

***Interactive comment on* “Technical note:  
Optimizing the utility of combined GPR, OSL, and  
LiDAR (GOaL) to extract paleoenvironmental  
records and decipher shoreline evolution” by  
Amy J. Dougherty et al.**

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Received and published: 5 March 2018

This technical note calls for investigating prograded barriers worldwide using a combination of LiDAR, GPR, and OSL (GOaL), with a few general recommendations about how to use and interpret the GOaL dataset. The proposed research strategy to study prograded barrier through LiDAR derived topography informing subsurface GPR stratigraphy collection, which in turn informing geochronology data collection makes perfect sense. The technical note suggests that local to global forcing on coastal evolution can be better deciphered with a large enough prograded barrier dataset collected

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following this strategy. This strategy has been applied to earlier coastal studies though not systemically structured like here (e.g., Mallinson et al 2008, Quaternary Research, 69, 97-109). Therefore, it is necessary to call for a systematic and semi-standardized data collection and interpretation as proposed here. One advantage of combining Li-DAR topography and GPR not mentioned yet is that the former is very useful for elevation correction of the latter. However, some common pitfalls of the individual technique are not mentioned, which makes the strategy practically less useful to follow. GPR data collection and interpretation depend not only on gain, but also on the frequency of radar, antenna shielding, spacing of traces, and speed of radar in sediments of different nature. I am not sure why the note specifically picked gain, but not others in the recommendation. OSL age determination is affected by many assumptions about bleaching, distribution of radioactive sources in the sediment, water content variation, postdepositional disturbance, disequilibrium in the uranium and thorium decay series, and cosmic radiation (often a very important component to the total radiation a beach sample received) change because of change of overlying sediment thickness. The choice of appropriate age model does not handle all these complications. One more recommendation about OSL date is that the ages should be reported in a way to enable comparison across different publications. This is because OSL ages refer to the time before OSL measurement and the measurement time must be reported to ensure comparison. As an example of inappropriate reporting OSL data, I noted that the note used 'BP' as a unit for OSL data, which suggests to me that these OSL data refers to AD 1950 following the most common use of BP in the geochronology community. However, my sense is that I am reading the unit 'BP' in the note wrongly.

Specific comments: P4, L4: add 'can' before 'be utilized' P4, L10: add 'of' before 'coastal' toward the end of the line P6, L4: parenthesis for reference not correctly used P6, L12-13: delete 'in the' between the two lines P9, L11: replace 'bleaches' by 'can bleach', and 'any' by 'light-sensitive' P9, L15: replace 'accumulation period' by 'burial period' P11, L5-6: 'In order to decipher the timing of this shift, the aerial imagery was used to target the changes in morphology and GPR to locate corresponding differences

in the underlying stratigraphy'. Can this be shown in Fig. 5b? P11, L14-15: repeating reference P11, L20-21: 'Initially this complicated spit system did not appear as an ideal site to extract a sea level history'. What is the reason for this? P14, L7: sentence toward the end does not seem to be complete P16, L4: replace 'form' by 'from' P16, L5: replace 'intern' by 'in turn' Fig 1: the OSL data seem represented by circles filled by brown, but not open black circles as indicated in the caption. Fig 2: legend in 2b is not legible Fig 6: the thin dashed lines in 6b are not interpreted. Why are there two different y-scales in 6c? What is the difference between berm markers and beach-dune markers? Are the latter beach/dune boundary?

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Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2018-4>, 2018.

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