Figure S1

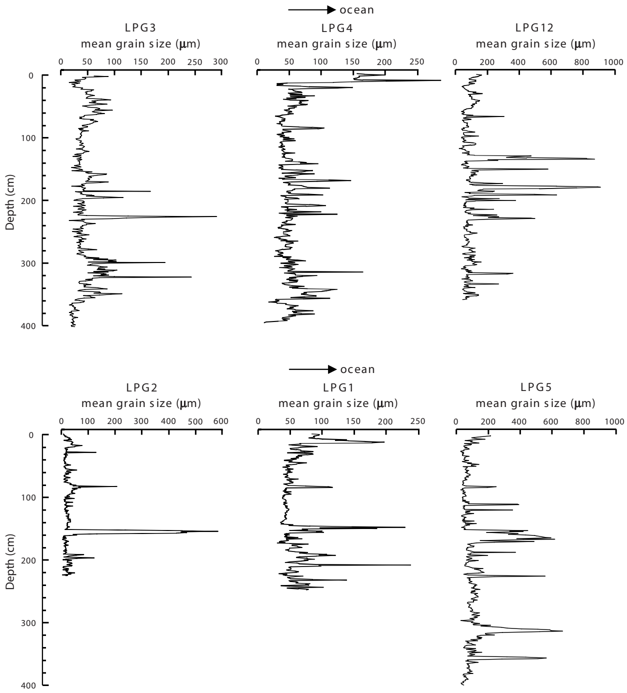

Figure S1 – Bulk grain-size data from both transects. Mean grain-size data from bulk sediment for transect presented in the paper (LPG12, LPG4, and LPG3 (same as Fig. 2)) and transect of cores to the east (i.e. LPG5, LPG1, and LPG2; see Fig. 1). Note the mean grain size scales (x-axis) are set differently for each plot. Cores LPG12 and LPG5 are located closest to the barrier and cores LPG3 and LPG2 are located the furthest from the barrier.

Figure S2

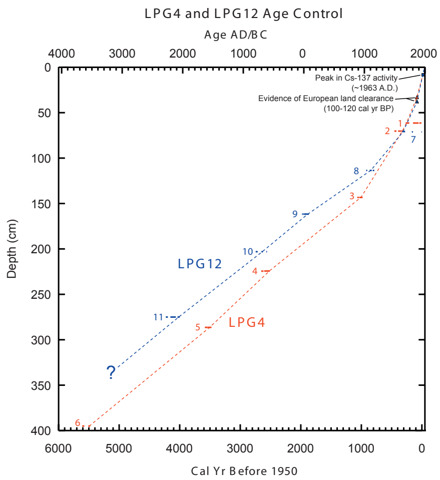

Figure S3

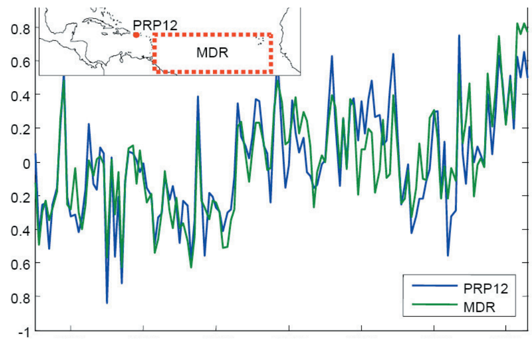

Figure S2 – Age versus depth plot of chronological data for LPG4 and LPG12. Radiocarbon ages are calibrated to calendar years at 1 standard deviation (see Table S1). Geochemical evidence (Ti and Fe) of increased input of terrestrial sediment associated with European land clearance for sugarcane production between 1830 and 1850 AD. is noted with triangles. The peak in Cesium-137 in LPG12 associated with a peak in atmospheric nuclear weapons testing in 1963 AD is noted with a square. The sedimentation rates of LPG4 and LPG12 are similar throughout with rates of about 0.5 mm yr-1 in the earlier part of the record and rates of approximately 2 mm yr-1 over the last several hundred years. However, there is an offset of about 30cm between the calibrated radiocarbon ages in LPG4 and LPG12 for the earlier part of the record. This offset may reflect a difference in sedimentation rates between the two cores in the early part of the last millenium and/or the LPG12 record may have experienced roughly 30 cm of erosion due to one or more of the events in the last ~1500 years. As LPG12 is located next to the barrier it most likely experiences higher energy during overwash events and is more susceptible to sediment erosion resulting in the truncations of the record. The more distal LPG4 likely provides a more complete record, and given that barrier sediments must be transported over 100 meters, coarse-grained sediments at this site are most likely transported by the most extreme events. Lines connecting depths in LPG4 and LPG12 of approximately the same age in Fig. 2 are derived from the age models shown with dashed lines. The 5000 yr BP correlation line in Fig. 2 is based on the LPG4 age model and an extrapolation of the roughly linear sedimentation rate in core LPG12.

Figure S3 – Sea surface temperature (SST) comparison. SST anomalies for the main development region (MDR) compared to the SSTs just to the south of Puerto Rico where paleo-proxy reconstructions for SST are available (core PRP12, Nyberg et al., 2002). Inset map identifies the location of PRP12 (red circle) and the MDR (red dashed box, as defined by Emanuel (2005)). Monthly SST data was obtained from the Hadley Centre Sea Ice and SST data set (HADISST, Rayner et al., 2003) and averaged over the months of August-October. SSTs for PRP12 (17.9°N, 66.6°W) are based on the values for the 1° grid cell centered at 17.5°N and 66.5°W. Data for the MDR was obtained by averaging the HADISST data from within the box identified in the inset map (6°N-18°N and 20°W-60°W). SSTs for the MDR and PRP12 are highly correlated (r^2=0.75, n=137) suggesting that the SST reconstruction available at PRP12 is likely a good proxy for MDR SSTs.

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Table S1: Laguna Playa Grande radiocarbon results

Index No.	Lab number	Core	^{14}C age	1σ calendar age (cal yr BP)	δ^{13}C (‰)	Sample depth (cm)	Material Dated
1	OS-41547	LPG4	125 ±45	15-41 59-146 214-234 238-268	-25.59	61-62	woody debris
2	OS-41362	LPG4	340 ±20	319-337 348-392 426-457	-26.71	70-71	woody debris
3	OS-41360	LPG4	1140 ±25	983-1034 1048-1067	-18.91	143-144	seeds/woody debris
4	OS-56742	LPG4	2810 ±30	2502-2618 2621-2651 (ΔR=0)	-2.03	224-225	Gastropods shells (*Heleobops sp.*)
5	OS-41361	LPG4	3320 ±30	3481-3541	-17.22	286-287	seeds/woody debris
6	OS-44220	LPG4	4840 ±35	5486-5509 5581-5609	-23.65	394.5-395.5	Wood
7	OS-50218	LPG12	240 ±30	0-1 153-168 282-307	-28.23	70-71	wood
8	OS-50219	LPG12	940 ±30	797-818 822-870 898-916	-28.46	112-113	wood
9	OS-50177	LPG12	1970 ±45	1876-1951 1960-1971 1978-1986	-25.92	161-162	wood
10	OS-50360	LPG12	2570 ±40	2546-2560 2617-2634 2702-2754	-26.07	201-202	wood
11	OS-50176	LPG12	3750 ±45	3994-4038 4076-4156 4206-4222	-25.03	273-274	wood
*	OS-50217	LPG12	605 ±40	552-567 585-614 617-647	-26.07	17-18	wood

* too old based on Cs-137, land clearance indicators, and other C-14 ages in series