

A sedimentary and foraminiferal record of early to mid-Holocene environmental change from Singapore

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INTRODUCTION

Investigating environmental changes from early-to-mid Holocene provides valuable information and analog for future projections.

A ~ 22 m long shallow marine sediment core (GRBH03) obtained from the Kallang River Basin, Singapore, records how the environment has responded to rising sea level from about 9 to 6 thousand years ago.

METHODS

Chronology

- Radiocarbon dating
- Bchron* (Parnell, 2008)

Sediment

- Grain size distribution
- Loss on Ignition
- XRF core scanning

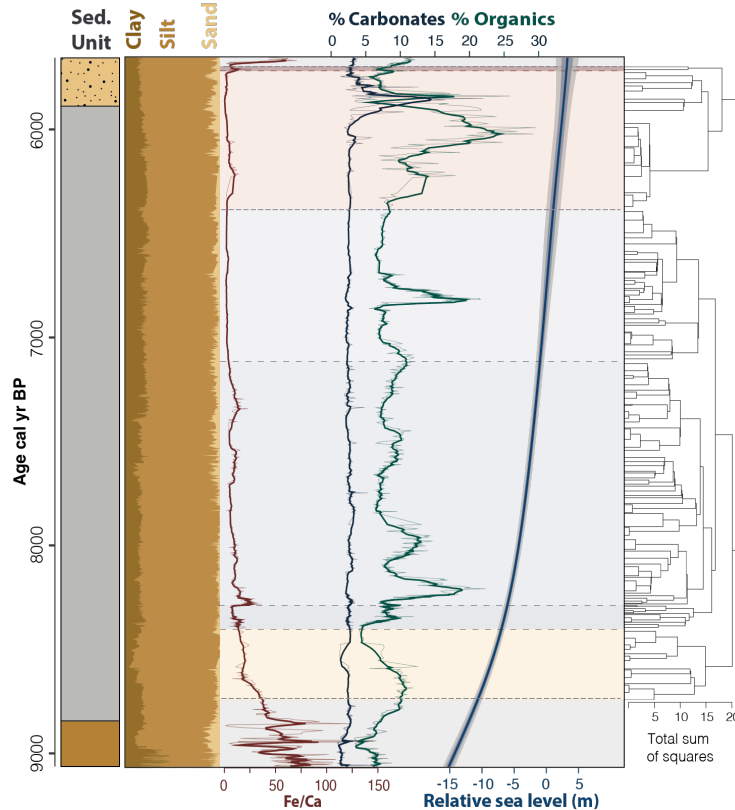
Foraminifera

- 200 specimens
- CONISS (Grimm, 1987)

RESULTS

Chronology

- Records from about 9 to 6 cal ka BP
- Local ΔR value of -188.5 ± 108.5 obtained from paired marine-terrestrial samples



3 sedimentary units

- Unit III: Shelly sandy unit
- Unit II: Blue grey marine mud
- Unit I: Dark grey sandy silt

6 foraminiferal clusters

Shallow benthic foraminifera are mostly found well-preserved in the marine muds (Unit II).

- Cluster IV** (brown): Foraminifera tests present are mostly broken
- Cluster V** (orange): Increased abundance of *A. veneta*, *B. striatula*, *M. globosa*
- Cluster II - IV** (grey): Increased abundance of *Murrayinella murrayi*
- Cluster I** (yellow): Dominated by *Ammonia* and *Elphidium* species

DISCUSSION

- From ~ 9 – 8 ka cal ka BP, Unit I (fringing mangrove) was deposited when sea level was low. No foraminifera were found in this unit likely due to degradation of organic material.
- Unit II (marine mud) was then deposited during higher sea levels and foraminiferal assemblages (Clusters I to IV) show increase in marine influence.
- About 7.5 cal ka BP, foraminiferal Cluster V show transition to brackish water environment.
- Unit III (nearshore) likely deposited when sea level rise slow down, and no foraminifera were found in this unit.

CONCLUSION

Changes in sedimentary units and foraminiferal clusters generally follow sea level changes.

REFERENCES & ACKNOWLEDGEMENTS

Figure 1: Results of sedimentological analyses and foraminiferal clusters identified are plotted with age. Changes in sedimentary units and foraminiferal clusters generally follow changes in sea level (Chua et al., 2021)

Introduction

Sunda Shelf

- Impending climate and sea level changes threaten millions of people living in coastal areas (e.g., South-east Asia)
- Contains thick Holocene sedimentary archives
 - Record past environmental changes
 - Contains useful information for future projections

Study area

- Kallang River Basin, Singapore
- GRBH03
 - ~22 m shallow marine sediment core



Figure 2: Map of Sunda shelf (dashed dotted line shows ~120 m isobath) and location of GRBH03