The origin and tectonic frame of the Dabieshan Orogenic belt: Constraints from geophysical data

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Introduction

The Dabieshan orogenic belt, located in the southeast of the Anhui province, is the joint area of three first-class tectonic units, namely the North China plate, the Qinling Orogen and the Yangtze plate. Recently numerous geological and geophysical studies have been contributed to its formation mechenism and geological structure evolvement. Based on a computer modelling of the massive published data, this paper focuses on the origin and the tectonic evolution of the Orogen.

Results and Discussion

Using the Bouguer gravity anomaly data, referring to the joint inversion for Moho profiles of gravity and magnetic from the Dabieshan Orogenic belt and the area along the Yangtze river in the Anhui province, as well as the deep magnetotelluric Moho profiles from Lu-an to Rui-chang, we calculated the isodepth map of the Moho in the Dabieshan area according to the calculating method of single density-interface. After a combined analysis of basic geological features, Moho characteristics, and information from regional drilling, we suggest that the formation of the orogenic belt is the result of a collision between the North China and the Yangtze plates, with the latter subducted beneath the former. The Orogen has been pushed to the south, followed the rising of massive magma intrusion, which separated the Yangtze plate and the North China plate and caused a bottom slipping. However, it does not show the inherited characteristics of the two plates, due to the modification from late metamorphic events. It is an independent tectonic region, representing a geo-structure window and a collision zone between ancient islands and continents.

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δD and $\delta^{18}O$ variations of water in the Yellow River and its significance in environmental studies

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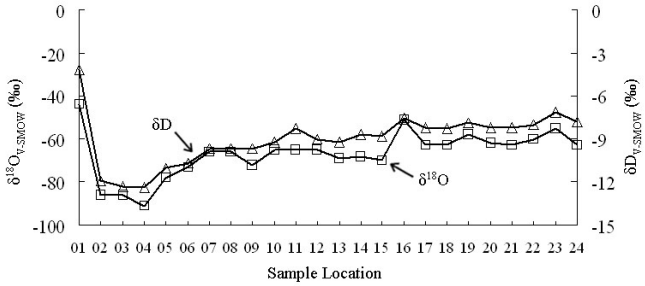
The H and O isotope compositions of water from the Yellow River were investigated in this study. The samples were collected at 24 hydrological stations along the mainstream of the Yellow River, from the source region to the Bohai Sea, during July 2005.

The δD and $\delta^{18}O$ values of water samples vary from -91 ~-44‰ and -12.4~-4.2‰ respectively. The δD and $\delta^{18}O$ values both increased gradually from the upper reaches to the lower reaches, except for the sample from No. 1 station. No. 1 station is located at the down stream of lake and marsh area in the Qinghai-Tibet Plateau, where long residence time of surface water, and strong sun light makes the evaporative capacity 3.8 times larger than the precipitation [1]. The input of highly evaporated water from lake and marsh area may be the main reason for high δD and $\delta^{18}O$ values observed in this station.

The correlation between δD and $v^{18}O$ follow an equation of $\delta D=5.69\delta^{18}O-15.51$. The slope of this equation (5.69) is lower than the slope of meteoric water line for the Yellow River basin ($\delta D=6.86\delta^{18}O-4.20$, calculated from the GNIP data), and much smaller than that of meteoric water line in China ($\delta D=7.9\delta^{18}O+8.2$ [2]).

It is infered that this observation is caused by two factors: the first is the effect of arid evironment to the δD and $\delta^{18}O$ values of precipitation; the second is the effect of further evaporation on δD and $\delta^{18}O$ values of surface water with long residence time or recycled.



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[2] Zheng *et al*. (1983) *Chinese Science Bulletin* **13**, 801-806.