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Pleistocene sea-level record in low latitude settings: the Cape Verde Islands

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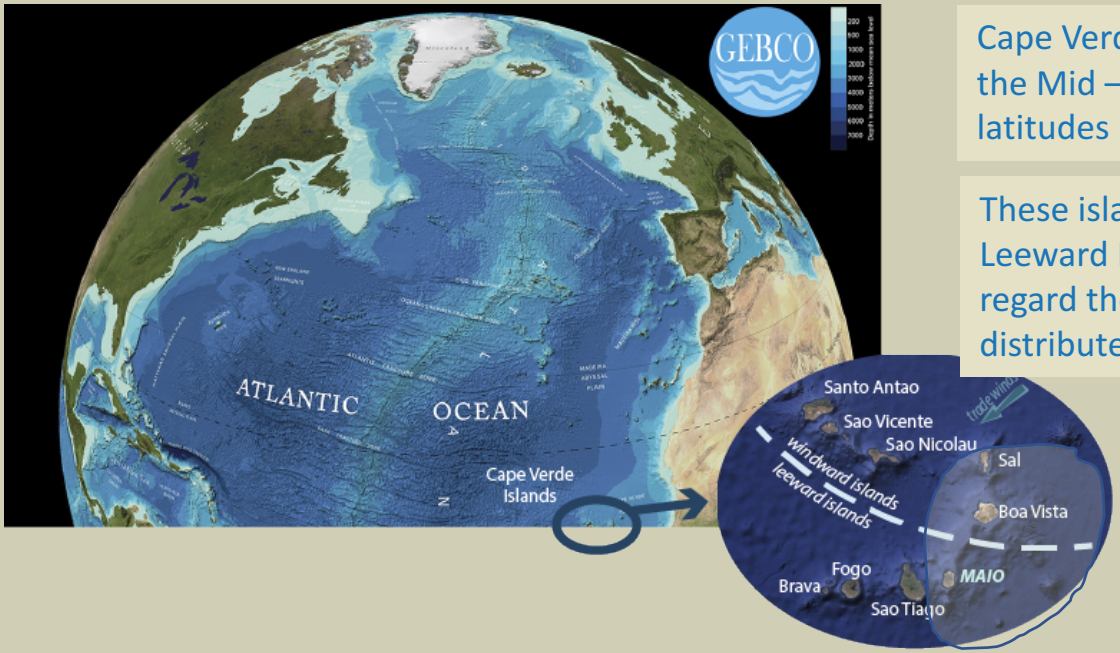
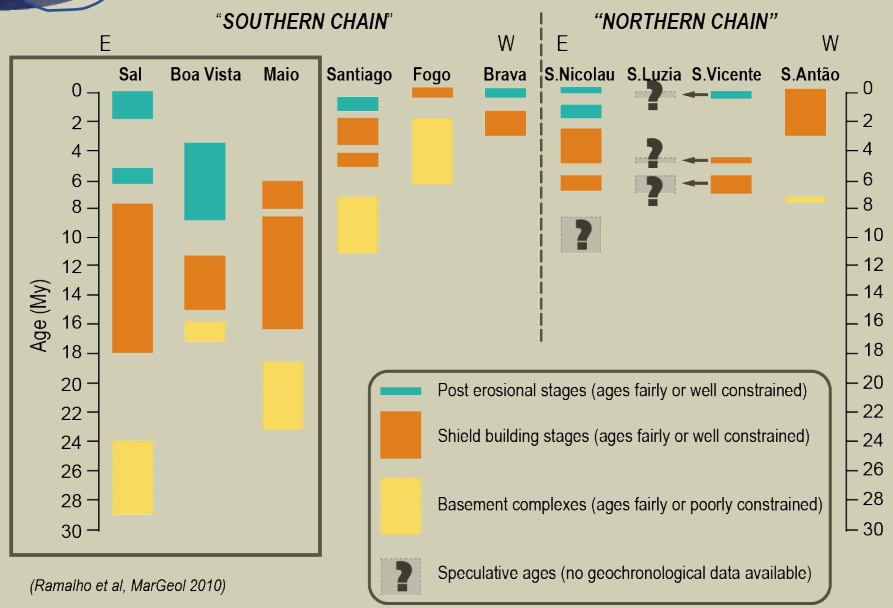


Cape Verde is a volcanic archipelago located in the Mid – Eastern Atlantic Ocean between latitudes 14° and 18° N.

