Dear M. Wendt,

Thank you for your work and patience, we have tried to respond to all your comments. They contribute to improve the paper. Please find our answers marked in red. We have tried to explain the better possible the interrogation on the tectonic part and added comments on the sedimentologic part. The description of necessary changes in the revised manuscript are attached to this reply.

Sincerely,

Paul Perron, Michel Guiraud, Emmanuelle Vennin, Eric Portier, Isabelle Moretti, Moussa Konaté

Color legend in attached manuscript:

~~Green~~ + Green = moved sentences

~~Red~~ = deleted sentences

Red = added sentences

Preliminary remarks:

Though I have been working on the Paleozoic of the Algerian Sahara for many years (1987-2006) I am only familiar with the Devonian and Carboniferous, but not with the older formations and the crystalline basement. Therefore, I can only judge these aspects of the above manuscript. Likewise, I feel not competent enough to consider some tectonic reconstructions. I hope that the other reviewer(s) are able to review these as- pects of the manuscript with a better competence.
The manuscript is an overview of the bio- and lithostratigraphic, sedimentologic, paleogeographic and paleotectonic evolution of the Ahnet-Mouydir area in southern Algeria based on field data from previous authors, well log analysis, satellite images and geophysical data. As such it is a good summary of the evolution of a marginal basin-and ridge system which farther north in central Algeria has yielded enormous oil and gas reservoirs.

Detailed critical remarks:

Title: The research areas covers a much larger area (including also the Reggane, Basin, Illizi Basin, Hoggar Shield) than expressed in the title. This should be made clear in the title.
-"We have added this remarks to the title even if the study is essentially focusing the Ahnet-Mouydir basins (line 2)."

Line 20: Pan-African orogeny. Strictly spoken this was around 600 MA, but including earlier phases it was 900-520 MA. What do you mean exactly?
- "We have corrected (line 46). Indeed, the Pan-African orogeny result from the accretion, then collision of different terranes during different phases. This polyphased event has constrained the structural framework of the Saharan Platform."

Line 35: "Devonian compression". I consider this as a mere speculation. According to all previously gathered data the Devonian was a period of tectonic quiescence accompanied by slight extension.

-"We refer to the (a) Siluro-Devonian (also called Caledonian) and the (b) Mid to Late Devonian events. We bring in our paper new evidences in favour of these tectonic events through seismic lines (Fig. 7) and satellite images (Fig. 6C, D, E, F). Besides, they are already mentioned in the literature:

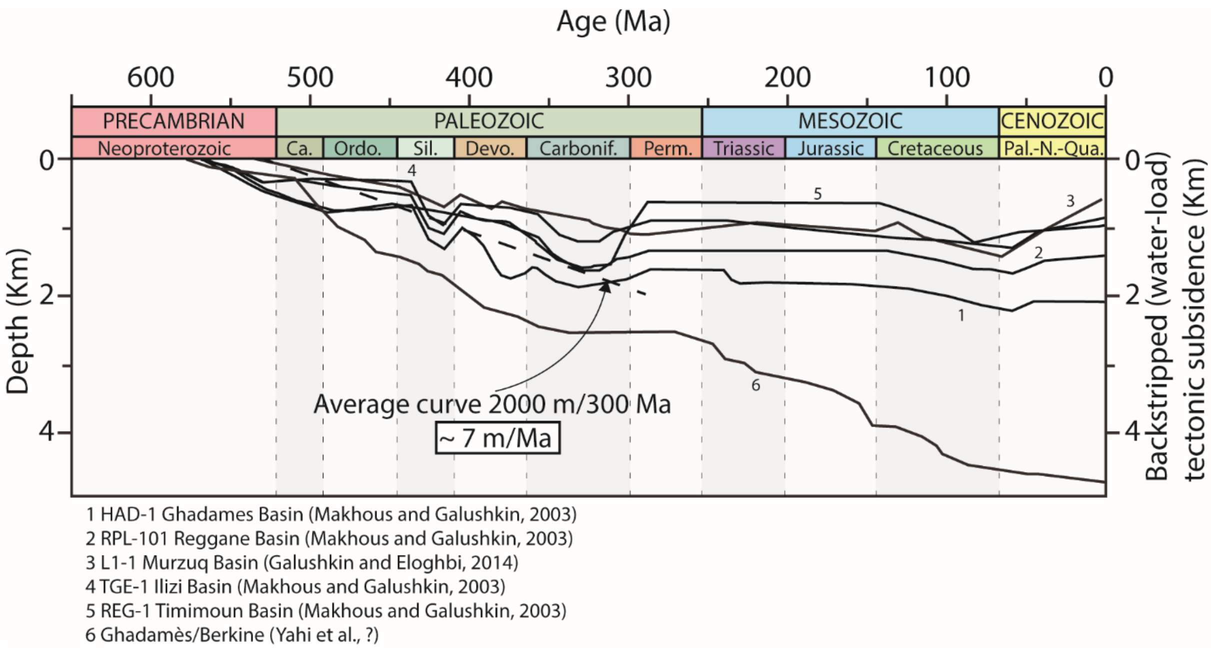
(a) In the Saharan platform, the Caledonian tectonic event, is mainly mentioned as uplifting of some trends, large-scale folding or blocktilting (e.g. Gargaff arch, Tihemboka arch, Ahara high, Amguid El Biod), associated with breaks in the series and frequent angular unconformities below Early Devonian formations (Beuf et al., 1971; Boote et al., 1998; Boudjema, 1987; Carruba et al., 2014; Coward and Ries, 2003; Echikh, 1998; Eschard et al., 2010; Frizon de Lamotte et al., 2013; Ghienne et al., 2013; Gindre et al., 2012; Legrand, 1967b, 1967a). During this compressive event, large wavelength folds and paleohighs were accentuated, affecting sedimentation and facies distribution in the sedimentary basins (Eschard et al., 2010; Galeazzi et al., 2010). Locally, paleohighs may have provided detrital material (Eschard et al., 2010; Galeazzi et al., 2010). Evidence of the Caledonian event is documented, in the southwestern and southern flank of the Ghadames Basin, the Lower Devonian Tadrart formation is seem to directly overly the Upper Silurian basal Acacus series with a progressive truncation of the Acacus (Upper Silurian) units from NE to SW on this unconformity (Echikh, 1998). In the Illizi basin, only the lowermost part of Acacus Formation is preserved (Echikh, 1998). Besides, seismic data may show folding of the Silurian section below flat-lying Devonian deposits (Echikh, 1998). Well described indication of Caledonian unconformity are also highlighted in the Murzuq basin (Ghienne et al., 2013) and Al Kufrah basin (Gindre et al., 2012). Massive sand injection associated with igneous intrusion triggered by basin-scale uplift are also described in the Murzuq basin (Moreau et al., 2012). These structural features imply NW-SE shortening, probably of moderate intensity, though much weaker than the Hercynian one (Guiraud et al., 2005). Elsewhere, in the Drâa basin, in the NW Libya and over the Al Kabir trend, there is also no sign of this event in Lower Devonian series (Echikh, 1998; Ouanaimi and Lazreq, 2008).

Moreover, a widespread near top Emsian unconformity probably triggered by regional tecontic activity has been identified in the Illizi basin (Abdesselam-Rouighi, 2003; Boudjema, 1987; Boumendjel et al., 1988; Brice and Latrèche, 1998; Moreau-Benoit et al., 1993), in the Ahnet-Mouydir basin (Wendt et al., 2006), in the Libyan Ghadames and Al Kufra basins (Bellini and Massa, 1980). It is associated to basaltic volcanism and intrusive activity in the Ahnet basin (?) and Anti-Atlas (Belka, 1998; Wendt et al., 1997)

Many authors have correlated the Late Silurian to Early Devonian tectonism as the maximum collisional deformation of the Caledonian Orogeny (see references below). However, this event clearly relates to collisions involving far away continents and terranes where Gondwana was located thousands of kilometres to the south and separated from the collisional zone by a major ocean during this time (Craig et al., 2006; Mckerrow et al., 2000; Stampfli and Borel, 2002). Tectonic events in North Africa during post-Infracambrian-pre-Hercynian times were therefore independent of the Caledonian Orogeny. Time-descriptive terms may be preferred instead (Craig et al., 2006). This denomination is thus controversial. The origin of this intra-plate stress could be linked to far field stresses, knowing that, in continental craton compression stresses can be transmitted through distances of up to 1600 km from a collision front (Ziegler et al., 1995). The origin of Late Silurian to Early Devonian intra-plate stress in North Africa is currently unclear but is possibly associated either with a phase of rifting along the Gondwana margin (Boote et al., 1998) or with initial closure of the Iapetus Ocean (Fekirine and Abdallah, 1998). Frizon de Lamotte et al., 2013 didn't interpreted it as a far effect of the Variscan orogeny, contrary to Fabre, 2005 who associated to the beginning of it.

(b) The Middle to Late Devonian is the time for two contrasting large-scale tectonic processes: the onset of the Variscan Orogeny along the Gondwana-Laurussia margin on the one hand and the development of magmatism, rifting and domal basement uplift within these continents on the other hand (Frizon de Lamotte et al., 2013). The collision between Gondwana and Laurasia that ultimately produced the Hercynian Orogeny possibly first affected North Africa during the mid-Devonian, creating extension/transtension pull-appart basins (Craig et al., 2006). This Devonian deformation has reactivated megashear zone systems coeval with semi-regional uplift of the Ghadames and Illizi basins and of the adjacent Tihemboka, Ahara, Gargaf and Brak-Bin Ghanimah arches in the mid-Eifelian and at the end of the mid-Devonian (Late Givetian) and with the related development of the Frasnian Unconformity (Craig et al., 2006). Evidence of extensional structures and/or tectonic activity during the Late Devonian, as proved by the major thickness variations of these series are documented in the Anti-Atlas (Baidder et al., 2008; Michard et al., 2008; Wendt, 1985), in the northern Africa and Arabia platform (Frizon de Lamotte et al., 2013) and in the Ahnet basin (Wendt et al., 2006). This event corresponds to a major collapse and even "disintegration" of the north-western Gondwana margin prior to the Variscan Orogeny (Wendt, 1985). While, the activity of the palaeohighs (e.g. Ahara, Gargaff and Tihemboka High) almost ceased during the Frasnian times, with marine shales onlapping different elements of the Palaeozoic succession below and sealing most of the palaeohighs (Eschard et al., 2010)."

Line 52: 7 m/MA. Give reference.
-"We have calculated it: 200m/300Ma=~7m/Ma (cf. figure below). It is not very precise but it is in the order of magnitude. Holt et al., (2010) indicate 22.2m/Myr (Ghadames) and 10.1 m/Myr (Al Kufrah) for the highest rates. Sloss, (1988) show 20-30 m/Myr to 3-4 m/Myr values."



Line 61: 16 million km2. Impossible! The entire Sahara occupies about 9 million km2.
-"We have modified this value (line 73)."

Line 121 ff. and 133: It is not clear if the authors have ever been in the field; equivalent data seem to be based on previous published sources only. This should be made clear unequivocally.
-"This study is written in the frame of a phD and there wasn't fieldtrip during this time. However, some of the authors have been on the field and have many years of experience of the area throughout the oil industry (NEPTUNE former ENGIE/GDFsuez) or throughout academic. We have better specified the new data (especially satellite images, seismic lines and well-logs) which have been used in this study. We have integrated a figure presenting the method and original work (cf. fig. 4 in manuscript in supply)."

Line 141: Please separate both calibration of well-logs by palynomorphs (which are poorly reliable biostratigraphic markers) and field sections by conodonts (which give by far the best time resolution), goniatites and brachiopods. Both biostratigraphic subdivisions can be only roughly be correlated.
-"We have modified and we are more careful with the data set (line 168-174). Indeed, we aware about the poor resolution of palynomorphs calibration. Unfortunately, it is the only data available in wells."

