

Evaluating organic matter sources in sediments using amino acids

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Lakes cover an area about 35 times smaller than the oceans but carbon burial in lakes is around the same order of magnitude or even higher than in the oceans. Understanding the processes responsible for organic carbon burial in lacustrine systems is hence essential. Studies of amino acid composition and stable isotopic composition in marine environments led to useful amino acid based proxies also valid in lakes. We used those proxies in this study to examine three different lakes systems that differ in trophic state and contribution of terrestrial organic matter to the sediments. Additionally, we used carbon isotope fingerprinting of amino acids to characterise the source and fate of the amino acids. Amino acids are mostly of autochthonous origin. Furthermore, amino acids only contribute for about 30-50 % of the carbon found in the acid soluble (AS) fraction after hydrolysis of the lipid-free samples. Therefore, another major fraction must be present in the AS fraction which is believed to derived from terrestrial origin. Furthermore, it could be shown that methanotrophic bacteria lead to increased values of a proxy for bacterial reworking (ΣV) and extraordinarily low $\delta^{13}C$ amino acid values (-30 to -60 ‰). Additionally, extracellular protein hydrolysis might explain the very high nitrogen isotopic composition in the water column of Lake Biel.