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## Radionuclide Dating ( $^{210}\text{Pb}$ , $^{137}\text{Cs}$ ) of Recent Inter-Dune Saline Lake Sediment Cores in the Badain Jaran Desert, Inner Mongolia, Northwest China

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Inter-dune lake sediment cores are ideal and unavailable materials for study climate and environmental changes of arid region. The precious dating of lake sediment cores is required for carrying out high resolution climate and environmental changes with these cores. The Badain Jaran inter-dune lake group embedding in the sand sea is the unique geological landscape (Yang et al., 2010) where lake sediment cores are feasible for high resolution research of climate and environmental records about recent 100 years.

Few reports about lake sediment records of palaeoclimate and palaeo-environmental related to the Badain Jaran Desert are saw, because dating inter-dune lake sediment core is difficult, which challenges further research of inter-dune lake sediment. Using artificial and natural radionuclide  $^{137}\text{Cs}$  and  $^{210}\text{Pb}$  to date about 120 years sediment core is widely successful applied in dating lake sediment cores from different lakes located at global with different scales (Appleby, 2008). However, dating inter-dune lake sediment core is difficult and unexpected for low deposit flux of radionuclides and abrupt lake level change.

In recent years though reports related to dating inter-dune lake sediment cores from the Badain Jaran Desert show that inter-dune lake sediment cores can be dated preciously with  $^{137}\text{Cs}$  and  $^{210}\text{Pb}$  (Liu et al., 2012; Rioual et al., 2013), uncertain factors related to dating needs to be further study. Three brackish water lakes are selected in the southeast of the Badain Jaran Desert as study objects for coring, and location of coring sites as show in Fig.1. Three undisturbed lake sediment cores (Ar-1, Br-1 and Dd-1) are obtained with the stainless steel gravity core. Specific activities of  $^{137}\text{Cs}$  of three cores are measured, and results show that three cores have well-defined 1963 peak. The 1963 peak of  $^{137}\text{Cs}$  of core Br-1 and Ar-1 occur at the 8cm



Fig. 1. Location map of coring sites

**Table1. Dates and calculated sedimentation rate of three inter-dune lake sediment cores**

|       |           | Age (a)                  |                   |  |
|-------|-----------|--------------------------|-------------------|--|
| Model | CRS       | CIC                      | $^{137}\text{Cs}$ |  |
| Ar-1  | 133       | 122                      | 161               |  |
| Dd-1  | 125       | 150                      | 65                |  |
| Br-1  | 136       | 150                      | 108               |  |
|       |           | Sedimentation rate(cm/a) |                   |  |
| Model | CRS       | CIC                      | $^{137}\text{Cs}$ |  |
| Ar-1  | 0.13-0.32 | 0.14                     | 0.18              |  |
| Dd-1  | 0.19-1    | 0.19                     | 0.43              |  |
| Br-1  | 0.14-0.23 | 0.21                     | 0.1-0.27          |  |

depth (1.15dpm/g) and 4cm depth (1.23dpm/g) of cores respectively, nevertheless, sub-peaks of the  $^{137}\text{Cs}$  also occur at the two cores that possible represent the 1954 time marker. The  $^{137}\text{Cs}$  peak of 1963 of Core Dd-1 occurs at the depth of 19cm with single peak. Specific actives varieties of  $^{210}\text{Pb}_{\text{tot}}$  are exponential decline from top to bottom of three cores. Ranges of  $^{210}\text{Pb}_{\text{tot}}$  specific actives of the interface of sediment-water are so closed from 2.63 dpm/g

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to 3.27 dpm/g. Ages and sedimentation rates are calculated with models of the CRS, CIC and  $^{137}\text{Cs}$ , and results are show as table 1. The  $^{137}\text{Cs}$  time markers of 1963 and 1954 coincide with  $^{210}\text{Pb}$  dates by models of CRS and CIC, so dates with  $^{137}\text{Cs}$  and  $^{210}\text{Pb}$  are reliable.

**Key words:**  $^{210}\text{Pb}$ ,  $^{137}\text{Cs}$ , CRS, lake sediment core, the Badain Jaran Desert

## References

Yang,X.,Ma,N.,Dong,J.,Zhu,B.,Xu,B.,Ma,z.,Liu,J.,2010.Recharg  
e to the inter-dune lakes and Holocene climatic changes in The

Badain Jaran Desert, western China. *Quaternary Research*, 73: 10-19.

Appleby, P.G., 2008. Three decades of dating recent sediments by fallout radionuclides: a review. *The Holocene* 18(1): 83-93.

Liu,S., Narentuya, Xia B., Chu, G.,Tian, M., 2012.Using  $^{210}\text{Pb}_{\text{uns}}$  and  $^{137}\text{Cs}$  to Date Recent Sediment Cores from the Badain Jaran Desert, Inner Mongolia, China. *Quaternary Geochronology*, 12:30-39.

Rioual, P., Lu,Y., Yang,H., Scuderi,L., Chu,G., Holmes,J., Zhu,B., Yang,X., 2013. Diatom–environment relationships and a transfer function for conductivity in lakes of the Badain Jaran Desert, Inner Mongolia, China. *Journal of Paleolimnology*, 50: 207-229.