Responses to the Comments of the Reviewers

Manuscript No. essd-2021-150

A review of Last Interglacial sea-level proxies in the Western Atlantic and Southwestern Caribbean, from Brazil to Honduras

Dear Editor, we would like to thank you for your work and three reviewers for their constructive comments. Please see attached a new version of the MS with track changes, and a point-by-point response to the reviewers' comments below. We are confident that the modifications suggested by the reviewers helped us to improve the MS, and we look forward to hear from you in due course.

In the following, our text is in blue ink, while the original reviewer's comments are in black ink.

Responses to the comments of Reviewer #1 Thomas M. Cronin (RC1 comments)

Citation: https://doi.org/10.5194/essd-2021-150-RC1

Thomas M. Cronin:

General. This is a useful summary, but I am bothered by the one main conclusion in the abstract: that nothing but future research ideas came of the compilation. How about some of the more high-quality SL reconstructions? None with stratigraphy and chronology are informative? I would think the data in Table 3, with a few assumptions, could be very revealing for MIS 5 SL. And the Caribbean sites certainly have a seal level-tectonics signal, maybe GIA too.

We thank the reviewer for the honest assessment of our data compilation. We try not to do any assumptions on the different sites, as we want to keep the paper as descriptive as possible. This is also contained in the guidelines of the journal and the special issue, which require an honest assessment of data but with limited interpretation. However, as we feel it is important to give the reader at least a feeling for both tectonics and GIA, we modified Figure 1 to include general tectonic plates and data from the global faults database. We also included a new section discussing departures from eustasy (Section 6.2) and a new figure (Figure 11) showing the output of a selected GIA model. This should give, in our opinion, enough perspective on this topic.

Given the large literature from for ex. Brazil, isn't there a relative SL record from the best studied and dated areas? Could such reconstructions be re-illustrated, re-interpreted in this paper?

It is very difficult to accurately identify studied and dated areas from Brazil. Several sites are identified in the literature, but often their description is scattered through different studies and were completed before it was common to provide accurate stratigraphic sections and reference to modern sea level. The best stratigraphic evidence is probably the one presented by Tomazelli and Dillenburg (2007), but they show the stratigraphic sections with photographs, so it is hard to reconcile these into a stratigraphy. We prefer to refrain from making interpretations based upon inaccurate data, and we do hope that our review will encourage other scientists to pick up the work where we left it.

On what basis is the white line along the coast in Figure 1 presumed to have relict shorelines? It seems like it just follows the coast? Related to this, the compilation really [and admittedly] uses a whole lot of different shoreline indicators, each having varying quality and methodology. See Tables 1 and 2.

The white line along the coast was supposed to indicate places where MIS 5 shorelines could be located but not enough information is available to create SL index points. Thanks to this comment, we second-guessed our drawing choice. We now realize that it confused the reader, so we took it out. It is indeed true that the compilation uses very different indicators, and that is reflected in our text. We leave to the database user the choice of filtering out data according to dating technique / indicator or quality.

Moreover, without adequate chronology and mapping, who knows if some are deposits or geomorphic features are not early Pleistocene? Pliocene, even Miocene?

That is correct, and this is the reason why the new Figure 1 does not include the white line. We feel that the discussion of these locations and our conclusion establish that more work is needed in these areas before SL index points are extracted for the LIG.

As you read the text on regional studies, there seems inconsistency about selection criteria to be included in WALIS, some areas with undated features are included, some with dates only have some included.

We tried to clarify better, wherever possible, the reasons for including or excluding sites in our compilation.

Finally, it seems unusual not to have discussions of GIA and tectonics, which is likely found in parallel papers from other coasts in the MIS 5 sea level volume

ESSD requests data papers, presenting data without too much room for discussions. However, we see the point of the reviewer: reminding the reader about tectonics, GIA and other processes is important. We therefore expanded the discussion of these processes in section 6.2 and 6.3.

Specific

Line 13. I’m not sure what this means: “assigned to one or more geochronological constraints”

This sentence was changed to: “each constrained by one or more geochronological methods”

Line 18. Or this, “to identify sea-level index”

To be clearer, we add the definition of index point in brackets:” discrete past position of relative sea level in space and time”.

Or line 29-30: “to insert standardized sea- level points for several areas”

This sentence was changed to: “to allow a proper standardization of sea-level data for the remain coastal areas”.

Line 53 says: “we extracted 50 sea-level index points” but abstract says 55, are these synonymous?

In the abstract we stated that we produced 55 data points, this value includes both index points and limiting points (50 index points, 4 marine limiting points and 1 terrestrial limiting point). A sea-level index point defines the discrete position of past relative sea level in space and time, whereas limiting data provide an upper (terrestrial limiting data point) or lower (marine limiting data point) bound on the past position of relative sea level at a given point in space and time.

Figure 1. The “white dashed line” is really a series of small dots? Confusing with the circles.

White line was deleted.

Line 92 what is a “used a total station to measure”

A total station is an instrument commonly used in topography to measure elevations. https://en.wikipedia.org/wiki/Total_station

Line 103 reword: “For which concerns the geographic positioning of sites”

This sentence was reworded

Line 123 reword: “thanks to stratigraphic similarities”

This sentence was reworded

Line 224. Fix this, you mean 94 ka right? “94,504 ka”

Yes 94 ka is right, we made the modification according to your suggestion.

Figure 6 seems out of place in this data compilation paper.

As we had this sketch from our own surveys, we thought that it might have been interesting for the reader to see at least one outcrop characterization. We refer to the editor on this: if he thinks that this figure is not necessary, we can drop it without problems.

Line 520. Aren’t there many studies of Neogene [possibly with Quaternary terraces] along the Caribbean coast of Costa Rica?

As mentioned in the text, the only study we could find for the Caribbean coast of Costa Rica is the one by Bergoeing, 2006, but there is not enough metadata in that study to create an index point for WALIS.

Line 558. Rewrite this: “For which concerns the Holocene”

This sentence was reworded

Responses to the comments of Reviewer #2 (RC2 comments)

Citation: https://doi.org/10.5194/essd-2021-150-RC2

Referee 2:

This Is an interesting dataset that screened and reviewed indicators along the coasts of the Western Atlantic and Southwestern Caribbean, on a transect from Brazil to Honduras that includes the islands of Aruba, Bonaire, and Curaçao.

The work summarises 55 standardized datapoints, each assigned to one or more geochronological constraints from a variety of relative sea-level indicators including beach deposits, coral reef terraces, marine terraces, burrows, and tidal notches. Like many in this volume and in recent years the paper focuses on concerns related to age control and the accuracy of elevation measurements.

The work then concludes rather flatly with a bland finale that much more is to be done. While I agree here I think much has been done and I am fairly sure there are sea level records from Brazil that could be compared to. I was also left feeling how does this study site compare to others in the volume. How does this dataset stand up against others with more or better data?

We thank the reviewer for this comment. To answer it, we inserted a specific section in the "Further remarks and conclusions" section, where we discuss about the data quality scores we assigned during the review. We compared this score with the score of all the other data already published in WALIS, in order to put it in perspective. We hope that adding such part to the discussion will answer this concern.

I have one primary criticism of the work and that relates to the discussion or lack thereof regarding tectonics. The authors skim over the tectonics of the region and it is almost certain that parts of the study area ie. **Netherlands Antilles** that will have been subject to tectonic contamination. A good starting point is maybe Wang et al., Remote Sens. 2019, 11(6), 680; https://doi.org/10.3390/rs11060680. Perhaps a section could be added on how to decontaminate or otherwise address sites that are clearly affected by tectonics either past or present.

We agree with the reviewer that some discussion on tectonics was missing in the previous version of the MS. To answer this query, we now updated Figure 1 and added a section (6.2) to explain the difference between the Brazilian shelf and the areas further to the North, on the Caribbean plate. In the same section, we discuss other processes causing departures from eustasy, such as Dynamic Topography, sediment isostasy and GIA.

In summary - the work is publishable and provides a good summary of the dataset and in particular some well though guidelines for future work.

We thank the reviewer for the time they took to review our MS. The constructive comments helped us improving the manuscript.

Responses to the comments of Reviewer #3 Rafael C. Carvalho (RC3 comments)

Citation: https://doi.org/10.5194/essd-2021-150-RC3

Rafael C. Carvalho:

The paper by Rubio-Sandoval et al. addresses the last interglacial sea-level proxies from Brazil to Honduras. The authors review and report a total of 55 index points extracted from 36 papers. The sea level indicators which comprise 50 of the index points are identified and discussed in terms of elevation, datum, and dating techniques. Additional sections summarizing the existing knowledge re sea level and discussing controversies and potential research directions into the future are also included.

My impression when I first read this manuscript was that the authors did a good job in terms of citing the scientific literature (at least, in my case, for the more familiar Brazilian coast), a basic prerequisite for a good review. I was happy to see that a comprehensive appraisal was conducted not only for the existing literature in English but also in Portuguese. However, several issues made me wonder whether the article itself was appropriate to support the publication of this dataset, and therefore I recommend a major review for this contribution.

We thank the reviewer for the time he took in reading our MS, and for the constructive comments that helped us improve our work.

What's the rationale for this latitudinal extent covering such broad regions with different tectonic settings (e.g. between Brazil and sites in the Caribbean)? Looking at the other articles in WALIS, I see a case for covering large areas (e.g. Freisleben et al. ---most of the Pacific coast of SA), but I was wondering whether the Caribbean datasets should be independent. If not, the authors must at least acknowledge this issue in introduction.

The rationale for including such a large geographic zone was to fill a gap in currently published WALIS compilations. To the North, Simms (2021) is extending down to Mexico, while to the South, Gowan et al. (2021) is covering up to Uruguay. We explained this rationale in the introduction. It is also important to mention that due to the limited data in the Caribbean (mostly from Curaçao and Bonaire) we would not have enough data for a standalone paper.

I was really surprised to see that despite its extension, not a single topographic profile/schematic cross-section, stratigraphy, sequence of depositional events, satellite image or even a photograph of the Brazilian coast was presented. This creates a contrast when compared to what's being presented for the Caribbean (Fig 6 and 8).

This is true, and the reason is rather simple: we do not have such data for Brazil. In the ABC islands, we have original data (as stated in the MS), therefore we could grond-truth the landforms that are visible on DEMs. Not having similar datasets for Brazil, we preferred to refrain from interpretations that would be only remote, without ground truthing.

There's clear potential for this dataset to be used based on its uniqueness, usefulness and completeness. However, a statement claiming that this database contribution represents a starting point (abstract) should be avoided considering this is using secondary data. Apart from the description of the dataset, the discussion is rather limited, and this reflects in the abstract and conclusion.

Thank you, we avoided this statement in the abstract.

E.g. If discernment of SL oscillations is not possible for Brazil, how about to discuss this with the aid of the Pleistocene SL curve, highlighting the reliable data of Tomazelli and Dillenburg, 2007; Martins et al., 2018? Or to use generalised cross-sections from several sites around Brazil similar to what was presented for the Australian coast (Murray-Wallace and Belperio 1991) for another discussion topic.

For which concerns sea-level oscillations, we took this and other suggestions from the reviewers and added a new section to the discussions. Unfortunately, it is very difficult, if not impossible, to draw an updated and complete section for Brazil, at the current status of knowledge. We put this as an endeavor for future studies in the discussion section.

In terms of cartographic content, the paper lacks quality. Map figures alternate between different colour palettes representing DEMs by different colours. I suggest standardising the colour scheme throughout paper and incorporate legends. I also feel that much more could be done to Figs. 3-5, 7 and 9, which are currently limited to represent the location of samples under a range of different scales, without really adding much information to what is already presented in Fig 1. I suppose all those figures (3-5, 7 and 9) could be incorporated as inserts into a larger Fig 1. This way, the reader would have a general idea of the point distribution and also have a better understanding at a larger scale of the south, northeast of Brazil (from north Bahia to RG do Norte only), Curacao, Bonaire, Providencia/San Andres points on a single figure. Regardless of this more complex Fig 1, the other figures need to become more informative and make better use of the data compiled by the authors. A bit of cartographic skills would make figs 3-5, 7 and 9 to represent the information discussed in text. E.g. Fig 3 could be made of three side-to-side maps representing elevation, datum and dating techniques (colour symbology). If this is done also for the other figs, the reader would then benefit from understanding much more than just the spatial distribution of the index points.

The choice of using DEMs for the reef islands stems from the fact that, on these datasets, it is really clear where the coral reef terrace sits. Using similar maps for the Brazilian coast (much smaller scale compared to the ABC islands) would add, in our opinion, very little information. With respect to the suggestion of "replicating" maps within a single figure, we remark that it would create a rather redundant bulk of information, also considering Table 3 and the database annexed, that can be easily downloaded and mapped with any categorization chosen by the user. We feel that the important part of all figures is the lower panel, where the elevation pattern of RSL information is presented. It is rather difficult to incorporate all the information contained in figures 3-5,7 and 9 in a single figure 1.

Please increase font size of Fig 2 and the distance elevation plots in figs 3-5, and 7. By the way is there a reason for not having a similar plot in Fig 9? Another observed inconsistency regards the labelling of points in those maps. I suggest to stick to Wallis IDs similar to what was done in fig 9. Therefore, get rid of the 0-18 in fig 3, 0-10 in fig 4, 0-10 in fig 5, 0-9 in fig 7, and label points according to IDs. Regarding scales, Fig 9 inserts have tiny graphical scales and font sizes. The other figs especially 5 and 7 lack scales!

We increased fonts as suggested. We did not add the plot in Figure 9 as there are only few datapoints, and the distance / elevation graph would be trivial. For which concerns the labelling, we tried to do as suggested, but as WALIS IDs are rather long (up to 3 or 4 characters), they would clutter the maps too much and make everything rather hard to read and understand. We inserted scales to field photos whenever possible, and we thank the reviewer for pointing this out.

The paper by Suguio et al 2005 also reports 12 Pleistocene TL/OSL dated samples and locations from the coast of Pernambuco and Rio Grande do Norte. 6-7 of those samples are from the MIS 5 and should at least be discussed why they are not incorporated into this review (similar to what was done with Fernando de Noronha).

We thank the reviewer for pointing out this paper, which had escaped our attention. We cross-checked the luminescence ages in Suguio et al., 2005 with those in the database, and we could verify that several are indeed already included as they were used in Barreto et al., 2002 and Suguio et al., 2011. These papers also give the stratigraphic context and elevation for these ages, which is not available for the ages we left out from Suguio et al., 2005. We, however, added this reference to both the database and the text, to make sure that any reader can track back the original sources.

A review of Last Interglacial sea-level proxies in the Western Atlantic and Southwestern Caribbean, from Brazil to Honduras

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Abstract. ~~In this paper, w~~We use a standardized template for Pleistocene sea-level data to review last interglacial (MIS 5) sea-level indicators along the coasts of the Western Atlantic and Southwestern Caribbean, on a transect spanning from Brazil to Honduras, and including the islands of Aruba, Bonaire, and Curaçao. We identified six main types of sea-level indicators (beach deposits, coral reef terraces, lagoonal deposits, marine terraces, *Ophiomorpha* burrows, and tidal notches) and produced 55 standardized data points, each constrained by one or more geochronological methods. Sea-level indicators are well preserved along the Brazilian coasts, providing an almost continuous north-to-south transect.~~,~~ ~~however~~However, this continuity disappears ~~as we move northward~~north of the Rio Grande do Norte Brazilian state. According to the sea-level index points (discrete past position of relative sea level in space and time) the paleo sea-level values ranging from ~5.6 to 20 m a.s.l. in the continental sector, and from ~2 to 10 m a.s.l. in the Caribbean islands. In this paper, we address the uncertainties surrounding these values. From our review, we identify that the coasts of Northern Brazil, French Guyana, Suriname, Guyana, and Venezuela would benefit from a renewed study of Pleistocene sea-level indicators, as it was not possible to identify sea-level index points for the ~~l~~Last I~~i~~nterglacial coastal outcrops of these countries. Future research must also be directed at improving the chronological control at several locations, and several sites would benefit from the re-measurement of sea-level index points using more accurate elevation measurement techniques. ~~Our~~The database compiled in this study is available in spreadsheet format at the following link: https://zenodo.org/record/5168571 (Version 1.02; Rubio-Sandoval et al., 2021).

