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## The Spatiotemporal Variations of Provenance in the Chinese Loess Plateau by the Sensitivity of Quartz Optical Stimulated Luminescence

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### The Spatiotemporal Variations of Provenance in the Chinese Loess Plateau by the Sensitivity of Quartz Optical Stimulated Luminescence

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Loess contains a lot of quartz, which is stable in nature and is not easy to be weathered and transformed. It can retain the original rock information, and the response of quartz crystals to radiation energy is obvious. Thus, optical stimulated luminescence (OSL) sensitivity can identify provenance. The magnetic susceptibility reflects the strength of the summer monsoon, and the grain size is a proxy for the winter monsoon. The magnetic susceptibility and grain size have been widely used in the study of Chinese loess as proxy indicators of the East Asian monsoon.

By studying the change of quartz optical stimulated luminescence sensitivity of loess-paleosol in the Xifeng section of the Chinese Loess Plateau, combined with the related work from others in the Chinese Loess Plateau, the provenance changes of the Chinese Loess Plateau in the time-space sequence were analyzed. In the time series, the sensitivity of quartz OSL showed a high value in paleosol, and the highest value was about 2700 counts/Gy/mg. Meanwhile, it exhibited a low value in loess, and the lowest value was about 200 counts/Gy/mg, which is different from paleosol. In the spatial sequence, the OSL sensitivity of quartz from west to east in the Chinese Loess Plateau has a large difference (8-10 times) in the interglacial (paleosol), and a small difference (1-2 times) in the glacial (loess). The sensitivity of quartz OSL preliminarily indicates that the provenance of the Chinese Loess Plateau has changed in time series (loess-paleosol). Moreover, in space sequence (among different profiles), the sensitivity of quartz OSL has changed in paleosol during the interglacial, but has a minor difference in the loess during glacial.

At the same time, combined with the study of magnetic susceptibility and grain size, the quartz OSL sensitivity corresponds well to the fluctuation of the climate proxy index, which shows that the quartz OSL sensitivity is positively correlated with the magnetic susceptibility and negatively

correlated with the particle size. The OSL sensitivity and magnetic susceptibility of quartz were higher in the paleosol and lower in the loess; the variation of grain size was the opposite.

**Keywords:** quartz, optically stimulated luminescence sensitivity, loess provenance, glacial-interglacial, Chinese Loess Plateau