

Review of Escuder et al: **The Imbert Formation of northern Hispaniola: a tectonic sedimentary record of arc continent collision and ophiolite emplacement in the northern Caribbean subduction-accretionary prism**

**General/overview**

This paper presents a nice, systematic, study of the Imbert Formation of Hispaniola. Despite several studies, this has never been achieved before. Much new data is presented.

*Some broader criticisms*

Title “subduction-accretionary prism” seems redundant – “subduction complex” seems better.

The “paleostress” analysis of syn-sedimentary structures is dubious. First, the authors could be mixing syn-sedimentary fault data with tectonic, bed-confined joint data. There is insufficient discussion of how “syn sedimentary” joints can be distinguished from tectonic joints. I personally have examined the Imbert and syn-sed deformation is present, but also what I interpret as tectonic joints. Second, the discussion of the results is in terms of tectonic stresses, but the “stress ellipsoid” syn-sedimentary structures are produced by gravitational stresses on paleoslopes, yet the paleoslope implications are not discussed. *Needs fixing, or omitting (these measurements and analyses don't add anything really important to the paper anyway)*

There are constant references to the **Curtiembre plutons** without explaining where they are or their significance.

The concluding model discussion is marred by assumptions and omission of alternatives. There is an assumption that the RSJ subduction channel structurally overlies the Samana complex, ie. the RSJ mélanges are equivalent to the Punta Balandra zone – but they are quite different. Also *Krebs et al 2008* (ignored in this paper) document that the RSJ mélanges contain blocks in a continuously cooling subduction channel from early in the subduction history (104 Ma) to peak pressure metamorphism at ~62 ma (Paleocene). The latest peak pressure dates in Samana are late Cretaceous, suggesting that the Samana nappes accreted into the subduction zone in Late K, while subduction in the RSJ continued into the Paleogene. The assumption in this paper is that Samana is part of the southern margin of N America (Bahamas) which is unlikely, given the full geochronological data. The alternative hypothesis that Samana could be part of the “Caribbeana” province (*Garcia-Casco et al, 2008*) is not even discussed.

I do not doubt that the oblique underplating of the Bahama Bank continental margin in the Mid Tertiary is involved in the uplift of the margins of the Imbert basin, but it is not the Samana terrane. The actual situation is more complex than presented in the discussion.

**Solution:** A more extensive discussion

## Specifics

p. 2 line 5 “chaotic” not “caotic”.

Line 21 “from” not “of”.

Line 23-24 fore arc basins are usually driven associated with the development of subduction complexes, not basaltic tectonic erosion. The Costa Rican arc referred to does not have a well developed fore arc basin – the opposite in fact. Delete phrase.

Line 29-30 Work into these sentences the “subduction channel” concept.

Appropriate for Hispaniola.

p. 3 line 16-18 does the orogenic belt result from convergence or collision? I would say the latter. Also the collision is *highly* oblique, and not final, it is continuing. Tighten up sentence

Line 24 call it the Puerto Plata complex, adjective “ophiolitic” is interpretative and very much a loaded term.

Line 29 “built” not “edified”; “composed of” not “constituted by”.

P. 4 line 15 “we show” not “will show”

Line 18-19 the RSJ complex is a subductional channel (long lived history) rather than a “suture zone” (short-lived, final-collision history).

Line 29 “island” not “Island”

p. 5 line 4 suggest “The magmatic arc related rocks”

line 5 suggest “Aptian –Early Eocene” interval because there are Lower Eocene tuffs and intrusives in Hispaniola.

Line 6 comment: while this is true, Paleocene-lower Eocene often contains tuffs/intrusives showing continuing magmatism.

Line 24, I suggest the unit is called the “Puerto Plata Complex”, as the term “ophiolitic” is interpretative and carries a lot of baggage. We are still trying to untangle Cuba’s interpretative “ophiolites” from its serpentinite mélanges and its true basalt-gabbro-peridotite complexes.

