

**Large-volume and shallow magma intrusions in the Blackfoot Reservoir volcanic field (Idaho, USA)**

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**Introduction**

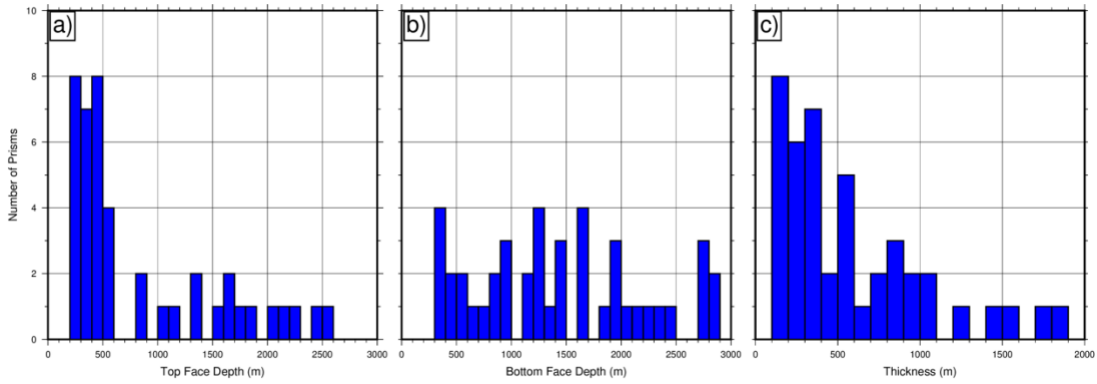
The supporting information relates to the preferred model from the main article (Figure 8). The text and figures in this supporting information is not critical to discussion and key points of the paper but provide additional information/visualization on some of the statements made in the main article relating to the modeled intrusion.

**Text S1**

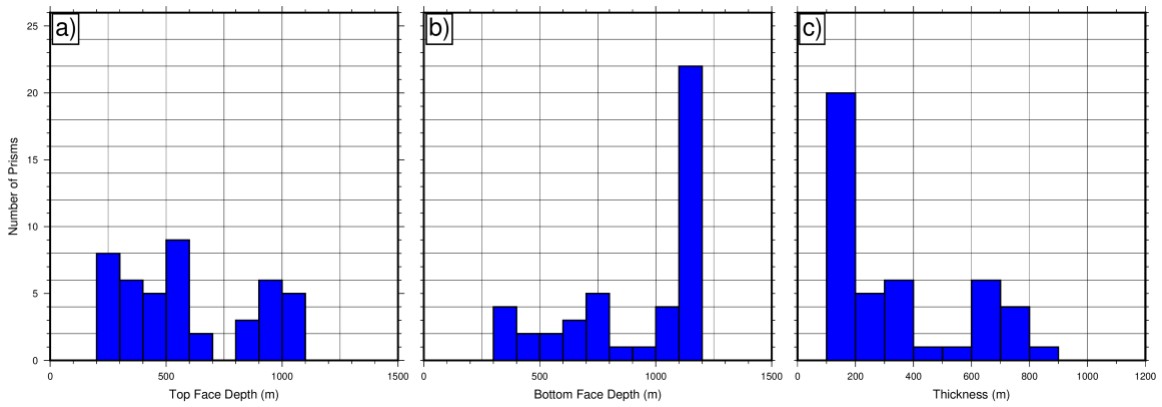
The best-fit models lie between 800-500 kg m<sup>-3</sup> show that the depth to the top is more significant than the depth to the bottom. Conversely, best-fit models between 500-350 kg m<sup>-3</sup> show that the model is more sensitive to the depth to top than the depth to the bottom. Figure S1 depicts the distribution in the depth to (a) tops, (b) bottoms, and (c) thickness of the prisms in a best-fit model with a density contrast of -400 kg m<sup>-3</sup> and reflects that the depth to the top is relatively constant compared to the variability in the depth to the bottom. The distribution for a best-fit model with density contrast of -600 kg m<sup>-3</sup> can be seen in Figure S2 and illustrates that the depth to the bottom is relatively constant while the depth to top is more variable. Figures S3 and S4 show the goodness-of-fit for both the -400 and -600 kg m<sup>-3</sup>, respectively. Both residual gravity maps show that the misfit of gravity is random indicating that there is not a systematic error in the models. The equiline plots show that the modeled gravity closely matches the observed gravity measurements, and similarly to the residual gravity map reflects that there is no systematic error or underestimating of a particular range of observed gravity values.

