Cultural Responses to Climate Change
DeMenocal, 2001
Dust storm approaching Stratford, Texas, in 1935.

Buried machinery in barn lot. Dallas, South Dakota, May 1936
DeMenocal, 2001
Fig. 3. Tree-ring-reconstructed July PHDI for the Tidewater region of Virginia and North Carolina from 1185 to 1984 (A) and for the early colonial period from 1560 to 1720 (B). The most extreme growing-season drought of the past 800 years was reconstructed for 1587, the year the colonists on Roanoke Island disappeared. The Lost Colony drought of 1587–1589 was the most extreme 3-year episode in the entire 800-year reconstruction. The prolonged Jamestown drought lasted from 1606 to 1612 and was the worst 7-year drought reconstructed for 770 years (from 1215 to 1984).

Stahle et al., 1998
The lost colony

Fig. 1. Location of Roanoke Island, Jamestown Colony, and the baldcypress tree-ring chronologies from Blackwater and Nottoway rivers used to reconstruct July PHDI for the Tidewater region of Virginia and North Carolina [map adapted from (13)].

Stahle et al., 1998
Reconstructed PHDI for Tidewater Region of Va and NC

Stahle et al., 1998

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Did the drought contribute to the high mortality and near abandonment of the colony?

38 of original 104 settlers alive after year 1.

4800 of 6000 settlers died between 1607-1625

Stahle et al., 1998
Mesa Verde
Fig. 3. Nine independent records of long-term aridity changes in subregions of the West (12, 16–23) compared to the DAI reconstruction. All of the time series records have been smoothed to highlight multi-decadal to centennial variations and are expressed as standard normal deviates for comparison purposes. The yellow bars are dated intervals of aridity. The break in the yellow bar for the "lake bottom stumps" indicates two dry periods separated by a wetter interval. The shaded tan area highlights the period of persistently elevated aridity in the DAI record over the AD 900 to 1300 period. These independent records all show multi-decadal intervals of elevated aridity during that time, which collectively support our DAI reconstruction based on long, drought-sensitive, tree-ring records. Numbers in parentheses are citations.

Cook et al., 2004
Figure 2. Population through Time at selected Lowland Maya Sites
Lake Coba, Yucatan Peninsula

Figure 7. Lake Coba pollen percentage diagram of selected taxa and group sums plotted on a time scale rather than a depth scale. The figure was plotted using calibrated years B.P., with selected calibrated calendar dates on the right. Chenopodiaceae represents the Chenopodiaceae-Amaranthaceae pollen type. Aquatic taxa and fern spores have been excluded from the pollen sum. Stippled curves reflect a 5% exaggeration of the pollen percentages. The zones indicate the archaeological periods included in pollen zones I-5. Dotted lines separate multiple archaeological periods within pollen zones.
Figure 3. Composite stratigraphy for wetland excavations and cores at Pulltrouser (Core PT-9), Douglas (Core DW-9), and Cob (Core Cob-3) Swamps. No scale; depth of upper contact of basal clay with Late Archaic occupation is about 2 m below ground surface. Hatched area marks organic wetland soil; the lower strata contain evidence of early agriculture. Calendar dates show stratigraphic position of dated samples and are given as the calibrated intercept date (Table 1).
Scarborough and Gallopin, 1991

Fig. 1. Map of the Maya area, showing the location of Tikal and other sites mentioned in the text.

Fig. 2. Main catchments. Map showing the central 9 km² of Tikal (11). The six central shaded areas are rainwater collection catchments. The Tikal, Corriental, Perdido, and Bejucal catchments each drain into their respective bajío-margin reservoirs. The catchments shown are the largest by far at Tikal, though other smaller more localized catchments exist. Some of these are located within larger catchments, others outside. All catchments are derived from contour lines taken from the detailed Tikal maps as well as comments about and drawings and photographs of Tikal (10–12).
Lake Chichancanab

Fig. 5. Images of four split cores taken at the same station in 14.7 m of water. Sediments are composed of interbedded gypsum and organic-rich strata containing abundant shell material. The similarity of the cores indicates that sediments were not disturbed during the coring and splitting process. Arrow in Core CH1 08-III-04-MWI-2 designates position of radiocarbon date (1130 ± 35 \(^{14}\)C years BP; 780–1000 AD).

Hoddell et al., 2004
Fig. 7. GRA bulk density records of the four cores taken in 14.7 m of water. Letters designate groups of density peaks and numbers refer to individual peaks that can be correlated among the four cores.
Fig. 1. Seasonal variations in the mean position of the ITCZ over Mayan region and northern South America.
Multiyear Droughts

Haug et al., 2003