

DISTO X2: A METHODOLOGICAL SOLUTION TO THE CHALLENGES OF SPATIAL MAPPING IN PRIMATE ARCHAEOLOGY



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INTRODUCTION

Primate archaeological research typically occurs in poorly accessible environments^{1,2}, often incompatible with modern mapping equipment, e.g. heavy Total Stations, or open-canopy dependent DGPSs³. Thus, Primate Archaeology largely relies on traditional approaches such as the Tape and Compass method^{1,3}. The discrepancy between conventional and primate archaeological mapping limits the scope for comparative studies.

The DistoX2 is a highly-portable, versatile, digital hand-held device that was developed for speleological mapping where Total Stations and DGPSs are not viable^{4,5,6}. We investigated the potential of the DistoX2 for archaeological mapping in non-human primate settings and test its performance in controlled above-ground settings relative to the Total Station and Tape and Compass methods.

METHODS

DISTO X2 PRECISION

- 50 points recorded 10 times with DistoX2 in hand-held and tripod modes to calculate and compare the average deviation

DISTO X2 VS TAPE AND COMPASS ACCURACY RELATIVE TO TOTAL STATION

- 50 points taken with Total Station, DistoX2 in tripod mode, and Tape and Compass method
- Absolute X, Y, Z, coordinates were compared to calculate instrument error
- Raw measurements were used to calculate measurement discrepancy

