

# Early to Middle Bronze Age Archaeobotanical Analysis of Urban Collapse in the Southern Levant

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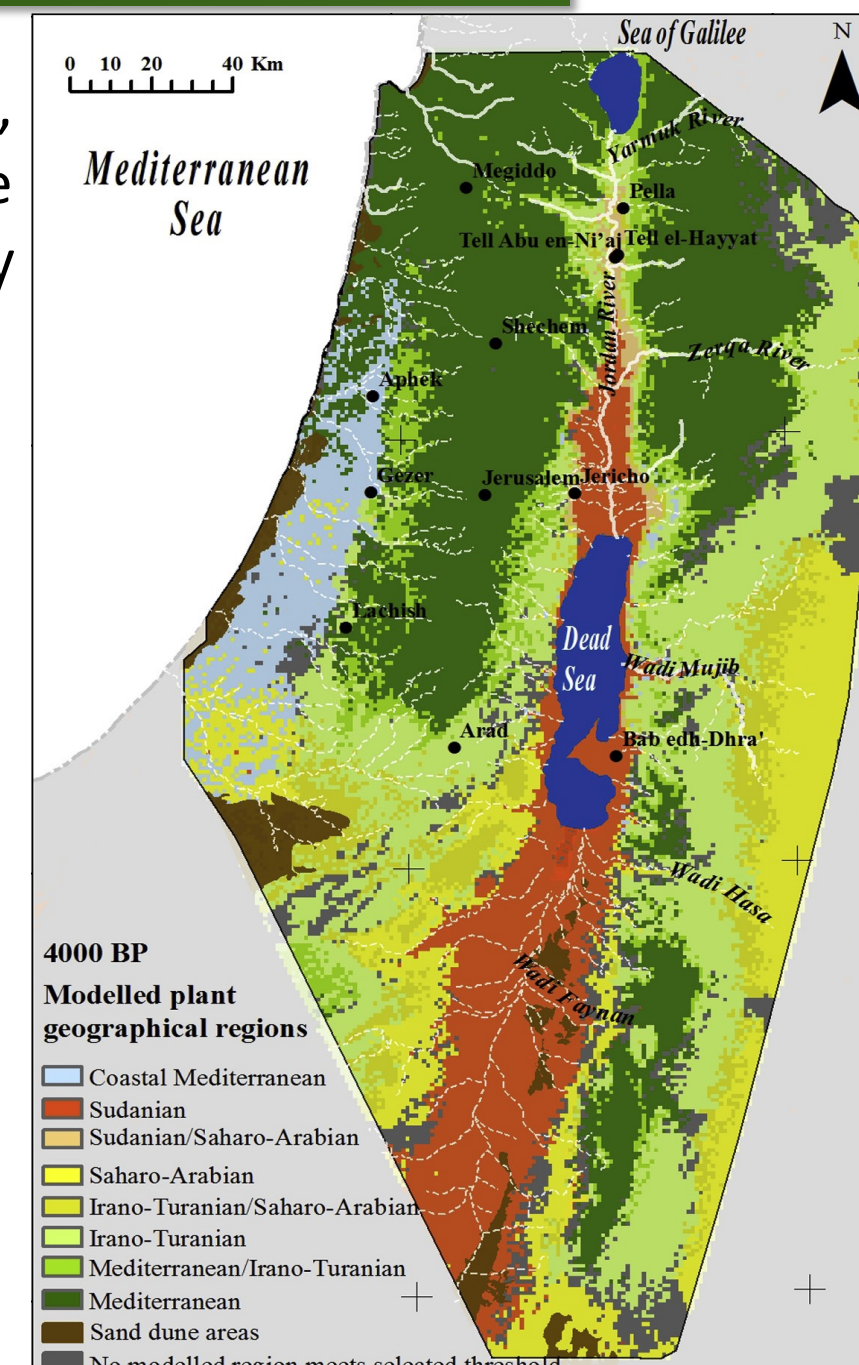
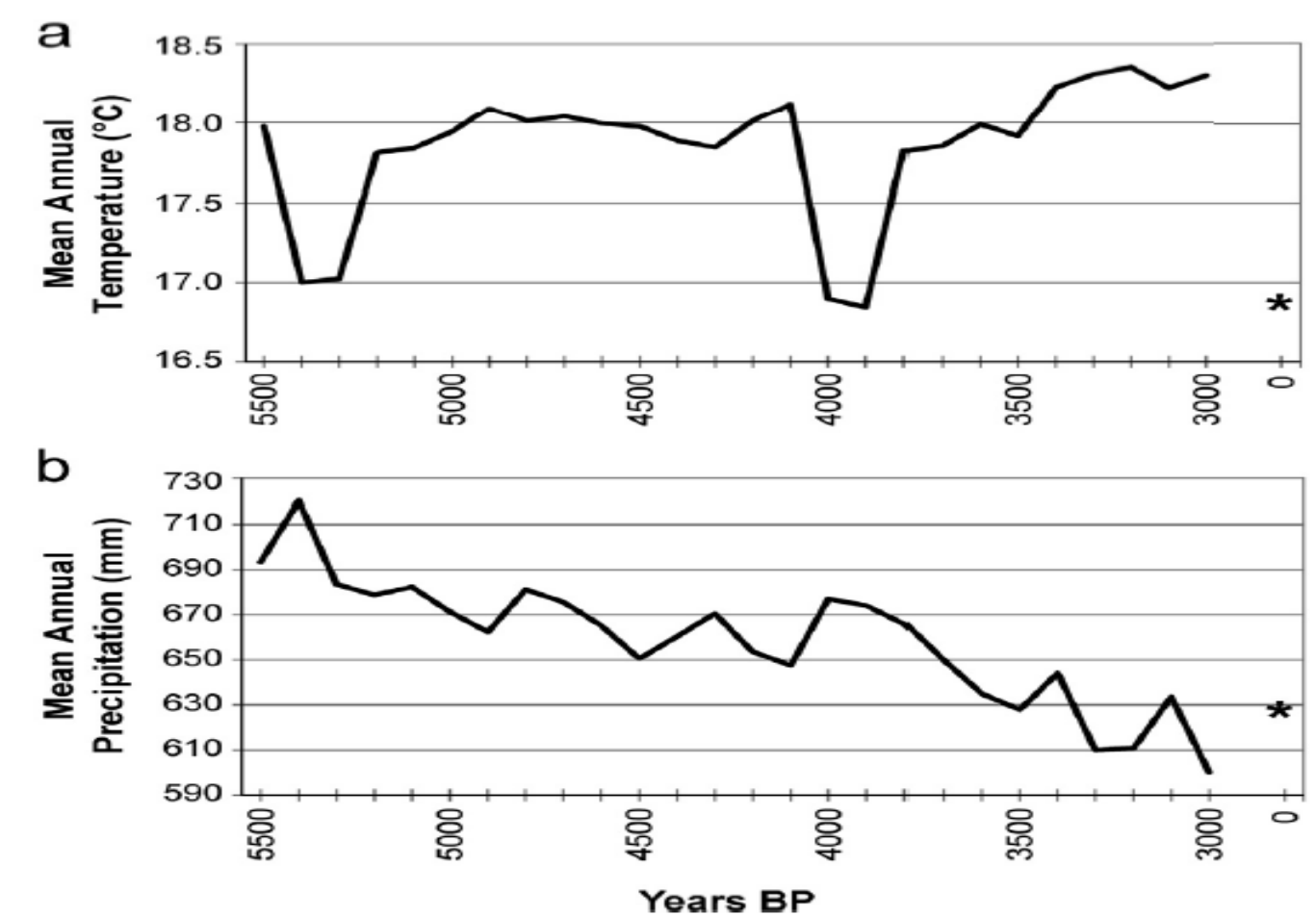


