

## ***Interactive comment on “Robust Isochron Calculation” by Roger Powell et al.***

### **Anonymous Referee #2**

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#### General comments

This paper discusses the use of robust regression estimators in the context of isochron calculations. It seems that this is a timely and useful contribution, and I believe this is a good first paper on the topic. I am particularly glad to see the authors include their code in the submission.

#### Specific comments

Since I am not familiar with the model, it took me several readings to realize that  $r_k$  did not denote regression residuals ( $y_k - a - b * x_k$ ), but rather standardized residuals where the sd is itself a function of the parameter  $b$  (c.f. equation A3). This necessarily complicates the calculation, and algorithms designed for "standard" regression/scale models do not apply here. I would recommend that be discussed explicitly earlier in the manuscript, to highlight that this is not just a simple linear regression problem.

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My main two suggestions are: (a) Figure 6 seems to suggest that high-leverage points may be present in the data. In that case, it is known that Huber-type loss functions may not protect against this type of outliers. A re-descending rho function is needed in such situations, and I would suggest that the authors mention this, and maybe run a small numerical experiment to assess its potential advantage. (b) The covariance matrix  $V_k$  (in equation (A1)) can also be affected by atypical observations. It may be a good idea to replace it with a robust alternative.

#### Technical corrections

The authors may want to refer to the second edition of this book: Maronna, Martin, Yohai and Salibián-Barrera, *Robust Statistics: Theory and Methods (with R)*, 2nd Edition, Wiley, 2019.

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