Line 144 (and later): "Synsedimentary extensional and compressional markers": This means during the Devonian and Carboniferous. On which evidence these important tectonic events are based? Apparently not on field data. During about 9 months of personal field work I followed typical marker levels (e.g. the upper Eifelian/Givetian limestone ridge) for tens of kilometers (walking from ridge into basin deposits), but I have never seen something like that. The observation of doubtless Hercynian faults does not automatically allow the conclusion that they are rejuvenated earlier structures.
-"In our area, evidences of tectono-sedimentary structures (i.e. thickness variations, lateral facies variations, current directions variations) showing activation and reactivations of arches were already highlighted in the literature by field studies:

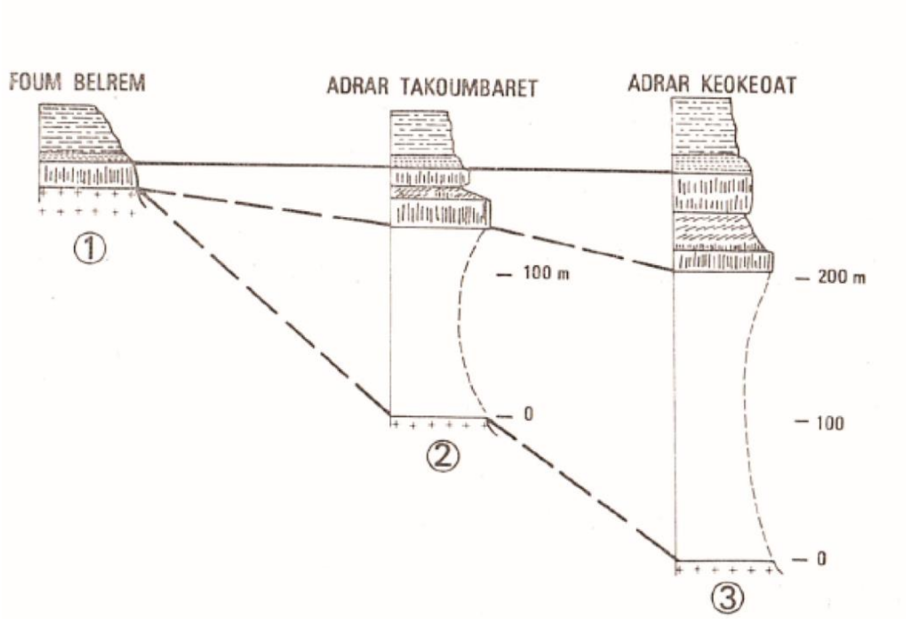
-In the Arak-Foum Belrem arch see (a), (b) and (c) below from (Beuf et al., 1971, 1968b) during the Ajjers deposition (i.e. Upper Cambrian Lower Ordovician).
-In the Bled El mass area of the Azzel Matti arch see e below from (Beuf et al., 1968a; Eschard et al., 2010) during the Ajjers deposition (i.e. Upper Cambrian Lower Ordovician).
-In the Tanezrouft area of the Azzel Matti arch see d below from (Beuf et al., 1971) during the Ajjers deposition (i.e. Upper Cambrian Lower Ordovician).

Then, during the Caledonian (i.e. Siluro Devonian), these structures are also known in the field:

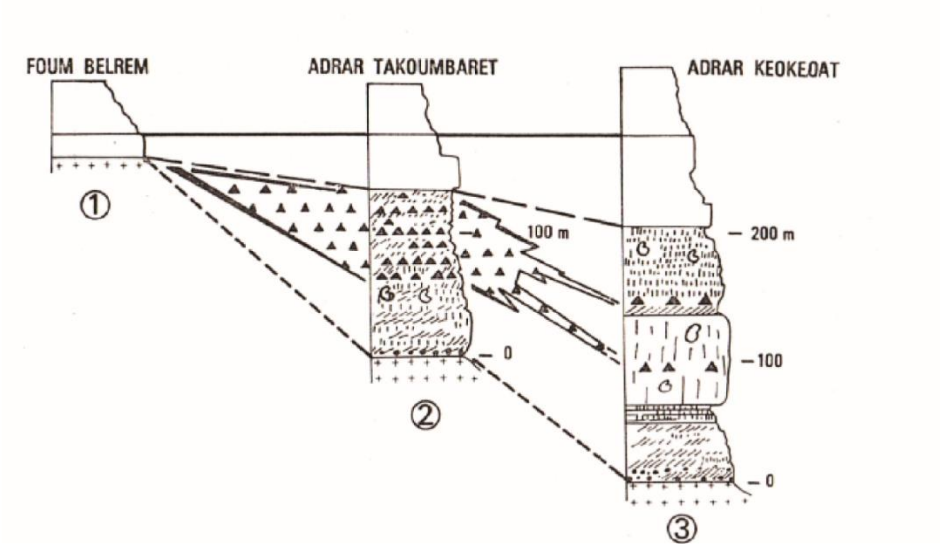
-In the Assedjrad area on the Azzel Matti arch see (h) below from (Beuf et al., 1971).
-In the Arak-Foum Belrem arch see (g) below from (Legrand, 1967a), see (h) below from (Beuf et al., 1971) and see also in (Biju-Duval et al., 1968).
-In the Idjerane axis see (f) below from (Legrand, 1967a).

These latter are evidences of the early activity of the arches leading to the individualization of the different basins since the Cambro-Ordovician time. Then, the arches were reactivated during the Caledonian (i.e.Siluro-Devonian). Here, we don't cite other arches (i.e. Tihemboka, Ahara, Amguid El Biod, Gargaf, Dor El Gussa-Murizidié…) of the Saharan Platform where these syn-sedimentary structures are also described (Borocco and Nyssen, 1959; Carruba et al., 2014; Chaumeau et al., 1961; Chavand and Claracq, 1960; Collomb, 1962; Dubois and Mazelet, 1964; Eschard et al., 2010; Fabre, 2005; Frizon de Lamotte et al., 2013; Ghienne et al., 2013; Massa, 1988)".

From this literature, we bring new evidences of syn-sedimentary tectonic reactivating successively arches structures during Paleozoic by using new unpublished data (from 3D Google Earth satellite images and seismic lines).



(a) Variation of Ajjers series on the Arak-Foum Belrem Arch (Beuf et al., 1968b).



(b) Syn-tetconic conglomerates in Ajjers series (i.e. Cambro-Ordovician) on the Arak-Foum Belrem Arch (Beuf et al., 1968b).

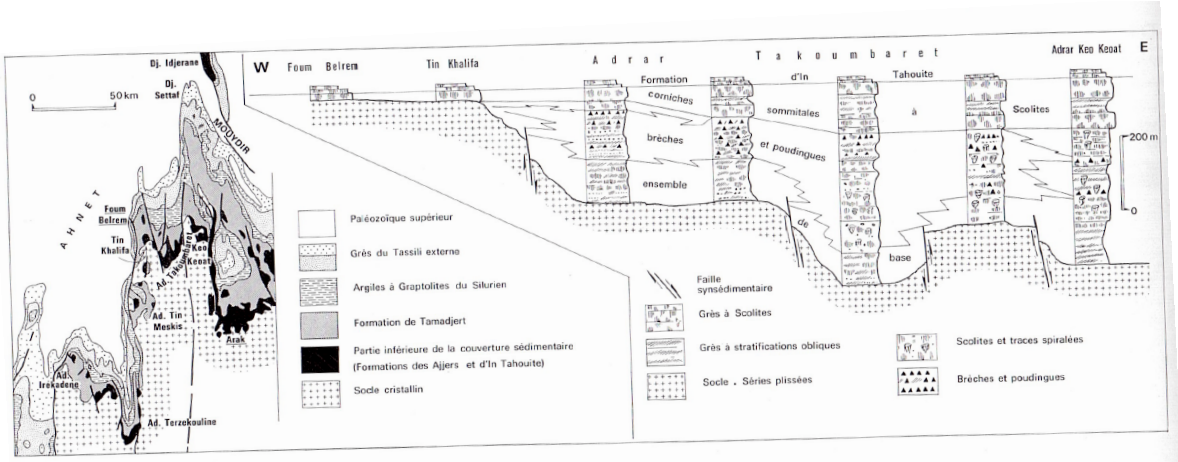


FIG. 301. — Réductions de série et variations sédimentaires dans la formation des Ajjers (partie nord-orientale du môle de Foum Belrem).

(c) Syn-tectonic conglomerates in Ajjers series (i.e. Cambro-Ordovician) on the Arak-Foum Belrem Arch (see fig. 301, p. 366) (Beuf et al., 1971).

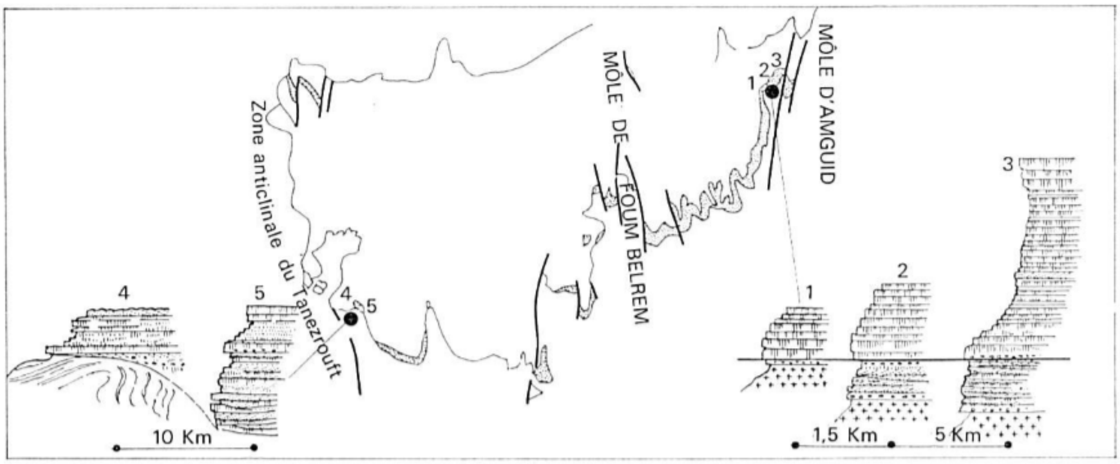
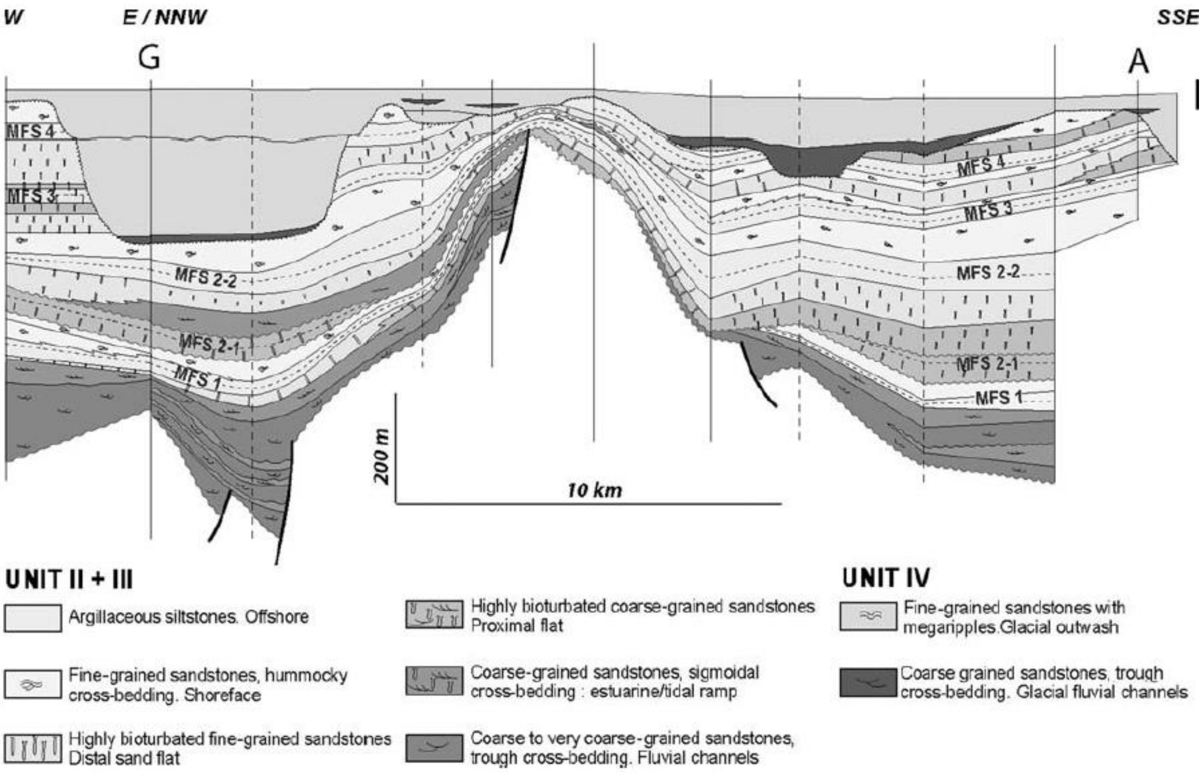
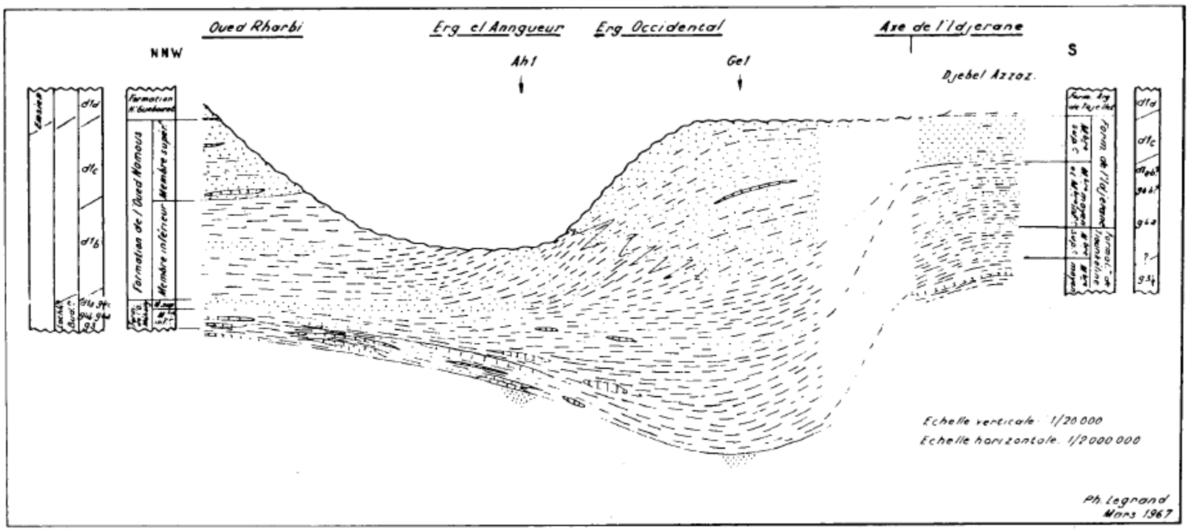


FIG. 331. — Influences de la tectonique synsédimentaire sur le dépôt de la formation des Ajjers (môle d'Amguid et bordure du Tanezrouft).