## Investigating Urban Collapse

Research focused on the Early Bronze IV (2550-2000 BC) archaeological site of Tell Abu en-Ni'aj, Jordan during a period of urban collapse. The Early Bronze IV is hypothesized to be a period of severe and rapid aridification throughout the Near East. This hypothesis was tested by analyzing the cultivation patterns at Ni'aj. Seed taxa were identified and counted to analyze trends in specific crop taxa, and carbon isotope ratios for the seeds were used to estimate drought stress. These measurements assess the impact of climate change on Levantine agrarian society in antiquity.

## Past Climate & Vegetation Models

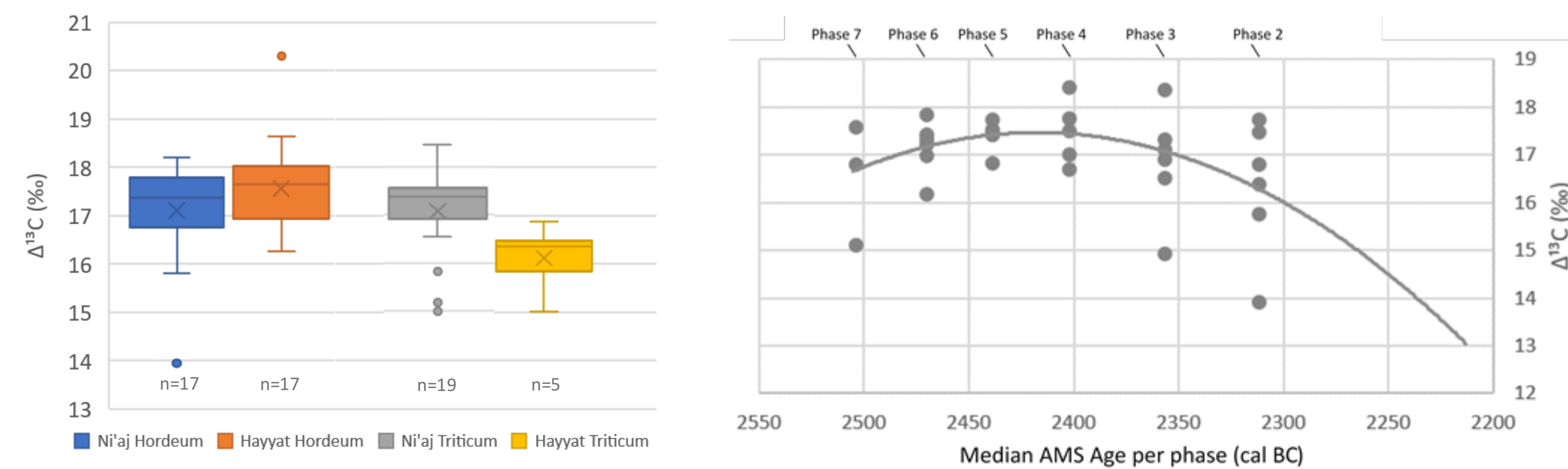
Data were compared to models from Soto-Berelev, Fall, Falconer & Ridder (2015) for Bronze Age temperature and precipitation (left), and vegetation at the Early Bronze/Middle Bronze transition (right).