These islands are separated into Windward and Leeward Islands depending on their orientation with regard the main NE Trade Winds, and they also distribute along a "Northern" and "Southern" chains

Sal, **Boa Vista** and **Maio**: oldest and driest

The islands lie on Jurassic-Cretacic seafloor and their evolution responds to a **hotspot** model: the younger vulcanism at the westernmost end of the archipelago, congruent with the relative motion of the Nubian plate



(Ramalho et al, MarGeol 2010)

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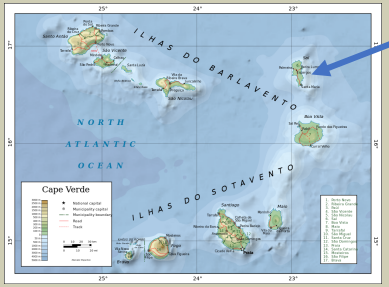


Sal (220 km²)

- Flat or almost flat
- Monte Grande, 460m
- Ancient Eruptive Complex (25.6±1 My)
- Isolated cones of post-erosional stage (ca 0.6My)

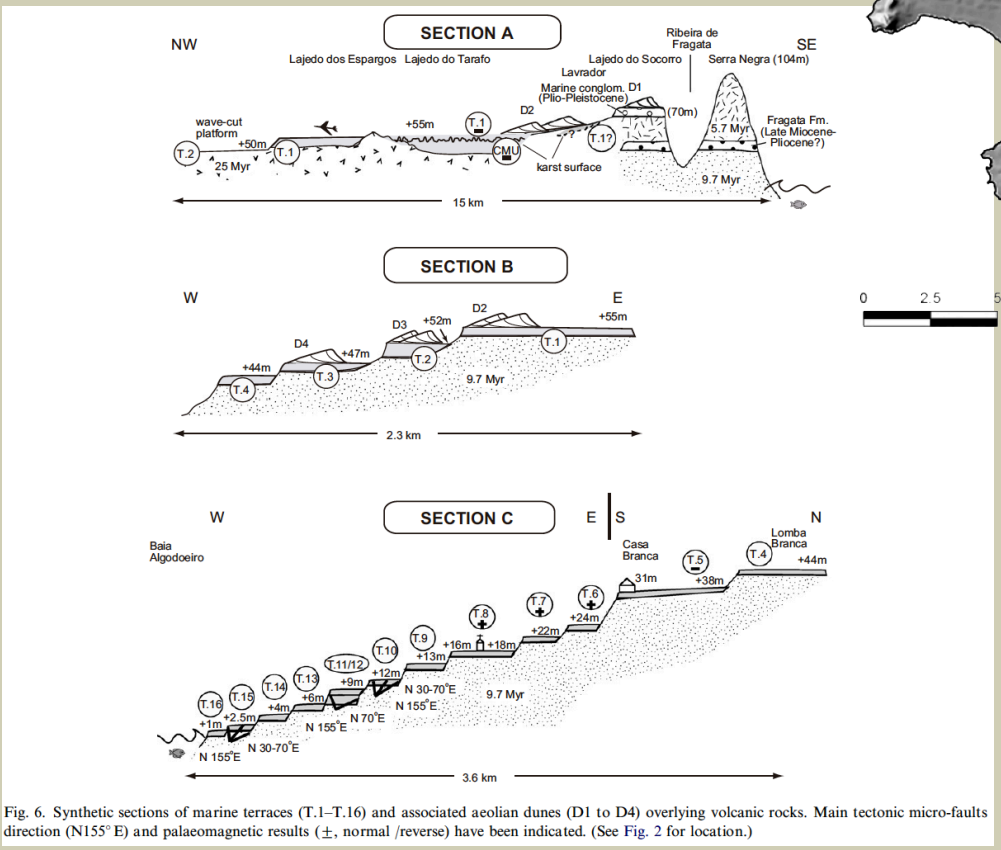
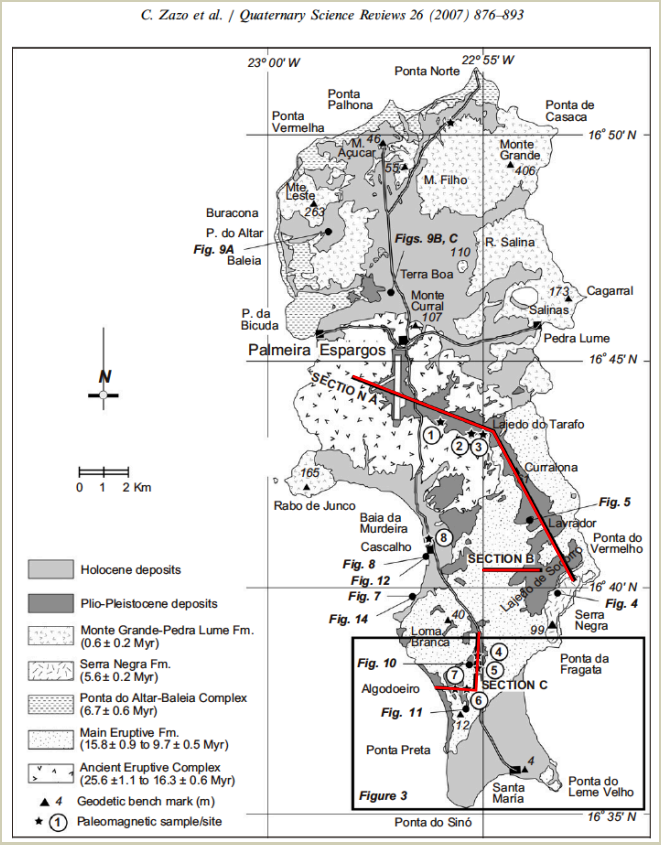