(d) Influence of syn-sedimentary tectonic in Ajjers series on the Azzel Matti Arch and Amguid El Biod Arch (Beuf et al., 1971).

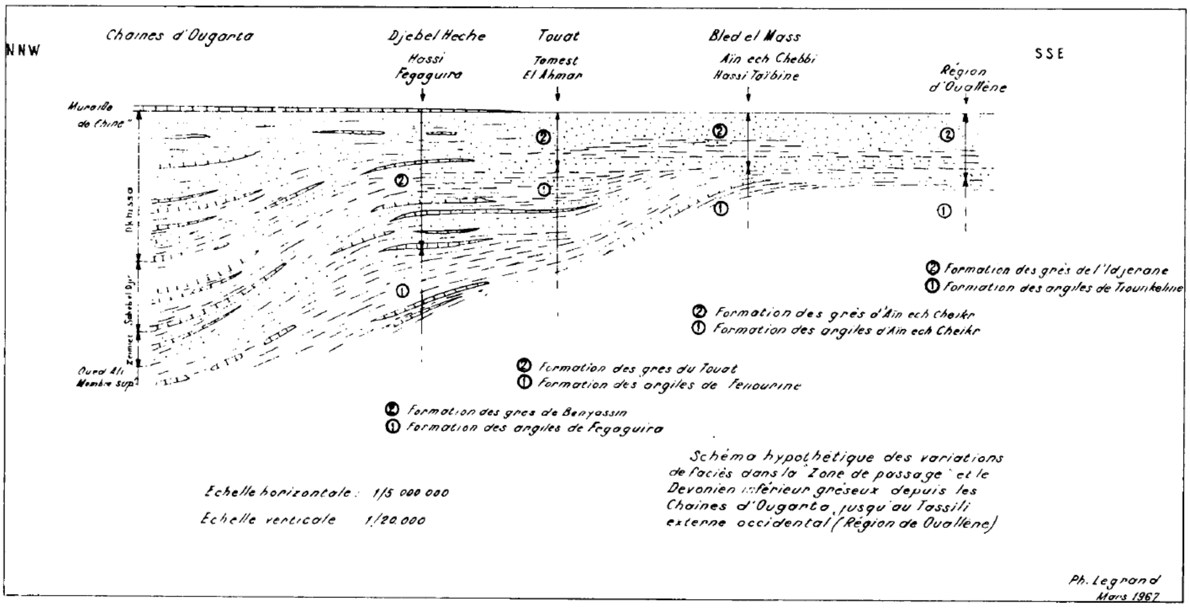


(e) NNW-SSE cross section on the Azzel Matti Arch (Ahnet Basin) showing variation of thickness, wedges strata in the Cambro-Ordovician series (Fig. 15) (Eschard et al., 2010).



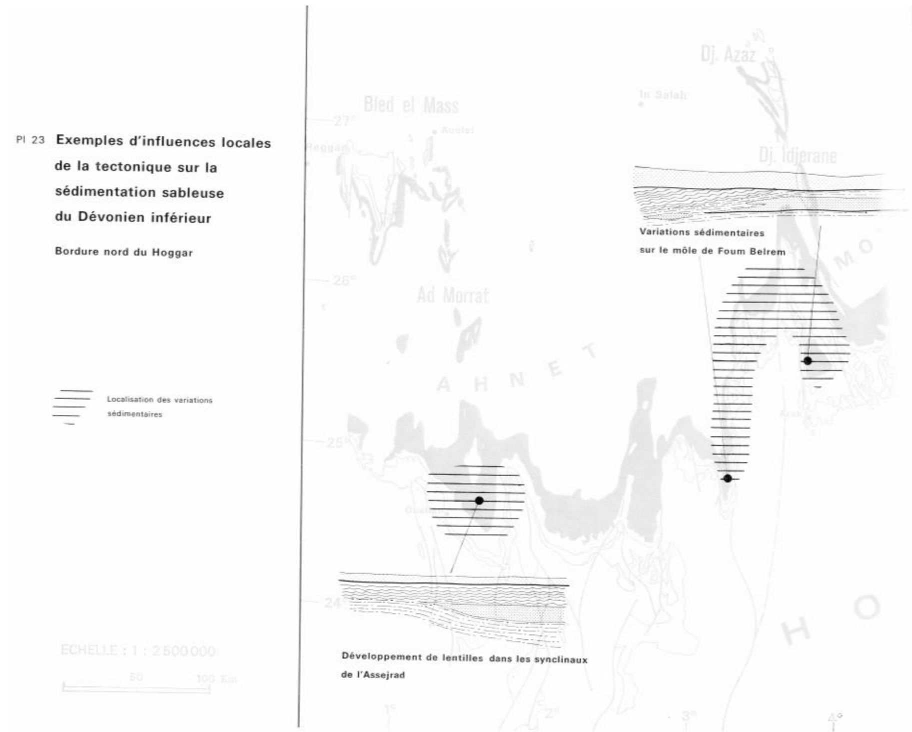
Pl. 3a. "ZONE DE PASSAGE" ET DEVONIAN INFERIEUR GRESEUX. A travers la region de l'Erg occidental, la région de l'Oued et de l'Erg el Anngueur jusqu'aux affleurements du Djebel Azzaz.

(f) Thickness and facies variations of Siluro-Devonian formations on the Idjerane axis (i.e. Arak-Foum belrem arch) (Legrand, 1967a).



Pl. 4. Schéma hypothétique des variations de faciès dans la "Zone de Passage" et le Dévonien inférieur gréseux depuis les Chaines d'Ougarta jusqu'au Tassili externe occidental (Région de Ouallene).

(g) Thickness and facies variations of Siluro-Devonian formations in the Bled El Mass area (i.e. Azzel Matti arch) (Legrand, 1967a).



(h) Example of local influence of tectonic in Lower Devonian series (Beuf et al., 1971).

Line 146: Outcrop sections O1- O12 cannot be detected in Figs 9 and 10. Are they personal field data? Position of well logs W1-W21 can only very roughly be located from Fig. 3A. Given the importance of these data (which apparently have never been published previously) it is absolutely necessary to indicate individual coordinates (best as an appendix) for both.

-"We have integrated supplementary data to the paper (cf. fig. 4, 11 and 13), even if there weren't indispensable for the comprehension of the paper (showing some redundancy). They allow a better understanding. This has changed the order of the figures. O1-O12 are presented in fig. 11, they are based and modified from Wendt et al., (2006), (2009)."

Line 152: add: major "depositional" unconformities, in order to avoid confusion with angular unconformities.
-"We have modified (line 184)."

Lines 153-154: The top Pragian unconformity is diachronous (comprises also the lowermost Emsian in the Reggane Basin and on the Azel Matti ridge). Top Givetian and top mid-Frasnian are no unconformities over the entire study area. Top Quaternary is an unconformity worldwide, therefore omit. Or do you mean base Quaternary? But this would be trivial. In this list you have omitted the most important depositional unconformity, the transgression of the lower Eifelian (costatus-Zone).
-"The calibration of the seismic lines to wells is not really precise (due to differential resolution between the two) that's why we added "Near top" for each horizons. Due to faulting or calibration issues, choose seismic horizons that are extendable is often not easy. Some of the horizon are not unconformities sensu stricto but just well-identifiable and extendable.

-The horizon named near top Pragian doesn't represent the top Pragian but a mid lower Devonian reflector horizon that is easily extendable (i.e. near top Pragian horizon).

-Top Quaternary was corrected to near base Quaternary.
-The transgression of the Lower Eifelian was difficulty extendable to the entire area due to lack of well-calibration and faulting between hanging-wall/footwall (furthermore, the seismic reflectors aren't "bright"), so was dismissed."

Line 156: geological map is 1: 200.000, not 1:20.000.
-"We have modified (line 189)."

Line 171: circular of oval shape of basins. This is pure imagination. Basins and ridges are capped by erosion in the south and by overlying Jurassic or Cretaceous in the north. Thus the second dimension of the paleogeographic units is unknown.
-"The observations of Fig. 1 resulting from Pre-Mesozoic subcrop geological maps of the Saharan Platform (Boote et al., 1998; Galeazzi et al., 2010) show this circular and oval shaped feature. They are bordered by the different arches (cf. Fig. 1 from Eschard et al., 2010 below). For example, it is well-represented by the Reggane or the Mouydir basins (cf. below Plate 1 from Galeazzi et al., 2010)."

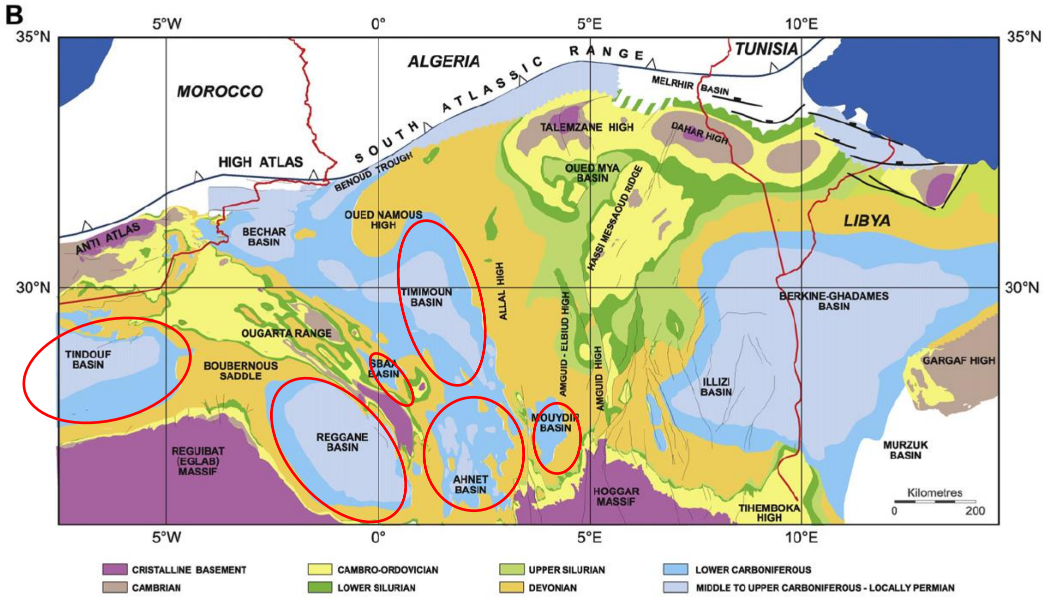


Plate 1. (A) Enhanced satellite image of the Maghreb region (NW Africa), showing the main tectonic domains of the area and the location of the study area (NW Africa). The Berkine–Ghadames and Illizi basins are Palaeozoic intracratonic depressions developed within the Saharan Platform. The Pan-African Tilemsi Suture separates the Eglab and Hoggar massifs. N–S oriented basement faults formed during the Pan-African Orogeny and strongly influenced the structural grain of the Berkine–Ghadames and Illizi basins. The Amguid fault and its continuation into the Amguid–El Biod fault trend bounds both basins to the west. (B) Pre-Mesozoic subcrop map of the Saharan Platform, showing the main Late Palaeozoic (mostly 'Hercynian')–Early Mesozoic tectonic elements.