Animated movie files are provided of the -400 and -600 kg m<sup>-3</sup> 3D model renderings. Both renderings are presented with 2.5 $\times$  vertical exaggeration to

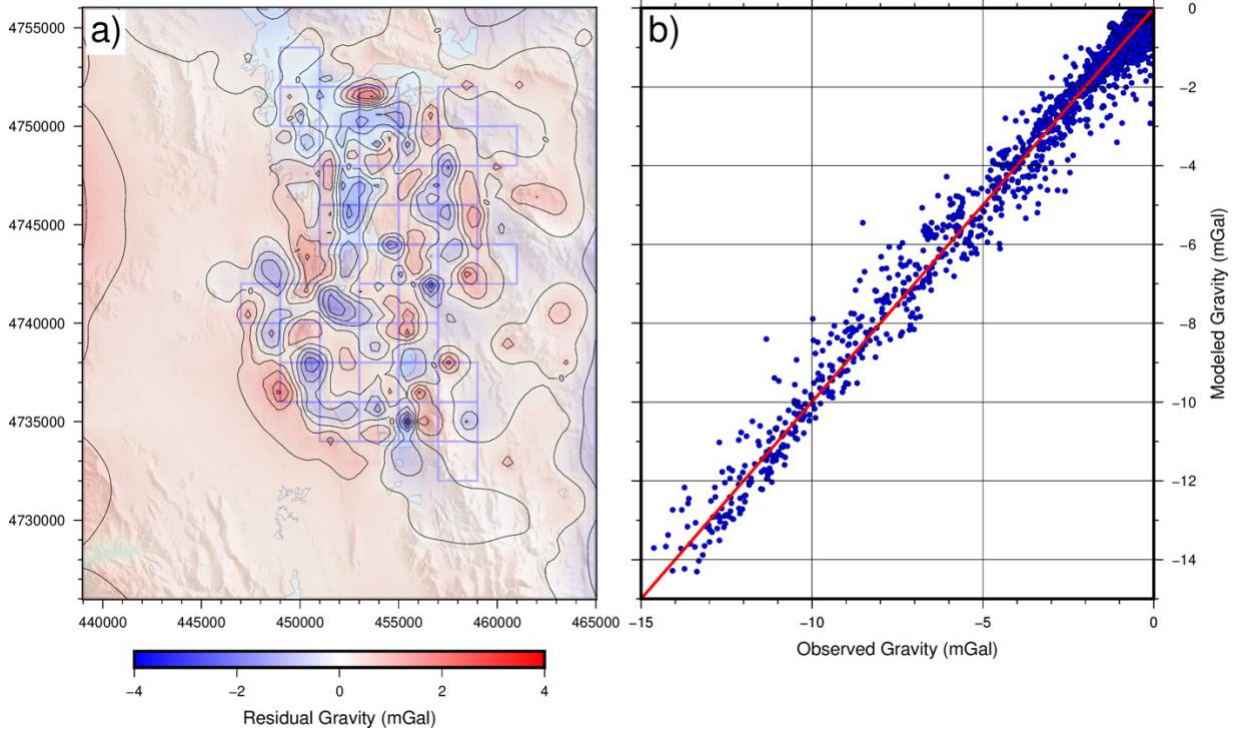
allow for visual comparison, and contain the same symbol scheme as Figure 8 of the main text.



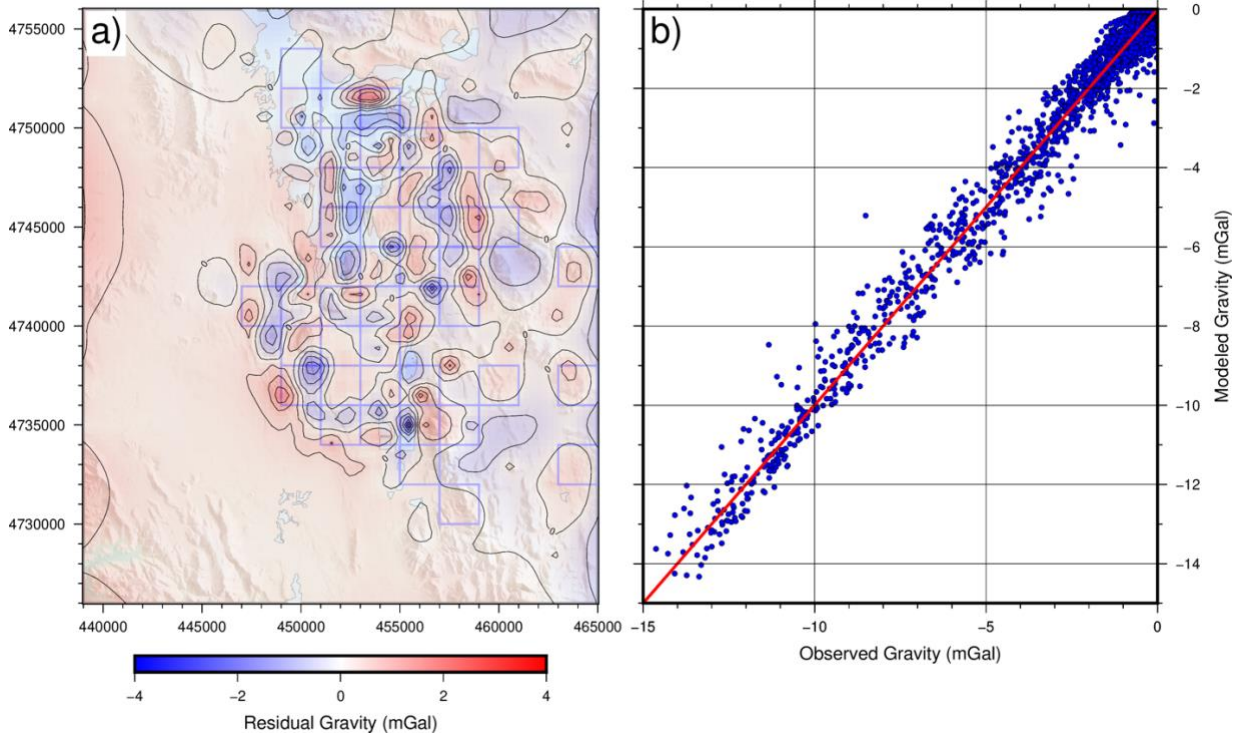
**Figure S1.** Distributions of (a) depths to top, (b) depths to bottom, and (c) thickness of prisms in the preferred model with a density contrast of  $-400 \text{ kg m}^{-3}$ .



