

AUTOMATING THE 2G MAGNETOMETER FOR SINGLE-SOLENOID ALTERNATING FIELD DEMAGNETIZATION

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We have automated a 2G Enterprises superconducting magnetometer to measure and demagnetize standard paleomagnetic samples. After loading a sample and setting the desired demagnetization steps, the operation is performed automatically. All three axes are measured in both directions multiple times. A single solenoid performs three-axis static demagnetization by rotating the specimen 120 degrees about an oblique axis to each orthogonal position, eliminating potential errors resulting from differences between the fields generated when using two orthogonal coils with different geometry. Each sample is handled only once, minimizing angular alignment errors. For natural remanent magnetizations greater than 10^{-3} A/m, high quality AF demagnetization results can be obtained. 10-to-20-step demagnetization takes between 20 and 70 minutes, depending on the sample's moment. 160-step demagnetizations have been run overnight.

This automated system is complemented by a custom program that controls all system elements. In addition, the controlling software includes tools for 1) sample parameter input and instant results recalculation upon parameter adjustment, 2) real time results visualization, 3) integrated sun compass correction software, and 4) several demagnetization routines optimized for different magnitudes of magnetization. The software uses a very general and flexible, XML-based file structure capable of storing an entire field study in one hierarchical file format, with levels for locality, site, sample, and demagnetization step. It serves as an electronic field notebook for recording many more parameters and comments than those strictly needed to measure the direction of the core. For more information, please see <http://es.ucsc.edu/~emorris/cryoslug>.

magnetometer-automation

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