

Thermal desorption mercury records across British Rhaetian–Hettangian sections: Implications for the sedimentary Hg paleovolcanism proxy

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Questions & Motivation

1. LIPs drive major Earth-system change.

- Volcanic emissions perturb climate, oceans, and the carbon cycle.
- Constraining LIP flux is links volcanism to environmental change.

2. Sedimentary Hg is a useful but imperfect volcanism proxy.

- Hg records volcanic input, but preservation depends on host phases and burial history.
- These controls remain poorly constrained. Hg/TOC is widely used.

3. British Triassic-Jurassic sections are a valuable test.

- CAMP volcanism coincides with End-Triassic mass extinction.
- British T–J sections preserve equivalent stratigraphy across contrasting depositional settings.

Materials

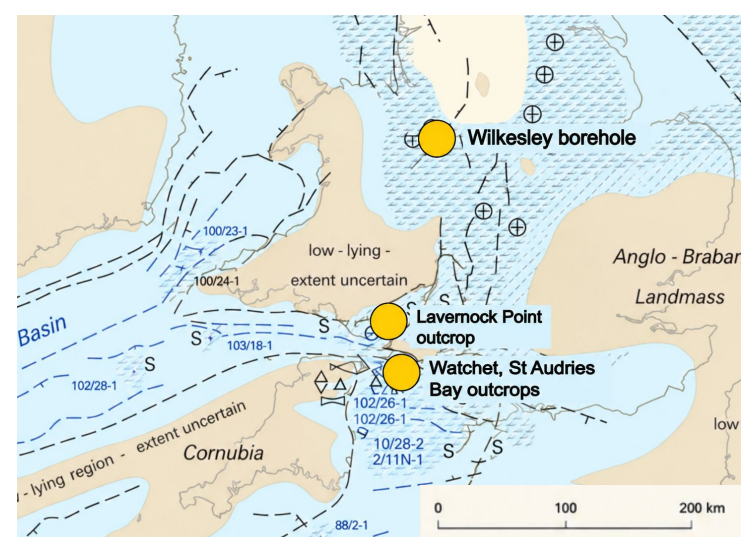
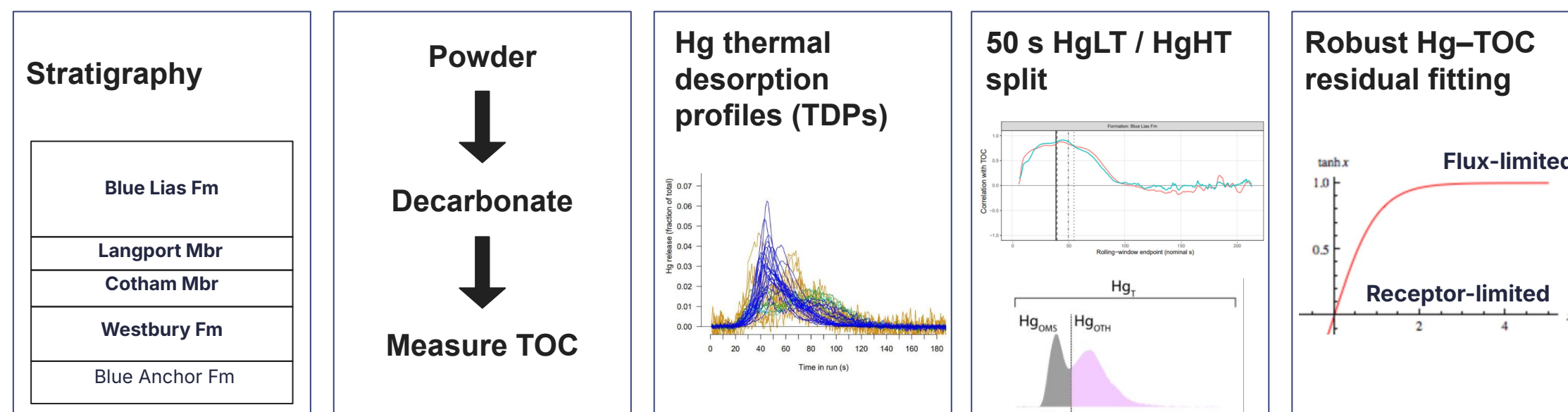


Figure 1. SW Britain of the Late Triassic, c. 210 Ma.

Wilkesley—**Cheshire Basin**; Watchet, St Audries Bay, and Lavernock Point—**Bristol Channel Basin**. Similar thermal maturities.

