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Errata: An alternate form of probability-distribution plots for D_e values

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Errata

In the paper by Berger (2010), there are two errors. In the first the author stated that radial plots are not applicable to D_e distributions containing negative D_e values. This is correct only if a logarithmic scale is used (as in the widely circulated radial-plot graphical routine by Olley). The author's statement is incorrect if a linear scale for D_e values is used (e.g., Fig. 1 in Berger, 2010, from Galbraith, 1988, and of course in Galbraith, 2010, Fig. 3).

The second error is that the author referred to the transformed PD plot as a 'relative probability' plot. This is incorrect because a $(D_e)^{-1}$ factor [in the partial-derivative transformation of $\log_e (D_e)$] was omitted. The $(D_e)^{-1}$ factor was omitted to create a plot yielding roughly constant peak heights for the example data in Fig. 3 of Berger (2010). As such the so-called TPD plot does not manifest relative probabilities (requiring comparison of areas under these peaks), rather something more akin to relative 'weighted' frequencies. If the $(D_e)^{-1}$ term is retained, then the TPD solid curve in the Fig. 3 of Berger (2010) would look closely alike the original dashed curve in that Fig. 3 (obtained using weighting by absolute errors). Thus the TPD plot (when presented with ranked D_e values) serves as only a visualization of relative (within the range of D_e values) 'weighted' frequencies when errors in D_e are mainly constant relative and when the distribution of D_e values is approximately log-normal. Finally, D_e values in the TPD plot were placed on a linear scale because generally we perceive geological time as linear, not logarithmic.

As Berger (2010) and Galbraith (2010) both agree, the appropriate post-visualization steps for calculating usefully accurate and precise age estimates involve the suitable use of either weighted means, minimum-age-models (MAM), central-age-models, etc., coupled sometimes with the display of data in a radial plot.

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References

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