Rb/Sr ratio in Lake Baikal sediment core:the new geochemical proxy for East Asian winter monsoon strength during cool climate period

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High-time resolution (70 year mean sampling) measurments of the major and trace inorganic elements, such as rubidium (Rb) and strontium (Sr), from the Lake Baikal sediment core was carried out to estimate the weathering response and the material provenance in the lake watershed. Because of the similarlity of the chemical properties between Rb and potassium (K), Rb behaves similarly to K in the geological processes, such as weathering. The high correlation between Rb and K during the Holocene in the lake sediment was observed ($r = 0.915$, $n = 221$, $p<0.001$). Additionally, the flucutuations of the Rb/Sr ratio and mean grain size (MGS) during the Holocece were corresponding with each other. These results indicate that the behavior of Rb and Sr are strongly influenced from the chemical weathring process during high precipitation period. On the other hand, there is no significant correlation between Rb and K during the late last glacial period (from 32 to 18 kyr BP), which is cool and dry climate period, and it shows higher concentration of Rb rather than those of K comparing with those of the Holocene. This would indicate the higher stability and immobility of Rb in clay minerals rather than K during the late last glacial period. The similar profiles between the Rb/Sr ratio and the MGS from loess sediment in China [1] were observed. These results imply that the Rb/Sr ratio can be used as the proxy to estimate the East Asian winter monsoon intensity during cool and dry climate period.

[1] *Sun et al., Nature Geoscience, p46-59. Vol.5, 2012*