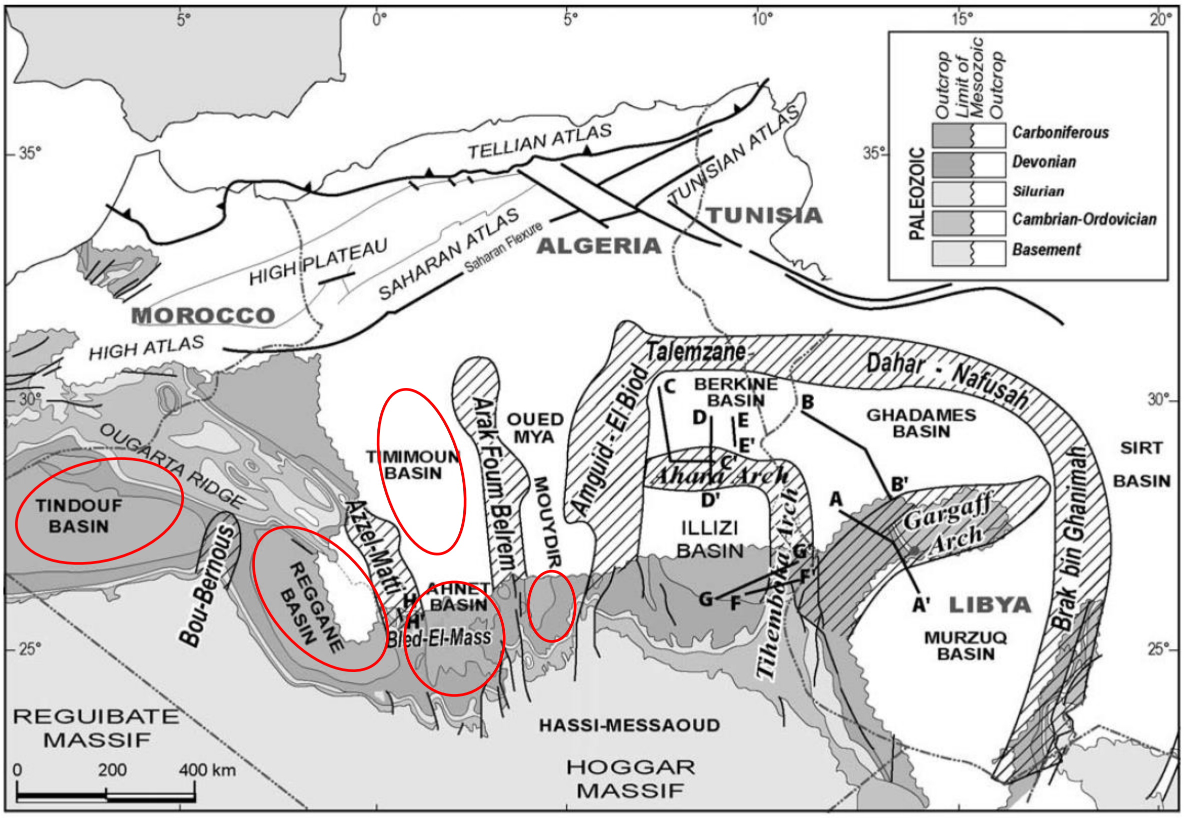


Fig. 1. Structural map showing the distribution of the main highs and basins across the Saharan Platform (partially redrawn from Boote *et al.* 1998). The hatched areas correspond to the main highs described in the text.

Line 174: major faults are all Hercynian. Eventual pre-Hercynian faults are inferred, but have never been documented in the field, thus are mere speculation.

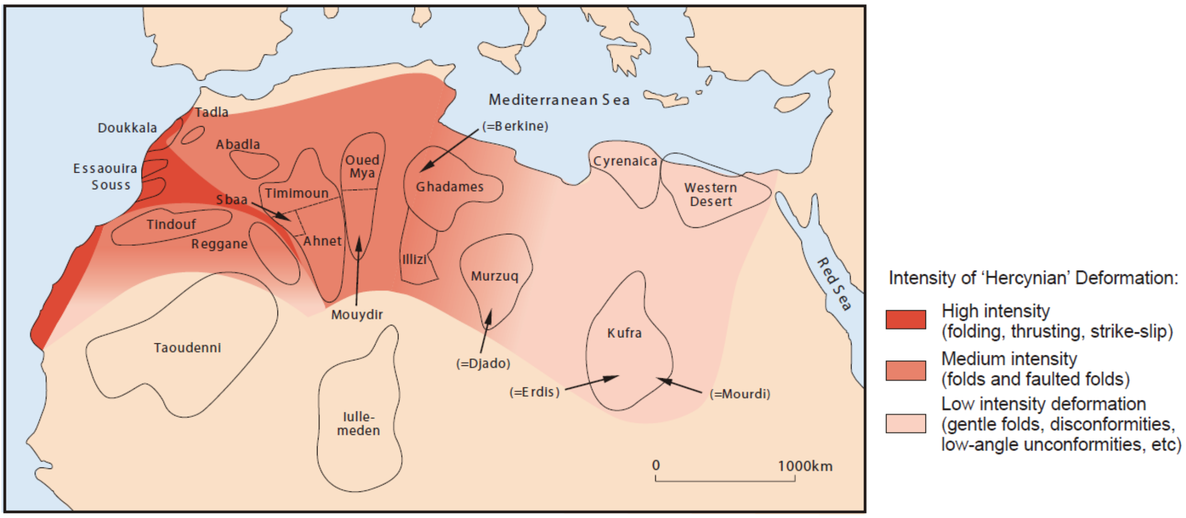
-"Previous work from Beuf et al. monograph essentially based on field studies has documented the formation and maintain of arches-basins shape through the Paleozoic (see previously). It is documented elsewhere on the Saharan Platform."

Line 178: "long" instead of "length".
-"We have modified (line 226)."

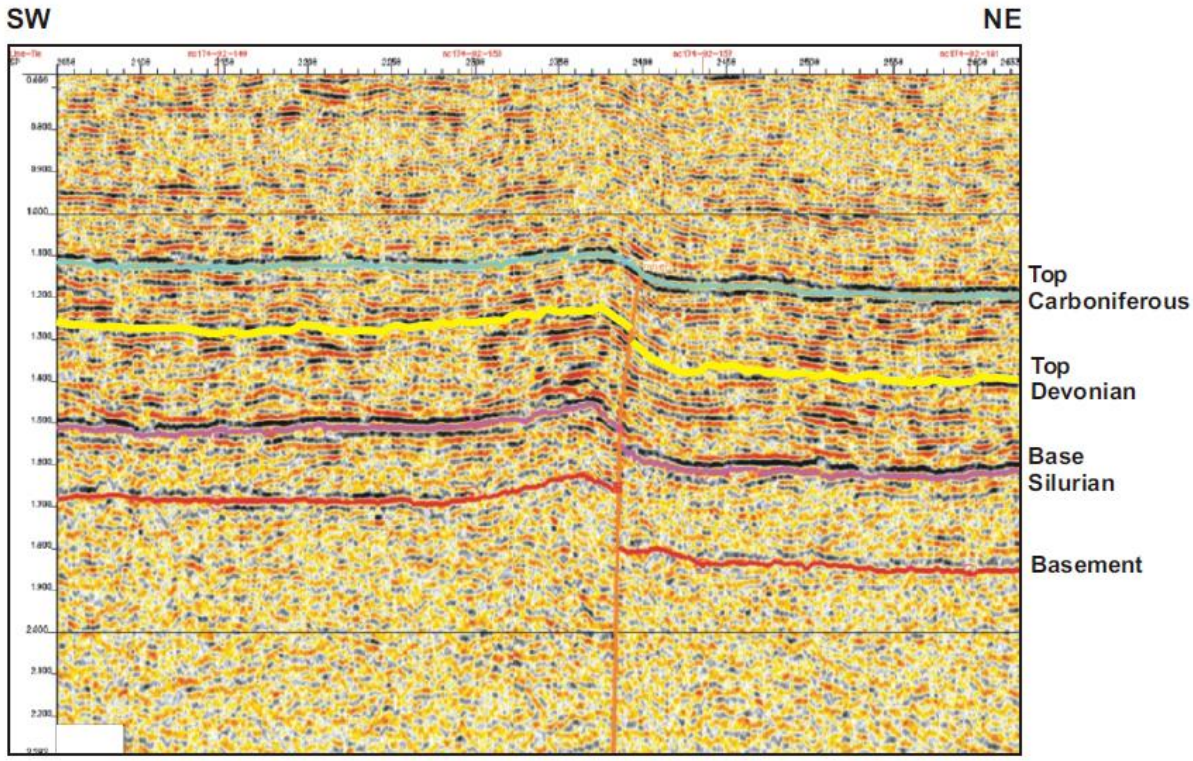
After line 178: Generally, at this point there is a paragraph entitled "Previous work", but this is missing here.
-"Previous works are already well summarized in Wendt et al., (2006) and since there weren't major studies on the area. However, we can add a little summary if it is needed."

Line 179: this chapter should be re-written avoiding speculations, even if they would fit well into a hypothetical and inferred depositional image. Regarding eventual "synsedimentary extensional markers" see above.
-"see explanation Line 174 above."

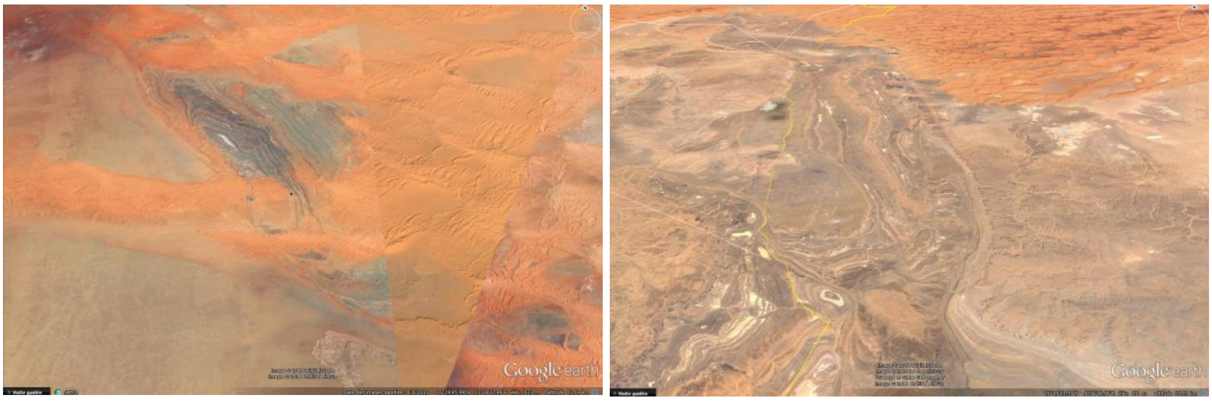
Line 191: Hercynian folding is restricted to the Reggane, Ahnet and western Mouydir Basins, but decreases markedly towards the east (eastern Mouydir and Illizi Basins) where Paleozoic strata are completely flat-lying.
-"Indeed, the strain deformation of the Hercynian is decreasing eastwards (see fig. a below). Nevertheless, there still exist folding as far as Murzuq basin (even farther) visible in seismic (see b below) or satellite images (see c below). These structures are often difficult to observe eastwards because of sand dunes or Mesozoic series."



(a) Intensity of Hercynian deformation on the Saharan Platform modified from (Craig et al., 2006)



(b) Seismic sections through selected structures in the Murzuq Basin, southwest Libya showing evidence of abrupt thickening of Cambro-Ordovician and Late Devonian to Carboniferous sequences across steeply-dipping faults (Craig et al., 2006).



(c) Fold on the Tihemboka arch (right), Atchan arch (left) visible on Google Earth images (Murzuq basin).

Lines 205-207: synsedimentary horst and graben structures – see above (lines 174 and below). What is a "synsedimentary forced fold"? A slump?

-"Forced folds were defined by Stearns, (1978) as 'folds in which the final overall shape and trend are dominated by the shape of some forcing member below'. There are also referred to as extensional fault-propagation folds, form in response to the upward propagation of normal faults (i.e. developed above tips of propagating faults) (e.g. Withjack et al., 1990). Growth strata, onlaps and thickness variation upon have permitted to date the deformation (see a below). See also abundant literature on the subject (e.g. Gawthorpe and Hardy, 2002; Hardy and McClay, 1999; Kane et al., 2010; Lewis et al., 2015). The kinematic is extensional in these cases. In our study, this structural style is coherent with the accommodation of deformation by basement block movement. The Silurian shales have the role of decoupling between Cambro-Ordovician sandstones and Devonian series."

