December 14, 2000

Paul Davis
Senior Editor
Journal of Geophysical Research
University of California, Los Angeles
Los Angeles, CA 90095-1567

Re: JB00-0201

Dear Dr. Davis,

Please find enclosed three (3) copies of the revised manuscript "Continuous GPS measurements of postglacial adjustment in Fennoscandia, 1. Geodetic results," for publication in JGR-Solid Earth. We have made changes to the manuscript to respond to all of the major criticisms of the referees and the AE. We were able to address many of these criticisms with a single modification, extending our analysis to include data acquired through May, 2000. Because of this change, we did not have to treat the Finnish data set differently. Moreover, the different analysis methods now compare much better, and the scatter in (current) Figure 4 (comparison of observed and model 3-D rates) is much clearer and more scientifically conclusive. Our main conclusion of the paper, that we are observing crustal deformation associated with Fennoscandian postglacial adjustment, has not changed. But because of the additional analysis, the observations are now accurate enough that we can add that we see systematic differences from the model. This makes for a much stronger paper, and we thank the referees and the AE for their comments in this regard.

Because the extension of the data set clears up a number of issues, this change also shortened the manuscript slightly. We removed Figure 3 (comparison of solutions), and replaced this with a table giving statistics of the differences. In this table, we incorporated the comments of the referees and the AE and performed a limited assessment of the effects of time series length and found it to be quite significant. We also made the decision to remove the power-spectrum study and leave a more in-depth treatment to a future paper. Finally, we removed the section on Baltic tilt. All these changes reduced the size of the manuscript by $\sim$10%. (This decrease is not reflected in the page count of the enclosed copies because we have now double-spaced Tables 1, 2, and 5.)

The AE states that Referee 2 suggested that a major revision is required, but this referee listed only minor deficiencies. Perhaps the AE meant Referee 1, who did, in fact, focus on the greatest weakness of the submitted manuscript: the length of the

data set. Thus, I believe that in lengthening the data span we have addressed this referee's greatest concerns.

Other changes are given in point form on an enclosed list.

Sincerely,

James L. Davis

enc.

Response to Referee Comments

In addition to the changes outlined in the letter accompanying this submission, we have made the following changes:

- We have made nearly all the changes suggested in the mark-ups of the manuscript.

- Referee 1 and the AE both noted the troubling issue of setting objective criteria for "good" and "bad" rates, rejecting certain rates, etc. Also, there is a problem in distinguishing between "short" and "long" time series. With the updated analysis, we have treated all the data the same and make no distinctions.

- The AE pointed out that there were intriguing departures from the model. Because of the revised analysis, we have enough confidence to point out that significant departures from the model are evident. These differences will be addressed in a future paper.

- Referee 1 requested more information on the linear correlations of some of the figures. While we have not provided explicit correlation coefficients, we have now made several changes that address this issue. In Figure 4 (observed versus model deformations) we have calculated and shown the best-fit lines for each frame, and given the RMS residuals in the text. In Figure 8 (correlation versus length), we have calculated and shown the best-fit line and we give its equation in the text.

- We have included a brief discussion regarding an EOF filter versus a filter based on the mean of the variations, as suggested by Referee 1. Using an EOF filter one can, if one wished, obtain zero residuals, so the size of the residuals is not necessarily a good measure of how well the filter works. This is obviously an area for future work.

- Referee 1 requested more information on our choice of a 2-D Gaussian to model the uplift rates. This is a simple model and we didn't want too much to be read into it. It provides parameters that crudely represent the position and shape of the uplift pattern. We now include a statement to this effect.

- Referee 1 also wanted more information on the EOF analysis. From his comments, we realize that a fuller explanation of this analysis is warranted, but to include too much detail (explicit parameterization, etc.) would detract from this already long paper. We therefore leave some of these issues to a future work.

- We include the alternate term "ambiguity fixing" as requested by Referee 1.

- We have changed "timescale" to "time scale," as per Referee 2.

- We did not address the suggestion of Referee 2 to include how ionosphere and troposphere affect determinations of north vs. east. This is certainly an interesting point, but we don't really know the answer to this. I started to perform a simulation that included gradients, etc., but this analysis quickly grew large and involved. We therefore leave this to a future work.

- We did not label Figure 5 (now Figure 4), as Referee 2 suggested, since the caption gives the required information.

- In response to Referee 2's comment to give a better explanation of the eigenvectors, we gave an expanded explanation in the text of the meaning of the first five eignevectors. After that, it's difficult to interpret. Often only the first eigenvector has an obvious meaning, so we were fortunate.

- As suggested by Referee 2, we removed Section 4.4.