1 Introduction

In this paper, we present the results of a literature survey on the L~~l~~ast I~~i~~nterglacial shorelines (here broadly defined as having formed during Marine Isotopic Stage [MIS] 5, 132–80 ka) along the Atlantic coasts of the following countries: Brazil, French Guiana, Suriname, Guyana, Venezuela, Bonaire, Curaçao, Aruba, Colombia, Panama, Costa Rica, Nicaragua, and

Honduras. The area covered by this review spans a large latitudinal gradient, including a passive margin (the central-southern coasts of Brazil) and areas located within the Caribbean Plate (Figure 1). The large geographic span of this review was selected to fill the geographic gap between the existing sea-level compilation of Simms (2021, Mexico and Northwestern Caribbean Sea) and Gowan et al. (2021, Atlantic coasts of Argentina and Uruguay).

While we found reports on Pleistocene shorelines in most countries listed above, we could only extract sea-level index points (or marine / terrestrial limiting points) for Brazil, Bonaire, Curaçao, Aruba, and for the islands of Providencia and San Andrés in Colombia (Figure 1). This was broadly caused by a lack of enough published metadata to ~~insert~~ allow ~~for~~ a proper ~~standar~~~~standardize~~ ~~dized~~ standardization of ~~the~~ sea-level data for the remaining coastal areas~~points for several areas~~.

We used ~~the~~ published peer-reviewed scientific papers to compile a database of MIS 5 relative sea-level indicators using the standardized framework of WALIS, the World Atlas of Last Interglacial Shorelines (Rovere et al., 2020). Overall, we report data contained in 36 papers, from which we extracted 50 relative sea-level (RSL) index points, 4 marine limiting, and 1 terrestrial limiting datapoint. Age constraints are associated with each geological sea-level proxy using Luminescence (n=21), U-series (n=48), and Electron Spin Resonance (ESR, n=24) dating techniques. Several outcrops were assigned minimum ages based on limiting radiocarbon ages, or other non-radiometric age constraints (e.g., chronostratigraphic correlations). The database is available open-access at this link: https://zenodo.org/record/5168571 (Version 1.02; Rubio-Sandoval et al., 2021).

In the following sections, we ~~describe the sea-level indicators identified in this work by region and then~~ first discuss the elevation measurement methods, sea-level datums, and the main dating techniques used by the original authors. We then describe the sea-level indicators identified in this work by region. ~~An~~ We then discuss data quality, processes causing departures from eustasy, and ~~additional section summarizes existing knowledge regarding sea-level associated~~ the presence in our area of interest of sea-level index points associated with older Pleistocene interglacials ~~and~~ or the Holocene. Finally, we discuss ~~controversies and the~~ potential future research directions that may be required to improve the quantity and quality of the data contained in our review.

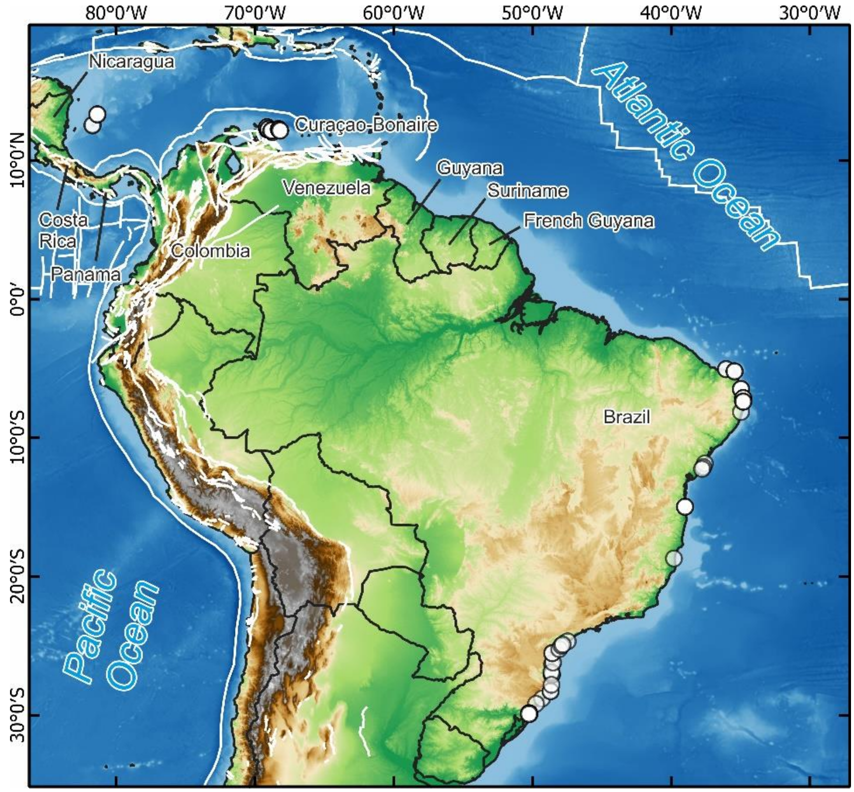

Figure 1. General overview of the areas surveyed in this study. Dots show the location of sea-level datapoints inserted in WALIS. White lines indicate the location of active faults and tectonic plate boundaries from the Global Active Faults Database (Styron and Pagani, 2020) ~~, while the dashed white line along the coast shows the areas for which Pleistocene shorelines may be present according to the descriptions retrieved from published literature, but not enough metadata was available to created sea-level index points.~~ Basemap compiled by Terrestris (www.terrestris.de), with data from GEBCO (doi:10.5285/836f016a-33be-6ddc-e053-6c86abc0788e), SRTM 30 m by NASA EOSDIS Land Processes Distributed Active Archive Center (LP DAAC, https://lpdaac.usgs.gov/) and Natural Earth (http://www.naturalearthdata.com).

2 Types of sea-level indicators

Within the region of interest (Figure 1), we identified six main types of sea-level indicators (Table 1). In addition to these, cheniers of possible last interglacial (LIG) age are reported in French Guiana and Suriname, and beach ridges were described in Venezuela. However, these latter instances were not included in the database due to an overall lack of sufficient information to produce standardized index points at these locations. To correlate each point with a paleo relative sea level, we applied the concept of indicative meaning that was introduced for Holocene sea-level studies (Shennan 1982, 1986, 1989, Shennan et al., 1983) and recently adopted also for Pleistocene sea-level index points (Rovere et al., 2016). The indicative meaning "*describes the central tendency (reference water level) and 2-sigma vertical range (indicative range) of the indicator's distribution relative to tidal levels*" (Khan et al., 2019). In the database, we calculated the reference water level (RWL) and indicative range (IR) for each sea-level index point using either modern analogs (when reported by the original study) or applying *ex-situ* quantifications derived from global wave and tide atlases, through the IMCalc tool (Lorscheid and Rovere, 2019).

In Brazil, marine terraces are the most widespread indicator type, although fossil beaches ~~beach and estuary deposits~~ are also ~~described~~common. At several locations in Brazil, sandy sediments are characterized by the presence of the *Ophiomorpha* burrows ichnofacies (Barbosa et al., 1986; Bittencourt et al., 1979; Tomazelli and Dillenburg, 2007). The main observed ichnospecies is *Ophimorpha nodosa*, which through comparison with burrows left by modern counterparts (*Callianassa major*, Frey et al., 1978), is considered an excellent sea-level indicator. Tomazelli and Dillenburg (2007) indicate that *Ophiomorpha* burrows allow the definition of the average low tide level during the deposition. However, we decided to adopt a more conservative indicative meaning (MSL to -4 m) as Frey et al. (1978) reports that, depending on the geographic region and environmental conditions, the burrows can also be found in shallow subtidal environments.

Several authors described coral reef terraces for the islands of Bonaire, Curaçao, and Aruba, located offshore Venezuela (Alexander, 1961; Schubert and Szabo, 1978; Schellmann et al., 2004). Several sea-level indicators, derived from coral reef terraces, are well preserved on Bonaire and Curaçao islands (Muhs et al., 2012; Felis et al., 2015; Obert et al., 2016; Lorscheid et al., 2017). Coral reef terraces are also reported in the Colombian islands of Providencia and San Andrés (Geister, 1972; Geister, 1986), located in the Caribbean Sea, offshore Nicaragua. At both islands, the whole reef complex is subdivided into different units according to their topography and ecology (Geister, 1992).

Table 1. Sea-level indicators ~~reviewed~~ in the study area, with Reference Water Level (RWL) and Indicative range (IR) quantifications. db=breaking depth; ld=lagoonal depth; MHHW=Mean Higher High Water; MLLW=Mean Lower Low Water; MSL=Mean Sea Level; Ob=Ordinary berm; SWSH=Storm Wave Swash Height.

Name of RSL indicator	Description of RSL indicator	RWL	Description of IR	Indicator reference(s)
Beach deposit or beachrock	Definition by Mauz et al., 2015: "*Beachrocks are lithified coastal deposits that are organized in sequences of slabs with seaward inclination generally between 5° and 15°*".	(Ob + db)/2	Ob to db	Mauz et al., 2015 Rovere et al., 2016
Coral reef terrace (general definition)	Coral-built flat surface, corresponding to the	(MLLW + db)/2	MLLW to db	Rovere et al., 2016; Lorscheid and

	area between shallow-water reef terrace and reef crest. The definition of indicative meaning is derived from Rovere et al., 2016, and it represents the broadest possible indicative range, that can be refined with information on coral living ranges.			Rovere, 2019
Lagoonal deposit	Lagoonal deposits consist of silty and/or clayey sediments, horizontally laminated (Zecchin et al., 2004) and associated with fossils of brackish or marine water fauna.	(MLLW + ld)/2	MLLW to ld	Rovere et al., 2016 Zecchin et al., 2004
Marine Terrace	Definition by Pirazzoli et al., 2005: "*Any relatively flat surface of marine origin*".	(SWSH + db)/2	SWSH to db	Pirazzoli, 2005 Rovere et al., 2016
Ophiomorpha burrow	*Ophiomorpha* is an ichnogenus that includes burrow structures built on sandy substrates extending from MSL down to 2 m to 4 m below the surface where they divide into horizontal and inclined galleries. The burrows present a broad spectrum of morphologies and environmental distributions, mostly developing in intertidal to very shallow waters.	MSL	MSL to -4m	Frey et al., 1978 Martins et al., 2018
Tidal notch	Definition by Antonioli et al., 2015: "*Indentations or undercuttings cut into rocky coasts by processes acting in the tidal zone (such as tidal wetting and drying cycles, bioerosion, or mechanical action)*".	(MHHW + MLLW)/2	MHHW to MLLW	Antonioli et al., 2015 Rovere et al., 2016

3 Positioning and sea-level datums

In general, the majority of studies we reviewed do not report how elevations were measured (Figure 2~~Figure 2~~a). Whenever this was the case, we assumed an elevation measurement error equal to ~~the~~ 20% of the elevation reported (Rovere et al., 2016). This was also done when elevations were derived from cross-section drawings in the original publications. Other elevation measurement methods include differential GPS, metered tape or rod, topographic map, and total station (Figure 2~~Figure 2~~a). Among these, the most accurate technique is differential GPS, used by Tomazelli and Dillenburg (2007) and Martins et al. (2018) in Brazil to report the elevations for the maximum height of *Ophiomorpa* burrows. Differential GPSs were also used by Muhs et al. (2012) and Lorscheid et al. (2017) in Curaçao and Bonaire, respectively. In this study, we also report new differential GPS elevation measurements taken by A. Rovere, T. Felis, and T. Lorscheid in 2016 on Bonaire at the same sites reported in Felis et al. (2015) and Obert et al. (2016). In northern Brazil, Suguio et al. (2011) used a total station to measure the elevation of different outcrops and referred the measurements to mean sea level using the tide-table predictions from two local stations. This technique also offers ~~some~~ a good degree of absolute elevation accuracy (±0.1m/±0.2 m), depending on the reference point and its distance from the base station. The rest of the elevation measurement methods reported ~~present~~ have different degrees of precision depending on the reference object scale.

In Brazil, ~~reported~~ elevations were referred to different datums, such as ~~are~~ mean low water springs (Tomazelli and Dillenburg, 2007), the local geoid (Martins et al., 2018), and local sea-level datums such as the "*Brazilian Córrego Alegre National datum*" (Suguio et al., 2011). Similarly, in ~~Curacao~~ Curaçao, a variety of datums are used: high tide level (Schellmann et al., 2004), CARIB97, and the ~~high-resolution~~ locally resolved geoid for the Caribbean Sea (Muhs et al, 2017)~~., and mean sea level f rom benchmarking of a temporary tid~~e guage~~al (Lorscheid et al., 2017).~~ The new GPS measurements from Bonaire reported for the first time in this paper, are referred to the EGM 2008 geoid (Figure 2~~Figure 2~~b; Table 2~~Table 2~~).

~~To geo-reference~~ To obtain~~get~~ the geographic coordinates of the ~~For which concerns the geographic positioning of~~ sites, in several cases, it was necessary to use ~~georeference the published maps in~~ Google Earth or to geocode location names to gather latitude and longitude values~~ for sites~~. Relatively few studies provided site coordinates (Figure 2~~Figure 2~~c). Hence, we remark that, for some sites, the coordinates are to be interpreted as merely indicative of the general location of the site.

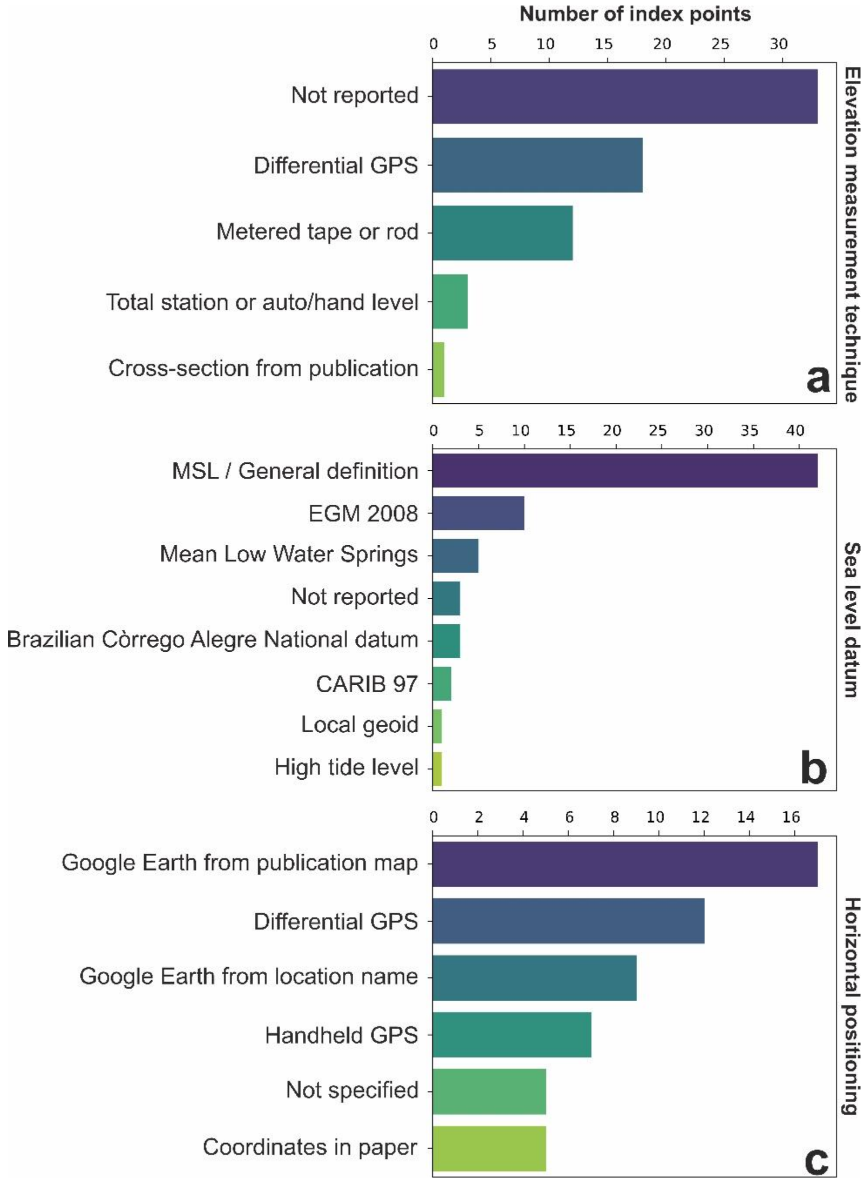

Figure 2. Frequency of Elevation measurement techniques (a), Datums (b), and Horizontal positioning techniques (c) used in the database.

