Supporting Information for "A data-driven approach to physics-based risk models for deep-seated landslides"

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Introduction This document serves as the supporting information for our study, providing detailed supplementary datasets and visualizations crucial for a comprehensive understanding of our methodologies and findings. The contents within aim to enhance the transparency and accessibility of our research, ensuring that fellow researchers can validate and build upon our work effectively. Included are the Sentinel-1 InSAR interferogram files that form the backbone of our time series inversion analysis and were downloaded from the Alaska Satellite Facility Vertex Platform. We also provide a series of comparison plots that juxtapose field measured temperatures with those predicted by our models. Lastly, for a more targeted analysis, we include InSAR model displacement comparison plots for five specific samples on the scarp. These plots compare the displacement data

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derived from InSAR observations with those predicted by our models, providing a sample

by sample breakdown of model performance.

**Sentinel-1 InSAR Interferogram Files for Time Series Inversion**

S1BB_20190503T174622_20190515T174622_VVP012_INT40_G_weF_4453

S1BB_20190503T174622_20190515T174622_VVP012_INT40_G_weF_D7F2

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S1BB_20190503T174622_20190702T174625_VVP060_INT40_G_weF_5E47

S1BB_20190515T174622_20190608T174624_VVP024_INT40_G_weF_9700

S1BB_20190515T174622_20190608T174624_VVP024_INT40_G_weF_E4F4

S1BB_20190515T174622_20190620T174624_VVP036_INT40_G_weF_0296

S1BB_20190515T174622_20190620T174624_VVP036_INT40_G_weF_39E4

S1BB_20190515T174622_20190702T174625_VVP048_INT40_G_weF_DE31

S1BB_20190515T174622_20190714T174626_VVP060_INT40_G_weF_EC4E

S1BB_20190608T174624_20190620T174624_VVP012_INT40_G_weF_55D5

S1BB_20190608T174624_20190620T174624_VVP012_INT40_G_weF_AD9C

S1BB_20190608T174624_20190702T174625_VVP024_INT40_G_weF_20EA

S1BB_20190608T174624_20190702T174625_VVP024_INT40_G_weF_A335

S1BB_20190608T174624_20190714T174626_VVP036_INT40_G_weF_3B0F

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S1BB_20190620T174624_20190702T174625_VVP012_INT40_G_weF_D547

S1BB_20190620T174624_20190714T174626_VVP024_INT40_G_weF_5E5A

S1BB_20190620T174624_20190714T174626_VVP024_INT40_G_weF_B7AD

S1BB_20190620T174624_20190807T174627_VVP048_INT40_G_weF_7E4F

S1BB_20190620T174624_20190819T174628_VVP060_INT40_G_weF_366E

S1BB_20190702T174625_20190714T174626_VVP012_INT40_G_weF_3534

S1BB_20190702T174625_20190714T174626_VVP012_INT40_G_weF_A87D

S1BB_20190702T174625_20190807T174627_VVP036_INT40_G_weF_1E82

S1BB_20190702T174625_20190819T174628_VVP048_INT40_G_weF_995D

S1BB_20190702T174625_20190831T174629_VVP060_INT40_G_weF_F527

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S1BB_20190831T174629_20191006T174630_VVP036_INT40_G_weF_C545

S1BB_20190831T174629_20191018T174630_VVP048_INT40_G_weF_42A8

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S1BB_20190912T174629_20191006T174630_VVP024_INT40_G_weF_778F

