Arason, Þ. and S. Levi (1995). Comparison of statistical methods in the analysis of inclinations-only paleomagnetic data, Oral presentation GAA62A-6, International Union of Geodesy and Geophysics, XXI General Assembly, Abstracts Week A, p. A182-A183, Boulder, Colorado, USA, 2-14 July 1995.

GAA62A-6   1515h

Comparison of Statistical Methods in the Analysis of Inclinations-Only Paleomagnetic Data

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It is well documented that arithmetic means of paleomagnetic inclinations, from horizontally unorientied borecores, where declinations are not available, are biased towards shallow inclinations. In order to remedy this bias, several methods have been used to analyze such inclinations-only data. To compare between these methods we have conducted a systematic study of the statistical parameters calculated from these methods. The parameters from the several methods are estimated using data sets generated by random sampling of true distributions with known statistical parameters. We show that for true inclinations below 60° all methods give reasonable estimates. The average inclination calculated by the method of *McFadden and Reid* [*Geophys. J. Roy. Astron. Soc.*, p.307, 1982], as presented in their article is very similar to the arithmetic mean of the inclinations and should not be used in its published form; however, we suggest a simple modification to their method. The method of *Kono* [*J. Geophys. Res.*, p.3878, 1980] appears to provide a more reasonable estimate for higher inclinations than the modified McFadden and Reid method. We show that for steep, near vertical inclinations the average inclination and the precision parameter can not be separated. The lack of declination data implies the loss of the ability to uniquely estimate the average inclination for very steep and scattered inclinations.