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Table 2. Elevation datums

Datum name	Datum description	Datum uncertainty	Reference(s)
Brazilian Córrego Alegre National datum	Local datum for Brazil	Not available	Suguio et al., 2011
CARIB97	From Smith and Small, 1999: "*A 2×2 arc-minute resolution geoid model, CARIB97, has been computed covering the Caribbean Sea. The geoid undulations refer to the GRS-80 ellipsoid, centered at the ITRF94 (1996.0) origin*".	From the original source: "*Comparison of CARIB97 geoid heights to 31 GPS/tidal (ITRF94/local) benchmarks shows an average offset (h–H–N) of 51 cm, with a Root Mean Square (RMS) of 62 cm about the average*".	Smith and Small, 1999
EGM 2008	From Pavlis et al., 2012: "*EGM2008 is a spherical harmonic model of the Earth's gravitational potential*".	From Pavlis et al., 2012: "*Over areas covered with high quality gravity data, the discrepancies between EGM2008 geoid undulations and independent GPS/Leveling values are on the order of ±5 cm to ±10 cm*".	Pavlis et al., 2012
High Tide Level	Described by Kennedy et al (2007) as the swash limit and the extent of fixed biological indicators, such as molluscs, having a restricted vertical range.	Per Rees-Jones et al (2000), accurate to +/- 2 m up to 15 m a.h.s.l and +/-5-10 m above 15 m a.h.s.l. Uncertainty will be dependent upon measurement method.	Kennedy et al., 2007 Rees-Jones et al 2000
Local geoid	Geoid calculated ad hoc for the surveyed area.	Usually, very accurate. Few centimeters.	
Mean Low Water Springs	From Baker and Watkins (1991): "*The average of the heights ... of each pair of successive low waters during that period of about 24 hours in each semi-lunation (approximately every 14 days), when the range of the tide is greatest*".	Declared +/- 0.1 m if datum is derived from 1 year and +/- 0.25 m if measured over 1 month.	Baker and Watkins, 1991
Mean Sea Level / General definition	General definition of MSL, with no indications on the datum to which it is referred to.	A datum uncertainty may be established on a case-by-case basis.	
Not reported	The sea-level datum is not reported and impossible to derive from metadata.	N/A	

4 Dating techniques

The last interglacial deposits in the Western Atlantic and Southwestern Caribbean have been dated using a wide variety of techniques: U-series, optically stimulated luminescence (OSL), thermoluminescence (TL), electron spin resonance (ESR), chronostratigraphy, and radiocarbon dates providing minimum ages. The abundance and preservation of corals on the islands Curaçao and Bonaire allow the application of U-series to provide reliable age assignments (Muhs et al., 2012; Felis et al., 2015; Obert et al., 2016; Lorscheid et al., 2017). ESR has also been used by Schellmann et al. (2004a) to date the coral reef terraces of Curaçao mainly to confirm the age of LIG deposits previously dated with U-series by Schubert and Szabo (1978) and to present for the first-time radiometric ages for older deposits.

Fossil corals have been preserved only at one site along the Brazilian coast. OSL and TL techniques have been used in different outcrops in northern and southern Brazil to assess the chronology of Pleistocene marine terraces (Poupeau et al., 1988; Barreto et al., 2002; Suguio et al., 2003;2011; Buchmann and Tomazelli, 2003; Giannini et al., 2007).

Other age assignments rely on relative dating based on the cross-correlation of outcrops due ~~thanks~~ to the stratigraphic similarities or radiocarbon dates (e.g., Bittencourt et al., 1979; Suguio et al., 1982; Angulo et al., 2002). When an outcrop had only minimum radiocarbon ages (radiocarbon ages above detection limit), the deposit is considered older than Holocene. There are three chronostratigraphic constraints in Brazil (Barrier III in the Rio Grande do Sul state; Cananéia Formation in São Paulo state and Sector I deposits in Bahia state, see regional descriptions in Section 5 for details) and one in Bonaire (Lower Terrace). In Brazil, the chronostratigraphic constraints are common due to the preservation of Pleistocene deposits and their almost uninterrupted extension along the coastal plain. The Barrier III, Cananéia Formation, and Sector I deposits have been dated using OSL, TL, or U-series techniques and were attributed broader MIS 5 or more detailed MIS 5e ages (Tomazelli and Dillenburg, 2007; Suguio et al., 2003; Martin et al.,1982).

5 Relative sea-level data

In the following sections, we describe the sea-level indicators in our database divided by country and, where applicable, by lower administrative boundaries (e.g. states, regions, provinces). An overview of the sites, the correlated paleo RSL, and the chronological attribution associated with them are reported in Table 3. We refer to the sea-level indicators included in the database with their WALIS RSL ID number, shortened here as RSL ID. This number is included in the first column of the "RSL proxies" spreadsheet within the database and is a unique ID attributed automatically to each data point entered into WALIS.

Table 3. Proxies compiled in this study. Elevation and paleo RSL errors are reported as 1-sigma, age uncertainties (where an absolute age is indicated) are 2-sigma. Type of datapoints: SLI = Sea-level indicator; TLI = Terrestrial limiting, MLI= Marine limiting. Dating techniques are abbreviated as follows: LUM = Luminescence; STRAT = Chronostratigraphic constraints; Other = Other age attribution, U/Th = U-series; ESR = Electron Spin Resonance. * = ages recalculated by Chutcharavan and Dutton (2020). For the U-series ages on Bonaire, Brocas et al., 2016 reports the following average ages: [1] BON-5-A = 121±1.1 ka; [2] BON-26-A = 124.9±1.9 ka; [3] BON-24-AII.2 = 125.5±2.4 ka; [4] BON-12-A = 123.9±1.3 ka.

WALIS RSL ID	Latitude Longitude	Site	Nation (Region)	Type of datapoint	Elevation (m)	Paleo RSL (m)	Dating technique (published sample ID)	Age (ka)
154	-29.928 -50.222	Osorio Outcrop 04	Brazil (R.G. do Sul)	SLI	5.37±0.6	5.62±0.65	LUM (RMG-04B) STRAT	>85.1 ka MIS 5
155	-29.923 -50.259	Osorio Outcrop 05	Brazil (R.G. do Sul)	SLI	7.72±0.5	7.97±0.55	LUM (RMG-04B) STRAT	>85.1 ka MIS 5
153	-29.903 -50.233	Osorio Outcrop 03	Brazil (R.G. do Sul)	SLI	7.27±1	7.52±1.03	LUM (RMG-04B) STRAT	>85.1 ka MIS 5
152	-29.88 -50.233	Osorio Outcrop 02	Brazil (R.G. do Sul)	SLI	5.73±0.7	5.98±0.74	LUM (RMG-04B) STRAT	>85.1 ka MIS 5
143	-29.862 -50.247	Osorio Outcrop 01	Brazil (R.G. do Sul)	SLI	5.13±0.7	5.38±0.74	LUM (RMG-04B) STRAT	>85.1 ka MIS 5
1288	-29.193802 -49.754044	Vila Conceição	Brazil (Santa Catarina)	SLI	9±5	9.18±5.1	STRAT	MIS 5
1286	-28.813156 -49.311895	Coqueiros	Brazil (Santa Catarina)	SLI	12±2	13±2.23	STRAT	MIS 5
1300	-28.285437 -48.698703	Guaiúba	Brazil (Santa Catarina)	TLI	6.5±1	-	LUM (G(E)6) LUM (G(E)7)	129.1±15 103.5±11.7
178	-27.8188 -48.6341	Pinheira	Brazil (Santa Catarina)	SLI	4.5±0.2	6.5±2	STRAT	MIS 5
1296	-27.096637 -48.617834	Itapema	Brazil (Santa Catarina)	SLI	7.35±1	7.32±1.81	STRAT	MIS 5
1297	-27.074291 -48.597176	Itapema Plaza Hotel	Brazil (Santa Catarina)	SLI	7.55±1	7.52±1.81	STRAT	MIS 5
1298	-26.922263 -48.643516	Itajaí South of Cemetery	Brazil (Santa Catarina)	SLI	8.68±1	8.64±1.8	STRAT	MIS 5
1287	-26.327691 -48.594331	Tapera	Brazil (Santa Catarina)	SLI	11.5±4.6	11.62±4.75	STRAT	MIS 5
179	-26.2133 -48.52361	São Francisco do sul Island	Brazil (Santa Catarina)	SLI	13.5±3.53	13.58±3.69	STRAT	MIS 5
181	-25.537397 -48.578236	Areal das Ilhas III P 01.06.05	Brazil (Parana)	SLI	5.5±1	7.5±2.23	Other (CENA-1070) Other (CENA-121)	>MIS 1 >MIS 1
186	-25.245 -48.0783	Canal do Varadouro	Brazil (Parana)	MLI	4.8±1	-	Other (CENA-121)	> MIS 1
202	-25.00388 -47.919722	Cananéia Island	Brazil (Sao Paulo)	SLI	7.5±2.06	7.25±2.33	STRAT	MIS 5
203	-24.92055 -47.8275	Comprida Island	Brazil (Sao Paulo)	SLI	5±1	4.75±1.48	STRAT	MIS 5
1299	-24.679948 -47.464543	Icapara	Brazil (Sao Paulo)	SLI	9.28±1	9.06±1.56	STRAT	MIS 5
204	-18.711944 -39.804166	São Mateus	Brazil (Esp. Santo)	SLI	8.5±1	8.11±1.7	STRAT	MIS 5e
168	-14.98	Fazenda Jariri	Brazil	SLI	1.27±1	7.77±3.64	U/Th (CP-2)	116±6.9

	-39.003333		(Bahia)				U/Th (CP-1)	122±6.1
							U/Th (CP-8)	124±8.7
							U/Th (CP-6)	132±9
							U/Th (CP-7)	142±9.7
171	-12.25 -37.779	Subaúma	Brazil (Bahia)	SLI	7.3±1	7.27±2.36	STRAT	MIS 5e
170	-12.115 -37.685	Palame	Brazil (Bahia)	SLI	7.3±1	7.27±2.36	STRAT	MIS 5e
169	-11.851 -37.577	Conde	Brazil (Bahia)	SLI	7.3±1	7.27±2.36	STRAT	MIS 5e
218	-8.14555 -34.9708	Lagoa Olhos-d'Agua Boa Viagem	Brazil (Pernambuco)	SLI	10.39±2.23	10.38±3.15	STRAT	MIS 5e
222	-7.396035 -34.805984	Pitimbu beach PB17	Brazil (Paraiba)	SLI	5.6±1.5	5.53±2.41	LUM (PB17A)	101±9
							LUM (PB17A)	100±11
							LUM (PB17B)	71±7.7
							LUM (PB17B)	46±4
221	-7.140833 -34.80861	Cabo Branco PB10	Brazil (Paraiba)	SLI	9.8±1.5	11.8±2.5	LUM (PB10A)	108±8
							LUM (PB10A)	110±20
							LUM (PB10B)	138±5
							LUM (PB10B)	120±2
220	-6.490277 -34.969722	Cordosas beach PB7	Brazil (Paraiba)	SLI	9±1.5	8.99±2.64	LUM (PB07B)	88.9±6
							LUM (PB07B)	70.3±5
							LUM (PB07C)	110±6.2
							LUM (PB07C)	86±5
163	-5.213 -35.433	Touros outcrop	Brazil (R.G. do Norte)	SLI	20±2	19.99±3.03	LUM (32-98)	117±10
							LUM (32-98)	117±10
							LUM (39-98)	110±10
144	-5.056 -36.043	São Bento outcrop	Brazil (R.G. do Norte)	SLI	20±2	19.88±2.99	LUM (32-98)	117±10
							LUM (32-98)	117±10
532	12.052154 -68.747586	Oostpunt	Curaçao	MLI	3.25±0.99	-	ESR (K4010)	112±9
							ESR (K4011)	111±10
537	12.155712 -68.82698	Boca Grandi	Curaçao	SLI	5.5±1.2	6.45±1.46	ESR (K4040)	120±13
							ESR (K4042)	117±9
							ESR (K4043)	116±12
3553	12.235586 -69.104427	Punta Halvedag	Curaçao	SLI	10±0.95	10.98±1.28	U/Th (Cur-Dat-16)	124.8±0.7*
							U/Th (Cur-Dat-17)	129.7±0.6*
							U/Th (Cur-Dat-17-A dup)	131.4±1*
							U/Th (Cur-Dat-17-A)	133.8±0.6*
536	12.157296 -68.829802	Boca Labadera	Curaçao	SLI	5.5±1.2	6.45±1.46	ESR (K4036)	112±9
							ESR (K4037)	120±13
535	12.262312 -69.042612	Boca San Pedro	Curaçao	SLI	6.5±1.39	7.55±1.67	ESR (K4029)	117±12
							ESR (K4031)	118±80
							ESR (K4032)	103±11
							ESR (K4030)	124±13
3563	12.277474 -69.051679	Boca Ascension	Curaçao	MLI	10±2	-	ESR (K4003)	124±8
3554	12.339078 -69.153554	Knipbai	Curaçao	MLI	3±1.37	-	U/Th (Cur-Dat-5)	124±0.5*
							U/Th (Cur-Dat-5-P)	127±0.6*
533	12.373829 -69.125355	Boca Cortalein	Curaçao	SLI	10±2	11.05±2.2	U/Th (Cur-Dat-1-A)	128±1.1*
							U/Th (Cur-Dat-1)	128.1±0.9*
							ESR (K4019)	123±9

							ESR (K4020)	125±11
							ESR (K4021)	118±8
3559	12.378402 -69.132382	Boca Mansalina	Curaçao	SLI	7.5±1.58	8.55±1.83	U/Th (Cur-Dat-4)	126.4±0.6*
							U/Th (Cur-Dat-4 dup)	126.7±0.8*
							ESR (K4049)	118±9
534	12.385825 -69.141518	Dos Bocas	Curaçao	SLI	10±2	11.05±2.2	ESR (K4024)	120±11
							ESR (K4025)	116±19
							ESR (K4026)	113±10
531	12.387517 -69.144038	Un Boca	Curaçao	SLI	10±2	11.05±2.2	U/Th (Cur-33-d)	118.8±0.8*
							U/Th (Cur-32)	128±7
							U/Th (Cur-33)	127±7
							U/Th (Cur-32-d)	133.1±0.8*
							ESR (K4006)	116±11
							ESR (K4007)	124±11
							ESR (K4009a)	140±9
							ESR (K4009b)	108±8
							ESR (K4009b1)	101±7
694	12.156163 -68.207258	South of Boca Washikemba	Bonaire	SLI	5.19±0.28	6.22±0.95	U/Th (BON-5-A, Bulk)[1]	120±1.8
							U/Th (BON-5-A, Theca)[1]	118.9±2
							U/Th (BON-5-A, Bulk)[1]	122.5±1.7
							U/Th (BON-5-A, Theca)[1]	121.3±1.8
							U/Th (BON-5-A, Theca)[1]	120.1±2.4
							U/Th (BON-5-A, Theca)[1]	119.4±2.7
							U/Th (BON-5-D)	117.7±0.8
1369	12.20234 -68.310734	Notch 1	Bonaire	SLI	6.66±0.18	6.66±0.31	STRAT	MIS 5e
1370	12.204183 -68.312796	Notch 2	Bonaire	SLI	6.61±0.11	6.61±0.28	STRAT	MIS 5e
1371	12.206776 -68.316292	Notch 3	Bonaire	SLI	6.96±0.15	6.96±0.3	STRAT	MIS 5e
1372	12.2104 -68.321163	Notch 4	Bonaire	SLI	6.83±0.15	6.83±0.3	STRAT	MIS 5e
1373	12.211271 -68.323699	Notch 5	Bonaire	SLI	7.21±0.17	7.21±0.31	STRAT	MIS 5e
1374	12.215117 -68.335901	Notch 6	Bonaire	SLI	7.26±0.12	7.26±0.28	STRAT	MIS 5e
693	12.237155 -68.285762	Boca Olivia	Bonaire	SLI	8.84±0.27	9.87±0.95	U/Th (BON-26-A, Theca)[2]	126.1±2.3
							U/Th (BON-24-AII.2 Bulk)[3]	126.7±0.97
							U/Th (BON-24-AII.2 Theca)[3]	122.6±1.9
							U/Th (BON-26-A, Theca)[2]	124.2±1.5
							U/Th (BON-24-AII.2 Theca)[3]	125.9±1.8
							U/Th (BON-24-AII.2 Bulk)[3]	128.2±2