## Regional Aridification

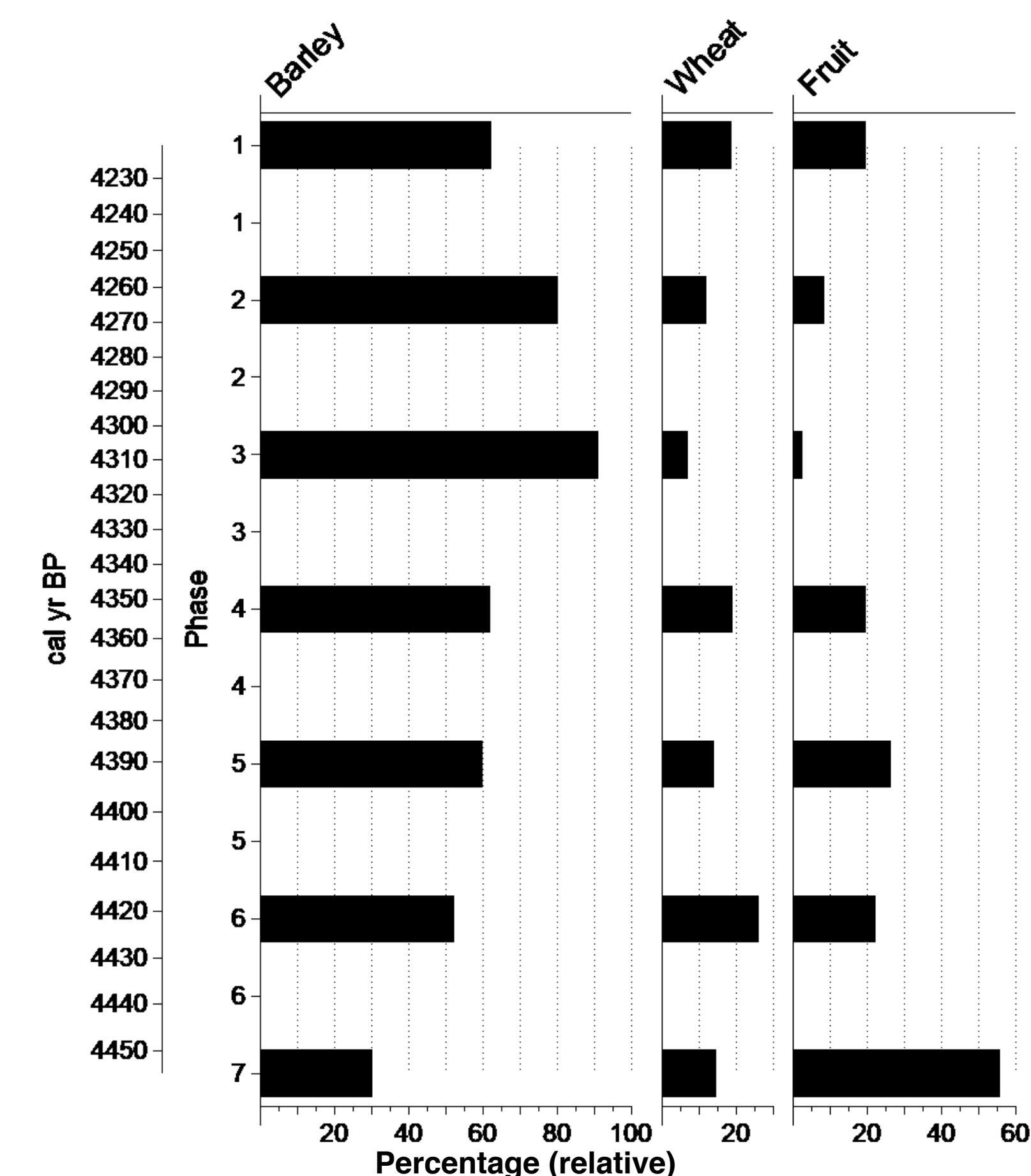
Analysis of seeds from Tell Abu en-Ni'aj shows a shift from wheat to barley reliance during urban abandonment in EB IV. Increased frequency of cultivated crops over wild species suggests intensified agriculture through the occupation of Ni'aj. Values for  $\Delta^{13}\text{C}$  indicate slightly increasing water availability early in EB IV, followed by a decline later in the period. Results show that changes in agricultural practices at Tell Abu en-Ni'aj correlate with the onset of high drought stress and aridity.

