

Review #1

PROPOSAL NO.: 0417929

INSTITUTION: U of Colorado Boulder

NSF PROGRAM: GEOPHYSICS

PRINCIPAL INVESTIGATOR: Ritzwoller, Michael H

TITLE: Collaborative Research: CMG: Uncertainty and Physical Constraints in Seismic Inferences

RATING: No Rating

REVIEW:

What is the intellectual merit of the proposed activity?

What are the broader impacts of the proposed activity?

The proposed research will be an excellent training ground for students, especially for statistics students in interdisciplinary research. The research on inverse problems is likely to be applicable to other general situations.

Summary Statement

This proposal constitutes an interface of geoscience and statistics. Both PIs have extensive experience in the proposed research area, and are well suited to conduct the research. A unique feature of the research team is that the lead PI, who is the statistician of the team, is also a trained geophysicist, and has been working on statistical issues, particularly inverse problems, that are relevant to seismology for nearly 20 years. He is well known in the statistical community for his early work on inverse problems and recent work on confidence intervals. This is a strength of the proposal.

However, the proposal remains fairly vague in terms of statistical methodology. A general picture is presented in which the expertise of the two PIs complements each other, but specifics are not provided in sufficient detail. For instance, the need to quantify uncertainties is convincing, but exactly how this will be carried out is unclear.

The same applies to the goal to reduce uncertainties in the estimated model and its associated inferences. What is the underlying physical model to be tested in Theme 4, and which test procedure will be employed? Does it involve the development of new statistical methodology? There is also no concrete plan for the confidence sets in Theme 5.

There are certainly difficult algorithmic issues inherent in seismic inversion, but it is hard to see where statistical concepts will be used or statistical modeling will be advanced in this research. The proposed research is described only on the last 2.5 pages in earnest. While possibly worthy goals are described in general terms, whose realization may have impact in seismology, there is virtually no research plan. The investigators do not give enough information to enable an evaluation of the proposed research in terms of its statistical content. We are essentially led to rely on the PIs' reputation to the timely delivery of the results.

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