S1BB_20190912T174629_20191018T174630_VVP036_INT40_G_weF_DA12

S1BB_20190912T174629_20191030T174630_VVP048_INT40_G_weF_188A

S1BB_20190912T174629_20191111T174630_VVP060_INT40_G_weF_9EF5

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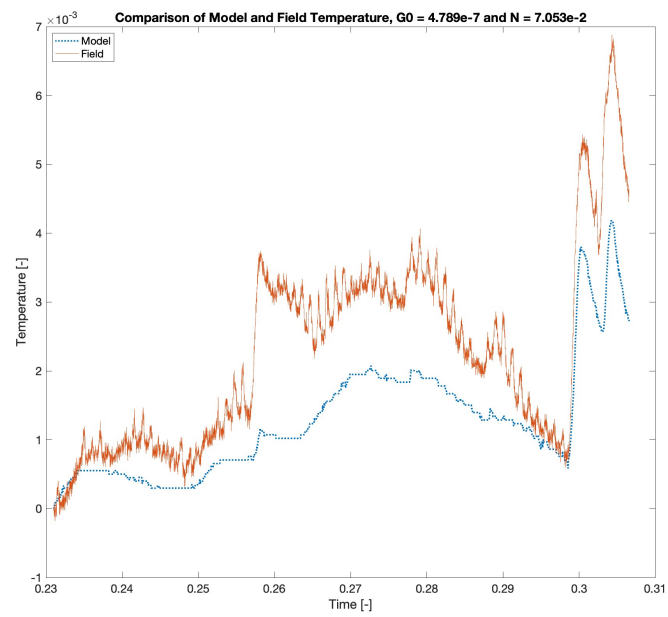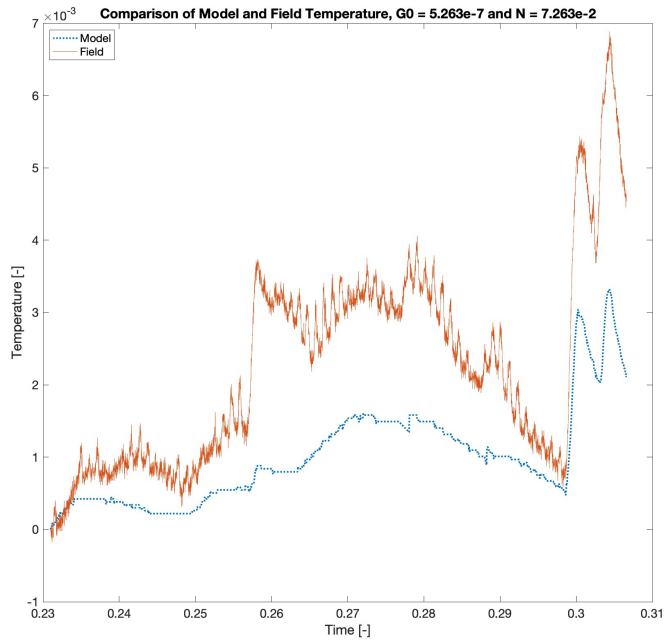