## Preliminary Stable Isotope Results

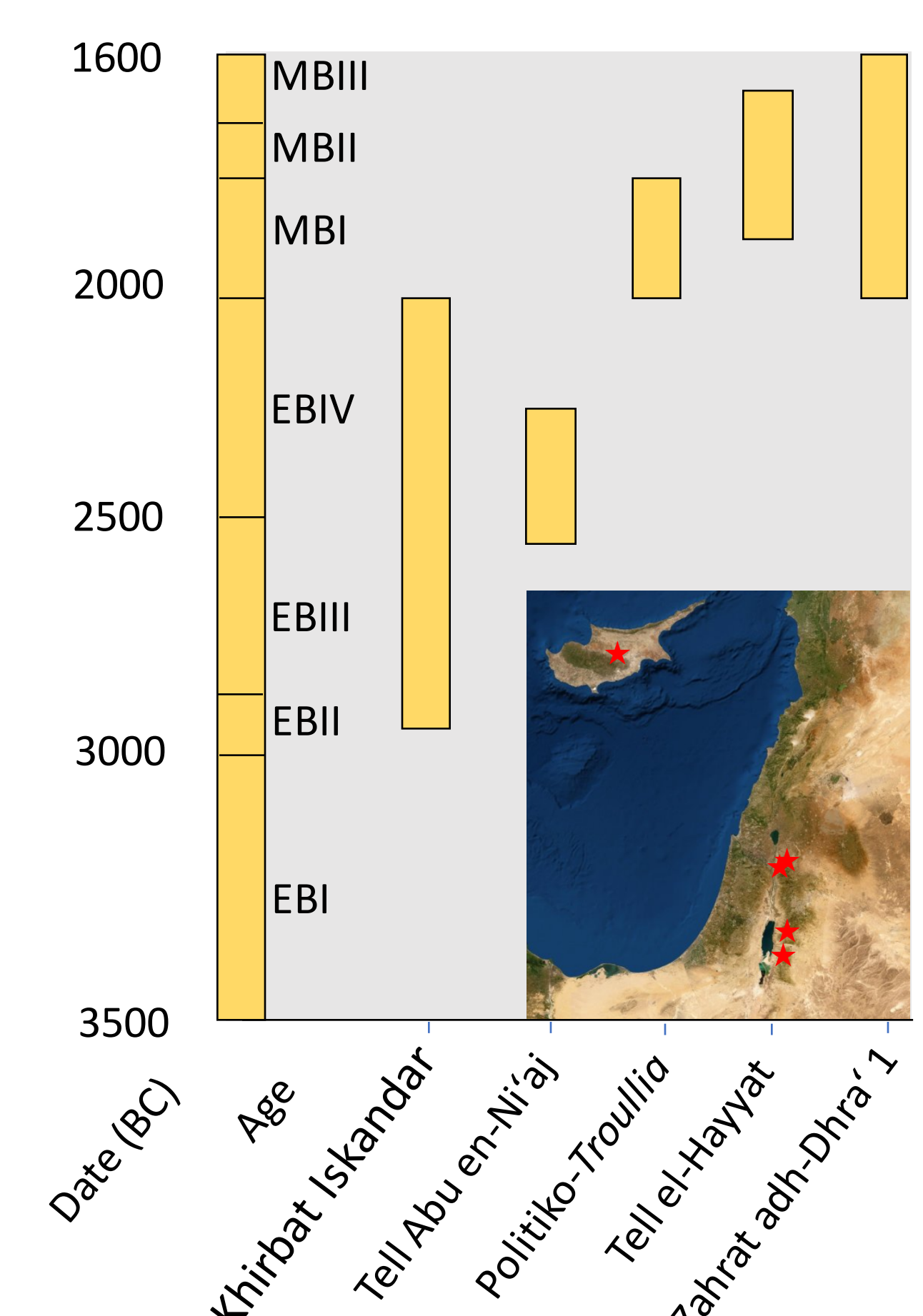


$\Delta^{13}\text{C}$  signature in cereals at Ni'aj and Hayyat (left) and  $\Delta^{13}\text{C}$  curve showing water availability at Ni'aj (right).