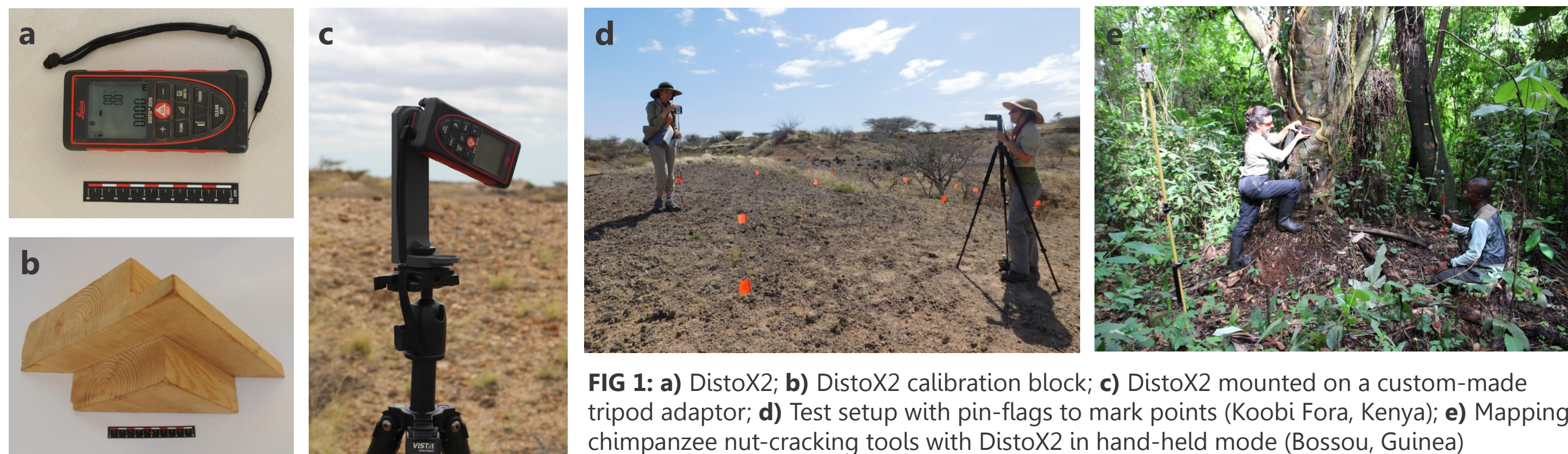
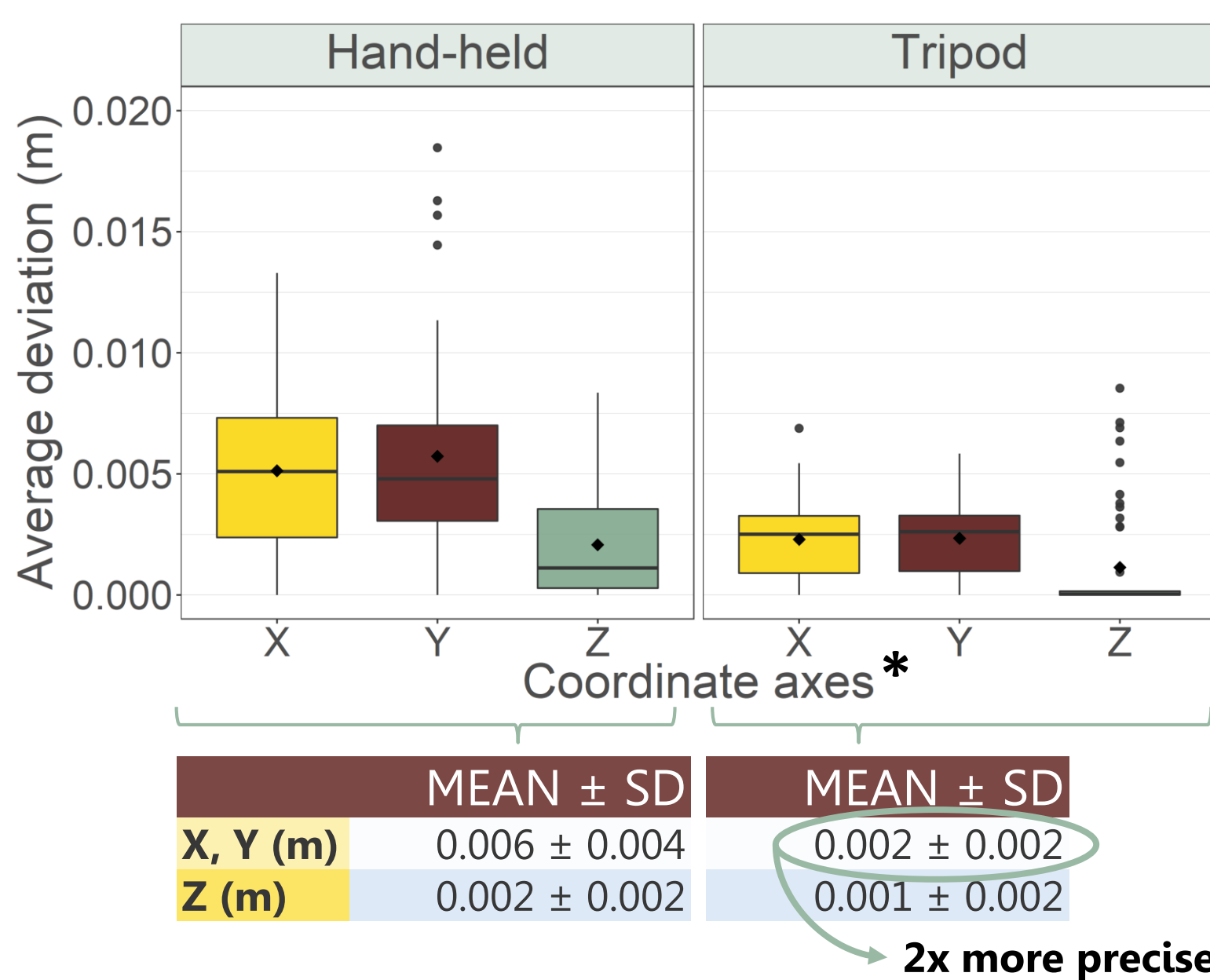