Fig. 6. Synthetic sections of marine terraces (T.1–T.16) and associated aeolian dunes (D1 to D4) overlying volcanic rocks. Main tectonic micro-faults direction (N155° E) and palaeomagnetic results (±, normal /reverse) have been indicated. (See Fig. 2 for location.)



- Sequence of up to 16 Quaternary marine terraces
- Mostly beach sediments over a basal wave-cut surface
- Heights from +70m to 0m
- Paleomagnetic measurements suggest an Early Pleistocene age for terraces T.1 to T.5
- Important dune development during Early Pleistocene
- Difference in altitude between successive terraces is higher in older terraces
  → stronger uplift during Early Pleistocene

(Zazo et al., 2007, QSR)

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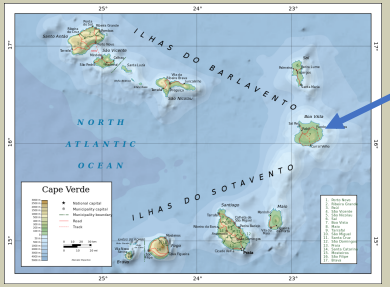
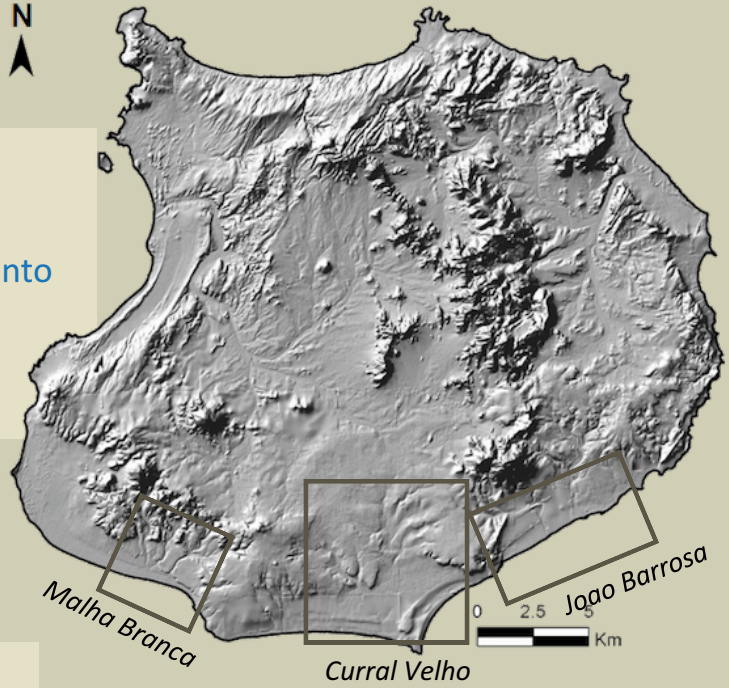


