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Peer Review

# Review of: "Development of an Uncertainty-Aware Equation of State for Gold"

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The article presents a method to model data for the Equation of State of gold containing uncertainty, using an error-in-variables Gaussian process (GP) model. My knowledge of the underlying physics is limited, thus this review will focus solely on the GP.

The text seems rather repetitive, which can hinder its full comprehension. Please streamline the text to avoid repetitions.

A few considerations about specific points:

1. Some of the data seems to follow a polynomial or exponential equation. Is it physically sound to assume this trend? In this case, the trend could be used as a mean for the GP, resulting in a smaller predictive variance. Specifically, the broadening of variance seen in Figures 7 and 10 could be alleviated with this approach.
2. The model presented in the Appendix seems to be of iterative nature. Please provide more details, preferably with a pseudocode to facilitate its comprehension.
3. For future work you might find the work of Paciorek and Schervish (2006) and Gonçalves and Wellmann (2025) useful.[1][2]

## References

1. ^Ítalo Gomes Gonçalves, Florian Wellmann. (2025). Uncertainty Propagation in Deep Gaussian Process Net works. Math Geosci. doi:10.1007/s11004-025-10187-4.
2. ^Christopher J. Paciorek, Mark J. Schervish. (2006). Spatial modelling using a new class of nonstationary co variance functions. Environmetrics, vol. 17 (5), 483-506. doi:10.1002/env.785.

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## Declarations

**Potential competing interests:** No potential competing interests to declare.