Reply to Reviews on "G&M3D 1.0: an Interactive Framework for 3D Model Construction and Forward Calculation of Potential Fields" by Wang et al.

We thank two Reviewers for their careful reviews and comments on our manuscript entitled "**G&M3D 1.0: an Interactive Framework for 3D Model Construction and Forward Calculation of Potential Fields**" (ID: egusphere-2025-5357). All of these comments are addressed in this document. For clarity, the original reviewer comments are reproduced below in *italics*, and our responses are provided in regular font.

 # RC2:
I have read and reviewed the manuscript entitled "G&M3D 1.0: an Interactive Framework for 3D Model Construction and Forward Calculation of Potential Fields." The paper addresses an important and practical challenge in the potential-field community, namely the construction of realistic and geologically meaningful 3-D synthetic models. From both technical and implementation perspectives, the manuscript is generally well structured and in good shape. I therefore recommend minor revision. My moderate-level comments are listed below.
Reply: We sincerely thank the reviewer for the positive evaluation of our manuscript and for recognizing the practical value of G&M3D 1.0 in constructing realistic and geologically meaningful 3-D synthetic models. We also appreciate the reviewer's helpful comments on the software design philosophy, input/output specifications, data interoperability, and heterogeneous physical-property representation. These suggestions have helped us improve both the manuscript and the software description. We have revised the manuscript accordingly, and detailed point-by-point responses are provided below.

1. Software design philosophy and architectural principles
As the manuscript presents a scientific software framework, it would be beneficial to more clearly describe the underlying software design philosophy and architectural principles adopted in the development of G&M3D. For example, discussing aspects such as modularity, low coupling and high cohesion, extensibility, and the separation between data structures and computational kernels would help readers better understand the robustness, scalability, and long-term maintainability of the framework.

Reply: Thanks. We have added a detailed description of the software's architectural principles in the revised manuscript. In particular, G&M3D 1.0 follows a modular design pattern that high cohesion and low coupling. There is a strict separation between the graphical user interface (GUI), model data management, and the high-performance forward-calculation kernels. This decoupled architecture not only enhances the framework's robustness but also facilitates the integration of new features and future maintenance. (page 9, lines 269-270; page 18, 427-429)

2. Input/output specifications and data interoperability

The paper would benefit from a clearer description of input and output requirements. In particular, it would be useful to specify supported data formats, model parameterization conventions (e.g., coordinate systems and right-hand rule definitions. A brief discussion on interoperability with existing modelling or inversion workflows (e.g., UBC-GIF formats, SEG standards, Oasis Montaj, etc) would further enhance the practical value and adoption potential of the framework.

Reply: Thanks for this valuable suggestion. In the revised manuscript, we have explicitly defined the input/output specifications and data interoperability of G&M3D 1.0. The software adopts a standard right-handed Cartesian coordinate system. It supports various inputs, including topographic digital elevation models (DEMs), predefined model files (.bin), and user-defined dynamic link libraries (.dll or .so) for modeling continuously varying physical properties. For output, G&M3D 1.0 supports an extensible data-export module, allowing users to save results in multiple formats (e.g., standard text and binary formats) via a dedicated Export tool. We have also expanded the discussion on interoperability, emphasizing that the architecture can be easily adapted to support industry-standard formats (such as UBC-GIF or SEG) to seamlessly integrate with existing inversion workflows. (page 10, line 273; page 14, lines 349-351)

3. Representation of heterogeneous physical properties
In the current implementation, each geological body appears to be assigned a constant physical property. The authors are encouraged to discuss the spatially varying physical properties, for example, Gaussian distribution.

Reply: Thanks for this helpful suggestion. In the original version, each geological body was assigned a constant physical property. In the revised version, we have significantly upgraded the property-assignment module to support spatially heterogeneous physical properties. Specifically, G&M3D 1.0 now facilitates analytically defined property variations, including built-in exponential models and flexible user-defined functional interfaces. This enhancement allows for the flexible representation of complex density contrast or magnetization distributions, such as Gaussian-type variations or depth-dependent density compaction. As an open-source framework, G&M3D 1.0 will undergo continuous refinement to support additional forms of continuous property variation in future releases. (page 11, lines 299-301)

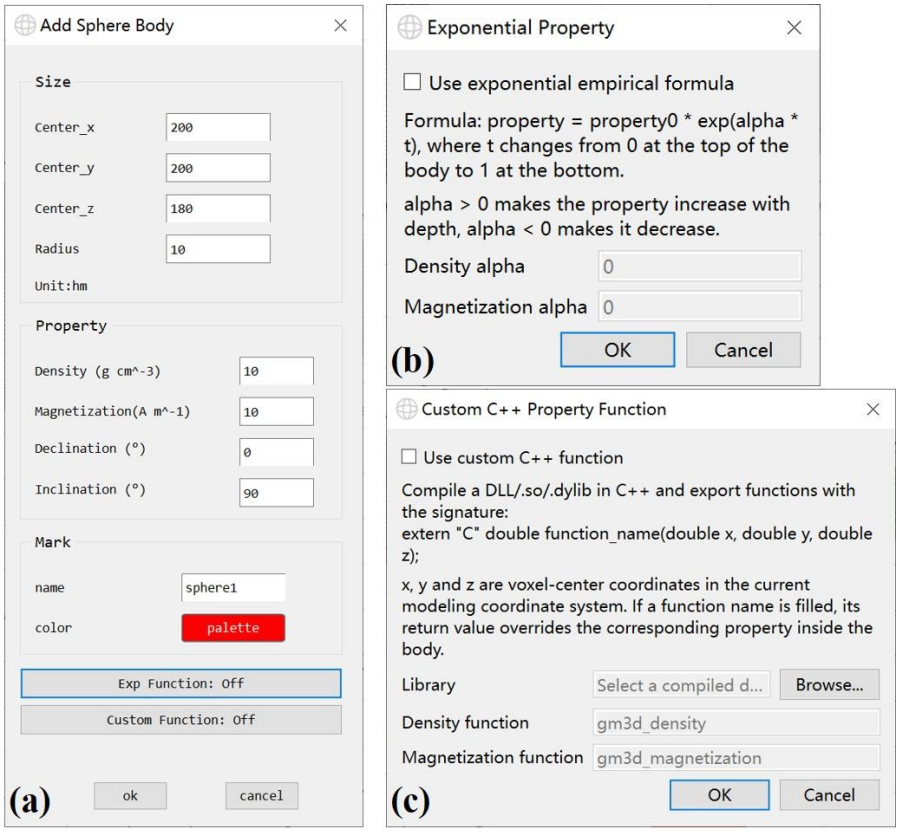

Figure R5: (a) The property-setting interface with two newly added buttons for continuous physical-property parameterization, (b) The built-in interface for defining exponential functions, (c) a flexible interface for implementing user-defined functions.

page 11, lines 299-301: “Spatially heterogeneous physical-property distributions within a single body can be represented in G&M3D 1.0 through continuously varying functions. In particular, the software supports user-defined functional forms, which allow flexible construction of bodies with spatially variable density contrast or magnetization.”