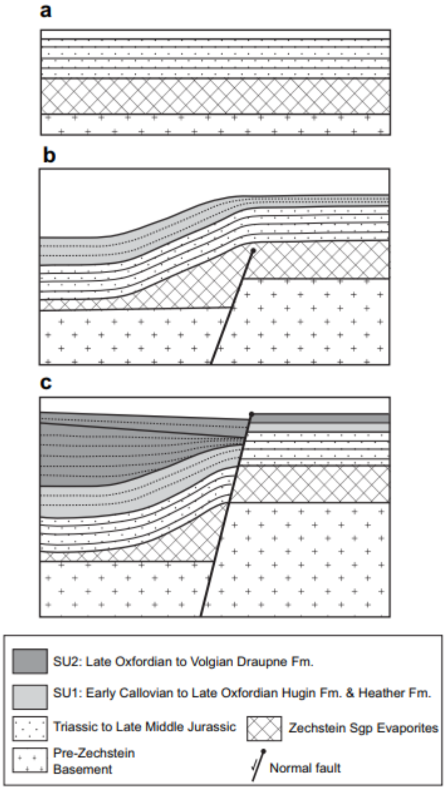


Fig. 13. Synoptic model illustrating the influence of extensional forced-fold development on syn-rift stratigraphic architecture (a) Geometry of basement, Zechstein Supergroup and pre-rift strata prior to fault propagation – units are assumed to be isochronous. (b) Early Callovian to Late Oxfordian (SU1). Upward fault propagation is inhibited by the presence of the salt, resulting in forced folding (*sensu* Withjack et al., 2002) of pre-rift cover strata and thinning of SU1 sediments towards the developing fold. (c) Late Oxfordian to Volgian (SU2). Early SU2 sediments onlap the upper surface of SU1 and continue to thin towards the fault until after the fault has breached the salt layer and overlying cover strata. This results in displacement at-surface and the migration of the depocentre towards the fault. Note that stage (c) is only applicable to the central and southern parts of the Sleipner Basin.

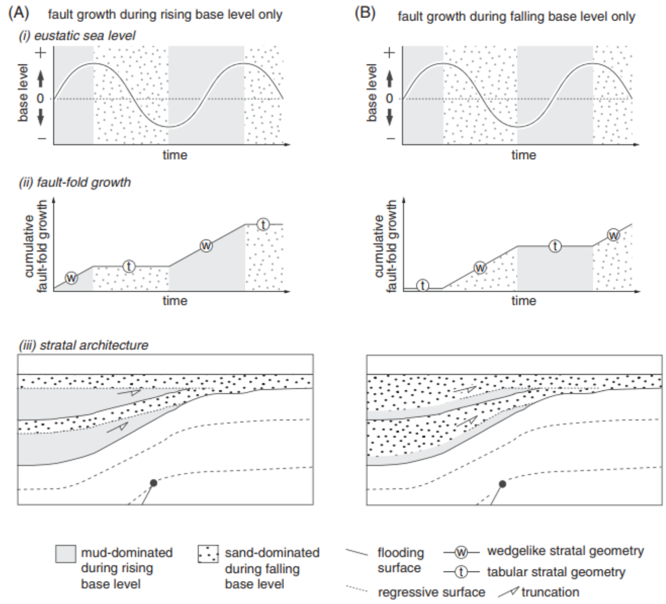


Figure 17. A schematic model illustrating how forced folding and eustasy combine to control the stratal architecture of early synrift deposits on the flanks of extensional forced folds. Two end-member scenarios, which both depict shallow marine shoreface sandstone deposition during falling base level (forced regression) only, are illustrated: (1) fault propagation and forced fold amplification during rising base level only, fold amplification and hanging-wall deepening during rising base level results in basinward thickening of mudstone-dominated bodies. Shoreface sand bodies are deposited during times of tectonic quiescence thus are uniform in thickness, and truncate underlying mudstones and amalgamate toward the fold crest; and (2) fault growth during falling base level only, fold amplification and hanging-wall subsidence during falling base level results in basinward thickening of sandstone-dominated bodies. Mudstone-dominated units are deposited during times of tectonic quiescence thus are uniform in thickness, being truncated toward and thinning onto the fold crest. The regressive surfaces of marine erosion that bound the bases of individual sand bodies may be sharp near the fold crest and pass basinward into a correlative conformity.

(a) Left from (Kane et al., 2010), and right from (Lewis et al., 2015).

Line 247: From Google Earth images it is possible to recognize faults, but it is impossible to determine their age. Please explain why the faults figures in Figs 4 and 6 are Silurian-Devonian and Middle to Late Devonian age.

-"The age is based on stratigraphic markers identified from georeferenced geological maps (Bennacef et al., 1974; Bensalah et al., 1971) which were veneering on 3D Google Earth images (i.e. associated with a digital elevation model DEM) (see Figs. below).

The high quality of the new satellite images permits also the differentiation between shale and sandstones levels (when knowing the stratigraphic succession of the area it is a help too).

It is sure that it does not replace a field mission but it allows to have an overview on very large objects. Kmz format (i.e. Google Earth format) of geological maps can be added to supplementary data. Or these figures can be added to the paper?!

The timing of faults activity (in seismic or in satellite images) is done by identifying sedimentary structures such as divergent onlaps (growth strata), thickness variation and truncatures in the hanging wall synclines of forced folds (cf. above).

For example:

-In figure 5A, the sinuous morphologies of the faults indicate synsedimentary fault propagation. So, the age of faults is given by stratigraphic layer impacted (i.e. *oTj* here Tamadjert fm. i.e. Unit IV).

-In figure 5B, age of faults are given by their control on channelized sandstone body systems which are dated late Hirnantian (Girard et al., 2012). Besides, in figure 6A, divergent onlaps (DO1) in In Tahouite series (*oTh* i.e. Unit III) located in the hanging-wall syncline of fault F2 permit to date the (re)activation of fault during the Ordovician. Then, F2 is reactivated during the Silurian (fig. 6B i.e. DO2 in *sIm* series).

-In figure 6C, divergent onlaps (DO2) in Asedjrad series (*sdAs1*, *dAs2*) located in the hanging-wall syncline of fault F5 permit to date the (re)activation of fault during the Siluro-Devonian.

-In figure 6E, divergent onlaps (DO3) in Givetian to Mehden Yahia series (*d2b*, *d3a*, *d3b*) located in the hanging-wall syncline of fault F2 permit to date the (re)activation of fault during the Middle to Late Devonian.

-In figure 7, divergent onlaps (DO0 to DO3), thickness variations in hanging walls or and footwalls are evidence of faults reactivations."

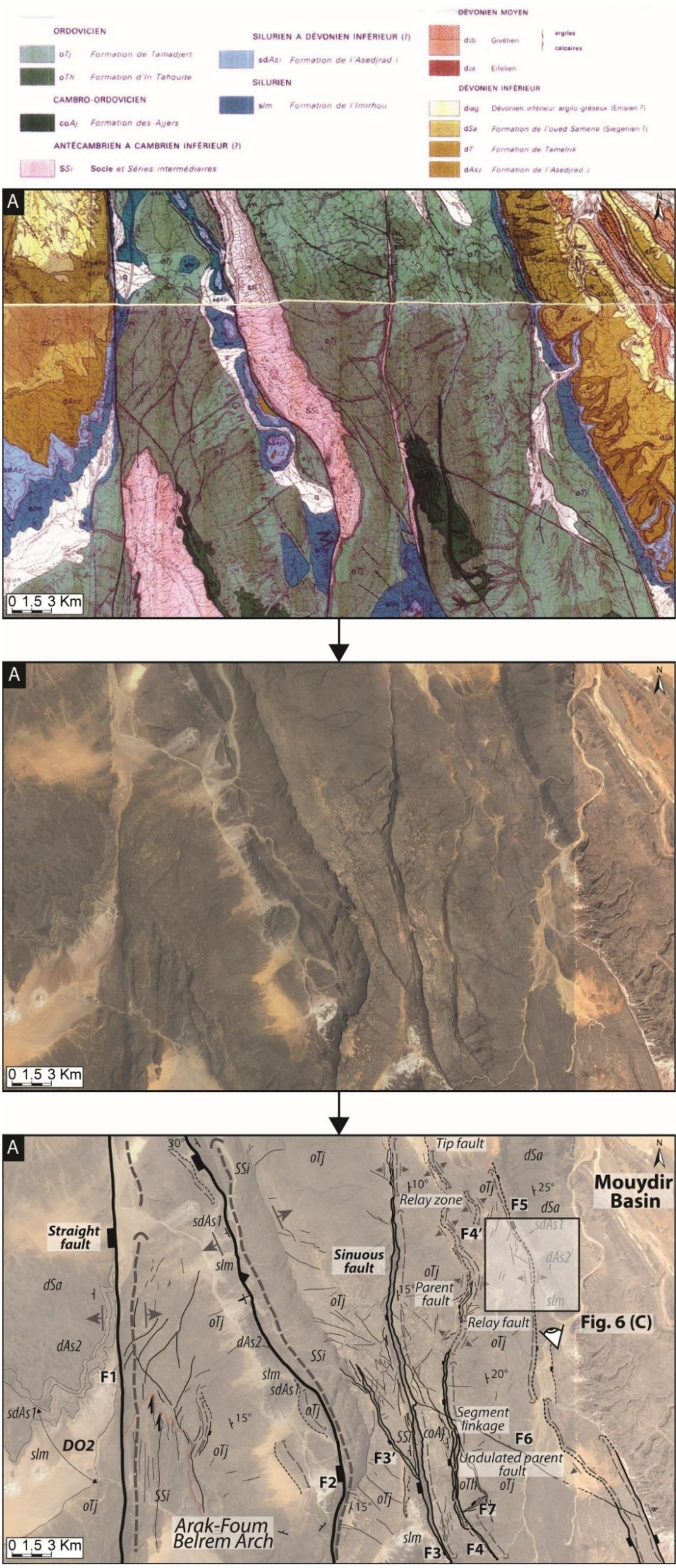


Fig. 5A (previous Fig. 4A)

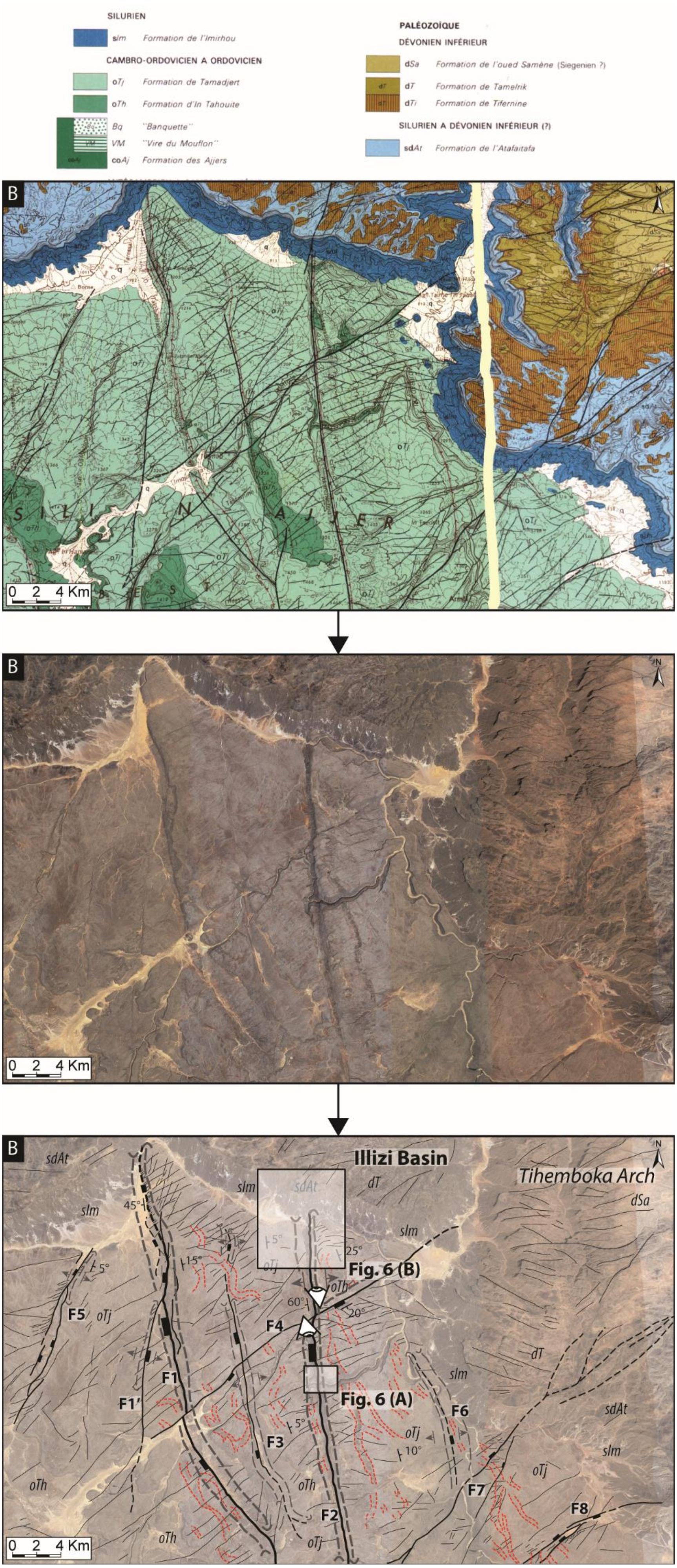


Fig. 5B (previous Fig. 4B)