S1BB_20191006T174630_20191018T174630_VVP012_INT40_G_weF_A106
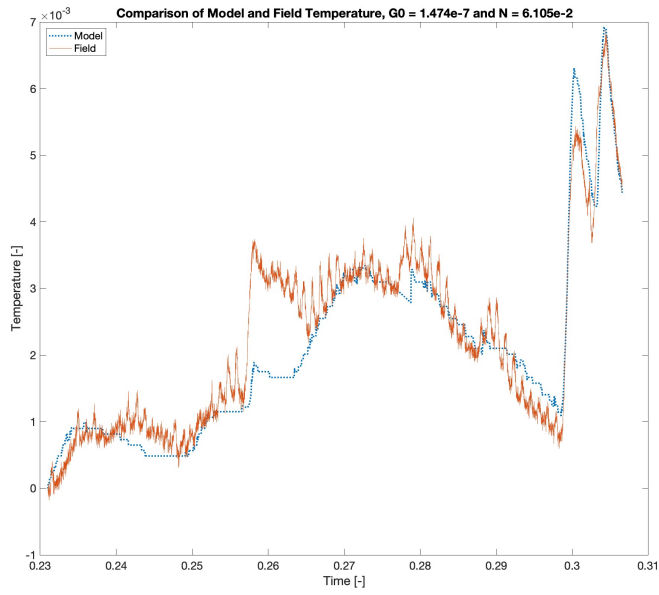
Figure S1. Comparison of model-output temperature with in situ temperature for Option C1.
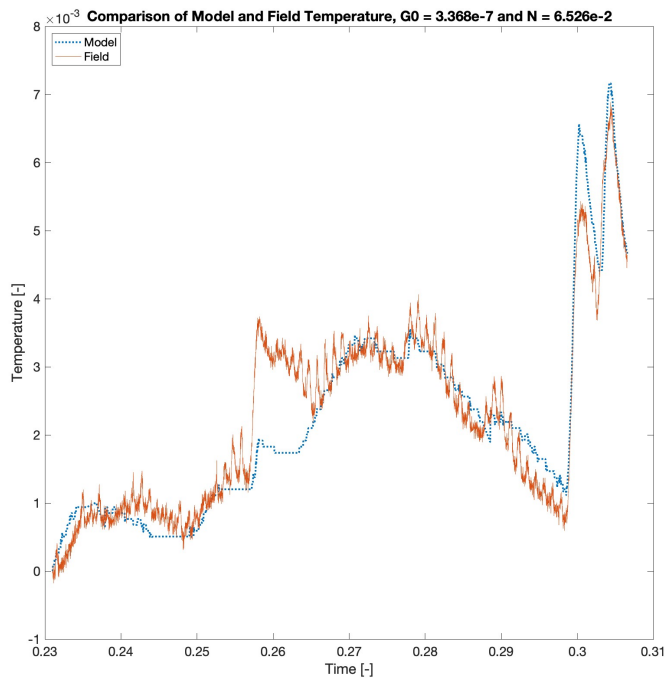
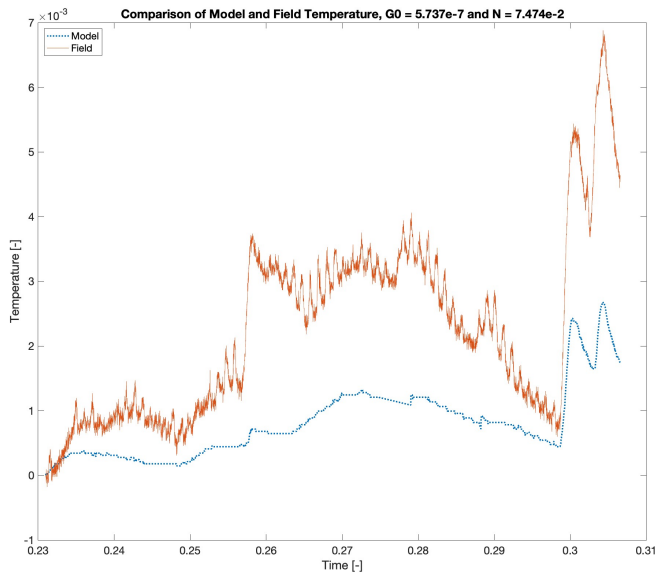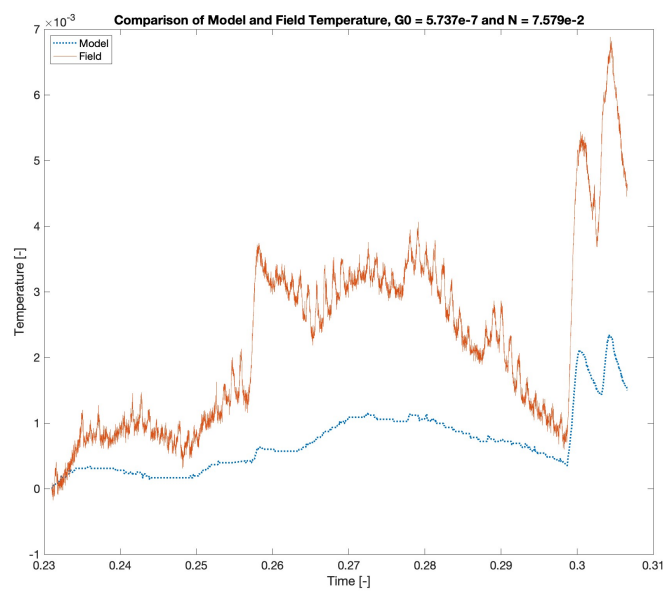**Figure S2.