692	12.247984 -68.296485	South of Boca Onima	Bonaire	SLI	5.72±0.3	6.75±0.96	U/Th (BON-17-AI, Theca)	121.72±0.91
							U/Th (BON-17-AI, Theca)	122.4±1.7
							U/Th (BON-17-AI, Theca)	124.2±1.8
							U/Th (BON-17-AI, Theca)	124.9±2.2
							U/Th (BON-12-A, Bulk)[4]	124.68±0.98
							U/Th (BON-12-A, Theca)[4]	122±1.6
							U/Th (BON-13-AI.1, Theca)	125.8±1.6
							U/Th (BON-12-A, Bulk)[4]	124.8±1.6
							U/Th (BON-12-A, Theca)[4]	123.6±1.6
3472	12.270639 -68.342514	Washington Slagbaai National Park	Bonaire	SLI	9.58±0.14	10.61±0.92	U/Th (BON-33-BI.2, Theca)	129.7±1.7
3681	12.524347 -81.729865	San Andrés "Southwest Cove"	Colombia (San Andres y Providencia)	SLI	1.5±0.5	4.5±2.06	Other (Ge 72, 3769A)	>MIS 1
3682	12.556155 -81.731978	San Andrés "May Cliff"	Colombia (San Andres y Providencia)	SLI	6±0.5	12±4.03	Other (Ge 72, 4109)	>MIS 1
950	13.321004 -81.387253	Providencia Island "South Point"	Colombia (San Andres y Providencia)	SLI	3±1.5	13±10.11	U/Th	118.8±35.64
							Other (Ge 92)	>MIS 1
3683	13.324392 -81.376752	Providencia South point	Colombia (San Andres y Providencia)	SLI	1.8±0.5	21.8±20	U/Th	118.8±35.64
							Other (Ge 72, 4110 a)	>MIS 1
							Other (Ge 72, 4110 b)	>MIS 1

5.1 Brazil

Studies describing the marine deposits in Brazil date back to the late 1800s (Hartt and Agassiz, 1870). In the early 1970s, the study of Quaternary coastal deposits began with Suguio and Petri (1973) describing the Iguape-Cananéia lagoonal region at the border between the regions of São Paulo and Paraná (Figure 3~~Figure 3~~). Later, the stratigraphic units of Bahia State were analyzed by Bittencourt et al. (1979) and further by Martin et al. (1982) and Bernat et al. (1983). These authors gathered new information on past sea-level changes and their meaning in the context of tectonic deformations. In the 1980s and 1990s, the exploration of Pleistocene deposits was extended to the states neighboring Bahia. In the south, Pleistocene outcrops were reported in Espírito Santo (Suguio et al., 1982), Rio de Janeiro (Martin et al., 1986; Martin et al., 1998), São Paulo (Suguio and Martin, 1995), and on the southern border of Brazil at Rio Grande do Sul (Villwock, 1984; Poupeau et al., 1988). To the north, studies focussed on the states of Sergipe (Bittencourt et al., 1983), Alagoas (Bittencourt et al., 1983; Barbosa et al., 1986), and Pernambuco (Martin et al., 1986; Dominguez et al., 1990). Most published papers presented data related to the Quaternary transgressive history of Brazil, describing the so-called “Penultimate Transgression” (~~or~~ called “Cananéia Transgression” in São Paulo state), attributed to MIS 5e (~120 ka). The main highstand of this transgression was reported at an elevation of ca. 8 m above sea level (a.s.l.). In general, the study of the ~~Last Interglacial~~last interglacial in Brazil is hindered by the small number of reliable chronological constraints. Therefore, the most recent studies were directed to use radiometric dating techniques (such as OSL or TL) to establish radiometric ages for Pleistocene deposits (Barreto et al., 2002; Buchmann and Tomazelli, 2003; Suguio et al., 2003; Tomazelli and Dillenburg, 2007; Rossetti et al., 2011; Suguio et al., 2011; Bezerra et al., 2015).

The collective effort from these researchers over the years has made possible the knowledge of the Brazilian coastal plain geomorphological history and the description of the Pleistocene sea-level changes, preserved mostly in the form of beach and coastal deposits. According to the literature, the last interglacial sequences are present almost continuously on a North-South gradient from Rio Grande do Sul to Rio Grande do Norte, leaving only eroded remains in the most northern states (Figure 3). Listed below are the published descriptions of the LIG deposits in this country, divided by administrative units (states).

5.1.1 Rio Grande do Sul

Villwock (1984) and Tomazelli et al. (2006) described a system of Pleistocene lagoons-barriers sub-parallel to the modern coast throughout the Rio Grande do Sul coastal area. Among these barriers (named I, II, and III), Barrier III is the best-preserved and has an almost continuous extension between the cities of Tramandaí (to the north) and Chuí (to the south). This barrier was associated with the LIG transgression because it occurs at the back of the Holocene lagoon-barrier system (Tomazelli et al., 2006). Tomazelli and Dillenburg (2007) re-assessed the age and elevations of Barrier III deposits at Osorio, describing five outcrops of foreshore sands with abundant *Ophiomorpha* ichnofossils (RSL IDs: 143 and 152 to 155) (Figure 3Figure 3). The deposits are 4 – 5 m thick and their reported elevations refer to the maximum elevation of *Ophiomorpha* burrows, ranging from 5.13 ± 0.7 m to 7.72 ± 0.5 m above Mean Low Water Springs (elevations measured with differential GPS). The authors recognize that there are limited chronological data for these outcrops, but highlight that a a minimum age for the foreshore deposits is available for one of the sites, where coastal dunes covering the foreshore sands were dated with TL to 85 ka (Poupeau et al., 1988). Buchmann and Tomazelli (2003) used TL to date a similar foreshore deposit at Bujuru (Conceição Lightouse) to 109 ± 7.5 ka. One photo in Dillenburg et al. (2009) (their Figure 3.16) shows that this outcrop is located possibly a few meters above modern sea level. In our literature survey, we were not able to find further details on the luminescence age reported by this study or on elevation measurements of this outcrop, therefore we do not include it in our database.

5.1.2 Santa Catarina

In Santa Catarina State, deposits correlated with "Barrier III" deposits of Rio Grande do Sul (lagoon and barrier facies) were reported in a series of 1:100.000 geomorphological maps (Horn Filho et al., 2014 and references therein). The deposits are mapped as widespread across the coastal plain. A geological field trip guide by Horn Filho et al. (2017) describes Upper Pleistocene lagoonal/beach deposits at three sites: Villa Conceição (RSL ID: 1288), Coqueiros (RSL ID: 1286), and Tapera (RSL ID: 1287). These three outcrops are located at elevations of 9-12 m a.s.l., but their elevations are bounded by large uncertainties as it is unclear how they were measured (Figure 3Figure 3).

More accurate elevation measurements are available in recent work by Martins et al. (2018). These authors investigated *Ophiomorpha* burrows within Barrier III deposits at Pinheira (RSL ID: 178). They used differential GPS to measure the top of *Ophiomorpha* at 4.5 m a.s.l (Figure 3Figure 3).

Another site where beach / shallow marine (occasionally with *Ophiomorpha* burrows) deposits occur is São Francisco do Sul Island, located on the Northern coast of the Santa Catarina State (Horn Filho and Simó, 2008). These deposits were reported at 10-17 m a.s.l. (RSL ID: 179) but were assigned, in our database, as low quality due to uncertainties in their location and elevation. A detailed map (1:90.000) of the coastal deposits in São Francisco Island shows the distribution of Pleistocene lagoonal and beach deposits in this area (Horn Filho and Vieira, 2017). Accurate elevation measurements of these units will help to shed light on the correlation of these deposits with other sea-level indicators in the Santa Catarina State.

Summarizing the sandy marine terraces on the Santa Catarina states coast, Martin et al. (1988) report three additional sites attributed broadly to MIS 5: two at Itapema and one at Itajaí (RSL IDs: 1296 to 1298). These are located at 6-8 m a.s.l. (Figure 3Figure 3).

Approximately 8 km south of Imbituba, Giannini et al. (2007) used OSL to date deposits associated with "*alluvial-eolian deflation*" and "*eolian accumulation*" facies. These deposits yielded ages of 129.1 ± 15 ka and 103.5 ± 11.7 ka respectively.

The deflation facies is located at a lower elevation (6.5 m a.s.l) than the accumulation facies and was inserted into WALIS (RSL ID: 1300) as a terrestrial limiting point.

5.1.3 Paraná

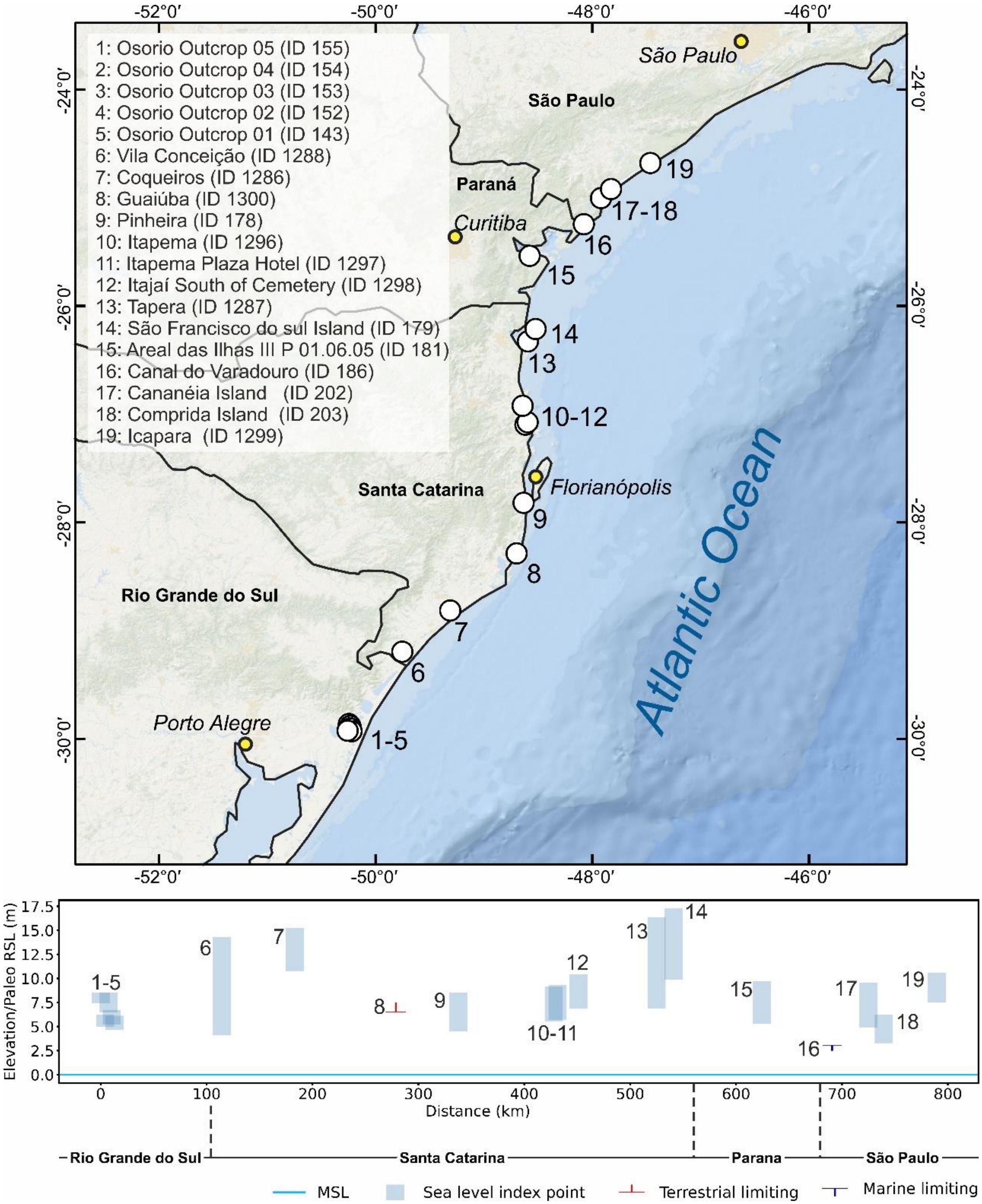
In the State of Paraná, Branco et al. (2010) report a Pleistocene barrier at elevations between 5 m and 10 m a.s.l. Among 19 stratigraphic sections, they report the presence of *Ophiomorpha* burrows at Section P 01.06.05 (RSL ID: 181) at 5.5 m a.s.l. (Figure 3~~Figure 3~~).

Angulo et al. (2002) describe a marine terrace deposited on an estuarine paleo-channel in Canal do Varadouro (RSL ID: 186) (Figure 3~~Figure 3~~). The sediments are approximately 1 m thick and have an undulated lamination suggesting that they formed within an intertidal environment. The reported elevation is 4 m about the current high tide level (4.8 m ~~above mean sea level~~a.s.l.). For both sites in the Paraná State, only minimum ages are available.

5.1.4 São Paulo

In the southern part of Sao Paulo State, the Pleistocene Cananéia Formation (a sandy coastal unit first described by Suguio and Petri, 1973), is reported in the Iguape-Cananeia lagoon region on Cananéia and Comprida Islands (Figure 3). The formation is capped by a member characterized by sands with *Ophiomorpha* burrows (Martin and Suguio, 1976). This formation was initially considered MIS 5 based on minimum radiocarbon ages (Martin and Suguio, 1976); an age later confirmed by OSL and TL ages of 94~~,504~~ ka (average age from Watanabe et al., 1997), and 81.55 ± 4.5 ka (average age from Suguio et al., 2003). We identified two (poorly constrained) sea-level index points on Cananéia and Comprida Islands (RSL IDs: 202, 203). Both data points are derived from Martin and Suguio (1976). From the description in the paper, we interpreted them as marine terraces. On Cananeia Island, the Cananéia Formation is located between 5-6 m and 9-10 m a.s.l. On Comprida Island, the altitudes vary from 2.5 m to 3 m a.s.l. in the south and from 5 m to 6 m a.s.l. in the north. As this difference is related to differential erosion to which the area was subject during the Holocene transgressive phase, we used the highest occurrence of the terrace as reported elevation.

A cross-section in Martin et al. (1988) reports another sea-level indicator associated with the Cananéia Formation close to Icapara (RSL ID: 1299) at 8.5 m above high tide (Figure 3~~Figure 3~~).



250 **Figure 3. Last interglacial sea-level data in the Brazilian states of Rio Grande do Sul, Santa Catarina, Paraná and São Paulo. Upper panel: map of sites. Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors. Lower panel: distance/elevation plot.**

5.1.5 Rio de Janeiro

Martin et al. (1998) describe Pleistocene beach barriers and sandy terraces in Rio de Janeiro state. These are located at 6-8 m a.s.l. (Isla and Angulo, 2016), and have been assigned to the LIG ~~on the basis of~~based on infinite radiocarbon ages. As no details on sea-level indicators are available for these terraces, we did not insert them in WALIS.

5.1.6 Espírito Santo

Suguio et al. (1982) studied the area near the Doce River mouth in Espírito Santo State. The authors describe the Pleistocene marine terraces which created an almost continuous strip of 4 km along the north section of the coastal plain. In the São Mateus area, these marine terraces reach a height of 9 m to 10 m a.s.l datum (RSL ID: 204) (Figure 4~~Figure 4~~), while to the south (close to the river entrance) the elevation ranges from 6 m to 10 m and the terrace loses its continuity as a result of the erosive effect from the Holocene transgression. The authors did not present specific ages for these deposits but assume a stratigraphic correlation with those of the neighboring state Bahia (see below), which indicates deposition during the LIG.

5.1.7 Bahia

In the State of Bahia, Martin et al. (1982) identified a fossil coral reef at "Fazenda Jarir" at an elevation corresponding to the modern high tide mark (1.27 ± 1 m a.s.l.; RSL ID: 168) (Figure 4~~Figure 4~~). They sampled 15 *Siderastrea* spp. corals; most likely, the species *Siderastrea stellata*, which is endemic to the coasts of Brazil and is reported as a primary bioconstructor in the shallow-water reefs in this area (Laborel, 1970). *S. stellata* is common in intertidal pools (de Oliveira Soares et al., 2017) with an average living range constrained between -3 m and -10 m depth (Segal and Castro, 2000). We used these values as, respectively, upper and lower limits of the indicative range to calculate paleo RSL for this site at 7.8 ± 3.6 m. These corals yielded (alpha-counting) U-series ages between 116 ± 6.9 ka and 142 ± 9.7 ka.

