Late Pleistocene dynamics of dust emissions related to Westerlies in northern Central Asia: New insights from quantifying loess provenance in the North Tian Shan

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Highlights
1. The first quantification of loess provenance changes since ~71 ka in Central Asia  
2. Obliquity and precession modulation of the long-term loess accumulation.  
3. Changes in intensity and position of the Westerlies affect loess deposition.  
4. Important implication for resolving dust cycle at regional and hemispheric scales.

Methodology and Analytical procedure

• X-SERIES inductively-coupled plasma mass spectrometer  
• Sediment source fingerprinting (SSF)  

\[
\sum_{i=1}^{n} P_i S_i = C_i \quad \sum_{i=1}^{n} P_i = 1, \quad 0 \leq P_i \leq 1
\]

Virtual mixtures (VM)

\[
\text{RMSE} = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (S_i - \hat{S}_i)^2}  
\quad \text{MAE} = \frac{1}{N} \sum_{i=1}^{N} |P_i - \hat{P}_i|
\]

Results

Discussion and Conclusions

✓ Quantifying loess provenance changes in this study represents one potential approach for resolving the relationships between dust cycle and climate system and genetic links of loess sediments and deserts over Central Asia.