

Interactive comment on “Diagenetic evolution of fault zones in Urgonian microporous carbonates, impact on reservoir properties (Provence – SE France)” by Irène Aubert et al.

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Received and published: 9 January 2020

Dear referee, I am pleased to send you the revised version of our paper on “Diagenetic evolution of fault zones in Urgonian microporous carbonates, impact on reservoir properties (Provence – SE France). You will find enclosed in the supplement, the comments and corrections to your remarks. They are listed together with the actions made: - Comments are in italics - Corrections validated are emphasized in green - Corrections with a red bold part are considered un-useful or inappropriate You will see that most of corrections have been respected as you requested. Best regards, Irène Aubert

I. General remarks 1. Authors should better illustrate the crosscutting relations among

C1

the different structural elements (dilatational bands, open fractures, shear fractures, etc.) measured both within and outside the study fault zones. - Chronological relation between cementation events has been added. Lines 266 to 275

“2. Rename section IV as “Discussion”, and shorten the single chapters it includes (mainly, the chapter on the fault-related diagenesis)”. - Done

3. Expand data discussion on the impact of fault zones on reservoir properties by adding references to other surface analogues worldwide. - Done. we added references lines 338-340, 362-364 and 378-380

II. Specific Comments Abstract: “please check for wrong punctuation marks, grammar, and syntax.” - done

Introduction: “please remove the final sentence.” - done

Geological context: “check for grammar; remove lines 110-124 (out of place).” - done

Methods: “please double check the standards used for stable isotope analyses.” - done

Results: “please check both grammar and syntax.” - done

Diagenetic Evolution: “please shorten the whole section, and rename it (cf. comment above);” - done – section was shortened by removing the part on C3 temperature calculation

“re-consider dilation as an incipient faulting mechanisms;” - done – we added this sentence : “Hence, in the Urgonian carbonates of La Fare sector, dilatant processes occurred as an incipient fault mechanism and enhanced fluid circulations along the deformation bands.” (line 327-328)

“please separate data interpretation for granular media from that inferred for a cohesive rock;” - Modifications effected. We have made a more marked separation between description of dilation bands within highly porous rock and Castellás host rock

C2

“please state all assumptions required for temperature calculation based upon oxygen isotope data and well-known fractionation curves.” - We removed this part. We decided to remove this part from the manuscript for 2 reasons: (1) to shorten the fault related diagenetic part and, (2) $\delta^{18}O$ during Durancian uplift (Aptian/Albian) was difficult to estimate. Moreover, the association of burial/uplift curve and $\delta^{13}C$ values allow an interpretation of the fluid origin. “As C3 cementation occurred during the Durancian uplift and denudation, C3 most probably did not cemented at high depth (depth of maximum 500m; Fig. III. 9C4). The negative $\delta^{13}C$ values tend corroborate that it would rather be a meteoric fluid than a marine fluid.” (lines 353-356)

Please also note the supplement to this comment:

<https://www.solid-earth-discuss.net/se-2019-153/se-2019-153-AC1-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2019-153>, 2019.

C3

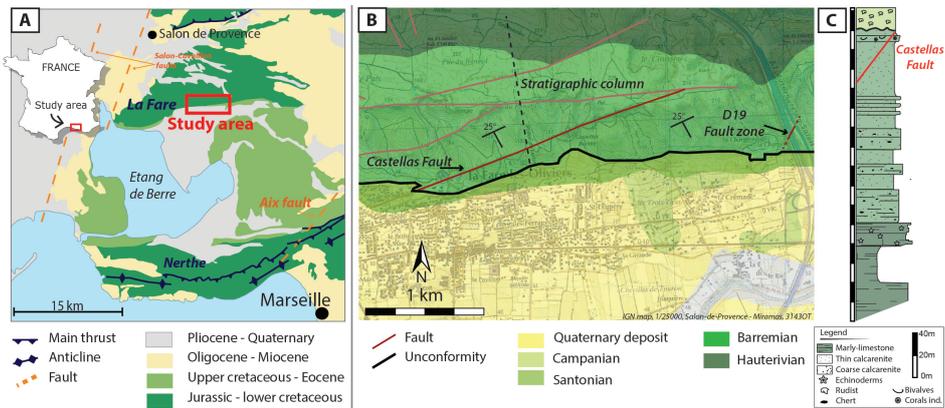


Fig. 1.

