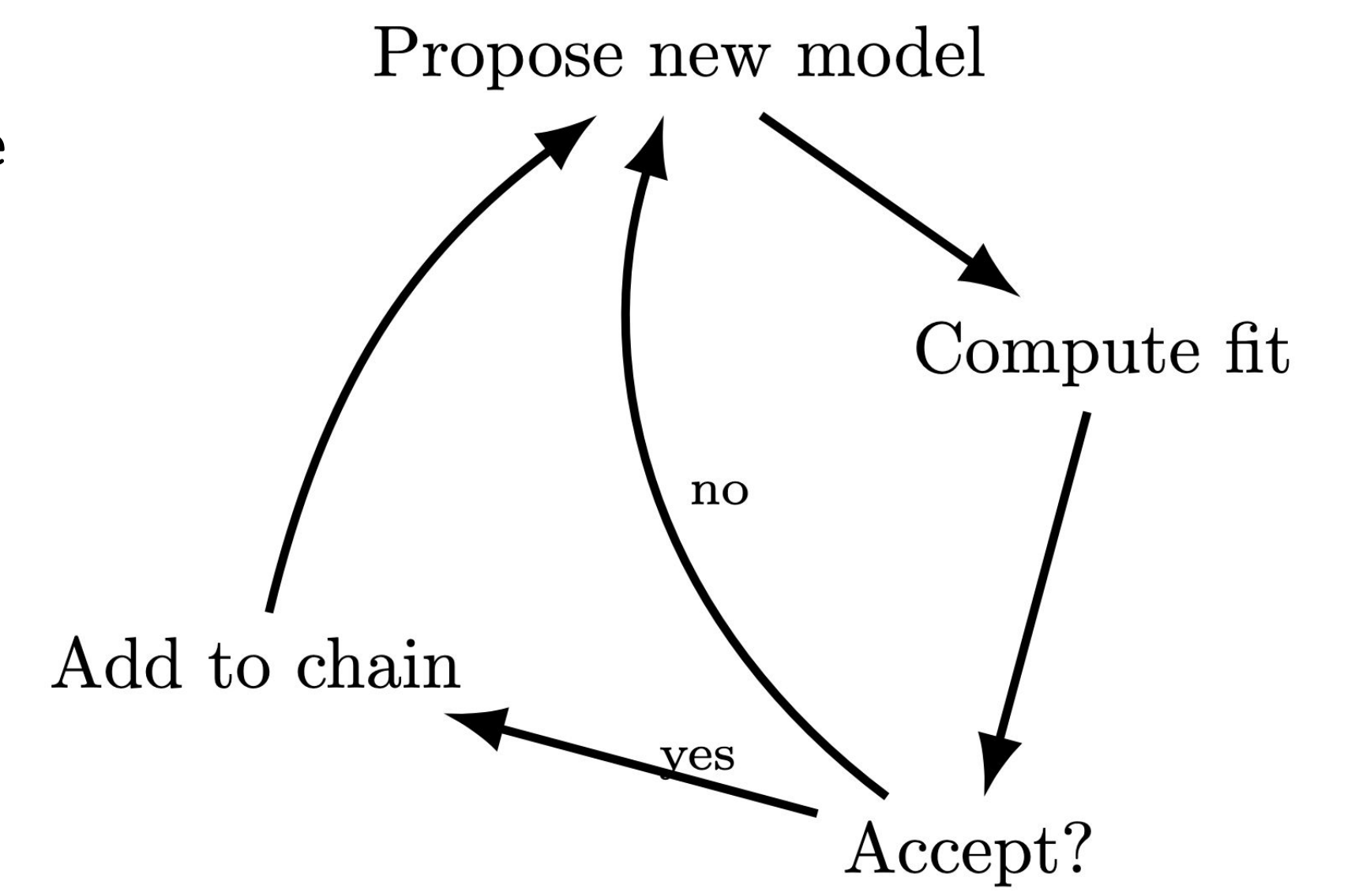


Introduction

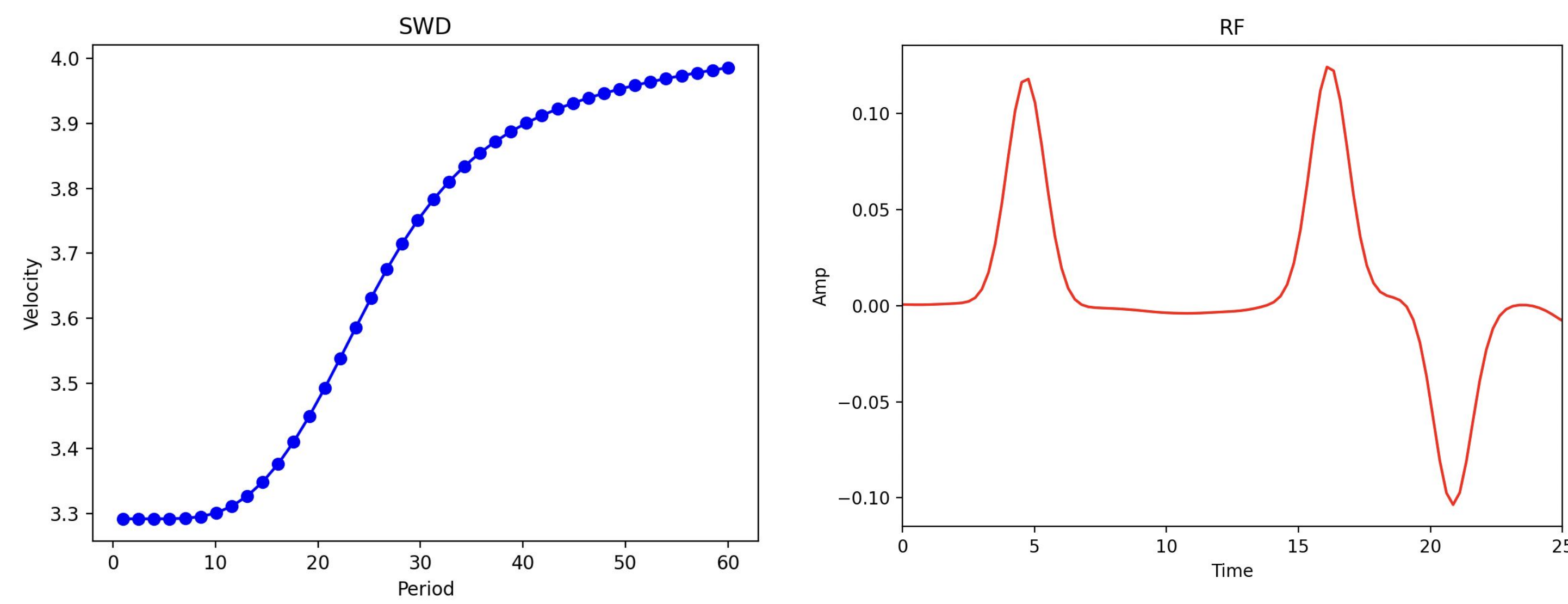
- Inversion is the process of working backwards from observations to estimate Earth's structure that produced them
- Joint inversion is using multiple datasets each sensitive to different properties to make a single consistent Earth model
- This work extends on the BayHunter framework by adding a gravity anomaly module to it
- We take data we can measure and search for a model of the Earth that could have generated those results

Methodology

- BayHunter is an open source MCMC joint inversion framework for surface waves and receiver functions
- We adjust the model until the predicted and observed data match as closely as possible