** Comparison of model-output temperature with in situ temperature for Option C2.
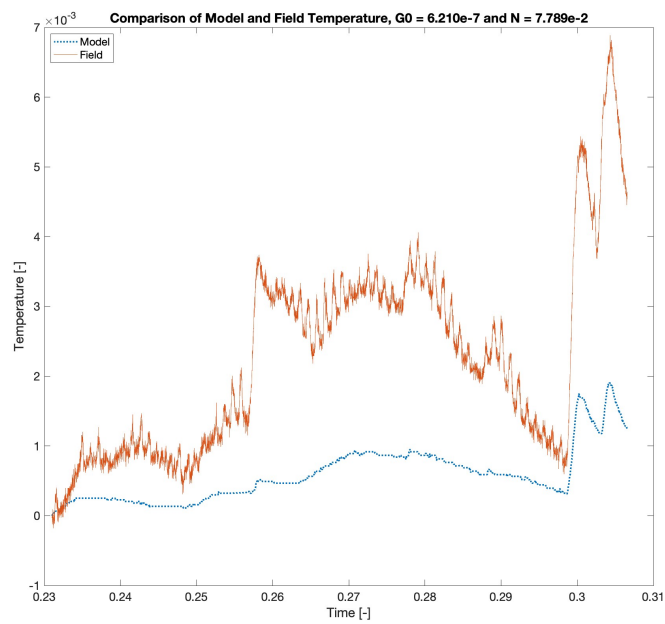
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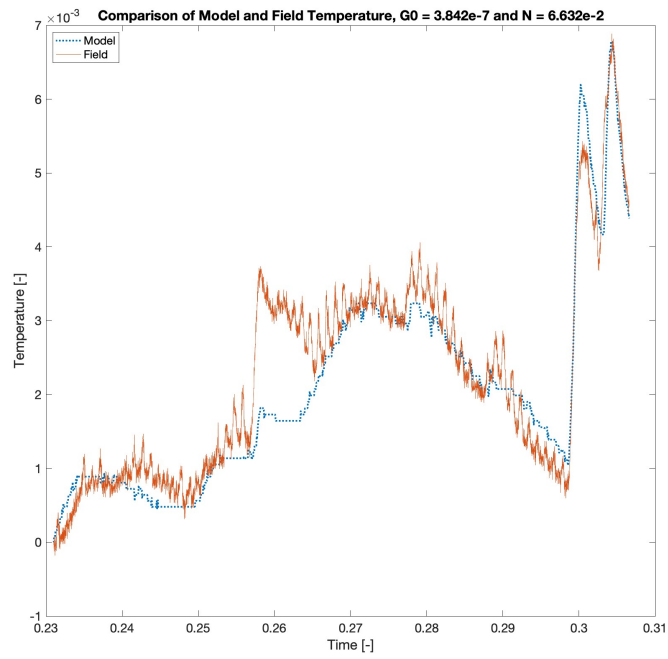
Figure S3. Comparison of model-output temperature with in situ temperature for Option C3.