C4

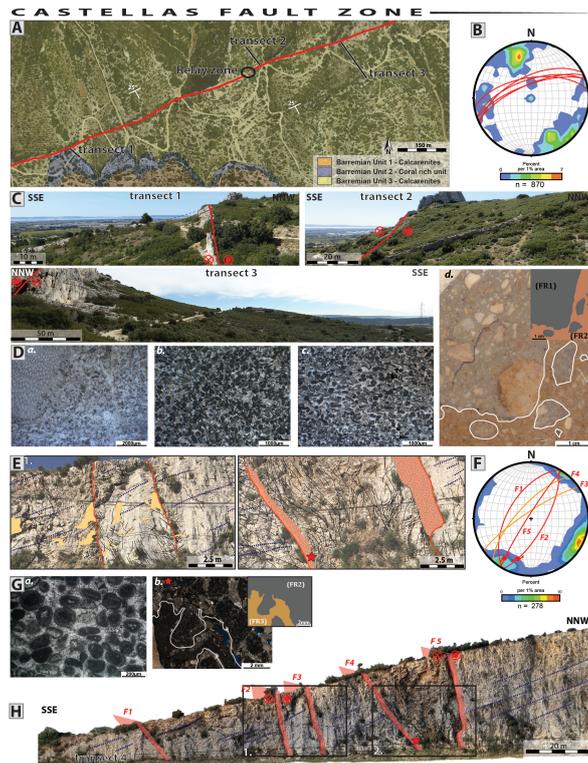


Fig. 2.

C5

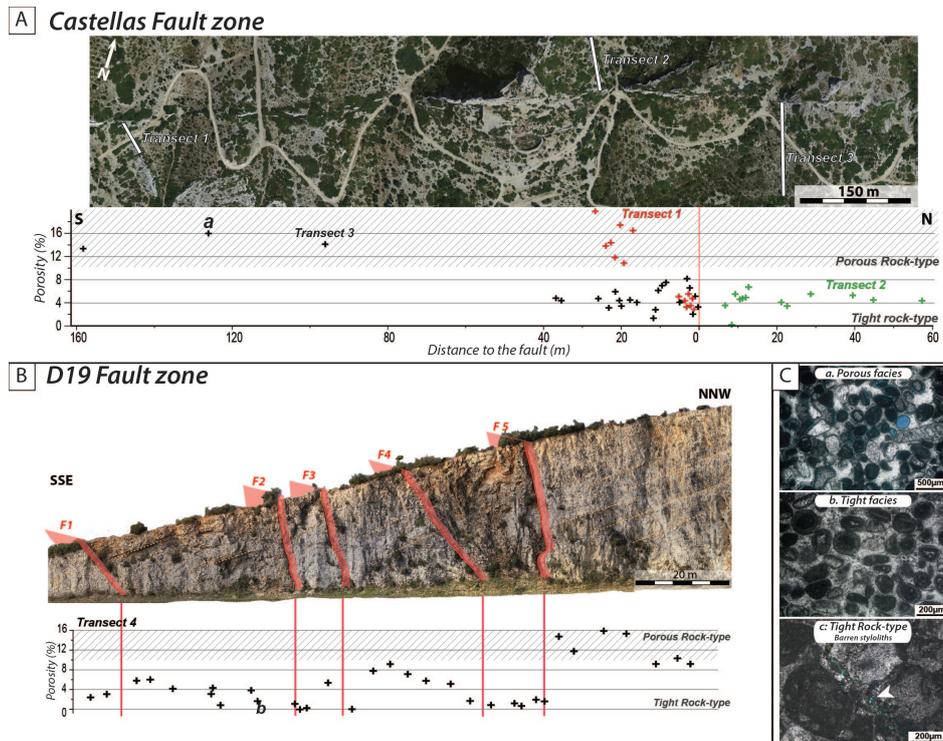


Fig. 3.