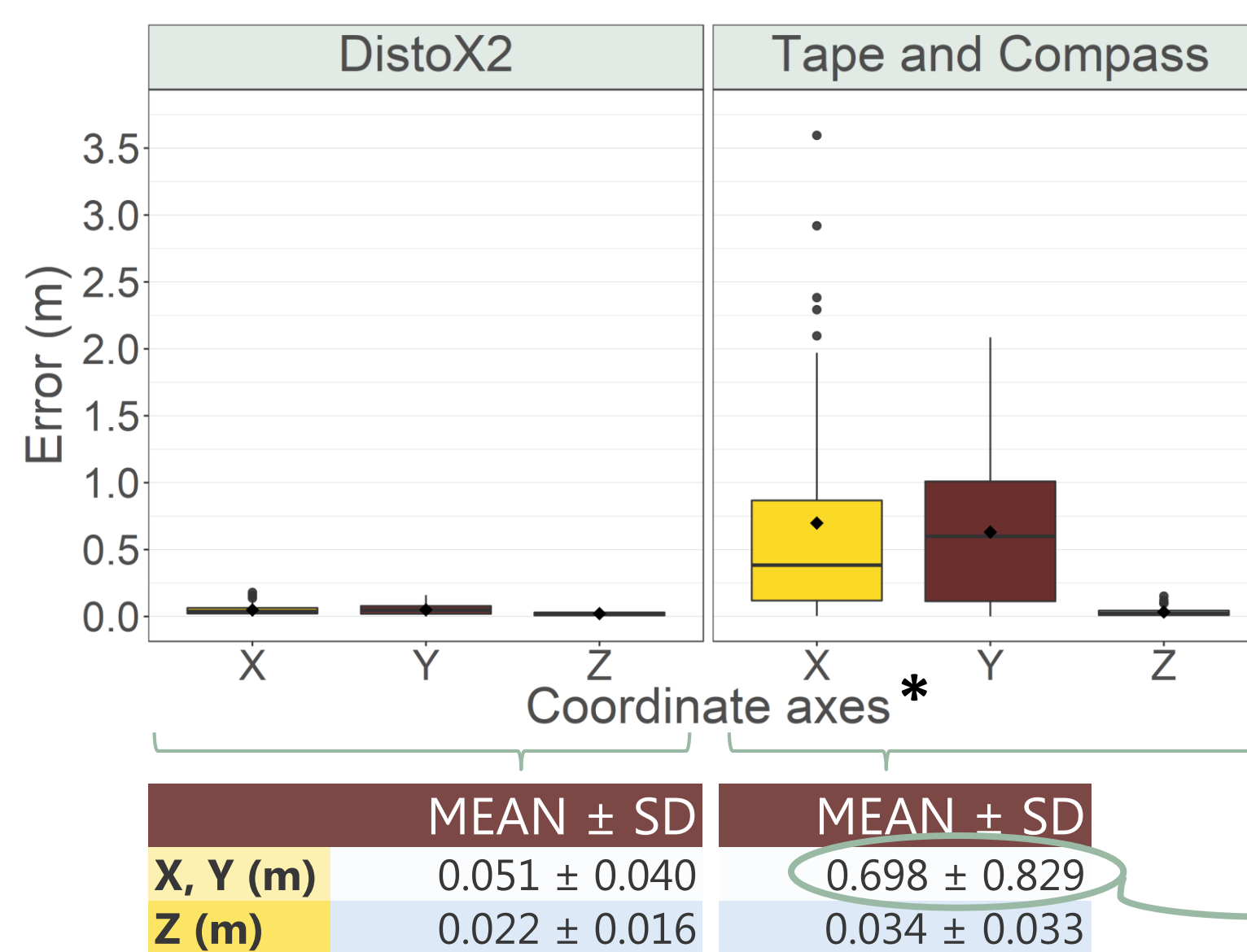
FIG 1: a) DistoX2; b) DistoX2 calibration block; c) DistoX2 mounted on a custom-made tripod adaptor; d) Test setup with pin-flags to mark points (Koobi Fora, Kenya); e) Mapping chimpanzee nut-cracking tools with DistoX2 in hand-held mode (Bossou, Guinea)

RESULTS

DistoX2 Precision



DistoX2 vs Tape and Compass Accuracy relative to Total Station



MEASUREMENT DISCREPANCY	MEAN ± SD
Horizontal distance (m)	0.019 ± 0.010
Vertical distance (m)	0.031 ± 0.026
Azimuth (°)	10.333 ± 7.357

Tape and compass error largely due to low resolution and precision of digital compass

Greater error is expected from analogue compasses

10x less accurate than the DistoX2

* P < 0.01

SUMMARY

METHOD	WEIGHT	ACCURACY	NORTH	SETUP	LIMITATIONS	COST
Tape and Compass	1 – 3 Kg	0.00 – 2.50 m	Magnetic North	Analogue or Semi-digital	Increased error with distance due to low compass resolution. Not suitable in steep terrain	\$20 – \$200
Total Station	4 – 10 Kg	<0.005 m	Programmed by user	Fully digital	Low portability. Not suitable for multi-site, landscape-wide surveys	\$4,000 - \$10,000
DistoX2	0.5 – 3 Kg	0.00 – 0.1 m	Magnetic North	Fully digital	Not suitable in highly magnetic contexts (e.g. power lines, cities). Hard to see laser in direct sunlight for targets >10m	\$280 - \$500

DISTO X2 CONCLUSIONS

Good level of precision, further improved when using a tripod

Significantly more accurate than the Tape and Compass method

Affordable and highly portable alternative to the Total Station in settings where it is not a viable option

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