Figure S4. Comparison of model-output temperature with in situ temperature for Option C5.

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Figure S5. Comparison of model-output temperature with in situ temperature for Option C6.

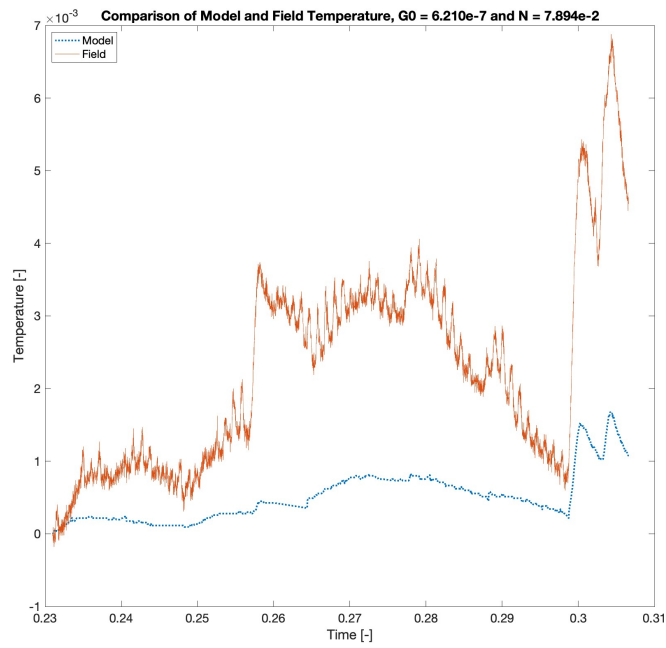**Figure S6.** Comparison of model-output temperature with in situ temperature for Option C7.
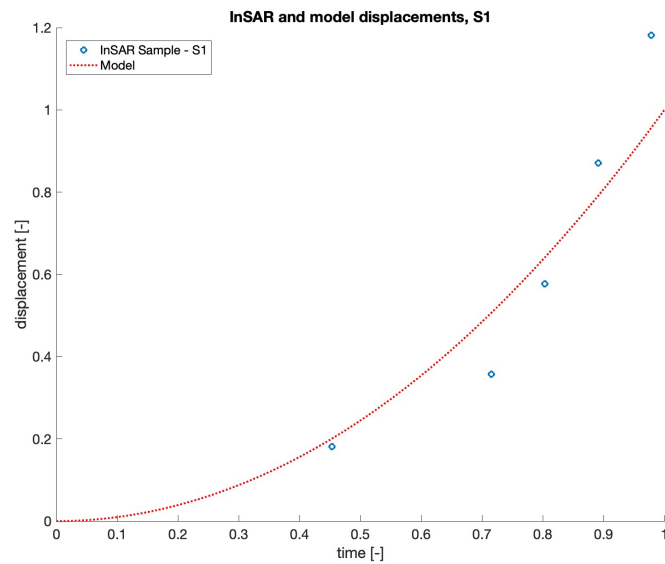
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Figure S7. Comparison of model-output temperature with in situ temperature for Option C8.

Figure S8. Comparison of model-output temperature with in situ temperature for Option C9.
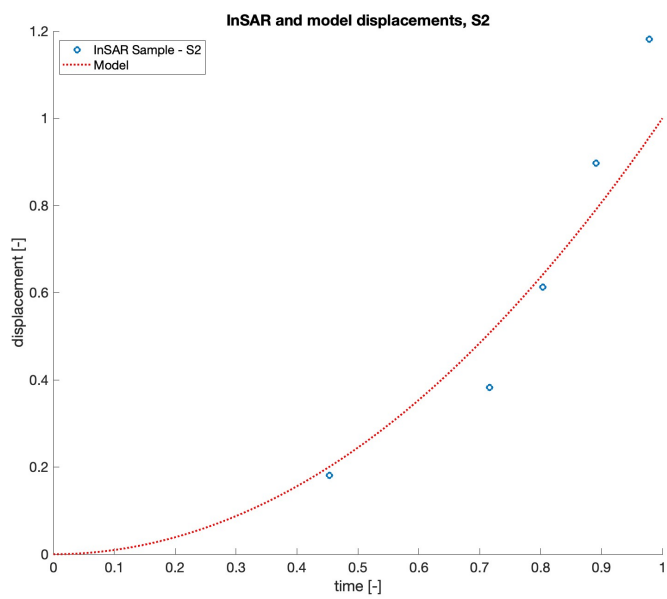
March 15, 2024, 8:03pm

Figure S9. Comparison of model-output temperature with in situ temperature for Option C10.