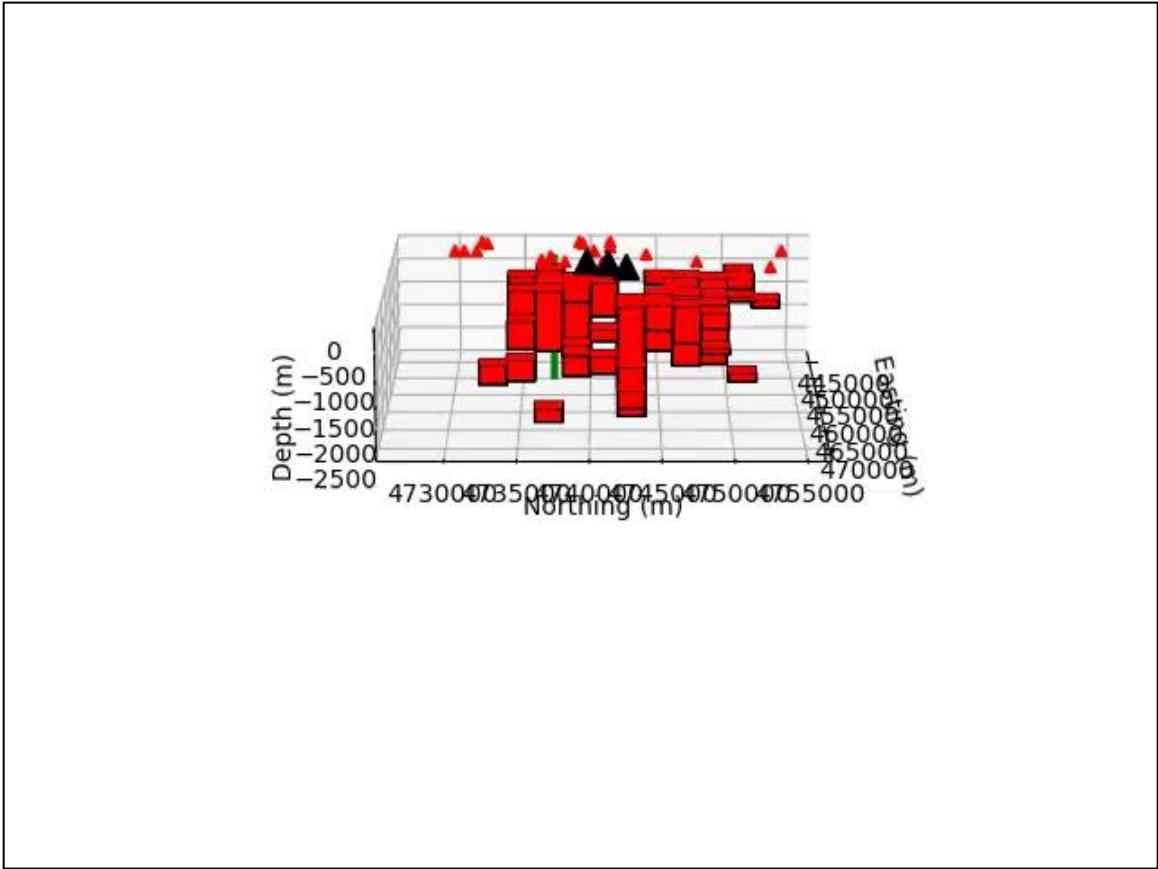
**Figure S2.** Distributions of (a) depths to top, (b) depths to bottom, and (c) thickness of prisms in the preferred model with a density contrast of  $-600 \text{ kg m}^{-3}$ .