Another three sites in Bahia state are reported by Bittencourt et al. (1979): Conde, Palame, and Subaúma (RSL IDs: 169, 170, 171) (Figure 4~~Figure 4~~). At these sites, the authors report that "*the remnants of the penultimate transgression are indicated by a sand terrace, the top of which is situated 6 m above high tide level*". These deposits are associated with the so-called "Bahia Sector I" stratigraphy, which is attributed to MIS 5e thanks to the ages of Martin et al. (1982).

5.1.8 Sergipe and Alagoas

To complement the work carried out by Bittencourt et al. (1979), Bittencourt et al. (1983) analyzed the Pleistocene marine terraces deposited in the Sergipe and south of Alagoa states. According to the authors, these sandy marine terraces present the same sedimentological and geomorphological characteristics as those observed in Bahia (Section 5.1.7). Therefore, the deposits can be inferred as spatially continuous from Bahia to Sergipe and Alagoas states (Barbosa et al. 1986). While the interglacial terraces are presented in maps within these publications, no precise location information is given, therefore these data were not inserted in WALIS.

5.1.9 Pernambuco

The Pleistocene marine terraces in the state of Pernambuco were described by Dominguez et al. (1990). Their elevations range from 7 m to 11 m above the present high tide level, some outcrops show traces of ancient beach ridges in the region between Lagoa Olhos-d'Agua and Boa Viagem (RSL ID: 218) (Figure 4~~Figure 4~~). These terraces have similar sedimentological characteristics as those described in the states of Alagoas, Sergipe, and Bahia, suggesting a depositional continuity, however, in Pernambuco are mostly present in small patches, arranged discontinuously along the coast. There are no absolute ages for the region, but these deposits are correlated with those in the State of Bahia (Dominguez et al. 1990).

There are indications of additional MIS 5 marine-associated deposits within the Pernambuco State. Suguio et al. (2005) and later Suguio et al. (2011) reported MIS 5 TL and OSL ages for sands that could be either marine or aeolian in origin. Pending further clarifications on these deposits, we did not insert them into WALIS. ~~and for which location could not be constrained.~~ On the island of Fernando de Noronha, aeolianites within Unit I of the Pleistocene Caracas Formation (Almeida, 1955) returned minimum radiocarbon ages of 50,000 years B.P. (Angulo et al., 2013). The poor constraint on age and location has precluded entry of these deposits to WALIS.

5.1.10 Paraíba

Suguio et al. (2005), and Suguio et al. (2011) described Late Pleistocene marine terraces in Paraíba state and dated them using TL and OSL techniques. Information to derive index points is given only for three of the nine dated outcrops. Two samples were collected above 4.1 ± 1.5 m a.s.l. at Pitimbu Beach (Figure 4~~Figure 4~~) (RSL ID: 220) yield TL ages of 101 ± 9 ka (PB17A) and 71 ± 7.7 ka (PB17B) and OSL ages of 100 ± 11 ka (PB17A) and 46 ± 4 ka (PB17B). These samples were collected from a massive sandstone unit, overlying a planar cross-stratification in sandstone. As no further details are given in the original papers, we interpret these sediments as part of a marine terrace and assign this datapoint a large indicative range. A unit composed of loose sands was dated at Cordosas beach (RSL ID: 222), and yielded TL ages of 88.9 6 ka (PB07B) and 110 ± 6.2 ka (PB07C) and OSL ages of 70.3 ± 5 ka (PB07B) and 86 ± 5 ka (PB07C). The best described among the outcrops of Suguio et al. (2011) is the one at Cabo Branco cliff (RSL ID: 221) (Figure 4~~Figure 4~~). Here, at 9.8 m a.s.l., a sandstone facies is characterized by planar cross-stratification and *Ophiomorpha* burrows. This deposit yielded a TL age of 138 ± 5 ka and an OSL age of 120 ± 2 ka (sample PB10B). A sandstone unit immediately above the location where these samples were taken (sample PB10A) was dated 108 ± 8 ka (TL) and 110 ± 20 ka (OSL).

5.1.11 Rio Grande do Norte

Barreto et al. (2002) described two distinct marine terraces in the state of Rio Grande do Norte. The sediments of these terraces were grouped into two stratigraphic units, dated to 220-206 ka and 117-110 ka with luminescence techniques. The younger 117-110 ka marine terrace deposit is preserved for about 120 km along the E-W coast and was associated with the highstand of MIS 5e. Two outcrops of this terrace, between São Bento and Touros, were described (RSL IDs: 144,163).

The elevations of the shallow-water facies reported by Barreto et al. (2002) range from 1-10 m a.s.l. and 2 km north of the town of Zumbi rise to a maximum of 20 m (Figure 4Figure 4). Therefore, the authors suggested a regional tectonic uplift by 10-12 m (considering the mean reported MIS 5e highstand of Brazil: 8 ± 2 m a.s.l.; Barreto et al., 2002).

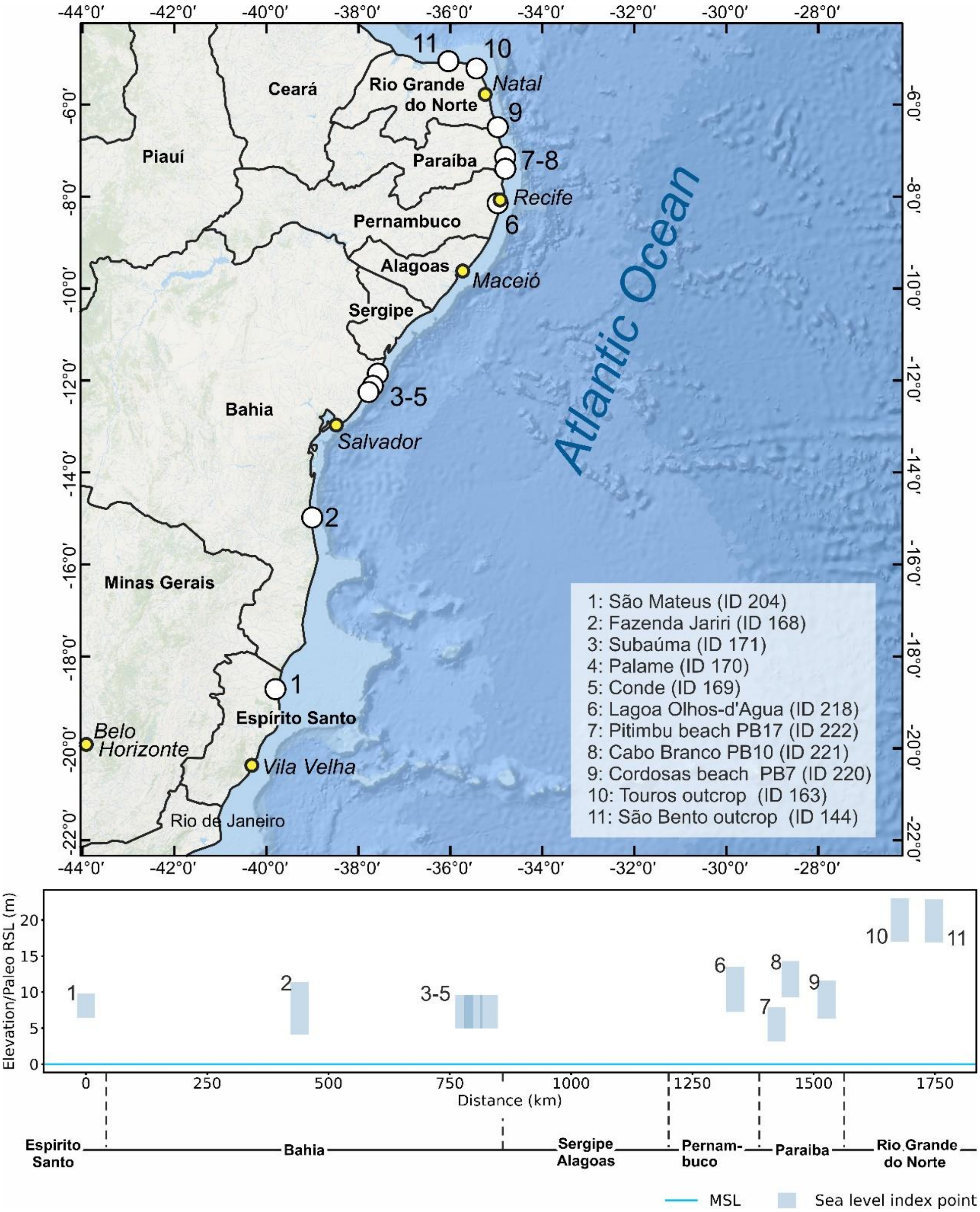


Figure 4. Last interglacial sea-level data in the Brazilian states of Espírito Santo, Bahia, Pernambuco, Paraíba and Rio Grande do Norte. Upper panel: map of sites. Basemap: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors. Lower panel: distance/elevation plot.

5.1.12 Amapá

In the northernmost states of Brazil, information on Pleistocene marine deposits was generally lacking until the recent work of Bezerra et al. (2015) in Amapa State. These authors define the Pleistocene "Itaubal Formation", and subdivide it into two progradational units (Upper and Lower), separated by an unconformity. Using OSL ages, the Itaubal Lower Unit was constrained to MIS 5 (120 ka to 71 ka). Detailed facies analysis along several outcrops allowed Bezerra et al. (2015) to assert that the Itaubal Lower unit is representative of "*subtidal and tide-influenced meandering stream and floodplain deposits*". While this study presents accurate chronological data and detailed facies analysis of the Lower Unit, it is not possible to insert any index point in the database due to the lack of any absolute elevation measurements constrained to modern sea level (only outcrop thickness is reported). However, we remark that this area looks promising for future research, especially because of the limited number of LIG deposits preserved in northern Brazil.

5.2 French Guiana, Suriname & Guyana

French Guiana, Suriname, and Guyana share a very similar geological setting. Along the coasts of these three countries, different authors report the presence of littoral deposits that were emplaced by previous sea-level highstands (Brinkman and Pons, 1968; Iriondo, 2013). These deposits were studied by Choubert (1956) and Boyé and Cruys (1961), who described a unit made of sands and clays parallel to the shoreline that was initially attributed to the Riss-Würm (MIS 5) transgressive event. In French Guiana and Suriname, similar sedimentological facies are named, respectively, "Coswine Series" and "Coropina Series". Brinkman and Pons (1968) propose that the Coswine and Coropina Series are divided into two members, the Para member (attributed to the middle Pleistocene) and the Lelydorp member (attributed to the Eemian interglacial, MIS 5e). These authors suggest that the Lelydorp member outcrops between the towns of Cayenne and Organabo in French Guiana and Suriname in the district of Coronie.

The attribution of the Lelydrop member to MIS 5e was due to a radiocarbon date above the detection limit considered as a minimum age by Brinkman and Pons (1968) (48,000 years B.P., sample ID: GRN 4718). Wong (1992) continued with the study of this region publishing "*the Quaternary stratigraphy of Suriname*", in which he addressed the problem related to the chronological assignment of these eroded and weathered records. Wong et al. (2009) used paleomagnetic data to estimate ages along the Suriname coastal plain. The results suggest that the Lelydorp member is of early Pleistocene age, hence much older than hitherto assumed. Due to the lack of precise chronologic constraints, and with the work of Wong et al. (2009) essentially pre-dating the units previously assumed to be of last interglacial age, no data has been inserted in WALIS for French Guiana, Guyana, and Suriname.

5.3 Venezuela

The Pleistocene marine deposits of Venezuela are well-known and have been extensively described by Bermudez and Farias (1975). As early as the late 1700s, Humboldt (1799) remarked upon formations now recognized as Pleistocene-age within the state of Sucre (Bermudez and Farias, 1975). A couple of centuries later, Bermudez (1969) presented a detailed account of the Quaternary and recent stratigraphy of Venezuela. In this study, the author mentions Pleistocene marine units on Cabo Blanco (Miranda State), on the south coast of Tortuga Island, and the islands Cubagua, Coche, and Margarita. In Cabo Blanco, Bermudez (1969) describes Pleistocene "*raised beaches*", located at 62 m a.s.l. Danielo (1976) worked on the Northern coasts of Venezuela, and reported the presence of several Pleistocene beach deposits in the Araya and Paraguana Peninsulas, as well as in Puerto Cumareboy and Margarita regions. Among the different sea level proxies~~s~~ on the northern coasts of Venezuela identified by the author, it appears that two would correlate with MIS 5, notably the so-called "Tyrrhénien I" (25-30 m) and the "Oujien" (6-8 m). Unfortunately, there is no dating associated with these deposits, therefore they could not be included in our database.

The Paraguana Peninsula is one of the most studied sites in Venezuela for which concerns Quaternary outcrops. Here, Rey (1996), described a 1.7 m-thick conglomeratic sequence containing fragments of mollusks and foraminifera. The author interprets the depositional environment as that of a high-energy beach and reports that this unit cannot be older than the Pleistocene due to the presence of the marine foraminifera *Globorotalia truncatulinoides*. Audemard (1996a,b) reported several Pleistocene coastal outcrops along the Paraguana Peninsula. On the southern coast of the peninsula, at Punta Cardon, Audemard (1996a,b) report the presence of a fossil coral reef, with a height of 1.5 m and species of the genera *Porites* preserved in living position within a "*reddish sand matrix*". The authors attribute this reef tentatively to MIS 5. To the west of the Paraguana Penninsula, Audemard (1996a) reports a terrace with heights from 4 m to 5 m a.s.l. This terrace presents sediments with different grain sizes and fragments of shells and corals. One radiocarbon analysis was performed on a coral fragment; its age was above the detection limit and the author assigns an MIS 5 age. To the north of Paraguana, the same author describes two eroded "*isolated beach deposits*" at Punta Macolla, despite not presenting an elevation for these, he correlates them with the MIS 5.

After the work of Audemard (1996b), no further references could be found in this review. Up to now, none of the studies listed above present radiometric dates, and the estimated ages were based on either geomorphological (Danielo, 1976; Audemard, 1996a, b; Rey, 1996) or biological (Bermudez, 1969; Bermudez and Farias, 1975) characteristics of the deposits described. Only the work of Audemard (1996a) refers to a single coral radiocarbon sample with age beyond the dating limit. None of the studies listed was included in WALIS~~ since the chronological assignment did not satisfy the screening criteria~~.

5.4 Aruba, ~~Curacao~~ Curaçao, and Bonaire (ABC) Islands

Aruba, Curaçao, and Bonaire islands lie in front of Venezuela, forming the so-called "ABC Islands" group. These three islands are included in this review due to the proximity to the Venezuelan coast and the quantity of last interglacial sea-level indicators that have been reported along their shores. The Pleistocene sea-level record at these islands is mostly preserved in the form of staircases of coral reef terraces (Alexander, 1961; Herweijer and Focke, 1978). These are usually wider along the windward side of the island than their leeward sides. The terraces display shore-parallel changes in elevation, which would suggest they have been affected by tectonic processes. This seems likely as they are located between the South Caribbean and South American Plates (Hippolyte and Mann, 2011). The reef terraces are often interrupted by "Bocas", i.e. incisions in the continuity of the Pleistocene reefs that expose the stratigraphy of the terrace, which can be also observed along sea cliffs. These outcrops facilitated the study of paleo-ecological properties of Pleistocene reefs (Pandolfi and Jackson, 2001; Meyer et al., 2003), their dating (Schellmann et al., 2004; Obert et al., 2016; Felis et al., 2015; Schubert and Szabo, 1978; Hamelin et al., 1991), and helped unravel their significance in the context of paleo relative sea-level changes (Lorscheid et al., 2017; Muhs et al., 2012; Kim and Lee, 1999). The evidence of MIS 5e reef terrace development on each island is briefly described hereafter.

5.4.1 Aruba

In Aruba, the so-called "*third terrace*" (third terrace level counting from modern sea level) was attributed to a "*Sangamonian*" (i.e., MIS 5e) age by Alexander (1961). The terrace is reported as well developed and is parallel to the shore along the North-Western coasts of the island. The terrace elevation is "25 feet" (7.6 m) a.s.l. While Pleistocene marine terraces appear prominent in the landscape of Aruba, we could not find any description nor absolute ages to confirm the MIS 5e age designation; therefore, we did not insert any datapoint for Aruba in the database.