Blue Lias Fm — open marine
Langport Mbr — shallow-marine carbonate
Cotham Mbr — restricted lagoonal / tidal-flat
Westbury Fm — transgressive marine
Blue Anchor Fm — marginal-marine

Methods



Results

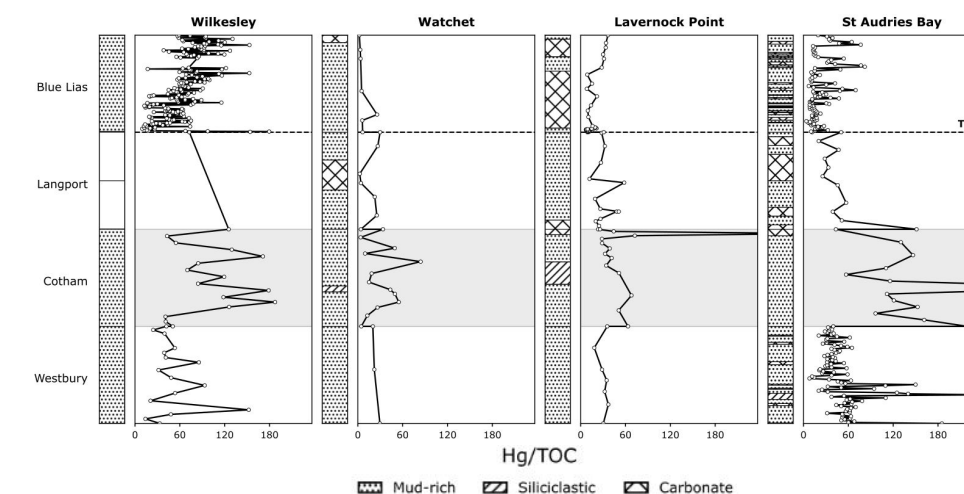


Figure 2. Hg/TOC across stratigraphic units at all four sites. Cotham enrichment recurs every site.

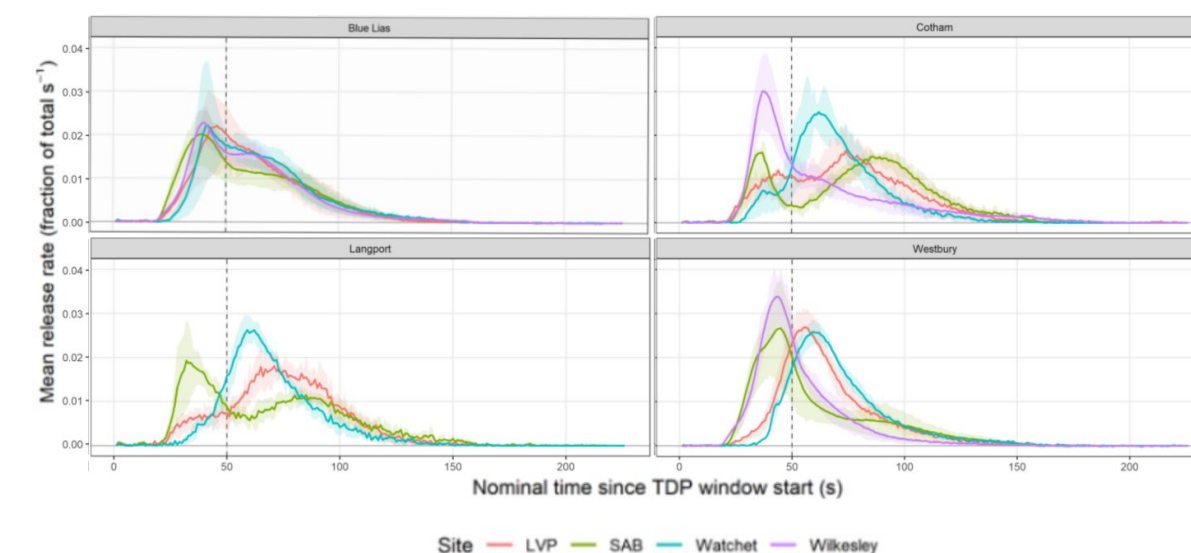


Figure 3. Mean unit-area-normalized TDPs by site and stratigraphic unit. Blue Lias TDPs converge across sites.

