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Interactive comment on "The Ogooue Fan (Gabon): a modern example of deep-sea system on a complex sea-floor topography" *by* Salomé Mignard et al.

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This paper provides interesting details of a part of the West African margin for which there is limited data currently available in the public domain. It describes a deep-sea fan system related to sediment discharged from the Ogooue River in Gabon (although it is also characterised as an apron on the basis of multiple feeder systems). The area sits between areas where extensive work has already been published so it fills a gap and also demonstrates some features unique to this part of the margin. The focus here on tracing slope canyons and channels down slope across what is a topographically complex slope and basin floor on account of the presence of the Cameroon volcanic

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line across which the system traverses. The work is based on recent sea floor and shallow echosounder and seismic imaging, as well as an array of shallow cores, some of which have already been published, but not from the perspective of facies distribution and wider system character so there is significant new material here.

What will be of particular interest to the deep-water research community is the complex way in which the system is responding to the changing gradients and variable levels of lateral confinement. The paper includes some spectacular images of a headless valley system that sits mid way along the transport path (the term distal valley may be a little misleading particularly as there is another confinement further down slope). Unlike deep-sea fans building into open basins, this one has a series of depocentres separated by bypass sectors where gradients are steeper and where flows become more confined. Deep-water systems commonly traverse irregular sea floor topography related to mobile substrates and active or pre-existing structures so this aspect makes the study more than just of regional interest. The set-up in the introduction very much focusses on the west Africa margin but it might be useful to cast it more widely in terms of system response to complex topography and to refer to other examples in the literature – for example the late Bill Normark and colleagues work on headless channels in the California borderland. There has been a lot of work done on stepped slopes and the response of gravity currents to topography, so it is important that the more novel aspects of this system are stressed, and previous work referenced as appropriate.

One issue that is important in looking at interactions of deep sea systems and topography is whether the topographic is static or dynamic. Some more details on the history of the Cameroon volcanoes and sea mounts would be useful. How young are the volcanoes – is activity continuing in the offshore part of the chain? Are slopes beginning actively rotated or are they static. At several points the text mentions mud diapirism – but it is unclear to what extent this is an issue here in terms of sea floor topography. Where are the md diapirs? Given how important pock marks are in the area just to the north, why are these apparently less well developed in the study area? What is differ-

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ent about the Equatorial Guinean margin? Are there any examples of the Jobe et al. depositional canyons and if not why the change along the margin. Parts of the system apparently show extensive scouring and a range of different features are described, but it is a little hard to see these because they are overlain by the interpretation lines. It would be useful to include a few more un-interpreted sea floor images showing features such as the putative mega flutes. Figures 5 and 6 work very well showing one of the leveed channels and the valley feature. It would also be good to see more detail on the 'ponded' lobe associated with the northernmost Cape Lopez canyon – it is currently reproduced at very small scale. The straight to sinuous channels appear erosional and inset with channel floors well beneath the levees - is this similar to Congo fan? Levees seem to be relatively poorly developed – is this the case? I am not quite sure I know what is meant by a secondary channel.

The core data are a very useful compliment to the sea floor and shallow imaging and the age constraints are important in thinking about depositional rates. Are some of the AMS 14C dates new – some have been published already but if the others are new should be properly tabulated with analytical details. Only the MIS1/2 boundary is indicated on the core correlation in Fig. 3 but reading Mignard et al (2017) the case is made for penultimate glacial sections as well as last glacial in some of the cores of the basis of stable isotope profiling. It would be useful to indicate this on Fig. 3 where the lower part of KC10 is interpreted previously as MIS6.

