

Interactive comment on “Late Holocene evolution of a coupled, mud-dominated delta plain–chenier plain system, coastal Louisiana, USA” by Marc P. Hijma et al.

A. East (Referee)

aeast@usgs.gov

Received and published: 22 May 2017

This paper uses a suite of new OSL and 14C ages to refine the timing of coastal (chenier)-plain development of western Louisiana, USA, downdrift of the Mississippi-Atchafalaya delta, as well as refining chronology of evolution of the delta plain itself in greater detail than any previous study. As the authors state, better understanding the evolution of coupled delta-coastal plain systems has important implications for modeling and projecting the effects of sea-level rise, changes in fluvial sediment output (both affected by climate change) and human activities along the coastal zone and in the watershed. The study is robust and well conceived (and involved a large amount of work), and will be of interest to scientists studying coastal processes, Holocene land-

C1

scape evolution, and fluvio-deltaic stratigraphy and geochronology. This paper should be suitable for publication after minor revisions; most of those I suggest below are intended to expand the discussion of broader context and implications.

The stated hypothesis to be tested, that cyclic Mississippi delta subshifting has influenced evolution of the chenier plain coast, sounds a bit tepid because a number of studies in the 1950s through early 2000s (cited in this paper) already showed pretty convincingly that the evolution of the chenier-plain coast and associated continental shelf are linked to the activity of various sublobes of the Mississippi-Atchafalaya delta. Framing this study's objectives under a more specific hypothesis would set it up so that the results have greater impact (unless the authors intended to test an alternative hypothesis because they didn't believe the findings of those earlier studies, which doesn't seem to be the case).

The introduction presents well the larger scientific and management context of the work, which is substantial in scope and importance. It would be good to remind readers of this big-picture context again at the start of the Discussion section (beyond implications for inferring sea-level history), and revisit the implications further in the Conclusions. As is, the last several sections of the paper are focused so specifically on this immediate region that it may start to lose the broad scientific audience. It is also worth pointing out early in the Introduction (where it is mentioned that few studies address mud-dominated shoreline evolution) that the dynamics of mud-rich coasts are substantially different from those of sand-dominated shorelines, about which much more is known.

The section of the introduction that deals with background information on delta-switching in the Mississippi system needs more complete referencing, e.g., the work of Coleman, additional work by Oscar Huh beyond that cited here, and others. There is a much larger body of literature on this than the text currently reflects.

p. 13, bottom: the “capture” of the mainstem Mississippi by the Red/Atchafalaya River

C2

is better constrained than this. It occurred because a meander bend of the Mississippi (Turnbull's Bend) migrated laterally until it intersected the Atchafalaya during the 15th century, but the full capture has been both inadvertently assisted and now limited in scope by engineering works since the 1830s and especially since the 1950s. This bears mentioning in the text. I also couldn't find mention in the paper of the fact that the Wax Lake Delta formed from an artificially engineered outlet during Atchafalaya River flooding. The authors are certainly aware of these facts, but please state them in the paper for the benefit of readers unfamiliar with this river system.

Late in the Discussion and in the Conclusions, please expand on the potential broader implications for mud-dominated coasts beyond this field area in terms of coastal management, or landscape response to climate change and/or watershed-sediment-supply changes. The Discussion (section 6.1) does go into implications for inferring relative sea level from chenier coasts, which is an advance in understanding the dynamics of mud-rich shorelines and deltas better, and the paper does discuss implications for regional restoration scenarios. . . but can make further contributions by commenting on the additional broader issues just mentioned beyond this geographic region.

Technical corrections:

Section 3.2.1. ends abruptly; it's unclear whether the last sentence was truncated inadvertently.

Figure 14, caption, fix typo: "accumulation rate"

Interactive comment on Earth Surf. Dynam. Discuss., doi:10.5194/esurf-2017-24, 2017.