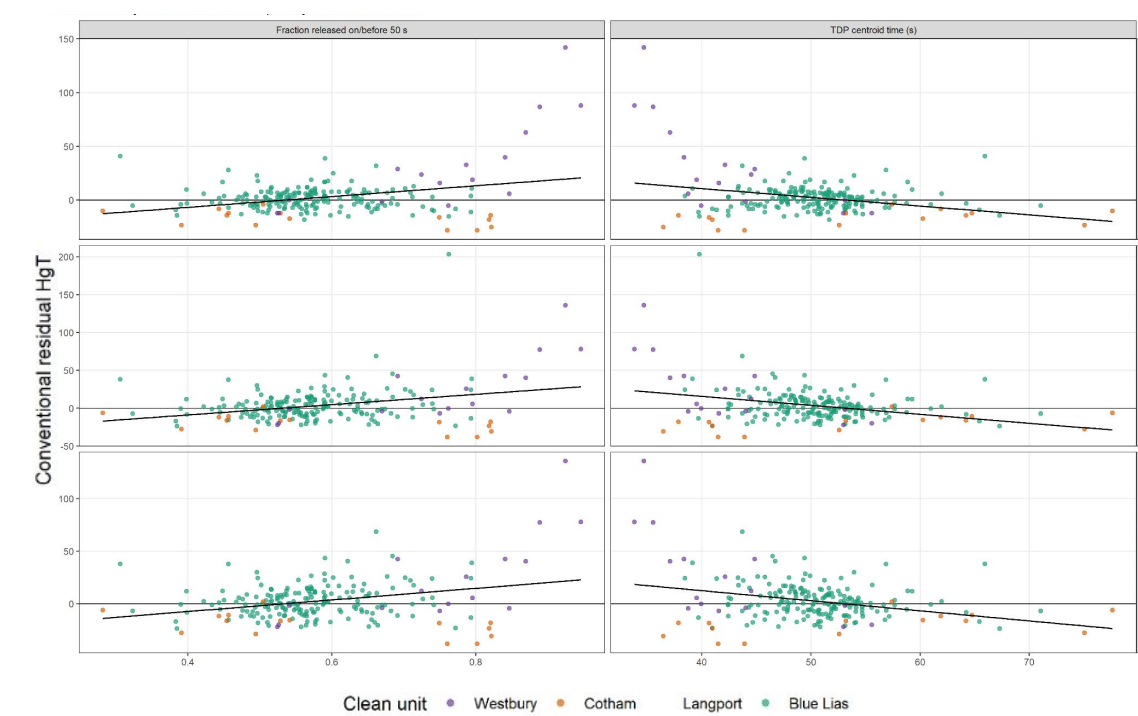


Figure 4. Wilkesley Hg residuals versus fraction released by 50 s ($r = 0.31$). The correction is not host-independent.

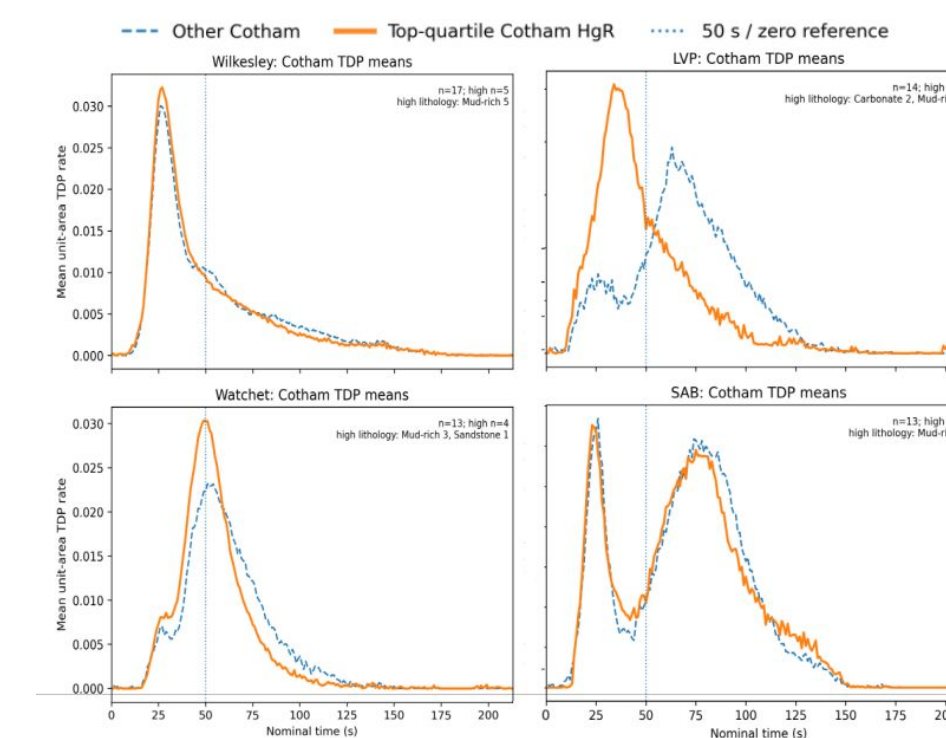


Figure 5. Mean Cotham TDPs for high- and low-residual samples at each site. The groups show similar TDP shapes.

Conclusions

1. Equivalent stratigraphy shows divergent Hg retention across sites.

- The same stratigraphic intervals preserve different TDP behavior, even within the Bristol Channel Basin and across broadly similar lithologies.

2. Variable Hg retention limits residual-Hg correction.

- At Wilkesley, residual Hg covaries with TDP behavior ($r = 0.31$).
- The correction suppresses the Cotham enrichment.

3. TDPs show Cotham Hg/TOC enrichment persists despite low residual Hg.

- Cotham enrichment recurs at all four sites despite differences in TDP behavior.
- High- and low-residual Cotham samples generally show similar TDP shapes.

4. Depositional setting influences Hg retention.

- Cross-site TDP similarity is greatest in the deeper-water Blue Lias.
- TDP shapes are most variable across sites in the Cotham–Langport when shallowing occurs.
- Greater Blue Lias similarity may reflect reduced terrestrial influence in deeper-water settings.

Acknowledgements

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