Original Datasets

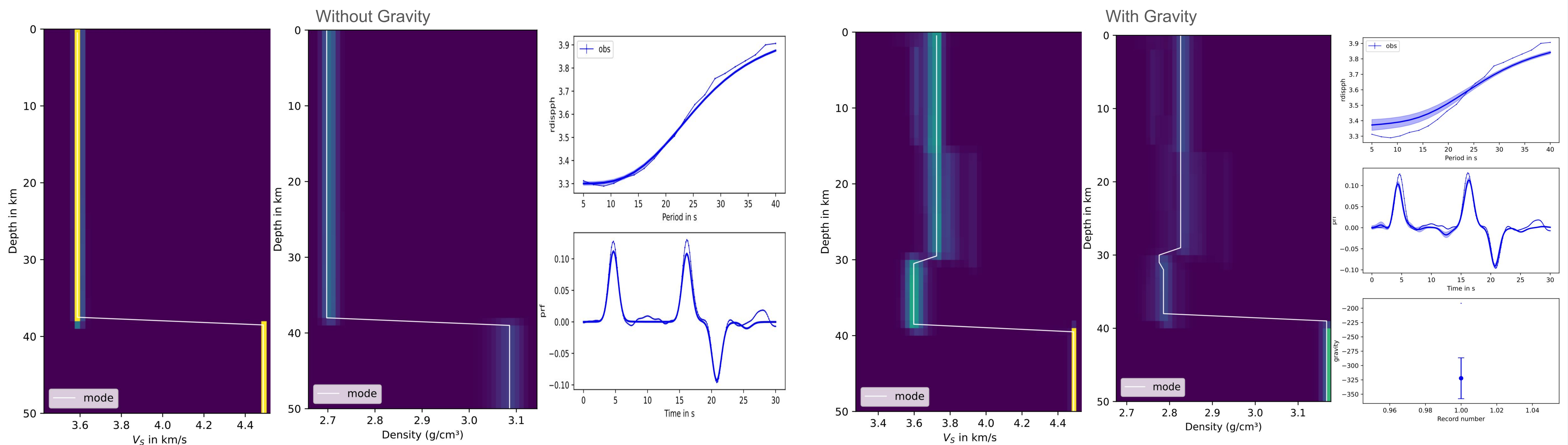


Our Additions

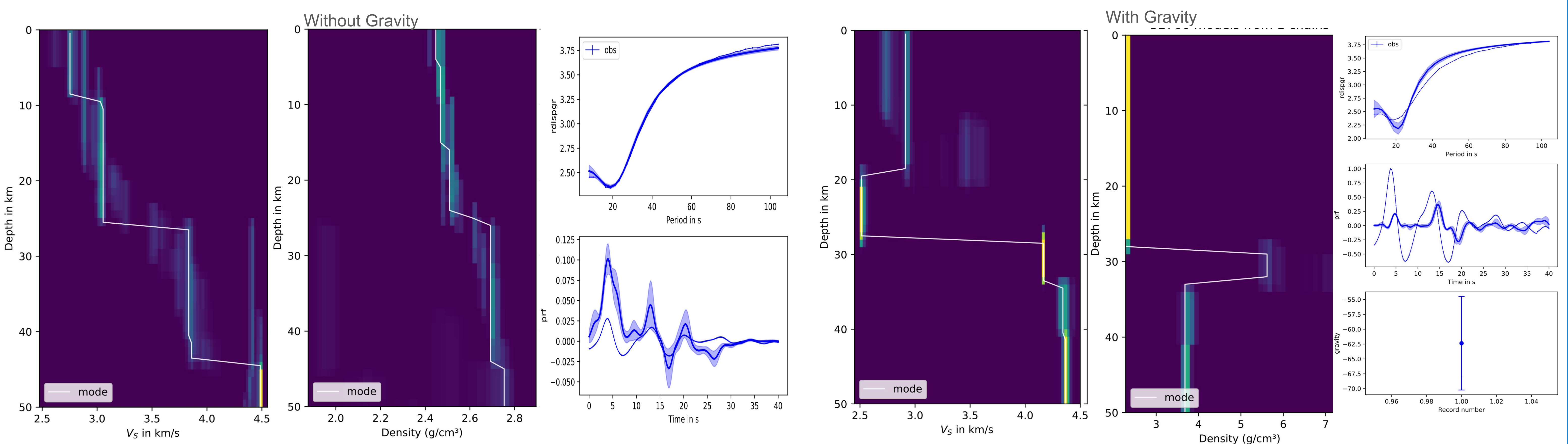
- **Gravity Anomaly**
 - Measures small changes in Earth's gravity field
 - Calculated by summing Bouguer Slab effect for each layer
 - Directly sensitive to density variations
 - Complements SWD (velocity) and RF (interfaces)
- **Density Equation**
 - Modified the linear relationship to a more non linear relation
 - Dependent on both V_p and V_s

$$\rho(V_p, V_s) = \frac{\sum_{i=0}^n \sum_{j=0}^i c_k V_p^{i-j} V_s^j}{\sum_{i=0}^q \sum_{j=0}^i d_k V_p^{i-j} V_s^j}$$

Synthetic Test



Application on HYB Station



Conclusion and Future Work

- Currently the addition of gravity seems to be reducing the quality of results rather than improving it
- Still a work in progress adding more data can yield more constrained information
- Addition of gravity seems to be reducing the V_p/V_s ratio could be related to reference model
- Figuring the optimal parameters for the inversion could help fix most of the issues
- We can improve the gravity forward model
- Doing for multiple stations in a line could reveal where the model is currently going wrong

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