5.4.2 Curaçao

Several last interglacial MIS 5e index points were reported from the island of Curaçao (Figure 5). The first U-series ages on corals from Curaçao were reported by Schubert and Szabo (1978) and later revisited by Muhs et al. (2012). We included in WALIS the sites reported by Schellmann et al. (2004), analyzed with ESR, and those reported by Muhs et al. (2012), measured with a differential GPS and analyzed with U-series. In reporting U-series and ESR data for Curaçao, we included only those ages within MIS 5e. We did not insert in the database the U-series ages obtained by Hamelin et al. (1991), as they were rejected by the original authors due to: i) large difference in ages (multiple ka) between different subsamples of the same coral or, ii) outside the acceptable range for initial uranium isotopic composition.

In general, within the "Bocas" dissecting the lower terrace of Curaçao, there are two distinct units where well-preserved corals (often in growth position) appear: the Cortalein (lower) and Hato (upper) units (Figure 6). Both ESR and U-series ages confirm that the Cortalein unit was forming during MIS 7 (ca. 200 ka), while the Hato unit is MIS 5e in age (Muhs et al., 2012; Schellmann et al., 2004). We report in the database only the dated samples collected from the Hato unit. In the following paragraphs, we report sample IDs as indicated in Table 2 of Schellmann et al. (2004) and Table 1 of Muhs et al. (2012) (for U-series).

The elevations reported by Muhs et al. (2012) are referenced to the CARIB 97 geoid (Smith and Small, 1999). We assigned an elevation uncertainty of 0.95 m, calculated from the root mean square of the sum of squares of the maximum error reported by Muhs et al. (2012) (0.8 m) and the CARIB97 datum uncertainty (0.51 m). Elevations for the sites mentioned in Schellmann et al. (2004) were taken directly from their Table 2, were referred to a general "mean sea level" datum, and were assigned an arbitrary uncertainty of 20% of the measured elevation. A similar approach was used in reporting sites investigated by Schubert and Szabo (1978).

On the leeward (southeastern) side of the island, a reef sequence at Punta Halvedag (RSL ID: 3553) was reported up to 10 m above present sea level. For this sequence, we included in WALIS four ages reported by Muhs et al. (2012) on two corals (Cur-Dat-16 and Cur-Dat-17). Muhs et al. (2012) was concerned about the U values for seawater and considered the ages to be overestimated by ~2.5-3.5 ka. Therefore, in WALIS we constrain the Punta Halvedag site as "younger than" these two corals, with the caveat that their age is most likely MIS 5e. North of Punta Halvedag, the same reef sequence is visible at Knipbai (RSL ID: 3554). As little information on the stratigraphic context is given for this site, we inserted it in WALIS as a marine limiting datapoint. From the Hato Unit at this location, one *Acropora palmata* was dated (Cur-Dat-5; Muhs et al., 2012). Muhs et al. (2012) report that this coral "*shows evidence of U gain, which would tend to bias the sample to a younger apparent age*". Therefore, in WALIS we constrain the Knipbai site as "older than" this coral.

On the windward (Northwestern) side of the island, most of the locations reported in WALIS have been surveyed inside "Bocas", where corals have been dated both with ESR and U-series. At Un Boca, three coral samples (99-6, 99-7, 99-9) yielded ESR ages between 101 ± 7 ka and 140 ± 9 ka (Schellmann et al., 2004). The top elevation of in situ corals at Un Boca is 10 m with significant uncertainties that stem from the unreported elevation measurement method. At Un Boca (RSL ID: 531), Muhs et al. (2012) re-dated two corals, that had already been dated to MIS 5e by Schubert and Szabo (1978). The new analyses yielded ages of 118.1 ± 0.8 ka (Cur-33-d, *Acropora palmata*) and 132.3 ± 0.8 ka (Cur-33-d, *Diploria* sp.). The authors note that the sample Cur-32-d is probably biased old by 2.5-3.5 ka. One *Acropora palmata* coral (original ID: 00-7) was analyzed by Schellmann et al. (2004) at a site located a few hundred meters south of Un Boca, called Dos Bocas (RSL ID: 534). Three subsamples of this coral yielded ESR ages between 113 ± 10 ka and 120 ± 11 ka. The reef terrace at Dos Bocas was assigned the same elevation as Un Boca, based on the data reported by Schellmann et al. (2004). Slightly more than 1 km south of Dos Bocas, another site (Boca Mansalina, RSL ID: 3559) yielded one *Acropora palmata* coral (sample 00-13) analyzed using ESR to provide an age of 118 ± 9 ka (Schellmann et al., 2004) and one *Siderastrea siderea* coral (sample Cur-Dat-4), of which two subsamples gave U-series ages of 125.7 ± 0.7 ka and 126.0 ± 0.8 ka. The highest *in situ* coral at this location is reported at 7-8 m a.s.l. and it appears to have been sampled close to the top of the terrace (Figure 8 panel 3 of Schellmann et al. (2004) and Figure 8a of Muhs et al. (2012). *Acropora palmata* corals were also dated with ESR (00-5) and U-series (Cur-Dat-1) at Boca Cortalein (RSL ID: 533), yielding ages between 118-125 ka (with error bars between 8-11 ka) and U-series average age of 127.3 ka (on two subsamples of the same coral). Also, at Boca Cortalein, we approximate the height of the reef terrace with the highest in situ coral, which is reported at 10 m a.s.l. (Schellmann et al., 2004). Approximately 15 km to 18 km south of Boca Cortalein, three additional sites were reported by Schellmann et al. (2004) and Muhs et al. (2012). At Boca Ascension (RSL ID: 3563), a *Montastraea* sp. coral yielded an ESR age of 124 ± 8 ka (99-3; Schellmann et al., 2004), but not enough stratigraphic information was given to establish a sea-level index point, therefore we insert this site in WALIS as marine limiting. At Boca San Pedro (RSL ID: 535), four *Acropora palmata* corals (00-9) were collected at 6-7 m a.s.l. and were dated with ESR to 103-124 ka (Schellmann et al., 2004). In this case, a cross-section (Fig.5-2 of Schellmann et al., 2004) shows that the highest of these corals was sampled close to the top of a reef terrace, therefore we consider this point a valid sea-level indicator.

Towards the southern part of the island, south of Hato International Airport, two nearby sites were dated with ESR by Schellmann et al. (2004): Boca Labadera (RSL ID: 536) and Boca Grandi (RSL ID: 537). These sites have ages ranging between 120 ± 13 ka and 112 ± 9 ka. At these two sites, all dated samples (n=5, WALIS ESR IDs 124 to 128) are close to the top of the terrace, were measured at 5-6 m above sea level, and have been treated in WALIS as valid sea-level indicators. At the southern tip of Curaçao, one site was reported by Schellmann et al. (2004) as “Sheraton Hotel” and is here reported as Oostpunt (RSL ID: 532). Here, two *Acropora palmata* corals (001-1) were sampled at 2.5-4 m. As no information is given on the stratigraphy of the reef terrace at this site, we insert this point in WALIS as a marine limiting point.

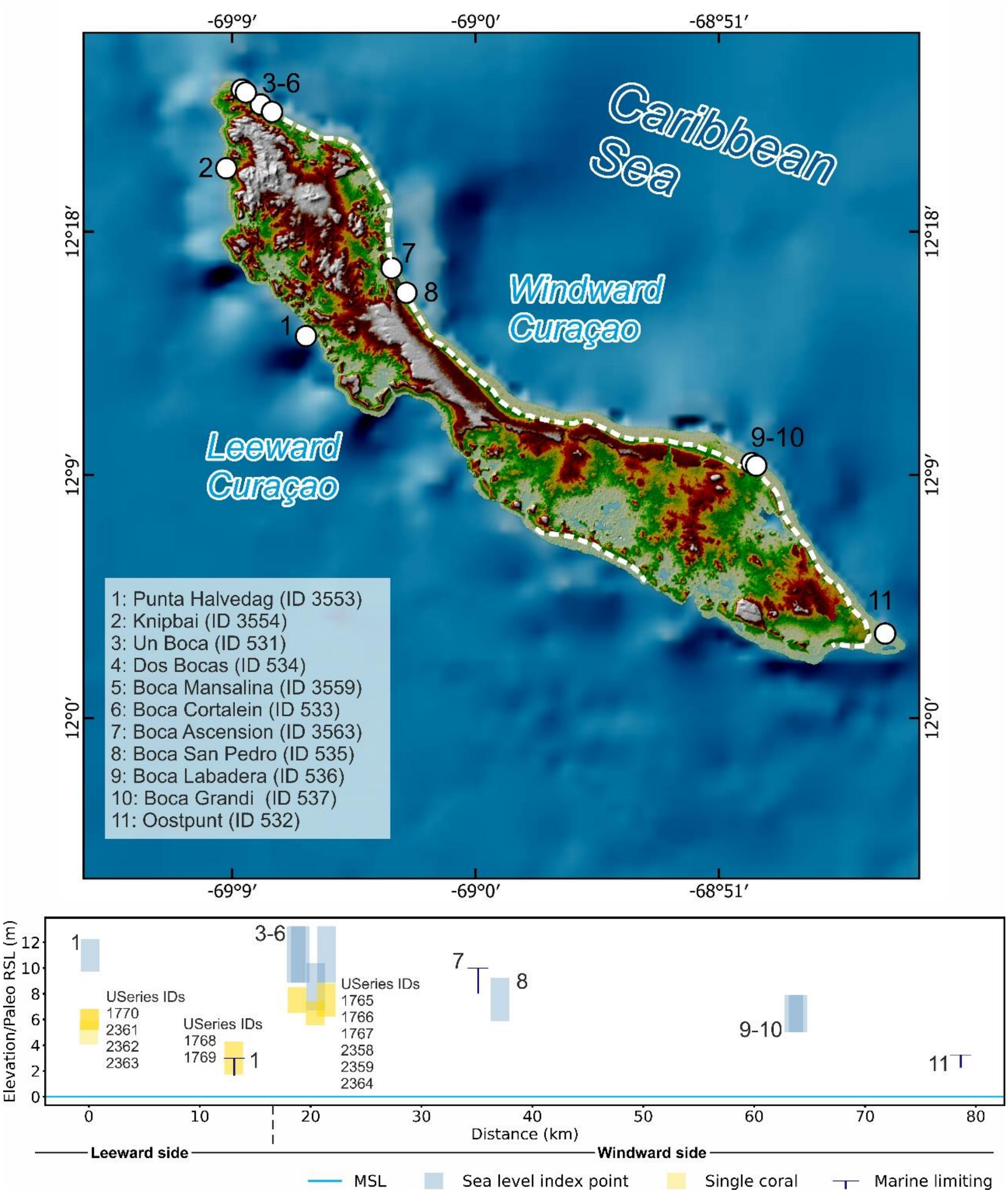


Figure 5. Last interglacial sea-level data in Curaçao. Upper panel: Map of reported sites. The dashed line shows the location of the last interglacial terrace. The "single coral" datapoints represent coral elevations as reported in Chutcharavan and Dutton (2020)~~, under review~~. Background map compiled with data from GEBCO (doi:10.5285/836f016a-33be-6ddc-e053-6c86abc0788e), SRTM 30m by NASA EOSDIS Land Processes Distributed Active Archive Center (LP DAAC, https://lpdaac.usgs.gov/). Lower panel: distance/elevation plot.

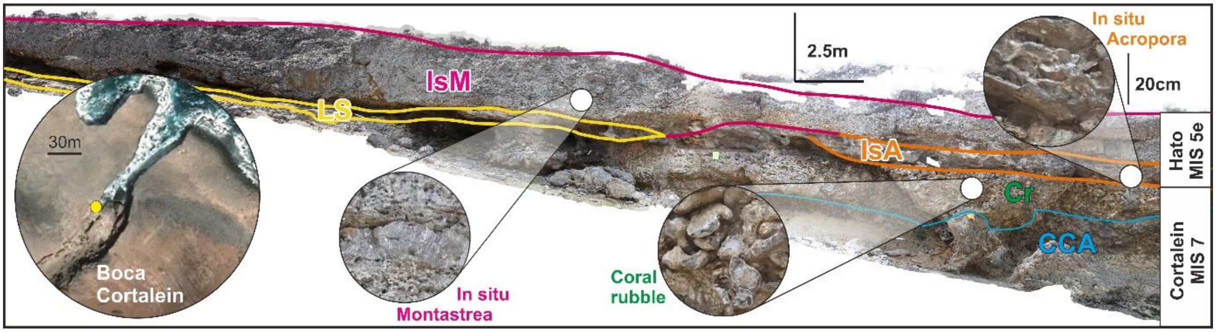


Figure 6. Photomosaic with the interpretation of the paleo reef units of MIS 7 and MIS 5e age at Boca Cortalein, Curaçao (originally by A.-K. Petersen, edited by A. Rovere). ***IsM*****: In situ** ***Montastraea*** **sp.;** ***LS*****: Layered sediments (beachrock);** ***IsA*****: In situ** ***Acropora*** **sp.; Cr: Coral rubble; CCA: Solitary corals and calcareous algae.**

5.4.3 Bonaire

The general coastal setting of Bonaire, similarly to that of Curaçao and Aruba, is characterized by broad (hundreds of meters wide) paleo reef terraces on the windward (Northern and Eastern) side of the island and narrow (tens of meters or less) paleo reef terraces on the leeward (South Western) side (Figure 7Figure 7).

On the leeward side, Lorscheid et al. (2017) measured six tidal notches carved into limestones older than MIS 5e (Figure 8Figure 8a). The elevations of the notches were measured with a combination of differential GPS and laser rangefinder and is are reported between 6.61 m and 7.26 m (RSL IDs: 1369 to 1374) above mean sea levela.s.l. Samples of a fossil coral from the terrace immediately below the notches yielded initial $^{234}U/^{238}U$ activity ratios higher than expected from the modern seawater value and were therefore considered unreliable by Lorscheid et al. (2017). Nevertheless, the notches are considered coeval with the terrace immediately below (Figure 8Figure 8b), which is correlated with the better-dated terrace level on the windward side of the island, described below.

Felis et al. (2015) and Obert et al. (2016) report several U-series ages from different skeletal parts (theca walls or bulk material) of nine corals located on top of the lower reef terrace characterizing the windward (northern and eastern) side of Bonaire (Figure 8Figure 8c, d, e). As there are multiple sub-samples for some individual corals, Brocas et al. (2016) calculate the weighted mean and weighted standard error of five of these nine corals giving a range from 120.5 ± 1.1 ka to 125.85 ± 2.46 ka. Of the 42 ages reported by Obert et al. (2016) and one1 age reported by Felis et al. (2015), we inserted in WALIS only those accepted within the original publication (based on progressively less strict criteria), restricting the number of available ages to 25 (8 corals). The elevation of these samples was initially measured using an altimeter “calibrated” to sea level at the time of measurement. The sampling sites were then re-visited by T. Lorscheid, A. Rovere, and T. Felis in 2016, and each sampled coral on top of the reef terrace was re-measured with differential GPS and referred to the EGM 2008 geoid. We report these new measurements in this paper for the first time. To provide additional constraint to each sample, an elevation was also recorded at the nearest accessible instance of the coral reef inner margin, which we consider here to approximate paleo sea level with an indicative range included between Mean Lower Low Water and the Breaking Depth, that we derived from IMCalc (Lorscheid and Rovere, 2019).

South of Boca Washikemba, Obert et al. (2016) and Felis et al. (2015) dated two corals: BON-5-A (120.5 ± 1.1 ka average age according to Brocas et al., 2016), and BON-5-D (117.7 ± 0.8 ka). Three kilometers north, the inner margin of the reef terrace was measured at 5.19 ± 0.28 m, where *in situ* massive corals can be recognized (RSL ID: 694). While this is the only site dated on the eastern coast of Bonaire, the wide coral reef terrace is almost continuous until a second site is reached on the northeastern coastline (identified within WALIS as Boca Olivia, RSL ID: 693), where Obert et al. (2016) dated two other corals BON-26-A, and BON-24-AII.2 giving average ages of 124.9 ±19 ka and 125.5 ± 2.4 ka respectively (Brocas et al., 2016). The inner margin of the coral reef terrace was measured 500 m inland of these two corals, at an elevation of 8.84 ± 0.27 m. Three kilometers north of this point, south of Boca Onima (RSL ID: 692), three corals (BON-17-AI, BON-12-A, and BON-13-AI.1) yielded an average age of 124.3 ± 1.5 ka (Obert et al., 2016; Brocas et al., 2016). The inner margin correlated to these corals was measured very close to the sample locations, at an elevation of 5.72 ± 0.3 m. Four kilometers north of Boca Onima close to the Washington Slagbaai National Park border (RSL ID: 3472), Obert et al. (2016) dated one coral (BON-33-BI.2) to 129.7 ± 1.7 ka. The inner margin of the terrace closest to this coral was measured at 9.58 ± 0.14 m. The measured elevations show a trend to become higher towards the North. That the coral ages reveal a broad trend from younger at lower elevations in the South to older at higher elevations in the North, with intermediate ages at intermediate elevations in between, has been noted by Obert et al. (2016) and attributed to the slight tilting of the island with relative uplift in the north and submergence in the south (Hippolyte and Mann, 2011). Consequently, this trend is unlikely to reflect past sea-level variations (Obert et al., 2016).