Line 32 “tens of meters to hundreds of meters spaced” fault bounded, instead of decametric to hectometric (not used much in English)

p. 6

line 28 lower case on “group”

line 30-31 “the sequence culminates” line 31 comma after “subhorizontal”; “the” Jaiba Formation.

p. 7 How can the author discuss the RSJ Complex without references to Krebs et al, (2008, 2011) and Abbott and Draper (2013 and previous papers) – eg. in lines 12 and 18-21

Escuder-Viruete did much interesting work in this region, but his were not the only contributions

p. 9 line 6 “Puerto Plata area”, not “Puerto Plata complex”

p. 11 line 29 delete “ophiolitic”

p. 12 line 13 “mudstones” not “mundstones”

p. 13 line 2 “mudstones” not “mundstones”; line 3 “chaotic” not “caotic”

line 21 “mudstones” not “mundstones”

line 25-26 Needs a clarifying statement that beds are therefore younger than Paleocene.

p. 14 lines – ll-13 ????? What is this geomagnetism thing ? Mistranslation of “magmatism” by Google Translate?

Line 23 dykes?(British) Or dikes(American).

**Line 30-31 The Curtiembre plutons are mentioned for the first time and are not on any map. Where are they?? Cordillera Oriental? What age? (not actually stated) Also Fig 1 shows the Pedro Garcia rocks occurring 20 km (not 1-2km) from Imbert. This is a very confusing sentence.**

Line 32 delete “the” in front of Imbert.

p. 15 line 4 “volcaniclastics” should be “volcaniclastic rocks”

line 12 Bulk rock major and trace element compositions **of what ?**

line 26-27 Curtiembre again

p. 16 line 25 “no contained garnet” should be “did not contain garnet”

p. 17 line 13 should be “Syn-sedimentary deformation . . . .

line 24 “Chaotic” not “caotic”

line19 replace “work” with “this part of the paper”

**p.17-19 While I concur with the authors that there is syn-sedimentary deformation in the Imbert of the kinds mentioned in this paper, do not understand the authors concept of a “syn-sedimentary stress regime”. Do authors mean paleoslopes? This is the usual concept in syn-sedimentary deformation. I also disagree that there are “syn sedimentary joints”. The joints that I have seen are tectonic and related to late uplift. Many joints are bed-confined, but this is a commonly observed feature of many joints, and does not mean that the joints are syn-sedimentary. Much of this section does not make sense. Also the position does its position between the geochemistry and geochronology sections doesn’t make sense. If retained, this deformation section should follow the stratigraphic descriptions.**

p. 19 line 25 “quarry” not “carry” **Authors need a more precise location with UTM and/or map co-ordinates, as the Puerto Plata-Imbert Road is long (and there are several quarries).**

p. 20 line 5 “quarry” not “carry”

p. 21 line 5 “On the other hand” not “By the other hand”  
line 20 “tectonics are” not “tectonics is”  
line 21 “alternations” instead of “alternance”

p. 22 line 13 “ruled out” not “rule out”  
line 16 “on the other hand”  
line 19 gravitational instability instead of tectonic??

p. 23 line 7 talks about “syn sedimentary tectonics” but couldn’t this be slope stability problems??  
line 13 “axe permutation” ??????  
line 16-18 Couldn’t the NE-SW extension be an SW dipping slope. The two are not incompatible, but the authors need to establish extension in the basement to say that there was a regional tectonic extension. Syn-sedimentary extension does not establish that.

p. 24 line 11 Which complex?? Unclear.

p.25 line 4 “on the other hand”

p. 26 line 18 “agrees” not “agree”

p. 17 Draper is affiliated with Florida International University, Miami, FL. Authors have known me for 16 years !!

### **References cited in this review**

Abbott, R.N. and Draper G, The Case for UHP Conditions in the Cuaba Terrane, Rio San Juan Metamorphic Complex, Dominican Republic, *Geologica Acta* (Barcelona) v. 11(2), p. 149-165.

García-Casco, A., M. Iturralde-Vinent, J. Pindell, 2008. Latest Cretaceous Collision/Accretion between the Caribbean Plate and Caribbeana: Origin of Metamorphic Terranes in the Greater Antilles. *International Geology Review*: v. 50, n. 9, p. 781-862

Krebs, M., Maresch, W.V., Schertl, H.-P., Baumann, A., Draper, G., Idleman, B., Munker, C., Trapp, E., 2008, The dynamics of intra-oceanic subduction zones: a

direct comparison between fossil petrological evidence (Rio San Juan Complex, Dominican Republic) and numerical simulation. *Lithos*, v. 103, 106-137

Krebs, M., Shertl, H-P., Maresch, W.V., and Draper, G., 2011, Mass flow in serpentinite-hosted subduction channels: P-T-t path patterns of metamorphic blocks in the Rio San Juan mélange (Dominican Republic) *Journal of Asian Earth Sciences*, v xx, p. xxx, doi:10.1016/j.seaes.2011.01.011