The mid-system incision and valley is a very interesting feature of this system and impressively wide at 15 km, presumably as it collected a number channels. A large volume of sediment has been removed and translated down slope (can you estimate how much?). A significant part of the lower fan system must come from erosion of this valley. Channels feeding to it seem better resolved to the north. Presumably during the Holocene (and earlier) transgression, precursors of Manji island may have migrated eastwards, sequentially feeding the various slope canyons ending up at Cape Lopez canyon today. The shelf/coastal set up is unusual with longshore drift maintaining

supply to deep water – comparisons are made with longshore drift in the California margin where longshore drift feeds sand to La Jolla canyon, but the kink in the Ogooue coast sets up a rather different geometry where sand is able to spill downslope at the shelf edge without the need for a canyon to cut back to the modern shoreline. One wonders also given the coastal and shelf geometry whether this type of system is partitioned into a contemporaneous sandy supply from the outboard littoral cell (in what is otherwise a sand deficient system) and contemporary mud supply from the extensive bay head delta behind it feeding north towards the Equatorial Guinea margin with its pockmarks and muddy depositional canyons. Is that a previous highstand strandplain sitting inboard of the modern bay head delta on Google Earth?

Specific points lied to line numbers. Line 20 'repartition'? Line 22: 'bottom of channel-levee systems'. Meaning on the floors of the channels? Line 23: 'The most distal depocenters receive only the upper parts of the flows, which are composed of fine-grained sediments'. Why uppermost – does this component not escape to the levees? Are you sure there are more distal sandy lobes as in the Congo? Line 25: evidence that the system is active during highstand? Line 38: 'Since the Neogene'. Before Neogene as well? Line 42: 'fed by'? sourced from Albian to Turonian shales Line 49: Coverage of the sea floor. Line 55: Explain acronyms. Line 50 Rephase 'the construction of which'. Line 67: Seems odd Angola Basin lies to north of ridge. Line 83 'draining to the North Atlantic' Line 97: What about the oceanographic set-up – are there bottom currents offshore and what about water stratification? Line 98: Show backscatter classes on separate figure showing examples. Line 109: variations in the nature of Line 115: A total of 4,5500 km . . . Line 127: delete 'is'. Line 128: potentially a little confing here –deepest cores (meaning depth of sea floor) rather than the depth of the cores. Might be useful to reverse Fig 3 so eastern and shallower cores are on the right to correspond to the core distribution on the maps. Why no MIS1/2 boundary in KC21 in terms of facies/carbonate content? Line 155: delete semi-colon. Line 160: of planktonic foraminifera. Lines 161/162: a pelagic drape deposit/majority of the core tops. Line 168: upper term of the gravity currents'? Do you mean overspill

from channels of flow tops? Line 170: What bedding structures? Line 172: sequences samples? Samples from successive sandy beds in KC01 Line 173: absent in all. Avoid term sequence. Line 177: source of mass transport deposits – do they have volcanic sand grains or not? Line 189: What is a thin incision? Some of detail here hard to see given small scale of seafloor maps – include a blow up? Line 202: Caption to Fig. 4 mentions flute like features but these are not mentioned here. Line 224. Evidence for active ... Line 205: Channel seems to change direction before seamount – why is this? What is bathymetry like between San Tome and seamount? Is there a ridge here? Great width of valley is interesting compared to channels feeding it. Line 213: How is image illuminated to produce shading? Line 219: Globally orientated? Line 226: How does lobe pass to channels. Provide a more detailed image. Line 239: Eight Line 248: Any potential for bed waves/cyclical steps? Line 254: layers Line 257: Massive meaning structureless? Line 297: is it all delta fed? Components supplied by alongshore transport? Meaning of mature in this context? Line 310 relatively Line 311: As terraces? Axial rather than central as this could relate to along channel variations. Line 315: or could it relate to slope as well? Or to upslope propagation of incision that fixes the channels? Line 321: Geometry of various scour features are not that well illustrated. Line 322: What is a secondary tenuous channel? Perhaps subtle would be better.Secondary? Line 334: downstream of the valley. Line 337: lobe complex Line 351; why the top? Line 355: but without the incision and valley formation. Inflection in gradient presumably reflects the presence of the volcanic centre. Line 369: Mud volcanoes? Where are these? Line 381: Why repartition - just partitioning along slope profile. Line 388: parts rather than terms. See below also. Line 390: sampled Line 431: fed with sediment

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