Boa Vista (620 km^2)

- almost flat
- Residual reliefs: Monte Estancia (390m) - Santo Antonio (379m) - Rocha Estancia (336m)
- Basement complex – 16-18 My
- Last eruptive stage - ca. 4 My



- Huge aeolian dune development along the entire Quaternary
- Most complete sequences of quaternary marine sedimentary terraces:
  - Malha Branca (up to +30m), Curral Velho (up to +40m) and Joao Barrosa (up to +75m)
  - Marine erosional terraces has been reported to occur as high as +110-120m (Serralheiro et al., 1974; Ramalho et al., 2010).
- Early and Middle Pleistocene sedimentary evolution responds to a model of sedimentary filling of shallows in an almost completely eroded and flattened island.

(Mapping of Early and Middle Pleistocene marine terraces in progress)

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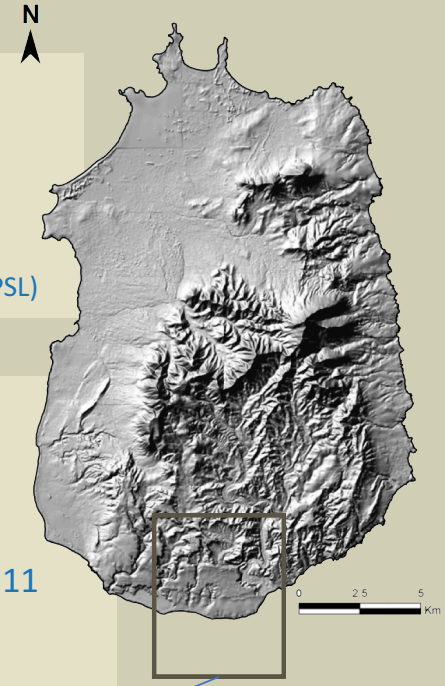
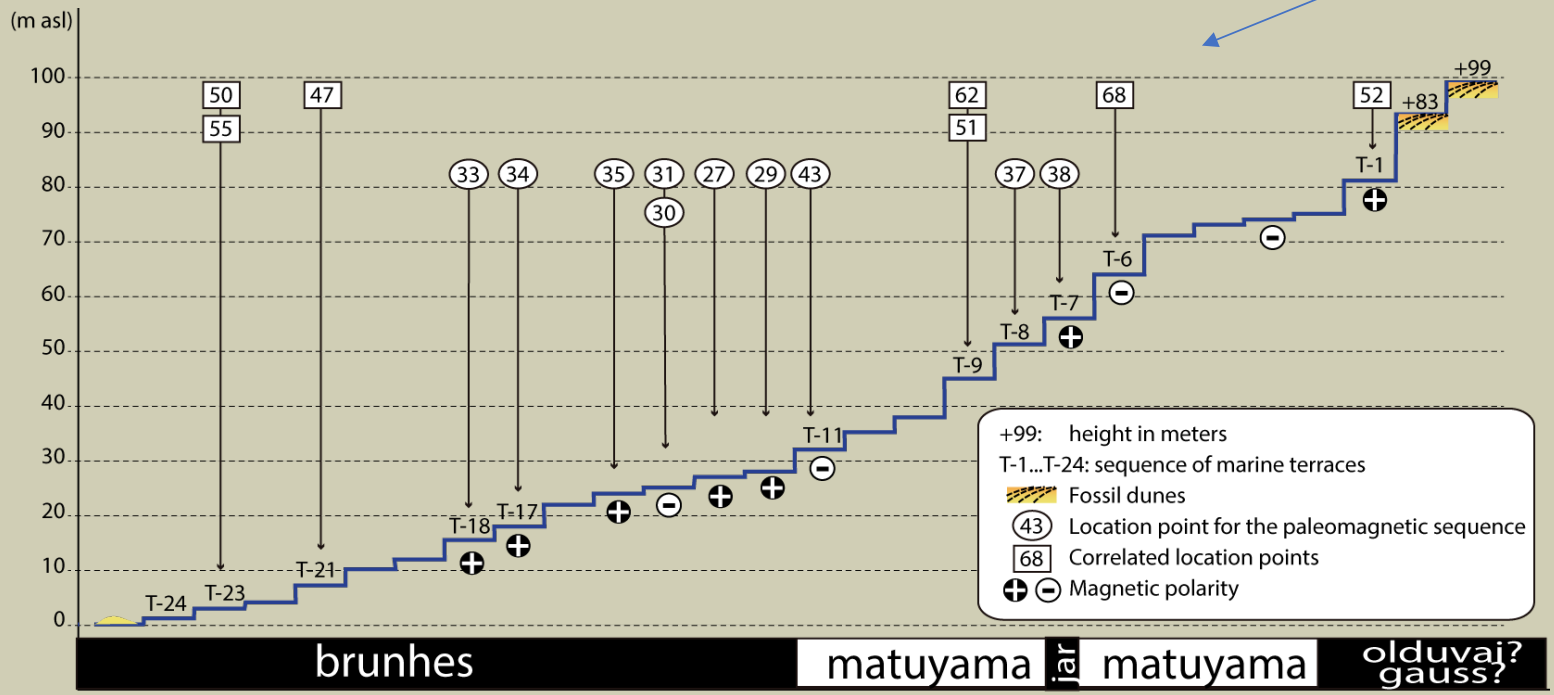
Maio (275 km²)