## Tell Abu en-Ni'aj Archaeobotany



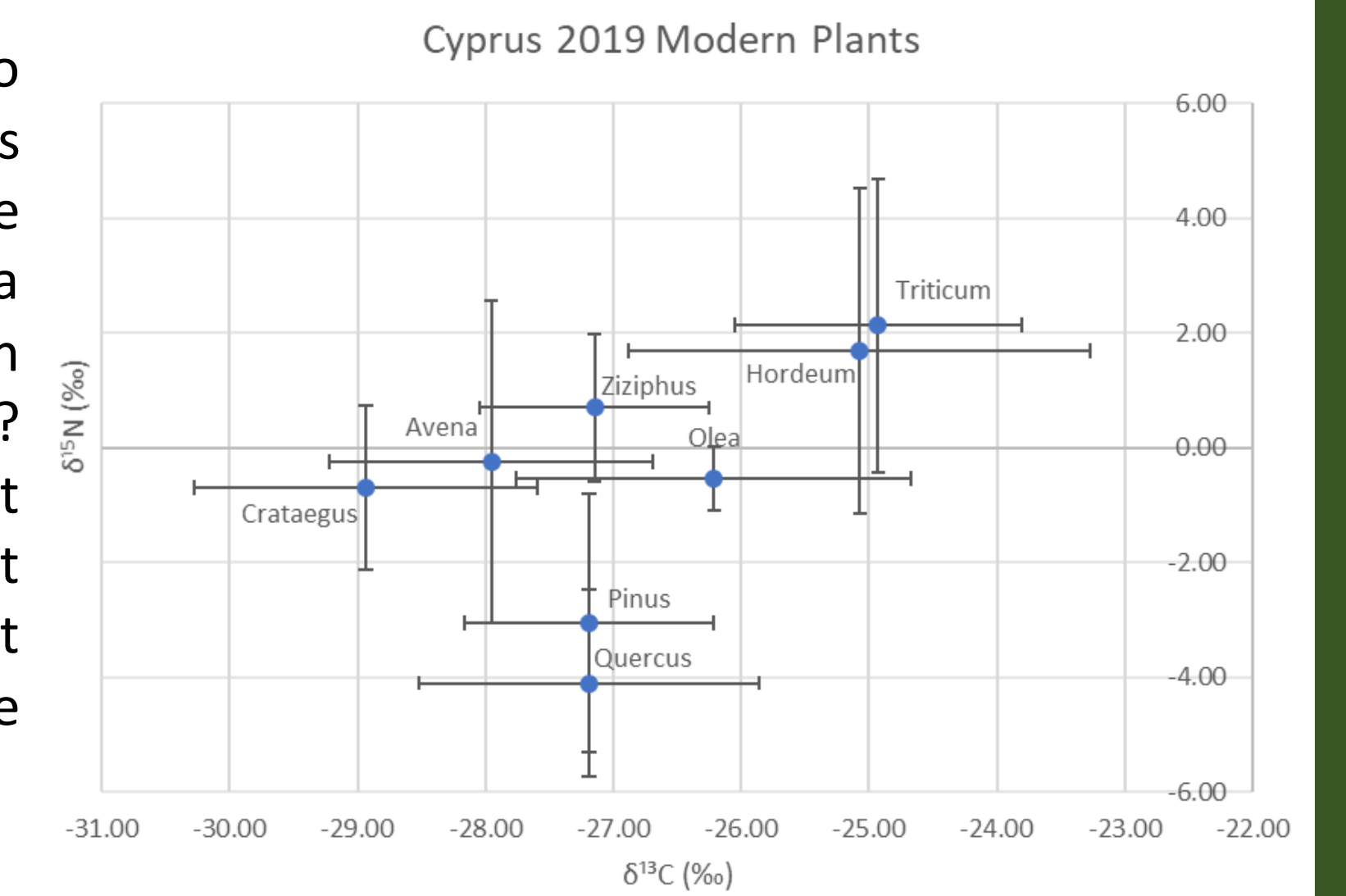
## Expanding Our Research



## Utilizing Isotopic Proxies

Expanded paleoenvironmental analysis will gather  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  from carbonized seeds and modern plants, and  $\delta^{18}\text{O}$  from faunal remains and modern water to assess isotope concentrations through the Early and Middle Bronze Ages (3000-1600 cal BC). We can expand our initial isotope curve from Ni'aj with more archaeobotanical surveys, while adding new measures of paleotemperature and precipitation at different scales.

Isotopes will help us to address our questions regarding Early to Middle Bronze transition. Did a two-phase aridification event occur in EB IV? How long did the event last, and how did it impact the environment and the people of the Southern Levant?



## Research Significance

Early Bronze IV is one of the most dramatic transitional periods in history. Tell Abu en-Ni'aj was one of the largest sedentary settlements in the Southern Levant occupied during EB IV, and offers a rare glimpse into this time period. Adding new sites to this archaeobotanical analysis will expand our spatial and temporal coverage and provide a much broadened context to enable us to test our hypothesis of a two-phase aridification event as a major driver of large-scale urban abandonments.

## Acknowledgements

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