C6

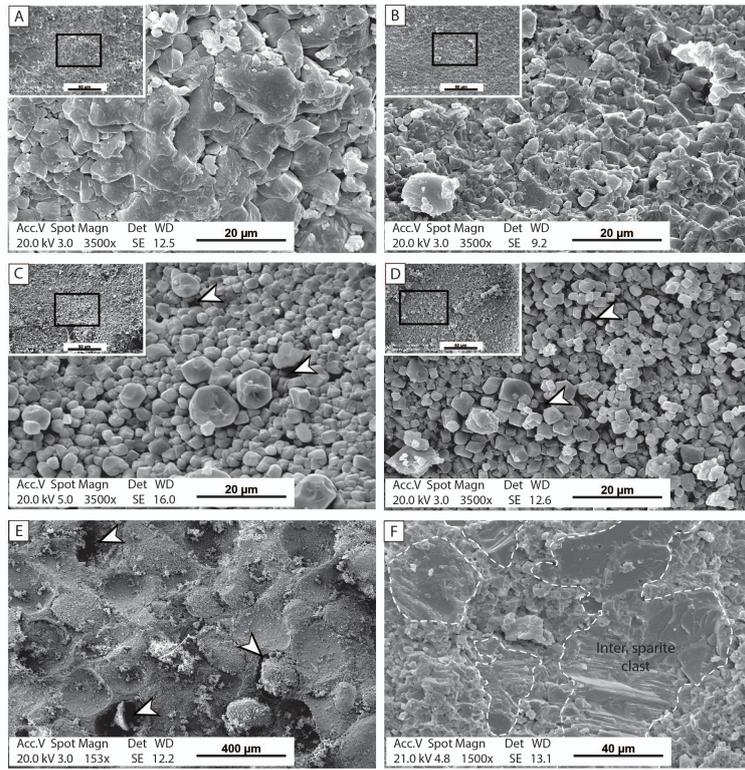


Fig. 4.

C7

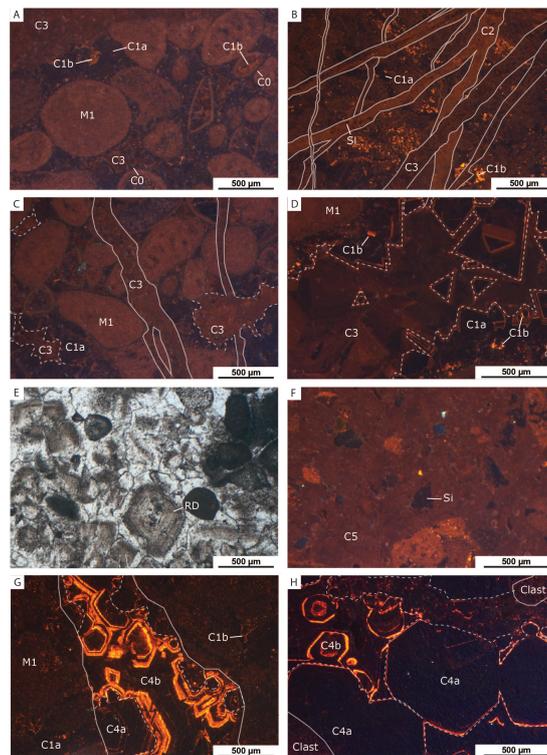


Fig. 5.

