you consider that there is no erosion in the center of the basin ?

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Interactive comment on Solid Earth Discuss., 7, 3587, 2015.

**SED**

7, C1777–C1781, 2016

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