Size and Magnetic Properties of Surface Sediments from Huguangyan Maar Lake: An Integrated Assessment of Controlling Factors and Implications for Recent Asian Monsoon Evolution

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INTRODUCTION & AIM

o Huguangyan Maar Lake (HML) is a critical repository for reconstructing paleoenvironmental changes in southern China.

o Interpretations of the Asian monsoon system from HML have been diverse and sometimes contradictory.

o **Aim:** This study evaluates 56 lake surface samples, 23 topsoil, and 4 volcanic rock samples to understand source-to-sink processes.

o **Objectives:** (1) Identify sediment/magnetic sources; (2) Evaluate influences of provenance, water depth, and redox; (3) Assess implications for monsoon evolution.

METHODS

o **Sampling:** 56 lake surface sediments from various water depths, plus catchment soil and rock samples.

o **Grain-size Analysis:** Measured using a Malvern MS3000 laser grain-size analyzer.

o **Magnetic Measurements:** Analysis of χ, χ_{fd}, ARM, and SIRM.

o **Geochemical Analysis:** Total Organic Matter (TOM) determined by loss-on-ignition.

RESULTS & DISCUSSION

o **Sediment Provenance:** Sediments are predominantly sourced from catchment runoff (soil/rock); aeolian input is negligible.

o **Spatial Distribution:**

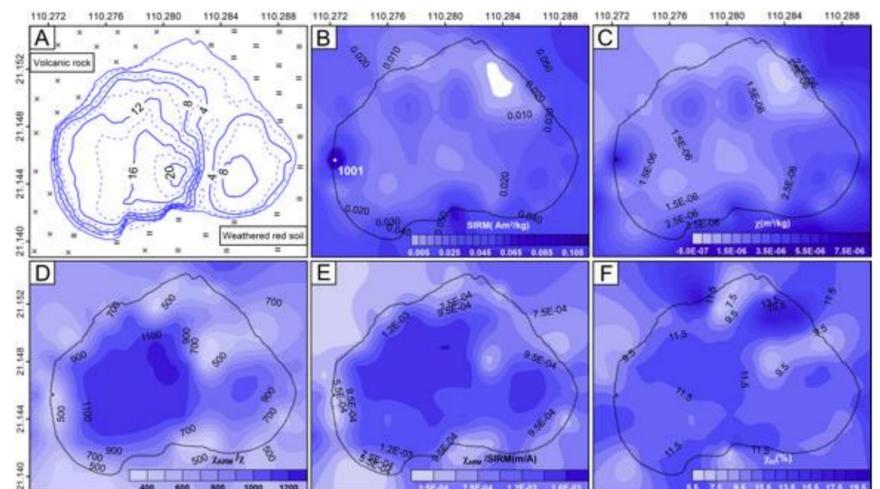**Grain-size:** Silt dominates (62.61%). Fining occurs from shore to center.
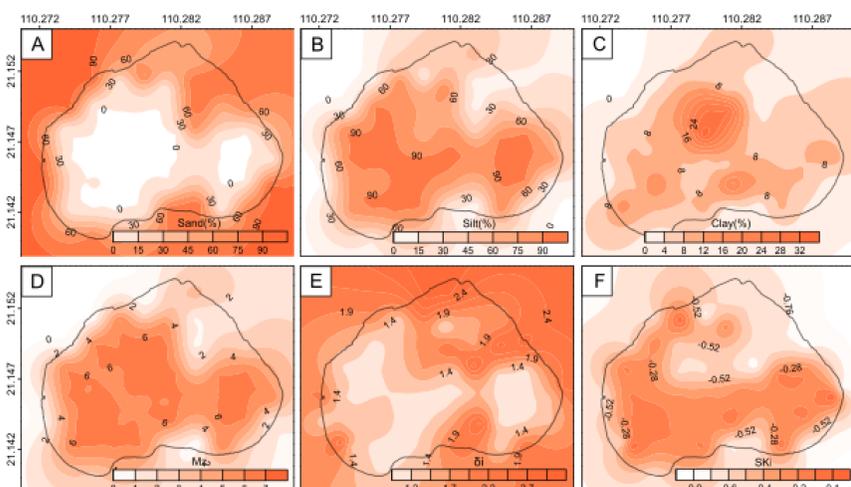
Magnetic Mineralogy: Dominated by low-coercivity magnetite/maghemite in PSD and MD states.
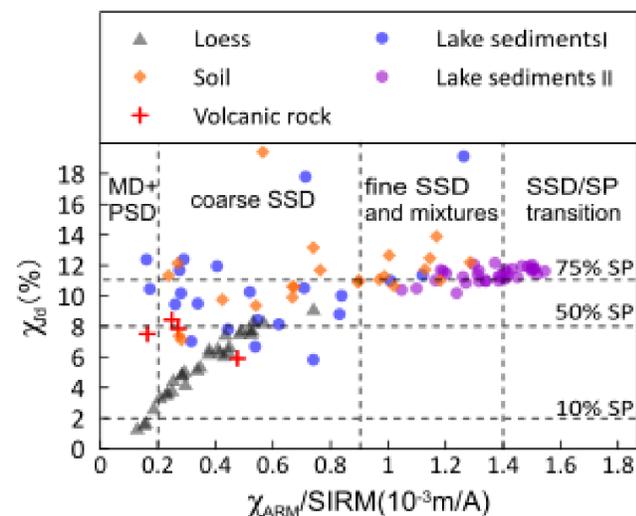
Magnetic Concentration: χ and SIRM increase with water depth.

Hydrodynamic Sorting: Finer magnetic grains (SSD/SP) are preferentially transported to the lake center

CONCLUSION

o HML sediments are catchment-derived and spatially sorted by lake hydrodynamics.

o Magnetic concentration increases with depth, while magnetic grain-size becomes finer.

o χ and SIRM in HML serve as reliable proxies for reconstructing the history of the Asian Summer Monsoon.

FUTURE WORK / REFERENCES

Future Work: Apply this source-to-sink framework to long-core records for high-resolution monsoon reconstruction.
Key References:
•Yancheva et al. (2007). Nature, 445: 74-77.
•Liu et al. (2013). Journal of Asian Earth Sciences, 73: 382-390.
•Wang et al. (2016). Scientific Reports, 6: 25456.

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