C8

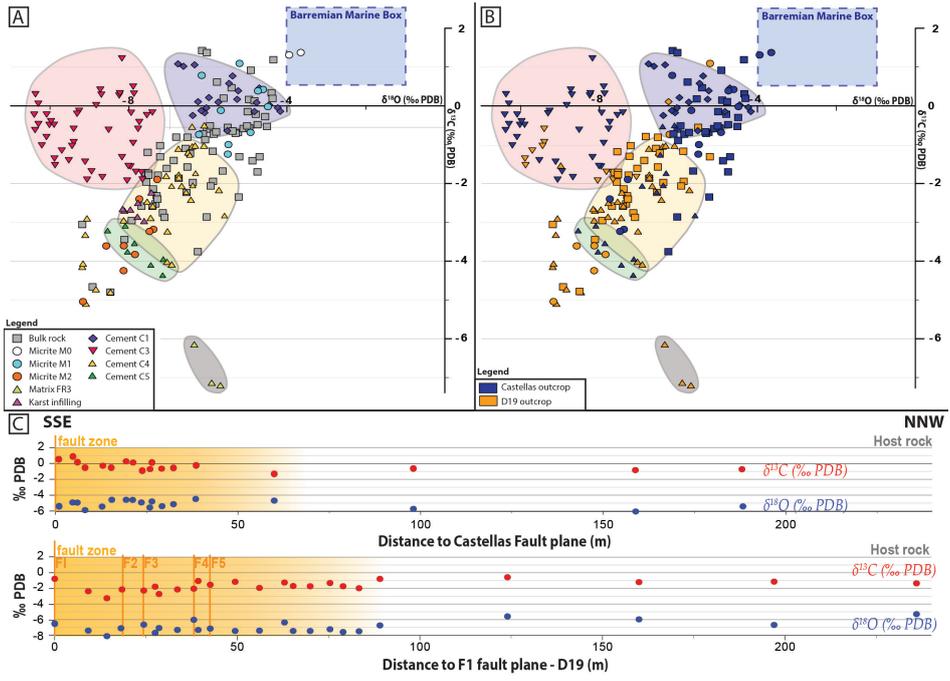


Fig. 6.

C9

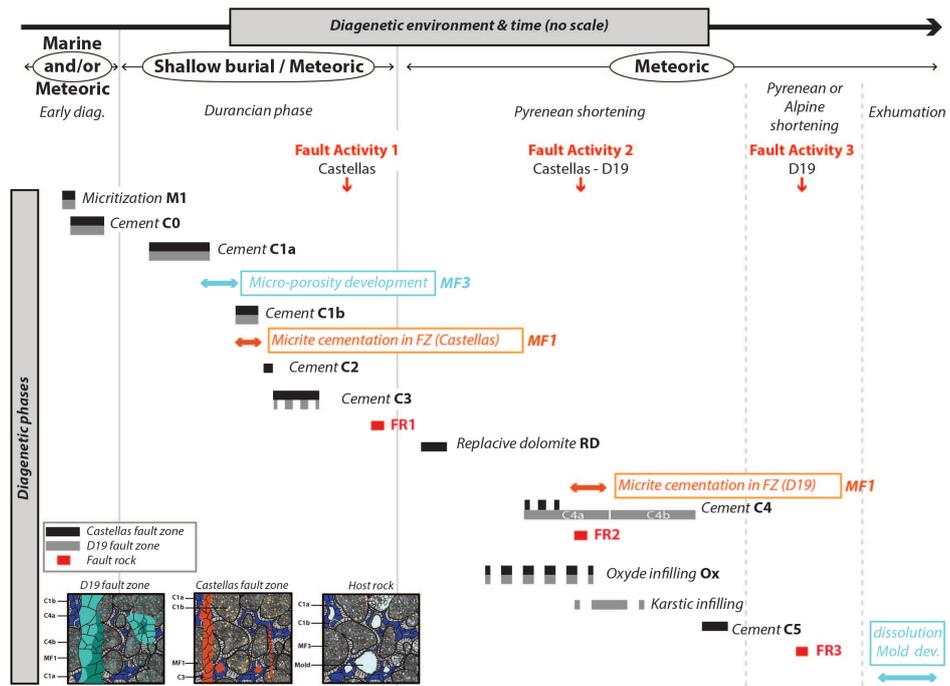


Fig. 7.