Figure S10. Comparison of model-output displacement for optimized S10 readings and correlated InSAR time series output for S1 sample pixel.
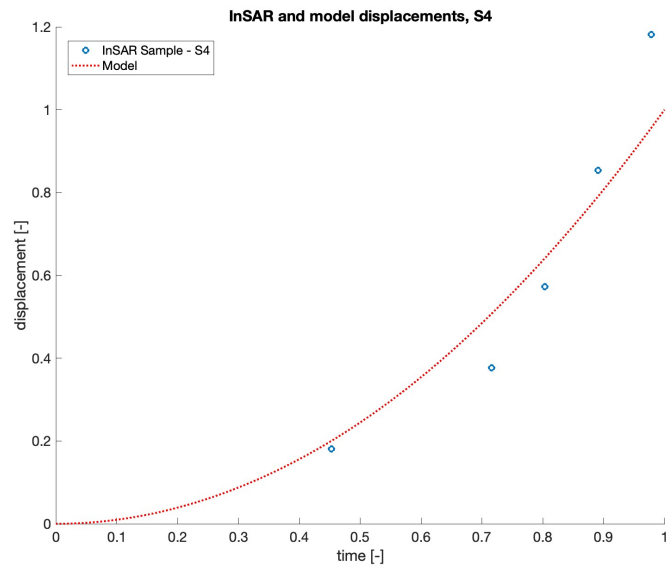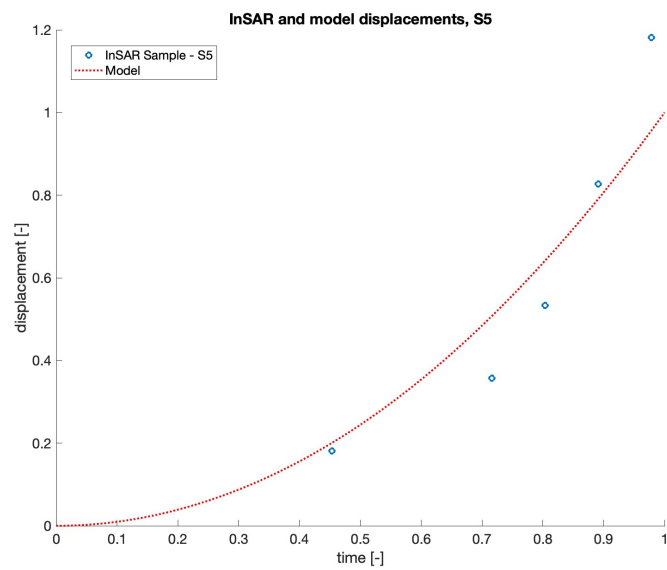
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Figure S11.   Comparison of model-output displacement for optimized S10 readings and correlated InSAR time series output for S2 sample pixel.
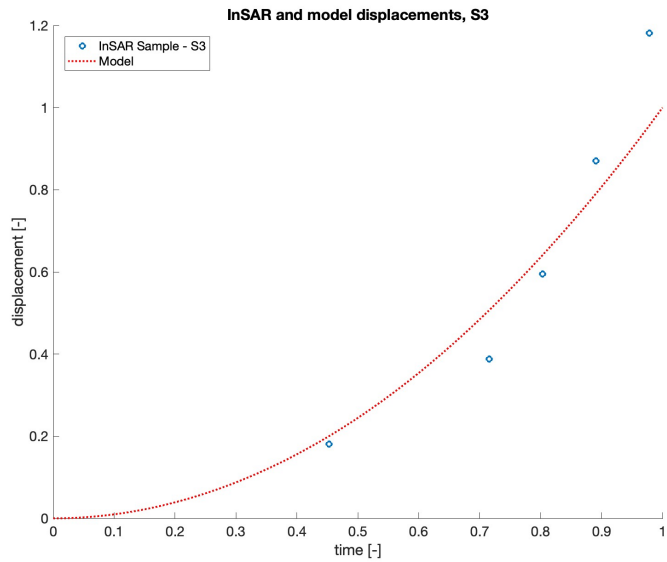
Figure S12.   Comparison of model-output displacement for optimized S10 readings and correlated InSAR time series output for S3 sample pixel.

InSAR and model displacements, S4

Figure S13. Comparison of model-output displacement for optimized S10 readings and correlated InSAR time series output for S4 sample pixel.

InSAR and model displacements, S5

Figure S14. Comparison of model-output displacement for optimized S10 readings and correlated InSAR time series output for S5 sample pixel.

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