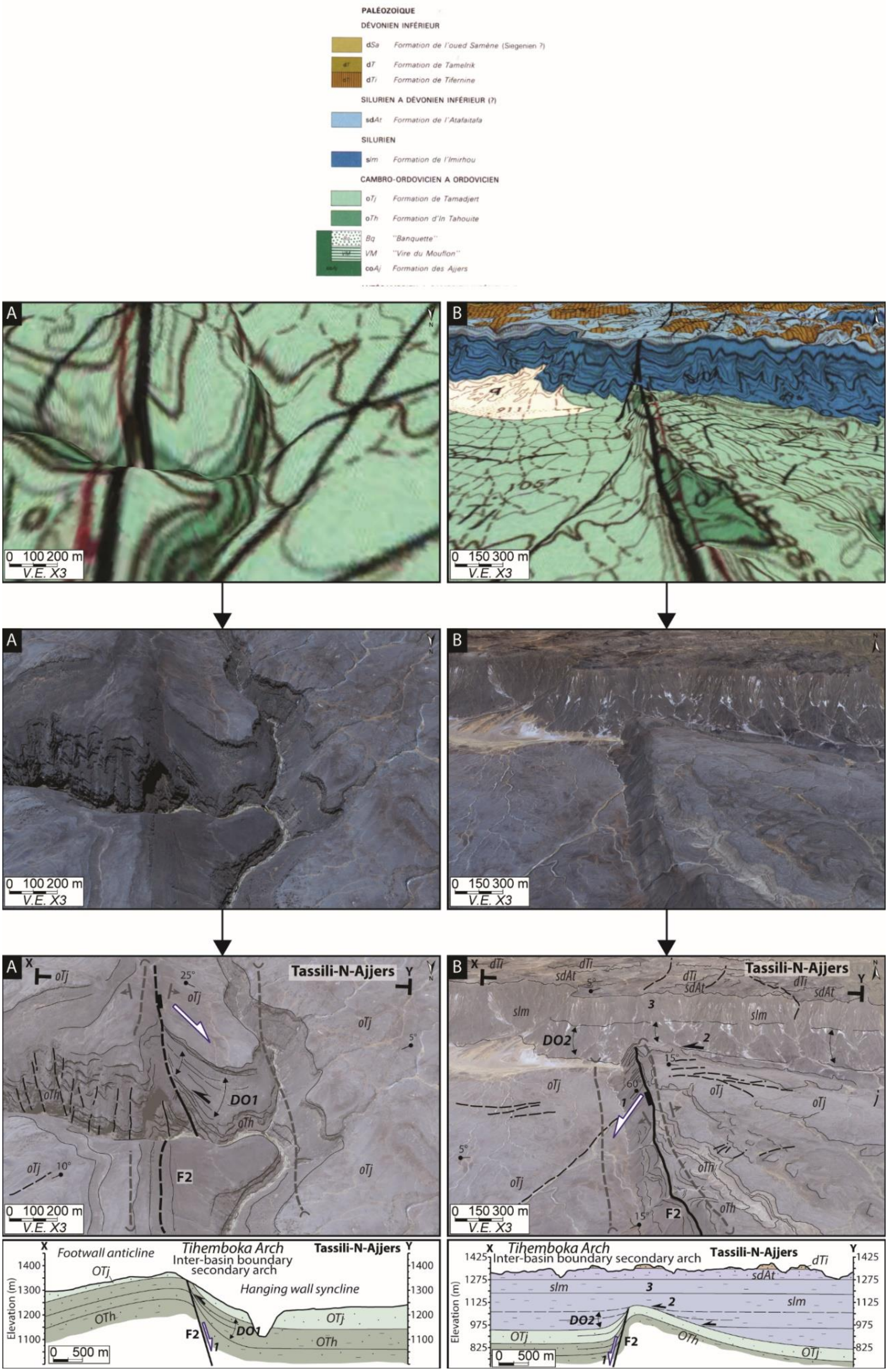


Fig. 6A and B (previous Fig. 5A and B)

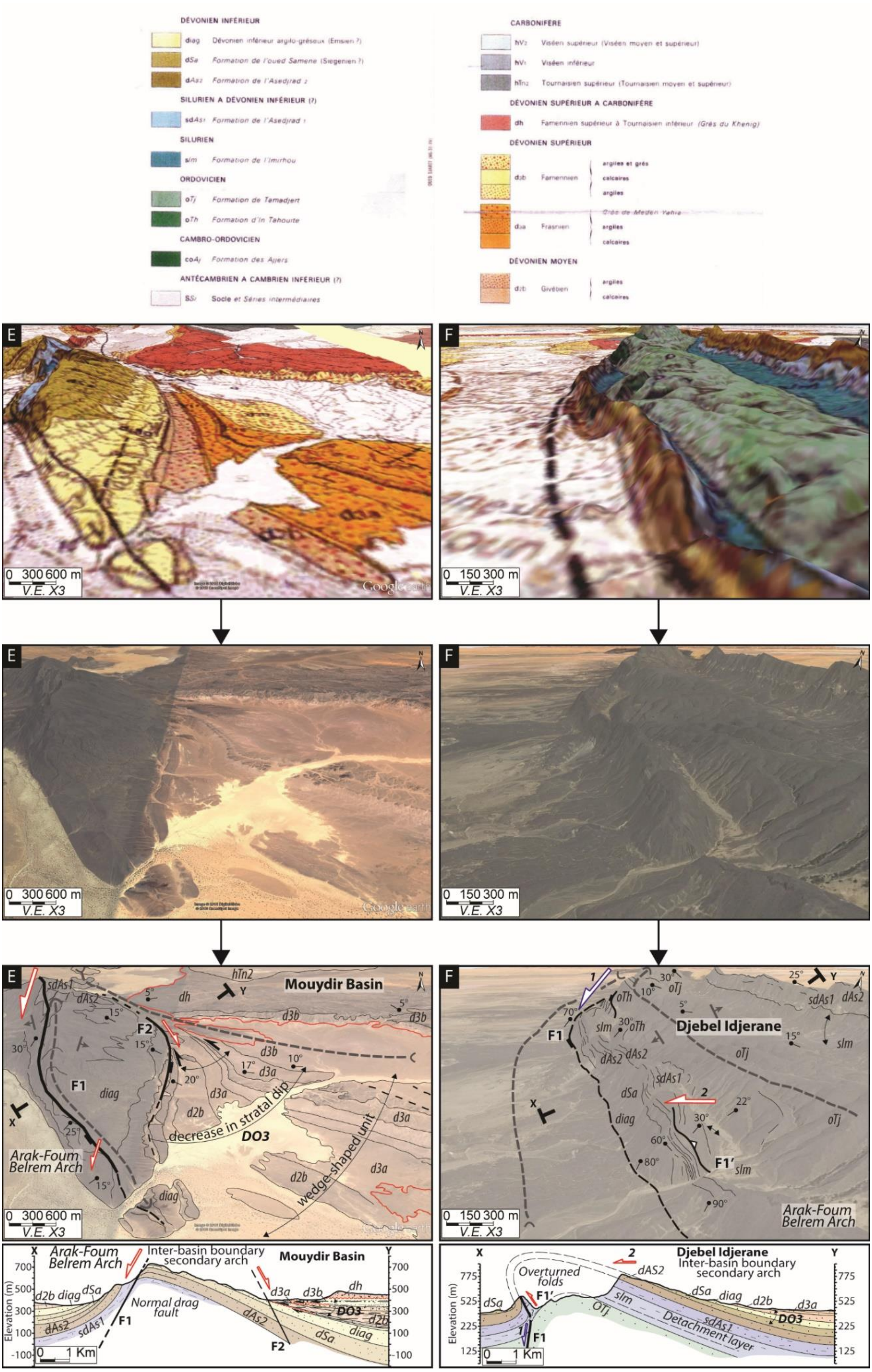


Fig. 6E and F (previous Fig. 5E and F)

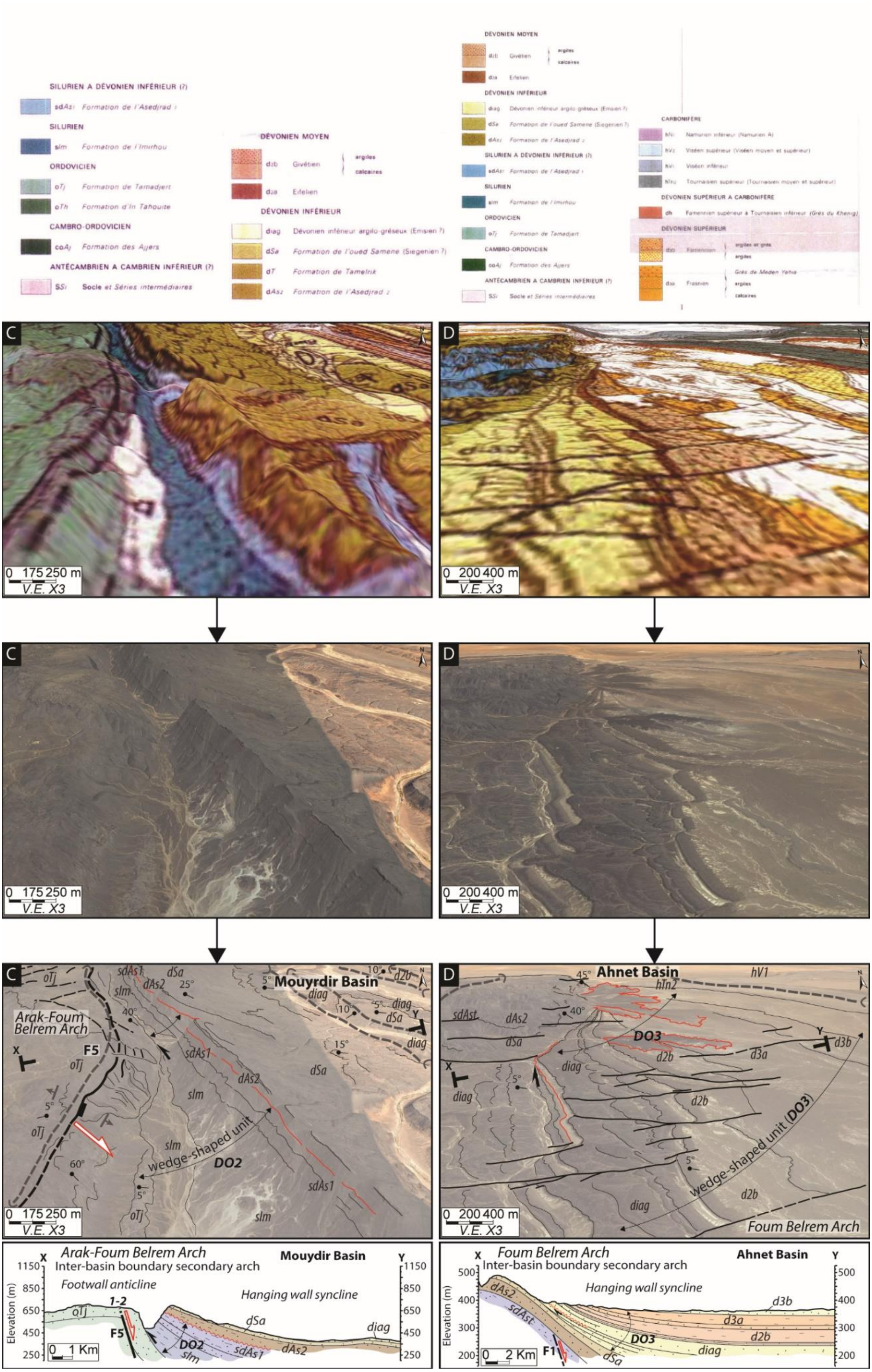


Fig. 6C and D (previous Fig. 5C and D)

Line 261: “Nine facies associations” cannot be detected in Figs 9 and 10. Do you mean the depositional environments? (these are 5). I also could not find the “supplementary data”.
-“We have modified (line 319). We have integrated supplementary data to the paper (cf. fig. 4, 11 and 13).”

Line 291: There is no clear horizontal (gAPI) scale in Fig. 8. Thus it is impossible to check the numbers.
-“We have done a bigger lettering (see Fig. 9).”

Line 298: values range to 120, not 200 in Fig. 8D.
-“modified (line 298).”

Lines 329-330: 30-60 gAPI are low, not high.
-“modified (line 389).”

Line 346: 25-60 gAPI are low, not high.
-“modified (line 407).”

Line 366: stromatoporoids, tabulate and rugose corals are not mentioned on Tab. 1.
-“modified (see Table 1).”

Line 378: same as above.*
-“modified (line 440).”

Line 382-83: same as above.
-“modified (line 445).”

Line 395: HCS probably stands for hummocky cross stratification. If this should be the case, these structures indicate a shallow marine environment, not deep marine. The same interpretation refers to “influence of storms”, i.e. shallow, not deep.
-“We have modified (line 459-463) and proposed that it corresponds to deeper than shoreface deposits. AF5a is interpreted as upper offshore (i.e. a kind of offshore transition). The occurrence of HCS and wavy-bedded structures, as well as the fossil traces indicate that this facies association recorded deposition in a marine environment between the fair-weather (MFWB) and the storm-wave base (MSWB) under the influence of storm wave’s oscillatory currents (Dott and Bourgeois, 1982; Reading, 2002). No influence of waves has been recorded and the storm-induced deposits are embedded in fine grain sediment (mud dominated).

