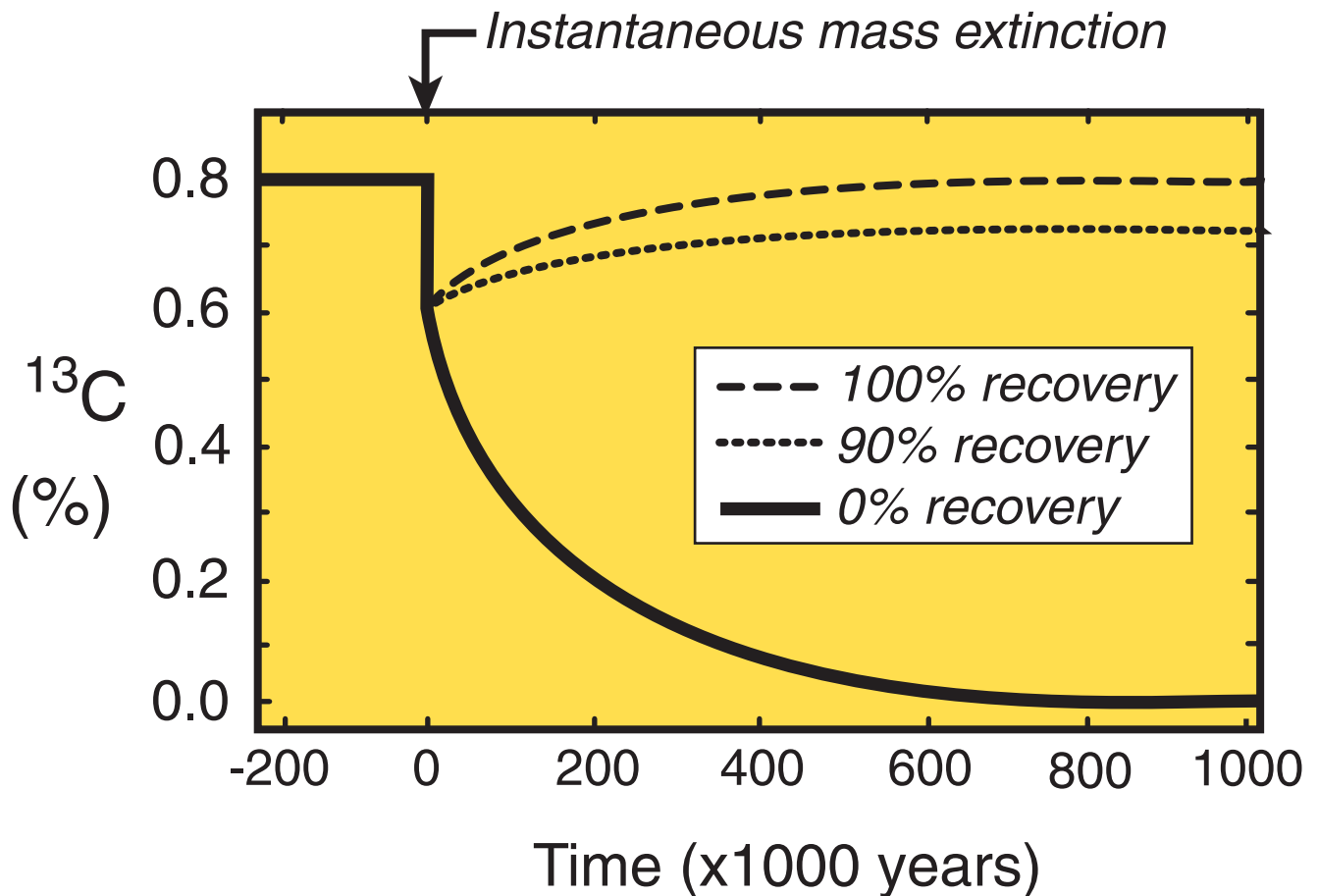


COLLAPSE IN ORGANIC PRODUCTIVITY



Changes in carbon isotopic composition of shallow marine carbonates following an instantaneous collapse in organic production. Loss of the dynamically maintained biological "pump" causes an immediate drop of 0.2‰ due to ocean mixing. Longer term trends depend on biological recovery. The "90% recovery" trend approximates the record of the K-T boundary mass extinction. Values approach 0‰ if no recovery occurs in 0.5 million years (e.g. "snowball" earth).