

Spatial and temporal expansions of C₄ plants in East Asia: evidence of carbon isotopes

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The expansion of C₄ plants constitutes one of the most important events of the Cenozoic. However, the pattern and timing of expansion is disputable. Evidence of carbon isotopes from Chinese Loess Plateau (CLP) and South China Sea (SCS) suggest an asynchronicity in the spread of C₄ plants in East Asia. Bulk organic carbon isotopes of CLP indicate that C₄ expansion commenced from around 3 Ma. A major expansion of C₄ biomass in relatively lower latitude of eastern Asia, evident from ~1 Ma and particularly from ~0.4 Ma, is later than other parts of the world, while around the same time the prominence of C₄ taxa declined at higher (more temperate) latitudes. Aside from the overall asynchronous variations in abundance, an increased prominence of C₄ taxa during interglacials compared with preceding or succeeding glacial periods is evident across much of the CLP. The opposite appears to have been the case at lower (subtropical and tropical) and higher (northwest part of CLP and central Asia) latitude parts of the region. Temperature and aridity likely influenced past variations in abundance of C₄ taxa across the range of altitudes influenced by the East Asian monsoon system.

