Biogeochemical characteristics and environmental effects of low-molecular-weight organic acids in lacustrine ecosystem

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Low molecular weight organic acids (LMWOAs), are generally considered as the important immediate products during the conversion of anaerobic organic substance (carbohydrates, fats, proteins, etc.) into CH_4 and CO_2, and closely related to lacustrine regional environmental evolution [1, 2]. In this research, the composition and contents of LMWOAs were determined, temporal-spatial variation trends and their contributions to dissolved organic carbon (DOC) were investigated in overlying waters of two plateau lakes in China: Lake Hongfeng (HF) and Lake Dianchi (DC) where two sampling sections were set as P1 and P2. Total organic acids (TOAs) were on average 6.55 μmol·L^{-1} in HF, 7.98 and 6.54 μmol·L^{-1} in DC, which can contribute to total DOC approximately 7.47%, 2.67% and 2.48%, respectively. This study identified 5 key organic acids such as lactic, acetic, pyruvic, sorbic and oxalic acid. The results show that pyruvic acid in these two lakes was confirmed as the major component among LMWOAs with the average concentrations of 2.35 μmol·L^{-1} in HF, 3.82 and 3.35 μmol·L^{-1} in DC. The sources and behaviors of LMWOAs during the photoradiation on lacustrine dissolved organic matter were also discussed. Differential physicochemical parameters indicated that the increasing-decreasing and decreasing-increasing diurnal variation trends of TOAs at two sampling sections in DC were dependent on autochthonous biological and photochemical activity. TOAs in HF decreased with time, mainly due to strong microbial assimilation and mineralization in hypolimnion. LMWOAs' photochemical production from allochthonous humus and consumptiom in epilimnion of HF basically leveled off with time except for significant increase at 18:00, indicative of their direct terrestrial import. The increase of pyruvic acid in epilimnion in HF at night reflected a photoradiation hysteresis effect, and resulted from great algal decomposition. Various hydrochemical conditions revealed that massive algal cover in DC and thermal stratification in HF primarily controlled the profile behavior of decrease and increase for LMWOAs. This research would benefit for management and eco-regulation of lacustrine aquatic environment.

[1] Boschker *et al*. (2001) *FEMS Microbiol Ecol* **35**, 97-103
[2] Xiao *et al*. (2009) *J Hydrol* **365**, 37-45

Redefine Bulunkuole group in eastern Pamirs syntaxis and its signification – From the evidence of LA-ICP-MS isotope dating of detrital zircon

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The Bulunkuole Group is riching in iron ore Paleoproterozoic mesometamorphic rock series distributing in the eastern Pamirs syntaxis. According to sedimentary formation, metamorphism, ore-bearing potential and isotope dating, we disassemble these high pressure rock association (metamorphosed in 220Ma) which is composed of granulite, spinel olivine, garnet pyroxenolite from Bulunkuole Group, belong to the part of Kangxiwar tectonic mélange; The rock series of alterative volcanic rock folding alterative detrital rock (age is 522Ma) belongs to Ordovician. In fact, the Bulunkuole Group is composed of alumina rich gneiss and schist, gneiss and schist folding quartzite and griotte, schist and calc-silicate rock folding metavolcanite and iron ore depsits from bottom to top, and it is intruded by early Palaeozoic (506-542 Ma) acidic to intermediate rocks. There are four peak values of age region: 2.7-2.1Ga, 1700-554Ma, 536-344Ma and 302-230Ma in age frequency diagram according to 127 isotope data of detrital zircon (Fig 1). The zircons of the first peak value (2.7-2.06Ga) show the characteristic of magmatic origin, the others were metamorphic origin(or recrystallization). In consequence, the Bulunkuole Group should formed in Paleo-Mesoproterozoic (from 2.14-2.06Ga to 1.14Ga).

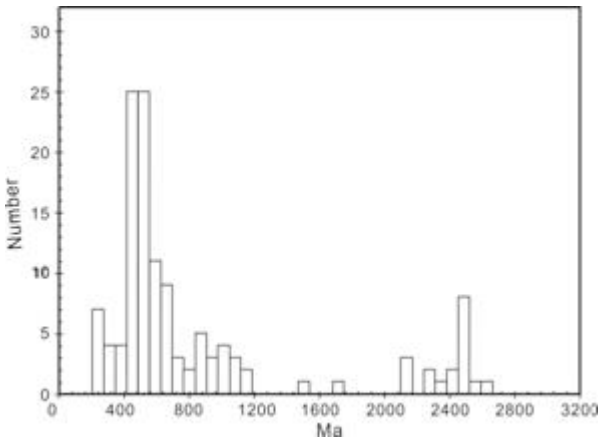

Figure 1 Age frequency diagram of detrital zircons from the Bulunkuole Group