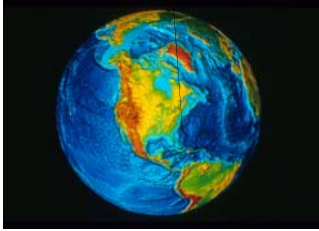


# Increased productivity of old-growth baldcypress (*Taxodium distichum*) in the southern United States

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Study area in southern Louisiana and Mississippi, USA



Old growth baldcypress tree surrounded by second growth trees, near the Tangipahoa River



Coring an old-growth baldcypress tree

**Introduction:** Baldcypress (*Taxodium distichum*) is a long-lived deciduous conifer that grows in intermittently flooded and poorly drained areas of the southeastern United States. Practically all the virgin baldcypress stands were logged during the late 19th and early 20th centuries, and most baldcypress that exists today is second growth. A few old-growth trees remain, but most are hollow due to heart rot caused by the fungus *Stereum taxodi*.

**Methods:** We located and cored solid baldcypress trees up to 1375 years old along the Tangipahoa and Pearl Rivers in southeastern Louisiana. We extracted cores from the base of each tree from 0.5 to 1.5 m above the ground in order to avoid hollow areas. Trees at our study site had practically no buttresses, unlike most baldcypress trees. We crossdated and measured the rings and converted average ring width to basal area increment data because basal area is a better indicator than ring width of actual tree productivity. A tree's ring width may be decreasing but it still may have constant or increasing basal area. Basal area is a better indicator of actual tree productivity than is ringwidths.

**Results and Discussion:** The old-growth trees (>1000 years) from both areas show increased radial growth since about 1850, and additional increased growth since around 1950. The younger old growth (500-1000 years) from the Pearl River demonstrate less accelerated growth during the same period and the young trees from the Tangipahoa River have maintained relatively constant basal area increment. It is surprising that very old trees are increasing in radial growth because the ratio of photosynthesis to respiration decreases in older trees. Old baldcypress trees have small live crowns a result of hurricanes and severe storms that are common in the coastal area of the southern U.S. Younger old growth and second growth trees have fuller crowns and probably have more active root systems, both of which probably provide a greater sink for carbon. The younger trees do not show the same increase in productivity. The lack of competition due to the logging of practically all virgin baldcypress during the last 150 years may be one explanation for the increased growth, but tree growth response due to reduced competition usually does not last very long and is accompanied by increased crown growth. Another possible explanation is that the increased growth is due to the recent increase in atmospheric CO<sub>2</sub>, and the newly fixed carbon is allocated to cambial growth in these ancient trees with small crowns. Numerous growth chamber studies have shown that growth of tree seedlings and saplings is increased by the addition of CO<sub>2</sub>. Increased radial growth since the mid 1800s has been reported for ancient trees in other locations (Graybill and Idso 1993,

## References:

Graybill, D.A. and S.B. Idso. 1993. Detecting the aerial fertilization effect of atmospheric CO<sub>2</sub> enrichment in tree-ring chronologies. *Global Biogeochemical Cycles* 7: 1981.

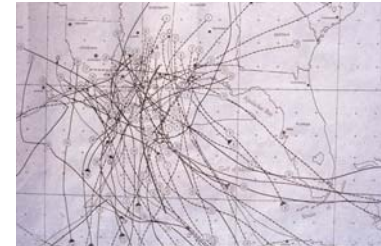
LaMarche, V.C., Jr., D.A. Graybill, H.C. Fritts, and M.R. Rose. 1984. Increasing atmospheric carbon dioxide: tree-ring evidence for growth enhancement in natural vegetation. *Science* 225: 1019.



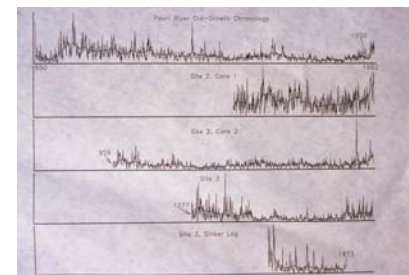
Coring an old-growth baldcypress tree in the Pearl River swamp



Old growth baldcypress tree surrounded by second growth trees, near the Pearl River swamp. This tree demonstrates the stovepipe stem and small crown that the ancient trees possess.



Path of hurricanes along the central Gulf of Mexico coast since 1831



Pearl River old growth chronology and individual cores