

# Archaeology and Changing Coastlines: A Case Study from Caesarea, Israel

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## Introduction

- Coastal environments are inherently dynamic, continually reshaped by processes such as sediment deposition, erosion, sea-level fluctuations, and episodic events such as storm surge, earthquakes, and tsunamis.
- Understanding how a coastal zone has responded to past environmental processes can help define the range of responses that can be expected in the face of future environmental changes.
- This study utilizes an integrated approach, combining the archaeological and sedimentological records, to assess shoreline changes at Caesarea on the Mediterranean coast of Israel.

*How has the northern coastline at Caesarea, Israel changed since the Roman Period?*



Locations of Israel on the Eastern Mediterranean (top left) & Caesarea (shown in red)



Locations of Offshore Excavation Area AT10 and Sediment Core CCI9C1 Relative to the Roman Harbor, Aqueduct, and Cloaca

## Methodology

- Drone Survey & Underwater Excavation 500 m off of Current Coast
- Sediment Collection: Sampling During Excavation & Pneumatic Corer
  - Sediment Sample Analysis: Grain Size, Stratigraphy
- Dating: Radiocarbon (C14) & Optically Stimulated Luminescence (OSL)



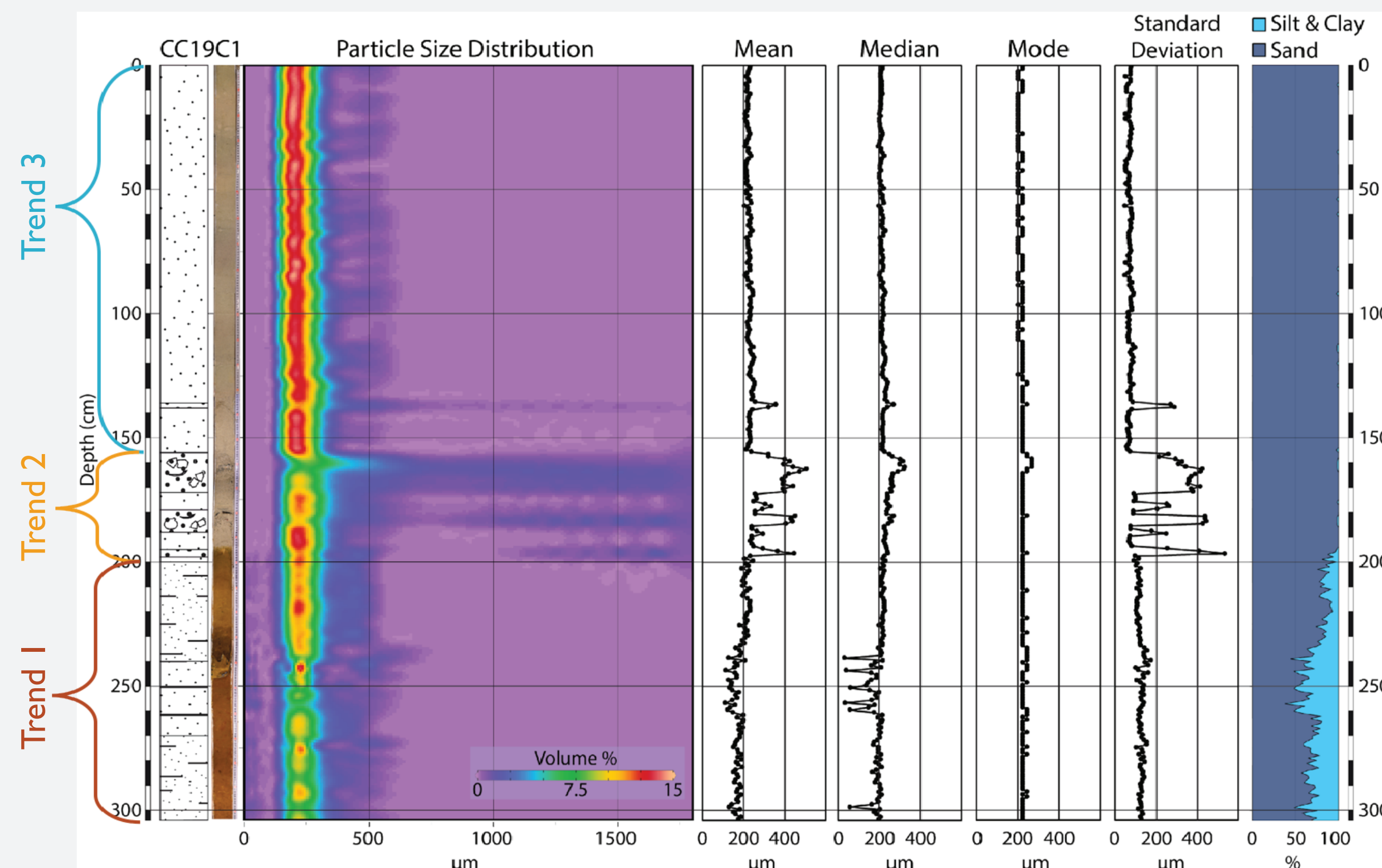
2x2 m Underwater Excavation Area AT10



Sandy Sediment at Top of Core CCI9C1

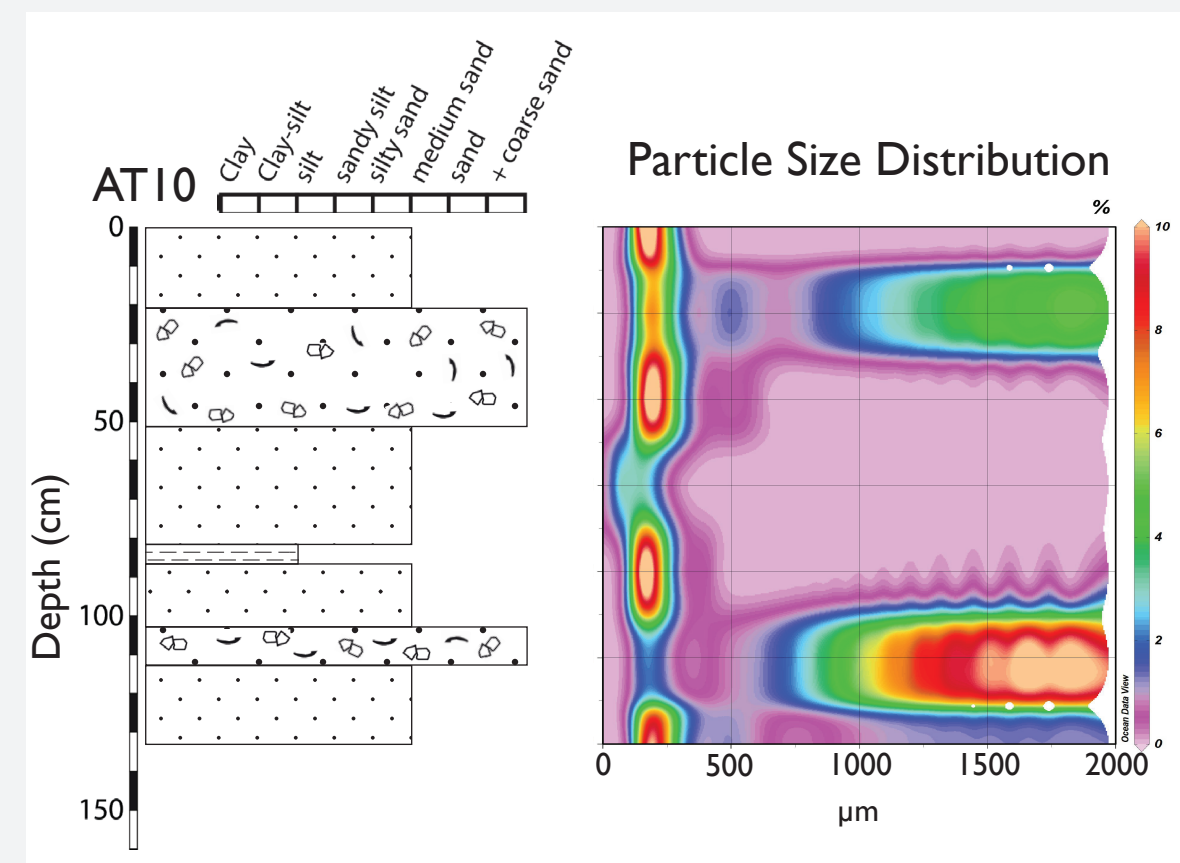
## Results

### CCI9C1 Sediment Core Grain Size



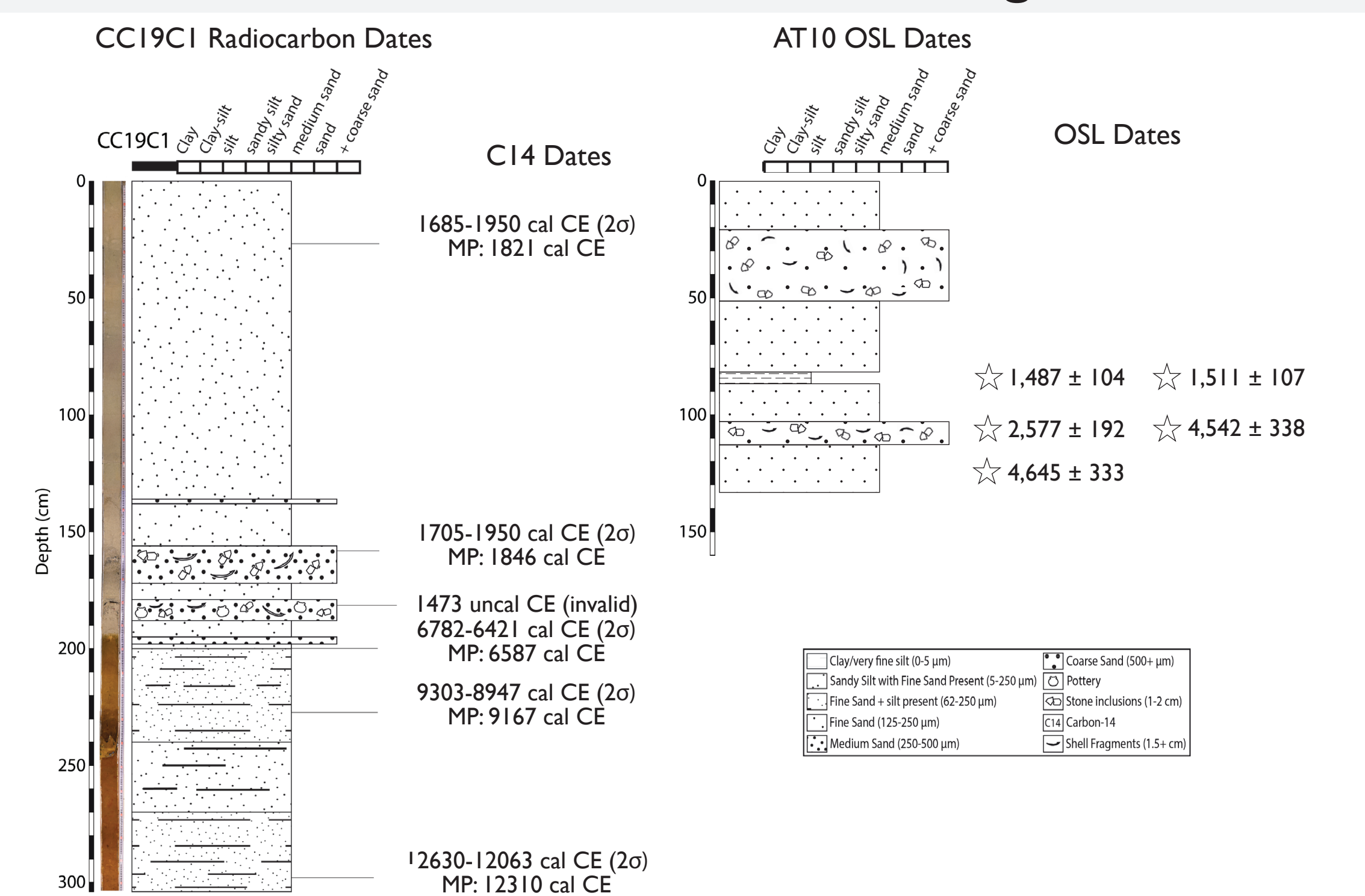
Grain Size Trends: Trend 1: Fine-Grained Sediment, Trend 2: Coarser Sediment with Shell and Pebble Inclusions, Trend 3: Medium Sand

### AT10 Offshore Excavation Area Grain Size



Grain Size Trends: Medium Sand with Two Layers of Coarse Sediment with Shell and Pebble Inclusions and a Thin Layer of Fine-Grained Sediment

### Radiocarbon and OSL Dating



Temporal Gap Visible in CCI9C1 versus More Continuous Dating Sequence in AT10

## Results

### Drone Survey



Submerged Roman Road (dashed line) Visible in Drone Images & Historic Map (Jacotin, 1810)

## Conclusions



Approximate location of Roman coastline between AT10 and CCI9C1 before eroding to current coastline position

1. Area of submerged road and aqueduct terrestrial during Roman Period.
2. CCI9C1 in erosive coastal zone during/following Roman Period, removing sediments, before area was rapidly submerged in recent centuries, depositing and preserving marine sands at top of core.
3. AT10 in marine environment below the breaker zone during Roman Period, preserving more complete sedimentary sequence.

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