C10

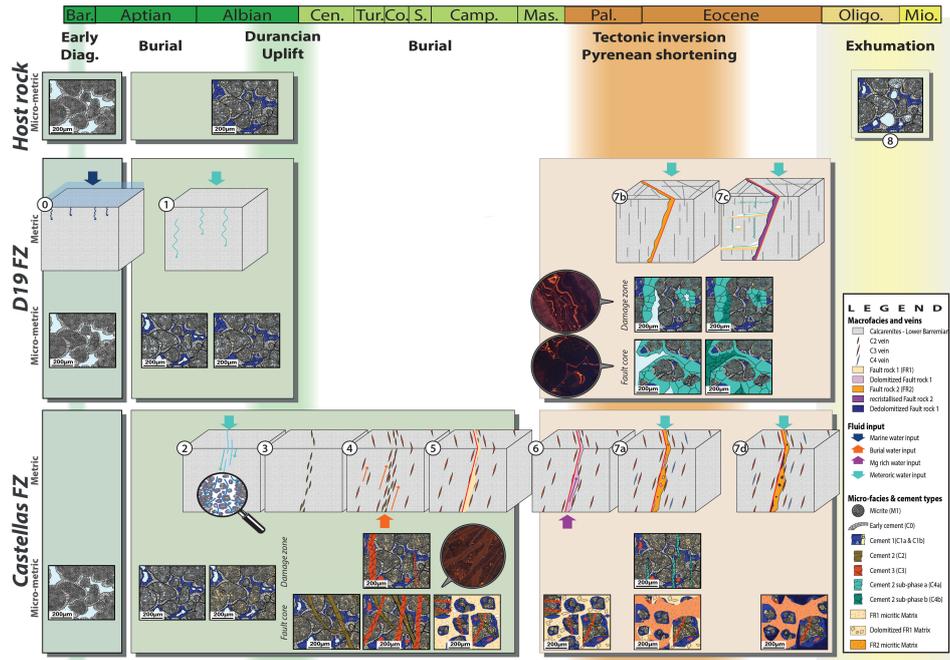


Fig. 8.

C11

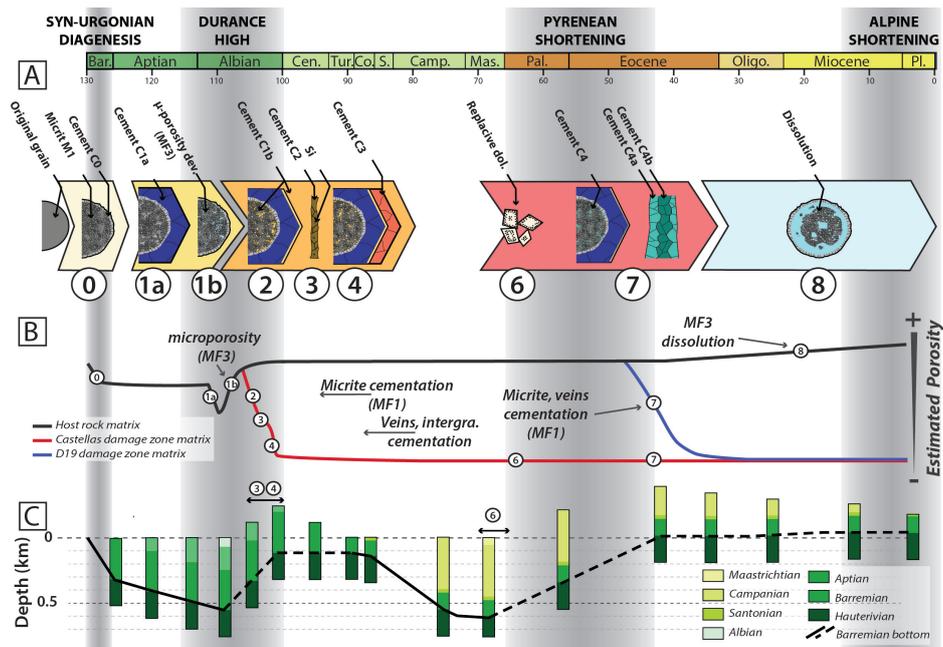


Fig. 9.

C12

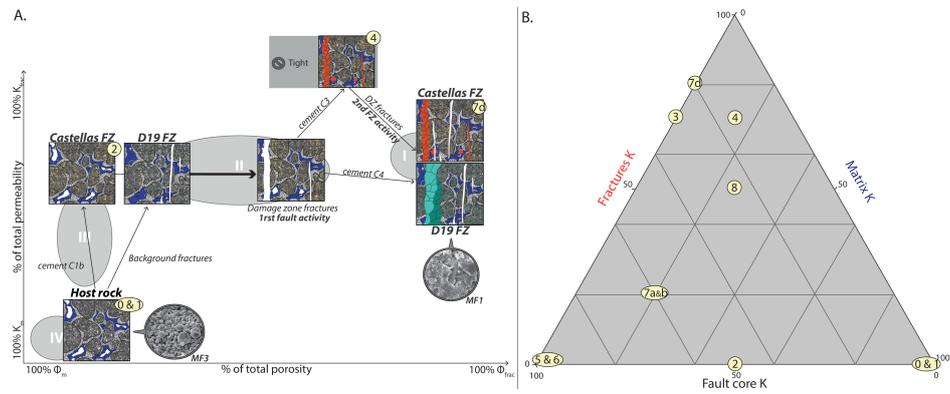


Fig. 10.