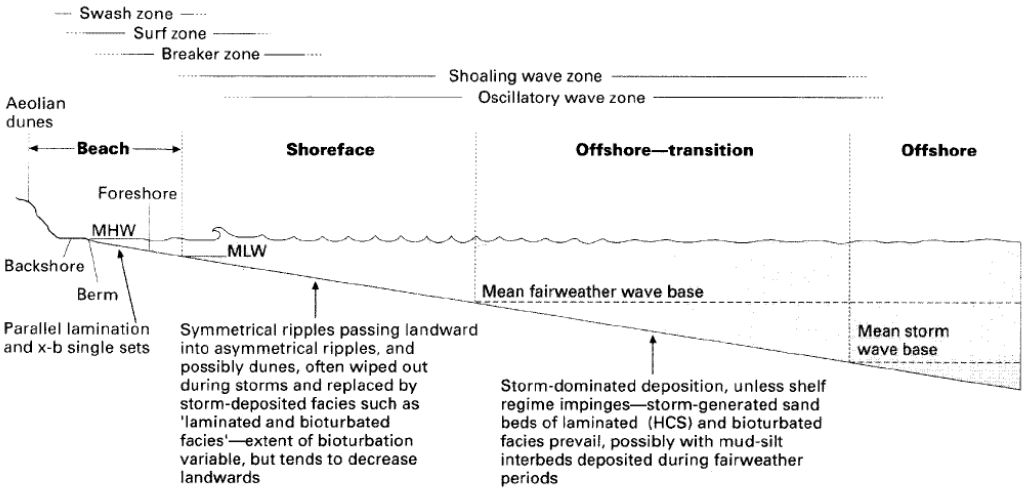


Figure 6.6 Generalized shoreline profile showing subenvironments, processes and facies.

From (Reading and Collinson, 2009) p. 160.

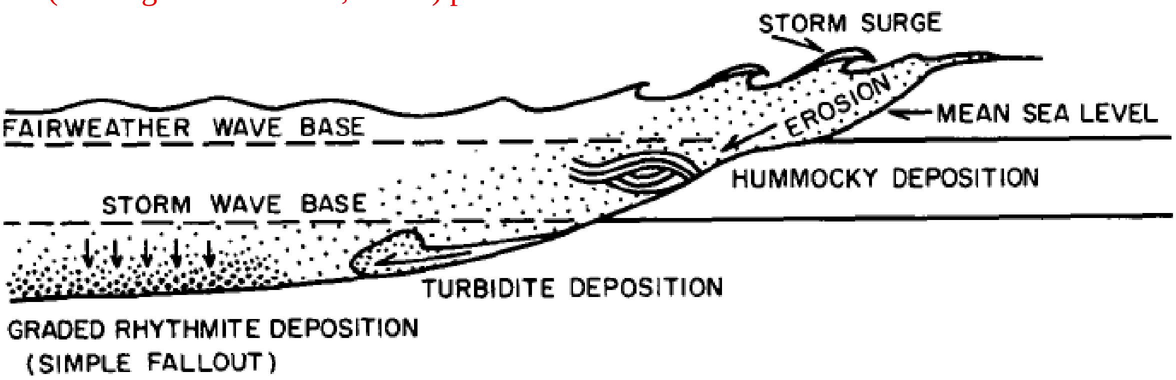


Figure 22. Diagram showing inferred storm origin of hummocky stratification and graded sand laminae on shelves. Storm surge erodes sand at shore; hummocky stratification is deposited and preserved in stormy seas between fair-weather and storm-wave bases; graded laminae may be deposited and preserved at greater depths by simple settling from suspension and/or from turbidity currents. (Modified from Walker, 1979, Fig. 15, and Dott and Bourgeois, 1980, Fig. 3.)

From (Dott and Bourgeois, 1982).

Line 396: The ichnofauna of AF5a does not necessarily indicate a deep marine environment, but could also be much more shallow, as indicated by the "influence of storms".

-"We agree that *Zoophycus* by itself can be interpreted as formed in shallow environments but also in deeper offshore setting (MacEachern et al., 2007; Vinn and Toom, 2015). In the literature, even if *Zoophycus* can be found in broad environmental systems, it occurs preferentially in deeper environments especially in slope area (Seilacher, 1967).

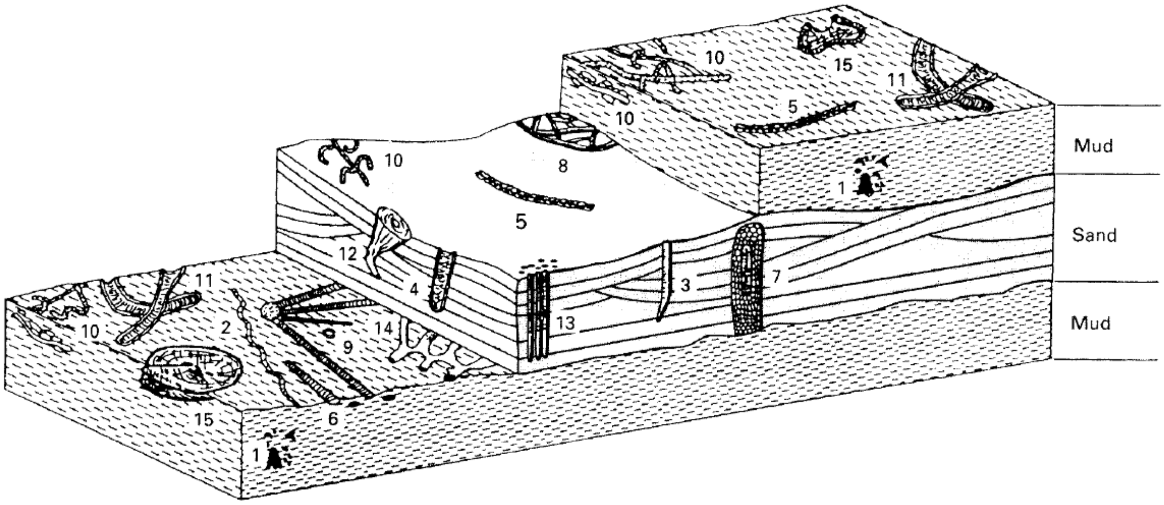


Figure 7.41 Typical trace fossil assemblages within offshore storm (hummocky cross-stratified) sand layers and their bounding mud units. 1, *Chondrites*; 2, *Cochlichnus*; 3, *Cylindrichnus*; 4, *Diplocraterion*; 5, *Gyrochorte*; 6, *Muensteria*; 7, *Ophiomorpha*; 8, *Palaeophycus*; 9, *Phoebichnus*; 10, *Planolites*; 11, *Rhizocorallium*; 12, *Rosselia*; 13, *Skolithus*; 14, *Thalassinoides*; 15, *Zoophycus* (from Ekdale, Bromley & Pemberton, 1984).

From (Reading, 2002) p. 264.

Line 406: The Grès de Mehden (not "Meden) Yahia and the Temertasset (not "Termatasset) shales were deposited during a regressive phase and should be discussed in one of the preceding paragraphs.
-"We have modified and added to paragraph 5.2 the regressive trend (line 520-522). However, it is written 'Meden' in geological maps (Bennacef et al., 1974; Bensalah et al., 1971) see above. Indeed, the transition from shales to sandstones correspond to a regressive trend (as proposed Wendt et al., 2006) but this paragraph only deal with the Argiles de Mehden Yahia shales interpreted as deeper environment the pattern corresponds to a MFS."

Line 410: not "Paleozoic" but "Devonian". Fig. 7 shows almost exclusively Devonian.
-"modified (line 476)."

Line 421: The major flooding surface is not MFS5 but MFS4 (Eifelian transgression).
-"We have added this comments (line 505-507). However, the MFS5 correspond to the transition of an important changes in geodynamic context but do not significate that it is an important MFS at the scale of the Devonian record. Besides, it is easily identified and extendable horizon because of a gamma ray peak. So, we have decided to horizontalized on it. Besides, outcrops (O1 – O9) from Wendt et al., (2006) are horizontalized on top Givetian."

Line 423: same error. Moreover, you have omitted the gap in the Emsian.
-"This gap is included in the pattern from D1 to D5 and is discussed in paragraph 6 (F) (line 585-591). Upper Emsian emergence is characterized by truncatures from satellites images (see fig. 6D and 6E) and well cross section (erosion and pinch out of upper Emsian to Eifelian series) (see fig. 10, 12 and 13)."

Lines 433-436: This is highly exaggerated. The facies variations between the Ahnet Basin and the adjacent ridges are very weak.
-"modified (line 500). We have moderated our purpose."

Line 442: MFS5 is not a major flooding surface. The corresponding black shales are diachronous (earliest ones in the Givetian, latest ones in the upper Frasnian), and their occurrence depends mainly on paleogeographic factors. It is true that there is an evident gap between the Givetian and the Frasnian, but this occurs only on the ridges, not in the basins, and it is caused by non-deposition, not by transgression.
-"The apparition of hot shales is observed during early Frasnian. This layer has been chosen as correlation layer as it was observed by GR in all the study core section and due to our biostratigraphical scale. These hot shales correspond to a flooding at the basin scale."

Line 451: not a maximum flooding but regression (see above).
-"D6 to D9 encompass the whole Frasnian to Famennian sedimentary succession interrupted by several sequence boundary and recording T-R trends (as shown in fig. 8)."

Line 514: an "early Eifelian" hiatus does not exist. Or do you mean the partitus Zone which in fact has not been documented? But I did not check the other references which appear to depend on palynomorph stratigraphy which, compared to conodont stratigraphy, is much less reliable.
-"corrected."

Line 660: Which are the "Three different periods of tectonic compressional pulses"? I am aware only of one, the Hercynian.
-"The Caledonian (i.e. Siluro-Devonian), Middle to Late Devonian and Pre-Hercynian events identified both in this study and in the literature see below."

Lines 668-1266: References: The reference list occupies almost the same space as the preceding text and should be drastically reduced, at least to one half. In order to avoid the impression that the article is nothing but a general review paper. Only articles referring to the study area should be included in the reference list. Unfortunately, the latter in its present length shows many incomplete citations (missing volume, missing pages, missing dots in abbreviations, missing editor, missing town (for books), missing capitalizing, wrong spelling), such as in lines 673, 676, 681, 685, 690, 696, 699, 740, 743, 745, 755, 762, 764, 765, 777, 814, 828, 830, 844, 863, 873, 893, 900, 902, 938, 957, 963, 979, 982, 1001, 1003, 1013, 1018, 1033, 1037, 1041, 1075, 1081, 1082, 1095, 1099, 1112, 1124, 1129, 1158, 1160, 1162, 1169, 1176, 1181, 1185, 1186, 1195, 1221, 1222, 1226, 1244, 1253, 1255, 1257, 1260. This list, however, is not complete. I did not check, if every reference in the text does also appear in the reference list and vice versa. This can be done much more accurately by a simple computer program (which I do not have). On the other hand, important local works are not cited.
-"We have modified references by using ZOTERO software and limited them in the text."

<u>Remarks to figures:</u>

Fig. 1: line 1275: 1: 200.000.
-"modified (line 1411)."

Line 1281: where are the supplementary data?
Map and reference of Monod (1931-1932) are missing.
"We have integrated supplementary data to the paper (cf. fig. 4, 11 and 13). Expect error on our part, we didn't' used map from Monod."

Fig. 2: Illizi Fm. Is missing in the Illizi column.
-"It is present in the Tassili column (see Fig. 3)."

Fig. 3: give exact coordinates for wells (W1- W21) and for outcrops (O1 – O9). What are the latter? Own data or previously published ones? Why there is no cross section along the O1-O9 line?

-"Coordinates of wells (W1- W21) are confidential they are put in a banalized format. O1-O9 outcrops data came from Wendt et al., (2006). However, you didn't had access to supplementary data. They are added to the paper (see fig. 11 and 13)."

Fig. 7: larger lettering is required. (I had to use a 3x magnifier to read it). What are the tiny arrows in the left gamma-ray-column?