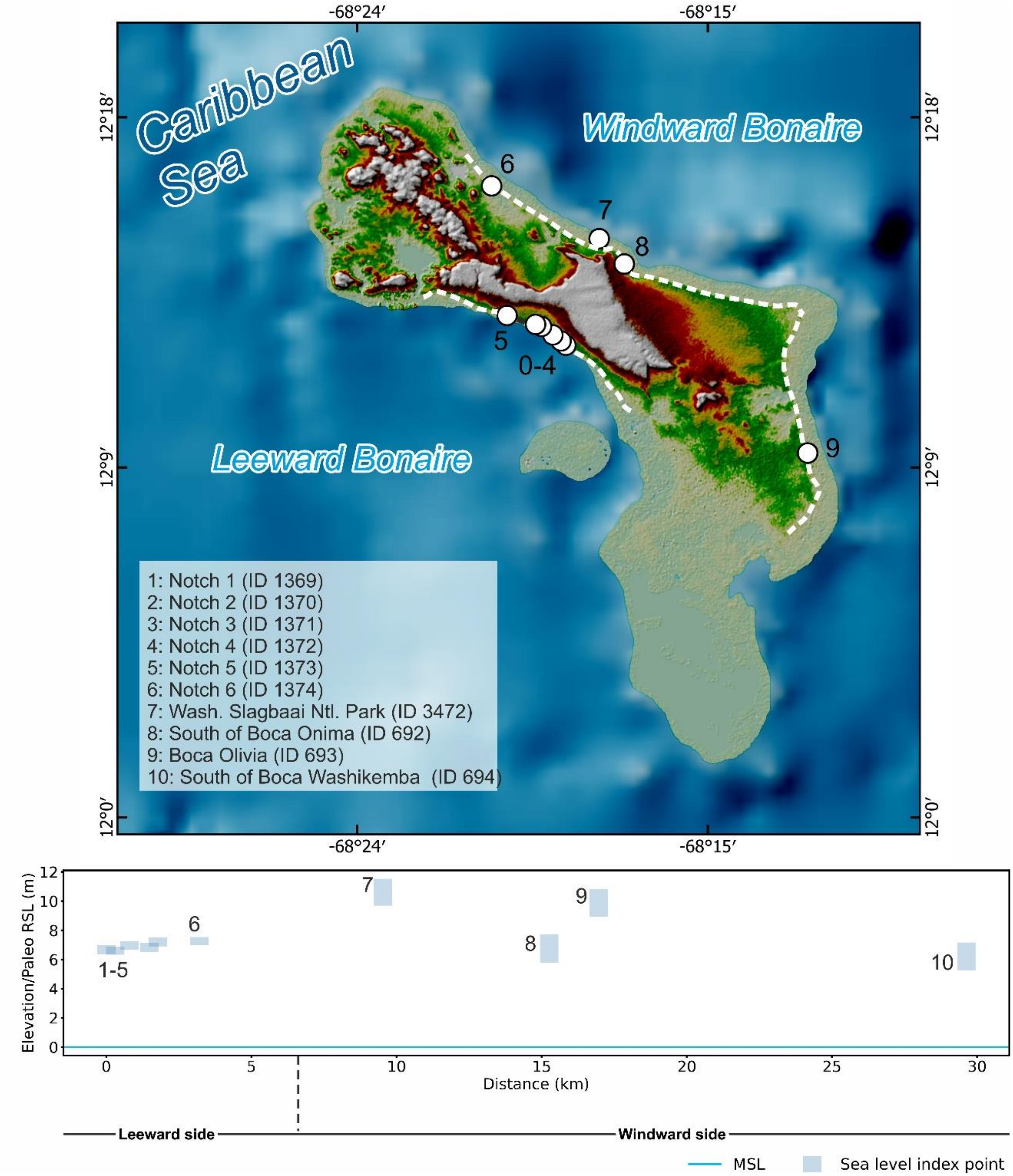


Figure 7. Last interglacial sea-level data in Bonaire. Upper panel: map of sites. The dashed line shows the location of the last interglacial terrace. Basemap compiled with data from GEBCO (doi:10.5285/836f016a-33be-6ddc-e053-6c86abc0788e), SRTM 30 m by NASA EOSDIS Land Processes Distributed Active Archive Center (LP DAAC, https://lpdaac.usgs.gov/). Lower panel: distance/elevation plot.

Figure 8. a) Tidal notch on the leeward side of Bonaire; b) last interglacial reef 1-2 meters below the location of the photo shown in a); c) exposed reef section on the windward side of Bonaire; d) large massive coral eroded on top of the MIS 5e terrace on the windward side of Bonaire; e) panorama view of the MIS 5e terrace on the windward side of Bonaire. Photos by T. Lorscheid (panel a), A. Rovere (panels b,c,e), T. Felis (panel d).

5.5 Colombia to Honduras

The coastal deposits of Colombia associated with the LIG have been mainly studied and described on offshore islands (Porta and Solé de Porta, 1960; Bürgl, 1961; Geister, 1972; Geister, 1986; Geister, 1992). Porta et al. (2008) mentioned the existence of marine terraces and coral platforms of different elevations along the mainland Colombian coast, mainly between Cartagena and Barranquilla; however, no further details are given on their ages or elevations or specific locations.

Porta and Solé de Porta (1960) describe the Quaternary coastal deposits on Tierrabomba Island. While the main focus of their paper is to describe the marine faunas of the islands, the authors mention Pleistocene marine terraces with heights of more than 20 m; however, none of these deposits are directly correlated with the LIG. One year later, Bürgl (1961) mentions three geological and geomorphological units on San Andrés Island: i) a marine platform of recent age, ii) a terrestrial platform of Pleistocene age, and iii) inland limestones of Miocene age. Geister (1972) hypothesizes that the deposits on the "terrestrial" platform were formed during a marine transgression, and correlates them with coral terraces observed in Providencia Island (Figure 9Figure 9) according to its geomorphology. Geister (1986) suggests the Providencia terraces are of Sangamon Interglacial age (MIS 5) based on a minimum radiocarbon age. The same author (Geister, 1992) later described this and the rest of the coral deposits of Providencia. He highlights that this fossil reef terrace is the only emerged relict of the Pleistocene complex which now underlies the Holocene deposits.

Literature describing MIS 5 relative sea-level indicators in Panama, Costa Rica, Nicaragua, and Honduras is scarce. Only one study in Costa Rica mentions the presence of a paleo-coral reef for which an Eemian age (MIS 5e) is postulated, in Puerto Viejo (Bergoeing, 2006). We surmise that it is possible that MIS 5 outcrops have not yet been described or do not exist in Panama, Nicaragua, and Honduras. For Panama and Costa Rica, several studies focus on the Pacific zone (Bee, 1999; Davidson, 2010; Bauch et al., 2011), which is out of the area of interest for this paper. No studies have been found in Nicaragua and Honduras, but we do not discard the possible existence of descriptions of MIS 5 outcrops in journals that we could not access online.

5.5.1 San Andrés Island

From the work of Geister (1972), it is possible to derive two sea-level indicators (generally defined as reef terraces) on the island of San Andrés. One is located in the south of the island at a point called "Southwest Cove" (RSL ID: 3681) and the second to the north, in "May Cliff" (RSL ID: 3682) (Figure 9Figure 9). The elevation of the "Southwest Cove" site was 1.5 m a.s.l., and the coral sampled belonged to the species *Acropora palmata*, which has an average living range between -1 m and – 5 m depth (Lighty et al., 1982). We use these values as, respectively, the upper and lower limit of the indicative range to calculate the paleo RSL for this site at 4.5 ± 2.06 m (RSL ID: 3681). This sample was radiocarbon dated, giving an age of 26,020 ± 675 years B.P., which according to the author should be considered as a minimum age. The "May Cliff" sample comes from a *Dendrogyra cylindurs* coral (from -2 m to -10 m living range in San Andrés, as reported by Cavada-Blanco et al., 2016) found at 6 m a.s.l. with a minimum radiocarbon age of 33,000 ± 770 years B.P. Considering the average living range of *D. cylindurs* (Cavada-Blanco et al., 2016) on this island, the paleo RSL calculated is 12 ± 4.03 m (RSL ID: 3682).

5.5.2 Providencia

To the south of the island of Providencia, Geister (1972) reports the elevation and two radiocarbon dates (33,310 ± 2300 years B.P., and 29,270 ± 930 years B.P.) of a specimen of the coral *Siderastrea radians*. The reported elevation of the sample is 1.8 m a.s.l. and both radiocarbon dates were considered as minimum ages. Twenty years later, the same author describes a coral reef terrace at about +3 m at a site called "*South Point*" (RSL ID: 950) (Figure 9~~Figure 9~~). One U-series age confirms the association of these deposits with MIS 5e, albeit with a large error (118 ± 11.0 ka; U-SERIES ID: 2026) (Geister, 1992).

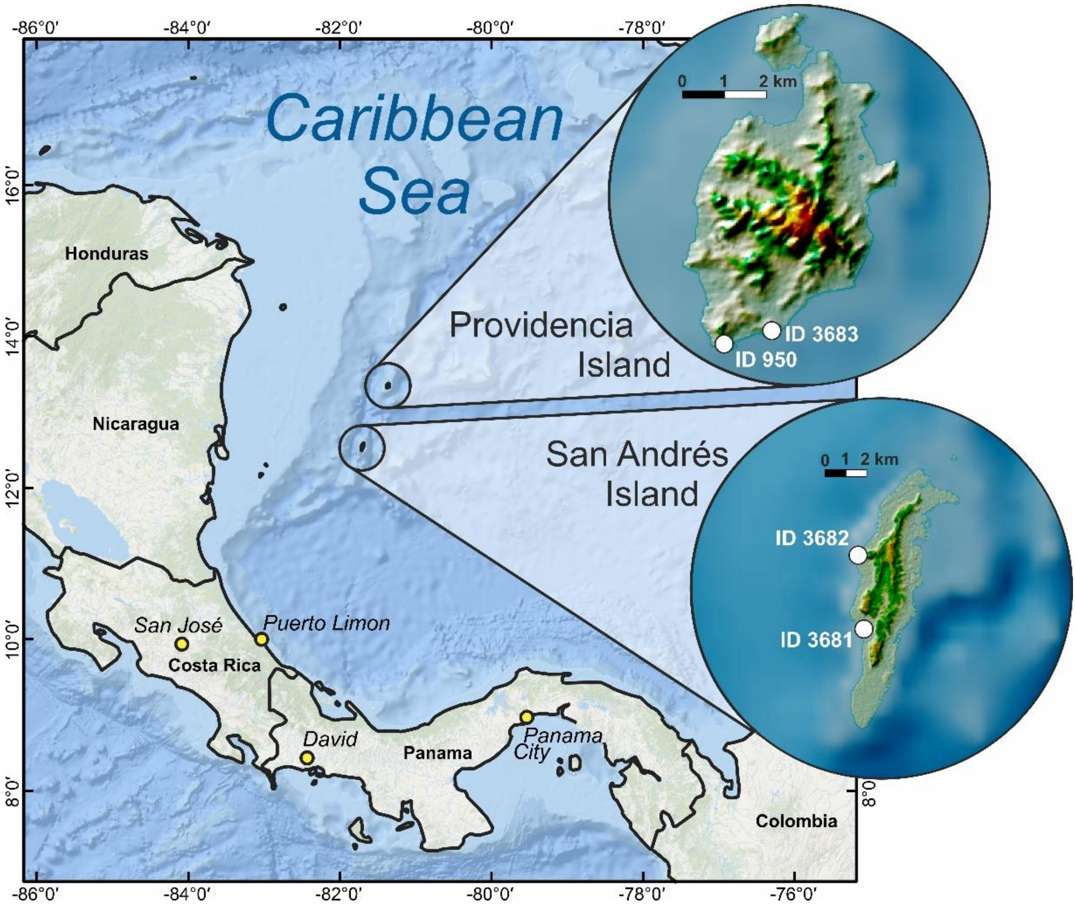


Figure 9. Location of Providencia and San Andrés islands within the Caribbean Sea. The insets show last interglacial sea-level data on the two islands. Basemap: Esri, Garmin, GEBCO, NOAA NGDC, SRTM 30m by NASA EOSDIS Land Processes Distributed Active Archive Center (LP DAAC, https://lpdaac.usgs.gov/).

6 Further remarks and conclusions

6.1 Data quality

Each RSL datapoint in our compilation has been assigned two quality scores, one for age and one for RSL information. The quality ranking goes from 0 (rejected) to 5 (excellent) and follows the guidelines given in Rovere et al., 2020. Thanks to the standardized WALIS interface, similar scores are available also for RSL datapoints located to the South and to the North of our region, which were compiled into WALIS by Gowan et al. (2021) and Simms (2021). In Figure 10, we compare the quality scores assigned in our review to those assigned by these studies. This comparison shows that the quality of both age and RSL information for our study area is, in general, higher than those in the nearby sites. However, the high scores on both properties are driven by the sites in the ABC islands, and no site in Brazil goes above the ‘Average’ age scores. For which concerns the RSL information, in Brazil only the sites described by Tomazelli and Dillenburg (2007) and Martins et al. (2018) have been scored as ‘Good’ to ‘Excellent’. This means that, potentially, these sites have final uncertainties on paleo RSL below two meters but their attribution to MIS 5e should be supported by more reliable dating.

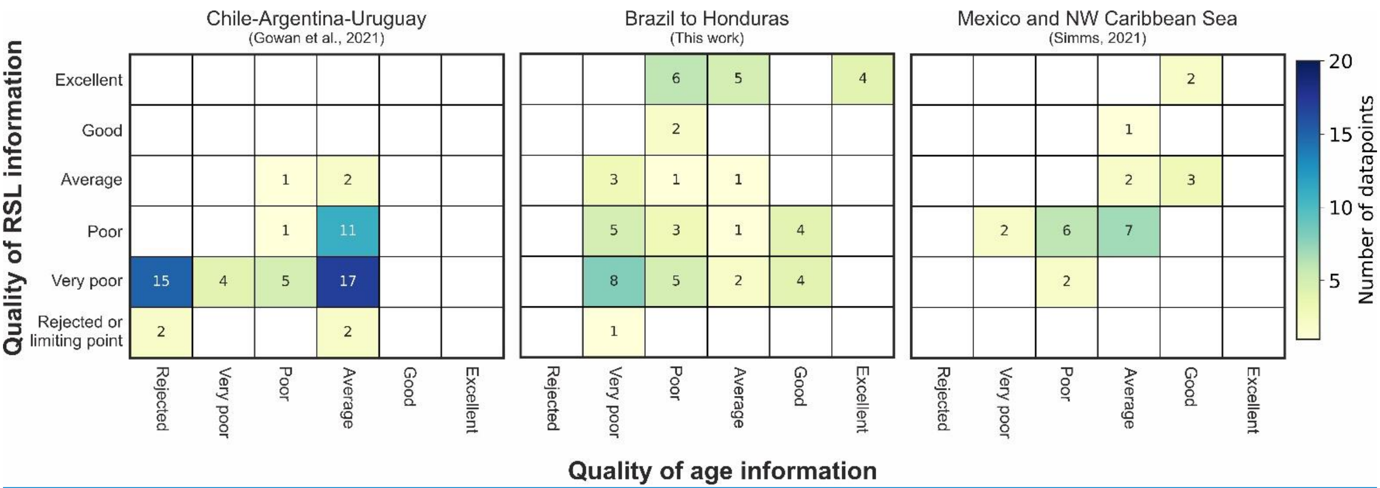


Figure 10 Quality of RSL and age information as estimated by (from left to right) Gowan et al. (2021) for Chile-Argentina-Uruguay, Brazil-Honduras (this study), and Mexico and NW Caribbean Sea (Simms, 2021). All studies used the same rationale to give a score to age and RSL information (see Rovere et al., 2020).