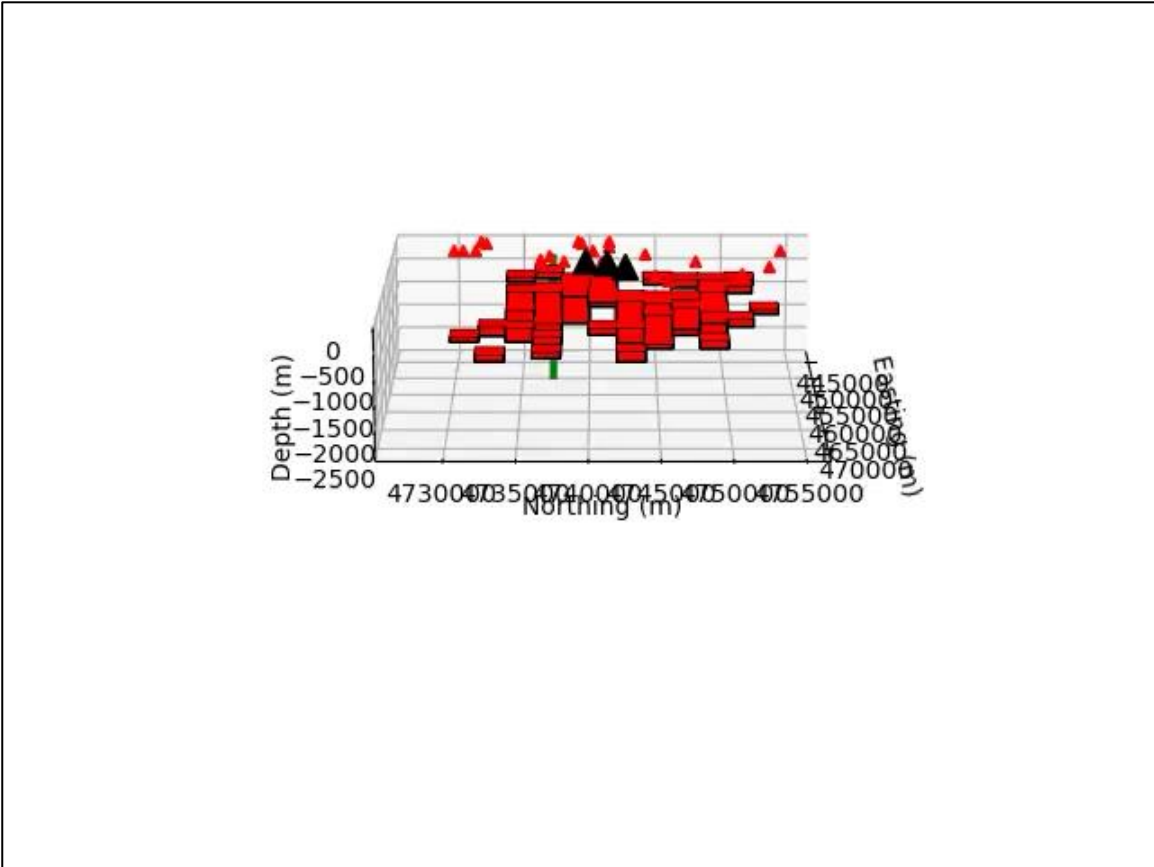
**Figure S3.** a) Residual gravity between the best-fit inversion using a density contrast of  $-400 \text{ kg m}^{-3}$  and the observed data. The blue squares show the locations of prisms in the inversion that have a non-zero thickness. b) An equiline plot showing the fit of the modeled gravity to the observed gravity. The red line represents the 1:1 fit indicating a perfect fit to the data.



**Figure S4.** a) Residual gravity between the best-fit inversion using a density contrast of  $-600 \text{ kg m}^{-3}$  and the observed data. The blue squares show the locations of prisms in the inversion that have a non-zero thickness. b) An equiline plot showing the fit of the modeled gravity to the observed gravity. The red line represents the 1:1 fit indicating a perfect fit to the data.



**Figure S5.** Animated movie file of the  $-400 \text{ kg m}^{-3}$  density contrast model with a 2.5x vertical exaggeration.



**Figure S6.** Animated movie file of the  $-600 \text{ kg m}^{-3}$  density contrast model with a 2.5x vertical exaggeration.