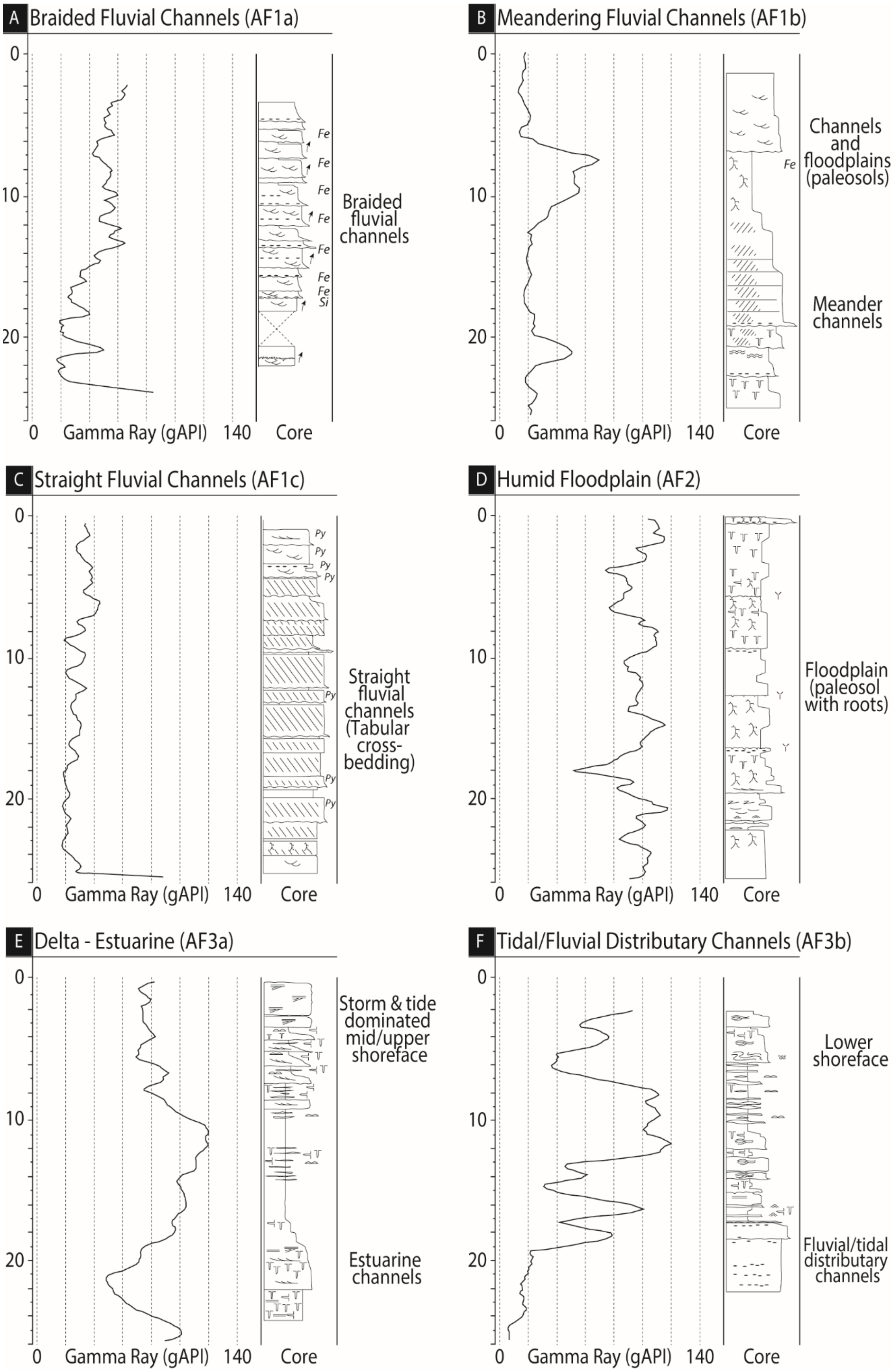
-"We have done a bigger lettering. The tiny arrows were giving the trend of the gamma ray but they are not indispensable for understanding. They were deleted (see Fig. 8)."

Tab. 1: Please add a column with the equivalent individual formation names. In the present form this table is rather theoretical and shows no relation to the Devonian depositional areas.

-"added (see Table 1)."

Fig. 8: Because of its tiny lettering this figure is almost unreadable. Stages and formation names should be added for each sub-figure. The accompanying sections are unreadable. I could not check the source because the equivalent reference is incomplete. In the present form this figure appears rather useless. Gamma-ray-curves often do not correspond to their interpretation in the text (see above). It would make a certain sense, if there were a comparison with equivalent well logs in each sub-figure, but it would better to omit this figure completely.

-"We have done a bigger lettering cf. fig. 9 (size minimum 7). We can divide this figure by 2 to magnify for a better visibility (cf. Fig. a and b below)."



A Braided Fluvial Channels (AF1a)
Braided fluvial channels
Fe
Si
0
10
20
0 Gamma Ray (gAPI) 140 Core
B Meandering Fluvial Channels (AF1b)
Channels and floodplains (paleosols)
Meander channels
Fe
0 Gamma Ray (gAPI) 140 Core
C Straight Fluvial Channels (AF1c)
Straight fluvial channels (Tabular cross-bedding)
Py
0 Gamma Ray (gAPI) 140 Core
D Humid Floodplain (AF2)
Floodplain (paleosol with roots)
0 Gamma Ray (gAPI) 140 Core
E Delta - Estuarine (AF3a)
Storm & tide dominated mid/upper shoreface
Estuarine channels
0 Gamma Ray (gAPI) 140 Core
F Tidal/Fluvial Distributary Channels (AF3b)
Lower shoreface
Fluvial/tidal distributary channels
0 Gamma Ray (gAPI) 140 Core

(a)

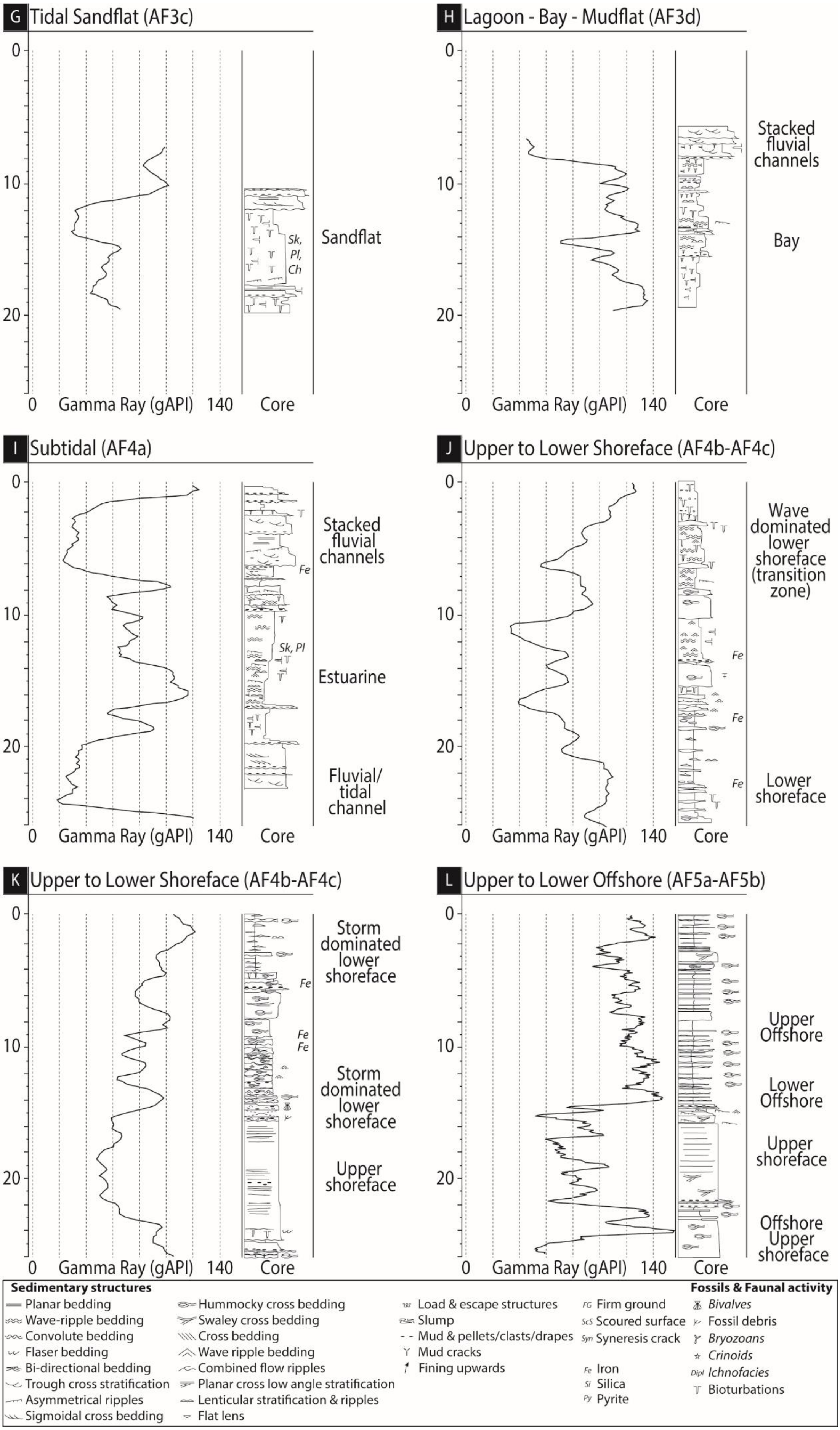

G Tidal Sandflat (AF3c)
Sandflat
Sk, Pl, Ch
H Lagoon - Bay - Mudflat (AF3d)
Stacked fluvial channels
Bay
I Subtidal (AF4a)
Stacked fluvial channels
Fe
Sk, Pl
Estuarine
Fluvial/ tidal channel
J Upper to Lower Shoreface (AF4b-AF4c)
Wave dominated lower shoreface (transition zone)
Fe
Lower shoreface
K Upper to Lower Shoreface (AF4b-AF4c)
Storm dominated lower shoreface
Fe
Storm dominated lower shoreface
Upper shoreface
L Upper to Lower Offshore (AF5a-AF5b)
Upper Offshore
Lower Offshore
Upper shoreface
Offshore
Upper shoreface
0
10
20
0 Gamma Ray (gAPI) 140
Core
Sedimentary structures
Planar bedding
Wave-ripple bedding
Convolute bedding
Flaser bedding
Bi-directional bedding
Trough cross stratification
Asymmetrical ripples
Sigmoidal cross bedding
Hummocky cross bedding
Swaley cross bedding
Cross bedding
Wave ripple bedding
Combined flow ripples
Planar cross low angle stratification
Lenticular stratification & ripples
Flat lens
Load & escape structures
Slump
Mud & pellets/clasts/drapes
Mud cracks
Fining upwards
FG Firm ground
ScS Scoured surface
Syn Syneresis crack
Fe Iron
Si Silica
Py Pyrite
Fossils & Faunal activity
Bivalves
Fossil debris
Bryozoans
Crinoids
Dipl Ichnofacies
Bioturbations
(b)

Fig. 9: Needs larger lettering! In Fig. 2 the Emsian is a gap (which is correct), but in Fig. 9 this stage is represented by strata, which is an obvious contradiction.
-"We have done a bigger lettering. In Fig. 10, 12 and 13 upper Emsian series are truncated. An evidence of hiatus. On this representation format we cannot show the presence of hiatus (It is not a chronostratigraphic representation)."

Fig. 10: same as Fig. 9.
-"see above."

Fig. 11: "K" is missing on A and B. (line 1486).
-"modified (line 1658-1659)."

Fig. 12: larger lettering, the smallest ones are illegible.
-"We have enlarged the lettering (size minimum 7). However, enlarged the figure cannot be done without separating in two the figure. So, we have separated in two the figure (see Fig. 15 and 16)."

Conclusion:

As a whole the paper is well written, rather concise and accompanied by good illustrations (apart from the above remarks). It is an example of a modern interpretation of a basin and ridge paleogeography using all available techniques. An important contribution is the representation of well data which are difficult to obtain by non-oil geologists. Nevertheless, it cannot be overlooked that as a whole the paper appears to be based almost exclusively on pre-existing data. The personal contribution to the subject is difficult to distinguish Thus, in several aspects and conclusions the interpretations of the data are not or only poorly compatible with well-established field data. Some of them are highly speculative. It should also be made clear that the depositional units (basins and ridges) are nothing else than the southern prolongation of the same (but more accentuated) ones farther north. It should also be clearly expressed that the basin-and-ridge paleotopography in the Ahnet and Mouydir is of relatively short duration (early Eifelian to early Famennian). The depositional pattern of the late Famennian and the Carboniferous Is totally different from the Devonian one. A Devonian sea-level curve would be highly desirable. Absolutely necessary are several block diagrams to show the basin-and-ridge configuration at various stages. I recommend publication of the manuscript after major revision, but I would be glad to receive the revised manuscript once more before its final acceptance.

-"We have added a method figure (fig. 4) and better specified the original work in the method part. In our paper, we argue that the basement structures (at a lithospheric scale) are alternately reactivated (i.e. uplifted basement=>forced folds) during the Paleozoic. The basin-and-ridge feature was preserved since the Cambrian until the Carboniferous (as seen before) due to tectonic pulses (syn-sedimentary) and to the inherited basement features (i.e. mega shear zones and terranes rheologies). This particular zonation of the terranes (Archean, Paleoproterozoic, Proterozoic…) has constrained the basin-and-ridge architecture. However, we agree with the fact that the arches were consecutively levelled and flooded (i.e. eustatic control) during some major transgression periods. A similar block diagrams showing the evolution of basin-and-ridge configuration is published (Eschard et al., 2010), even if there are some minor differences."

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