

Interactive comment on “Drainage reorganization and divide migration induced by the excavation of the Ebro basin (NE Spain)” by Arnaud Vacherat et al.

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GENERAL COMMENTS This study examines watershed migration as a result of capture between 2 of the largest Iberian drainages – the Ebro and the Duero. I think that the paper adds valuable insights into drivers of migration divide, but that these are currently somewhat lost in the manuscript. I suggest that the paper could be fronted and ended with a stronger abstract, introduction and discussion/conclusions that frame the wider implications of the study. We reorganized the ms accordingly to better highlight our main findings.

This would include emphasizing why this study is important in terms of wider implica-

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tions (eg type of capture Bishop 1995; implications for landscape Mather et al 2002.), ? I would argue that the key highlights need to be drawn out more clearly e.g. demonstrating the role of lithology as a limiter to incision (seen on smaller scale in other captures eg Shepherd 1982, Mather 2000). Where this occurs within the basin will impact on how far any sea-level generated wave of incision can propagate up a basin and thus has wide ranging significance to other studies. This occurs in both the mid Duero and lower Ebro in the coastal ranges. I am not suggesting a major re-write here – more a subtle re-wording of the text to incorporate such points and widen the impact of the study.

We agree that providing evidence of lithology as a limiter to incision would be an interesting topic however we do not think that we provide enough evidence of this mechanism to highlight it in this paper. On the opposite, the role of divide migration in reducing the incision capacity of a river is a phenomenon that, to our knowledge, has never been documented before and we consequently rather preferred to focus our paper on this new topic.

SPECIFIC COMMENTS / Line 40, 76, 659 – what does ‘almost still endoheric’ mean? – you mean it retains the landscape signature? clarify Corrected (see responses to associate editor an reviewer#1)

Line 41 – how does the Ebro enable enhoherism of the Duero? I don’t understand Rephrased (lines 31-35): “Fluvial captures have strong impact on drainage areas, fluxes, and so on their respective incision capacity. We conclude that drainage re-organization driven by the capture of the Duero rivers by the Ebro drainage system explains the first-order preservation of endorheic stage remnants in the Duero basin, due to drainage area loss, independently from tectonics and climate.”

Line 74, 578 – what is ‘unfilling’? This is not an established term - do you mean erosion? Incision? Corrected (erosion)

Lines 87-88 is one reason why it is important to know this, but it is sandwiched amidst

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other information – a more explicit ‘why this is important’ for the study should be provided from the start (currently this is hidden in the text) These lines are about one of the main conclusion of our study and have been removed from the end of the introduction.

Lines 320-1 Contrasts in sharpness could also be attributed to lithological differences - expand. We add the following sentence (lines 275-276): “However despite a similar bedrock we cannot ruled out some local influence of the lithology on the shape of these knickpoints”.

Line 597 – you mean the headwaters of the modern Ebro rather than the Duero (as this reads)? – confusing Yes, it was a mistake, Ebro instead of Duero. Corrected

Lines 613-618 – so how does this compare to other captures – as these are headward these are incremental – overall drainage has time to adjust rather than mid-basin captures which tend to be more of a sudden impact eg smaller , well documented captures such as Sorbas Basin. Stokes et al 2002 This is an interesting question that we cannot really address; it would deserve to be investigated for example through a modelling approach. Some areas could be more succinct (do we really need to know about the Late Cretaceous climate in section 2.4?) We think interesting to present the long-term climatic background because it allows us to propose that the difference in the landscape evolution of the Duero and Ebro is not related to climate

TECHNICAL COMMENTS

Line 71, 129, 189, 282, 284, 293, 520 onwards – use of ‘evidences’ should be evidence (it can only be singular!) OK corrected Line 72 since should be from OK corrected Line 99 on should be of OK corrected Line 107 ‘Since early stage collision, (not of) OK corrected Line 108 - ?carbonated alluvial sediments? – I do not understand Changed: “clastic deposits” Line 119 – as well as what process underlies. . . . OK corrected Line 122 – you mean upper Duero – there is much incision below this Yes, corrected Line 137 ‘in’ should be ‘of’ OK corrected Line 156 should be ‘accommodated’ and Hercynian OK corrected Line 158 – this event – what event? Clarify OK corrected Line 161, 209

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onwards 'deformations' should be deformation OK corrected Line 162 – 'such as the . . . ' OK corrected Line 170 – . . . periods of quiescence. . . OK corrected Line 173 such as fluvial. . . OK corrected Line 203 – took place should be 'existed' OK corrected Line 207 – 'detritic' not needed OK corrected Line 228 – network should be networks OK corrected Line 230 associated with (not to) OK corrected Line 233 precipitation not precipitations OK corrected Line 260 tongues are. . . . OK corrected Line 300 - knickpoints do not 'witness' capture – they may provide evidence of migrating base-levels which may be associated with capture OK corrected Lines 304/5 require references to support these ages We add reference to Gutierrez-Santolalla et al., 1996 Line 306 – 'never been drained before' – I think you mean never externally drained (it would have been drained ie had drainage)? Yes corrected by adding "externally" Line 322 – why 'for instance' ? Mistake, changed ("Finally" instead of "for instance") Line 331 – of not in OK corrected Line 358, 371, 635 – why 'remarkable' do you mean marked? OK corrected (deleted) Line 389 – witnessed? Do you mean suggested by. . . OK corrected (suggested) Line 391 – recorded = records OK corrected Line 398 with not to OK corrected Line 408 a lot = many OK corrected Line 487, little = small OK corrected Line 500, X value contrasts OK corrected Line 523 deduce not deduced OK corrected Line 525 suggested rather than evidence OK corrected Line 526-7 implied by rather than well witnessed by OK corrected Line 533 – define long (temporal? Spatial?) Long-term Line 536 – trends in not trend of / OK corrected Line 550 precipitation not precipitations OK corrected Line 559 – alternations between (rather than alternance) OK corrected Line 560 glacier not glaciers OK corrected Line 574 'the to first order' – does not make sense – reword Deleted: to first order Line 584 you mean 'climatic conditions similar to the. . . '? Yes. Corrected Line 608 'The present drainage of the . . . ' OK corrected Line 637 helps with (not for) Sentence deleted Line 647 Then ? – not needed, remove Sentence deleted Line 655 – record (not recorded) Sentence deleted Line 658 'was open to the Atlantic Ocean from the. . . ' OK corrected Line 659 records not record OK corrected

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