6.2 Departures from the eustatic signal

While in the WALIS interface there is the option to compile data and metadata on tectonic rates that affect each reported RSL data point, we chose to leave these fields blank. The reason behind this choice is that late Quaternary tectonic rates along the coasts covered by our review are often back-calculated from the elevation of the last interglacial shoreline and assumptions MIS 5e eustatic sea level, and therefore inserting such rates in the database would be affected by circularity. However, we remark that the area is characterized by different tectonic settings. The southern portion of Brazil (Figure 3~~Figure 3~~) is located roughly in the center of the South American Plate, hence sits on a passive margin. Towards the North (Figure 4~~Figure 4~~), several authors noted an increase in seismicity and highlighted the presence of faults offsetting Neogene deposits (Bezerra et al., 2006).

As remarked in the regional descriptions above, in this area last interglacial deposits appear higher than 20 meters and are hence considered uplifted (Barreto et al., 2002). The ABC islands are located on the Caribbean Plate, hence the elevation of MIS 5e sites on these islands is affected by tectonic displacement. Based on several levels of Quaternary reef terraces, Muhs et al. (2012) calculated that sites on the island of Curaçao are characterized by uplift rates in the order of 0.026-0.054 m/ka. Similarly, the island of Bonaire has also been affected by tectonic uplift, which appears to have caused a tilting of the island. Lorscheid et al. (2017) report that this tilting is 192 mm/km to the southeast, with the direction of the tilting comparing well with the one reported by Hippolyte and Mann (2011).

Besides tectonics, other regional processes might influence the elevation of RSL indicators in the area of interest. Earth Dynamic Topography has been shown to cause significant departures from eustasy in last interglacial sea-level records also along passive margins. Along the coasts of Brazil, Earth Dynamic Topography might contribute to several meters of uplift (Austermann et al., 2017, their Figure 3A,C). However, these predictions are still bounded by significant uncertainties (Austermann et al., 2017, their Figure 3B) and cannot be employed to 'correct' the RSL records shown here.

Another significant factor that may have caused the displacement of last interglacial RSL datapoints is sediment isostasy (Pico, 2020), which is defined as the isostatic response to sediments deposited by large rivers on the shelf. In particular, this process may affect areas close to the Amazon river (Pico, 2020, their Figure 3) causing net land subsidence in the order of tens of meters. This could explain why we did not find studies describing last interglacial RSL data points in this area, hinting that they might be located well below modern sea level.

A further process that has surely affected the current elevations of last interglacial RSL sea-level proxies along the coasts of Brazil to Honduras is glacial- and hydro-isostatic adjustment (GIA), which is caused by the isostatic response of the Earth to mass fluctuations of continental ice sheets. GIA consists of both solid Earth and mean sea surface (i.e. geoid) vertical variations that show up as relative sea-level (RSL) variations. The deviation of the local GIA-modulated RSL changes from the global mean, i.e. "eustatic", sea-level change, depends primarily on the distance from the ice sheets. During glacial periods such as MIS 6, the crust subsides underneath a growing ice sheet in response to the ice load. The upper mantle material is therefore pushed outwards to accommodate the bending lithosphere. At the same time, the increased mutual gravitational pull between the ice mass and the ocean water, causes the latter to rise in the proximity of the ice margins. As a result, ice-proximal locations experience RSL rise, which is significantly larger than the eustatic fall. Further away from the ice margins, the crust undergoes uplift in response to the upper mantle flow that is directed radially outwards and upwards. This is the so-called uplifting peripheral forebulge area, where the local glacial RSL drop is significantly larger (and faster in time) with respect to the global eustatic drop. Moving away from the forebulge, the local RSL drop tends to approximate the global eustatic signal, with deviations that depend on the water-loading redistributions in response to solid Earth, gravitational as well as rotational perturbations.

During deglacial and interglacial periods such as the MIS 5, the GIA process operates in the same way, but the overall trend switches. Accordingly, RSL drop is expected over the previously ice-covered region, while the collapse of the uplifted peripheral forebulge results in RSL rise larger than the eustatic. Interestingly, during the termination of the deglacial phases, the far-field areas that are either along the continental margins or in the equatorial band comprised between the tropics, do experience a noticeable RSL fluctuation that consists of an early highstand (above the eustatic value), then followed by a drop. Two processes are at work here: (i) the so-called continental levering, which consists of an upward tilt of the continental margins in response to the subsidence of the ocean basins which are loaded with meltwater, and (ii) the ocean syphoning, where water migrates towards the collapsing peripheral forebulges in response to ocean mass conservation.

6.3~~1~~ Last interglacial sea-level fluctuations

The current research status of the l~~L~~ast i~~I~~nterglacial in the Western Atlantic and Southwestern Caribbean does not allow for the discernment of sea-level oscillations within MIS 5e, since most studies in the region lack the refined chronology necessary to identify such detailed sea-level patterns. However, we remark that this area might help to solve several questions related to the presence and magnitude of sea-level oscillations during MIS 5e, if high-quality data will become available.

To illustrate this point, we model the GIA-modulated RSL changes by solving the gravitationally self-consistent sea-level equation (SLE; Spada and Stocchi, 2007). We use a solid Earth model that is spherically symmetric, self-gravitating, rotating and is divided into shells that are characterized by a linear Maxwell viscoelastic rheology. We divide the mantle into three layers and imposed a vertical stratification of viscosity following the VM2 mantle viscosity profile of Peltier (2004). We force our model with the ANICE-SELEN ice-sheets chronology, which consists of four ice sheets (North America, Eurasia, Greenland, and Antarctica) and covers the last 410 kyrs of climate fluctuations (i.e., four glacial-to-interglacial cycles; de Boer et al., 2014). For the MIS 5e interglacial, we impose a global mean sea level scenario where Greenland and Antarctic ice sheets release, respectively, 2.5 and 1.0 m ESL equivalent at 127 ka. The Greenland ice sheet remains stationary until 117 ka, while the Antarctic ice sheet releases another 4.5 m after 120 ka. This scenario is in line with the 'two-stepped' last interglacial sea level proposed by Hearty et al. (2007) and O'Leary et al. (2013), which is still debated as little evidence supports the notion of a rapid collapse of the Antarctic Ice Sheet (AIS, Barlow et al., 2018; Polyak et al., 2018).

The GIA model shows a strong latitudinal dependence of the RSL change along the transect composed by our compilation and those of Gowan et al. (2021) to the South and that of Simms (2021) to the North (Figure 11~~Figure 11~~b). Such a regionally-varying RSL pattern depends on the interplay between the collapsing forebulge in the north and the continental levering and ocean syphoning in the south.

In particular, at the northernmost site of XCaret, the predicted RSL elevation at 127 k~~ayrs~~ is still ~6 m lower than the eustatic value (i.e., +3.5 m a.s.l.). This stems from the local contribution of the collapsing forebulge that was uplifted in response to the North American ice sheet glaciation at the MIS 6. The viscous response of the upper mantle results in a delay of the local RSL change, which reaches, through a monotonic rise, the actual eustatic value only at 120 k~~ayrs~~, i.e. right before the final jump that is caused by the AIS melting. A similar trend, but smaller in amplitude, is predicted at Boca Cortalein, thus implying that the forebulge-related processes cease to exist between Venezuela and northern Brazil, where a true eustatic 'sea-level jump' is expected. The predicted RSL curve at Sao Bentos-Touros is close to the eustatic, although the combination of levering and syphoning is visible in the form of a ~1.0 m highstand at 127 ka, which is then followed by an RSL drop towards the eustatic value at 120 ka. The GIA-driven highstand at 127 ka increases towards the south and reaches its maximum at Camarones, i.e. at a significant distance from the North American ice sheet and Antarctica. Interestingly, the predicted highstand at 127 ka is of the same magnitude as the final peak between 119 and 117 ka. Under such scenario, there should be evidence, along the entire coasts of Argentina and central Brazil, of a high-to-low sea-level swing, caused by the interplay between GIA and eustatic changes. At Puerto Williams, instead, the proximity to the AIS results in a much lower highstand at 127 ka, most likely as a function of the reduced gravitational pull after the MIS 6 and 5e melting.

The effects of solid Earth and gravitational perturbations are also visible in the predicted elevations of the final jump that is caused by the AIS fast melting. The southernmost sites, being closer to the AIS, are affected by the geoid drop that is caused by the reduced gravitational pull. As a result, the predicted highstand is slightly lower than the eustatic. On the other hand, the northernmost sites experience a higher-than-eustatic peak, again as expected by the self-gravitation process.

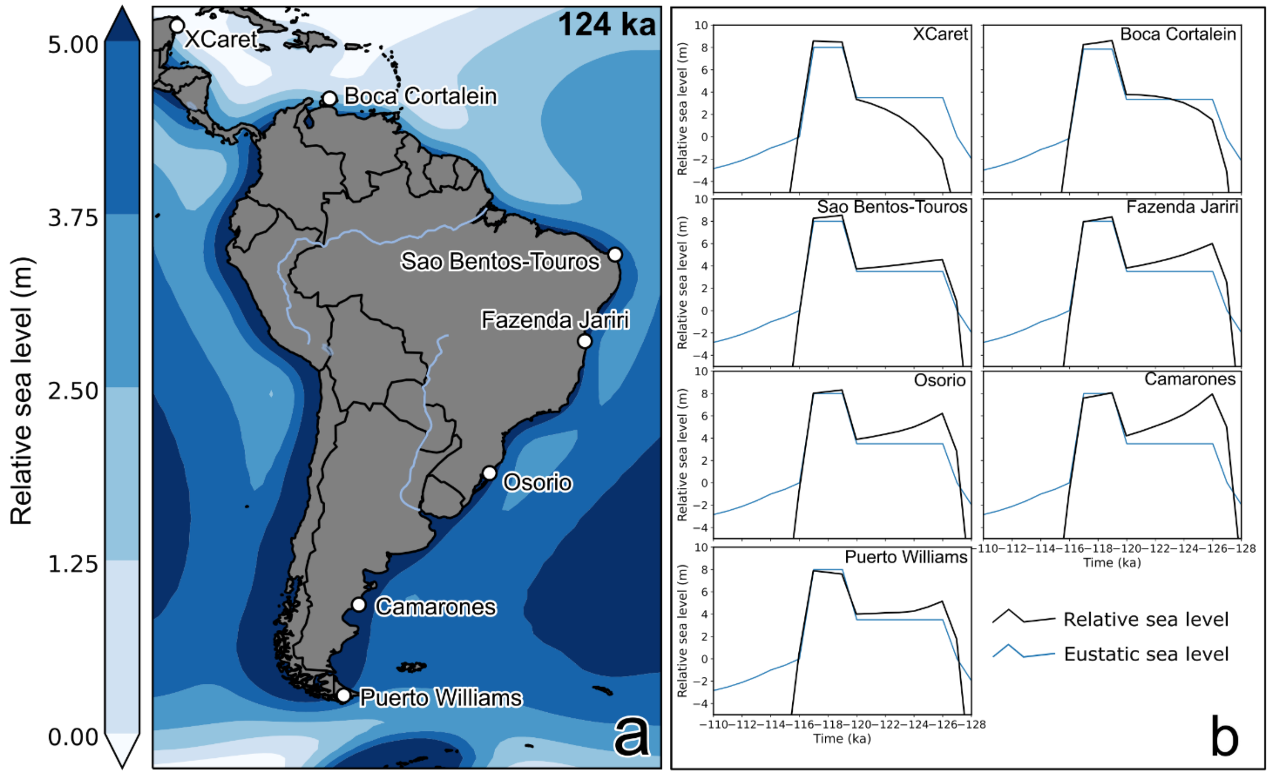


Figure 11 a) Relative sea level as predicted by the ANICE-SELEN model at 124 ka along a transect including selected sites in our review and those of Gowan et al. (2021) and Simms (2021); b) Time vs RSL at each location shown in a).

6.4~~2~~ Other interglacials and Holocene sea-level indicators

Among the studies reviewed, there are some reported ages/inferences related to other Quaternary sea-level highstands. In Brazil, Barreto et al. (2002) and Suguio et al. (2011) describe shorelines with elevations ranging from -2 m to 10 m a.s.l. that were associated with MIS 7 (substage 7c). In Curaçao, Schellmann et al. (2004) and Muhs et al. (2012) associate the Lower Terrace with the MIS 7 estimating a paleo sea level between -3.3 m to + 2.3 m, and the Middle Terrace with MIS 11, estimating paleo sea level ranging between approximately +8.3 m to +10 m.

For ~~which concerns~~ the Holocene, the work of Khan et al. (2017) presents standardized sea-level index points in Honduras, Panama, Venezuela, ~~Curacao~~ Curaçao, Guyana, and Suriname. A review of Holocene studies in Brazil was conducted by Angulo et al. (2006) and a database is available, albeit not yet standardized to state-of-the-art templates for Holocene sea-level studies (i.e., Khan et al., 2019).

6.5~~3~~ Future research directions

There are several lines of inquiry that merit attention for which concern LIG sea-level studies in the area covered by thi~~s~~se database.

1. ~~First, e~~Except for the islands of Bonaire and Curaçao, the age control on sea-level index points associated with MIS 5 is generally poor. Most locations have limited chronological control, relying upon minimum radiocarbon ages or chronostratigraphic correlations between sites. In Brazil, more accurate chronological techniques have been employed to date Pleistocene sediments (i.e. OSL and TL), but there is a general lack of reporting standards of geochemical values and metadata, which makes it difficult to assess the reliability of each sample.

~~1.~~ With few exceptions (Tomazelli and Dillenburg, 2007; Martins et al., 2018), the elevation of Brazilian sea-level proxies should be better measured with state-of-the-art techniques, such as differential GNSS systems, to reduce the currently large uncertainties. Therefore, a research priority for the vast area between Rio Grande do Sul and Rio Grande do Norte (Figures 3 and 4) is to perform new fieldwork aimed at re-measuring and re-dating the sites reported in our database, providing enough data and metadata on both elevation and age.

2.

~~2.~~ In Venezuela, the Paraguana Peninsula appears as a potential target for investigations on LIG shorelines. Here, ~~There~~ there is a general need for better site descriptions, location, and measurement. Coupled with U-series and/or OSL ages at selected sites, this will enable the possibility to add to our database several sea-level index points~~, and improve the quality of existing ones~~. For which concerns French Guiana, Suriname, and Guyana, there is evidence that LIG transgressive sequences are preserved, but the central need is to identify key sites and provide reliable geological descriptions, ages, and elevation measurements. Similarly, in the long stretch of coast from Colombia to Honduras, a research priority for ~~LIG~~ future studies is to identify whether last interglacial sites are ~~available~~present.

The fossil coral reef in Puerto Viejo (Costa Rica) reported in Bergoeing~~,~~ (2006) may represent the starting point for investigations on LIG sea-level changes in the region, which might also encompass a better description and dating of the reefs in the San Andrés and Providencia Islands.

3.

4. In Bonaire and ~~Curacao~~ Curaçao, the sea-level index points are generally well-described, precisely measured, and dated. This stands in ~~stark~~ strong contrast with the neighboring area of Aruba, where reef terraces are only generally reported in the literature, but for which age control and stratigraphic descriptions are not available. Completing the LIG history of the "ABC islands" by including details on the fossil reefs of Aruba appears as a priority in this area.

5. Together with the data compiled in Simms (2021) and Gowan et al. (2021), the data in this paper provide a unique transect across the forebulge of the former Antarctic Ice Sheet. The location of this transect may be used to test different ice melting histories, including testing the possibility of a rapid Antarctic Ice Sheet collapse during the last interglacial. This will be possible only by largely improving, with new field data, the data quality both on RSL index points and on their associated age.

~~3.~~

7 Data availability

The Western Atlantic and Southwestern Caribbean database is available at: https://zenodo.org/record/5168571 (Version 1.02; Rubio-Sandoval et al., 2021). The description of the database fields can be found at: https://zenodo.org/record/3961544 (Rovere et al., 2020).

Author contributions

KRS compiled the database and wrote the MS with help from AR and DDR. AR, TL, TF, CC, AKP and PS contributed original field data from Bonaire and Curaçao. All authors gave input on the manuscript, revised the final text and agree with its contents.

Competing interests

The authors declare no competing interests.

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