- Low-lying island
- Highest mountain: Monte Penoso, 436m
- Basement Complex, ca. 20My
- Youngest vulcanism: stratovolcano 7My (Mitchell et al., 1983-EPSL)

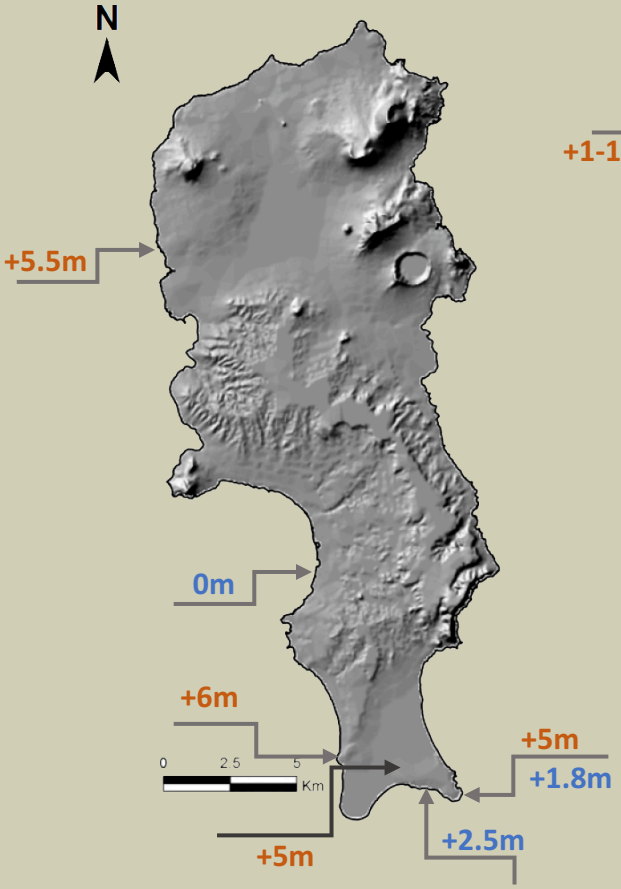


- Sequence of up to 24 Quaternary marine terraces
- Mostly beach sediments over a basal wave-cut surface
- Heights from +81m to +1m asl
- Two older flat surfaces (marine ?) covered by aeolian dunes
- Paleomagnetic measurements suggest an Early Pleistocene age for terraces T.1 to T.11
- Difference in altitude between successive terraces

→ complex history of vertical motion but uplift decreasing in time



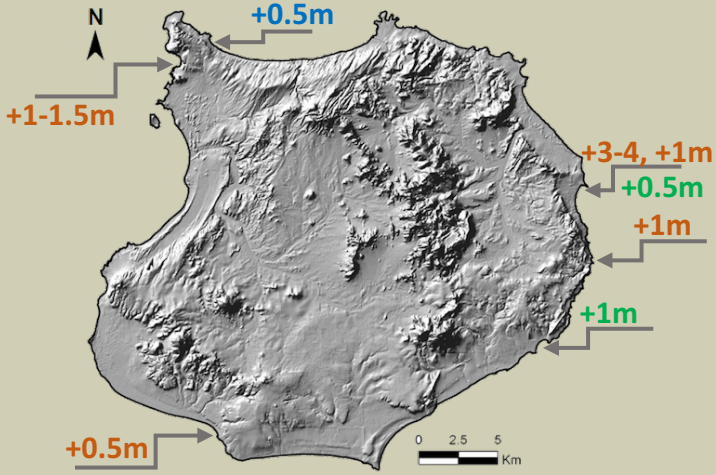
The most recent interglacials (MIS 11 to MIS5): U/Th results



SAL (data from Zazo et al., 2007-QSR)

MIS9: 312±26ka, 322±35ka, 343±73ka, 330±24ka

MIS5e: 114.8±4ka, 122.9±3.5ka, 114.2±1.5ka, 125.7±3ka, 127.8±2.7ka, 125.8±2.5ka, 128.5±3.6ka, 129.2±4ka, 110.2±2.5ka

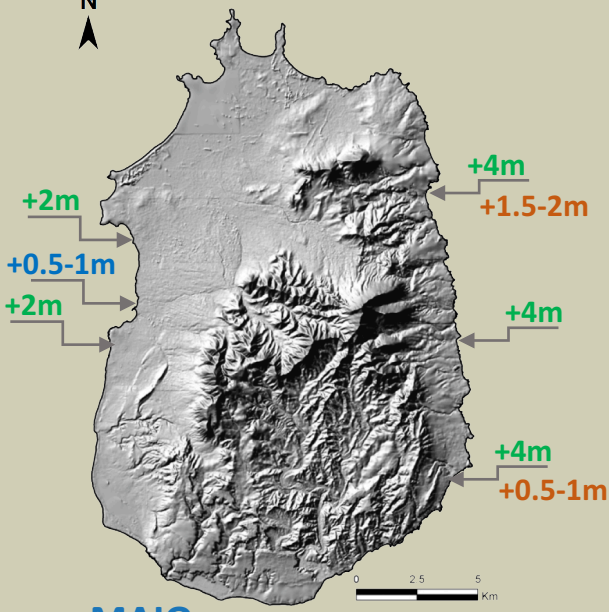


BOA VISTA

MIS11: 369.2±45ka, 343.5±57ka

MIS9: 277±13ka (?), 291±15ka, 292.2±16ka, 323.2±25ka, 292.7±16ka, 298.6±15ka, 333.2±37ka

MIS5e: only one site gave results compatible with MIS5e, 118±1ka



MAIO

MIS11: 367±17ka, 385±45ka, 386±37ka, 388±37,7ka, 417±45ka, 434±85ka, 452±67ka, 456±79ka

MIS9: 301±15ka, 306±16ka, 297±22ka, 313±18ka

MIS5e: only one site yielded ages compatible with MIS5e (7 samples)

The anomalous low heights of MIS11, MIS9 and MIS5e units, if compared with the general estimations (+6-13m for MIS11, +8-9 for MIS9, +6-9m for MIS5e; Spratt & Lisiecki, 2016-Clim.Past.) suggest a change in the vertical movement trend from uplift to subsidence after MIS5. However a lower sea level during these stages cannot be discharged.