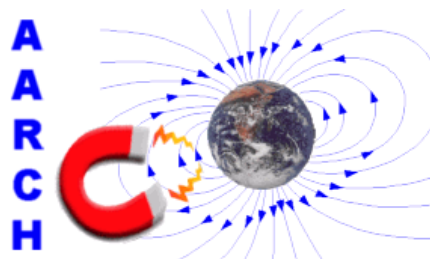
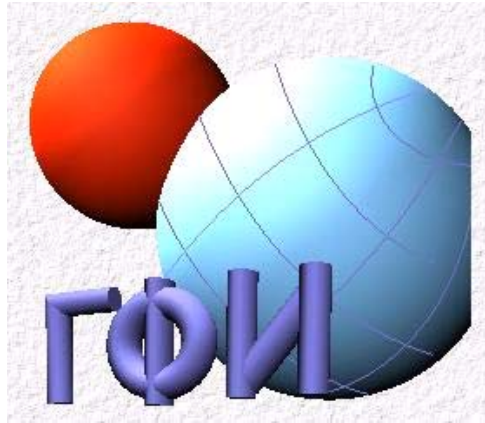


Archaeomagnetic Sampling Protocols for the BAN Geomagnetism Laboratory, Sofia, Bulgaria.

Andy. I.R. Herries & Mary Kovacheva



1. Equipment

- Non magnetic gypsum plaster.
- Mixing bowl with flexible sides (e.g. lower part of a 1.5 litre water bottle)
- Mixing device (e.g. flat, curved end spatula)
- Water
- Permanent marker
- Square plexi-glass with bubble level (Figure 1.1)
- Geological compass (Figure 1.2 shows the compass aligned along the north mark of a typical burnt clay archaeological sample).
- Clinometer
- packaging



2. Field Procedure

1. A drawing is made of the archaeological burnt features and initial (digital) pictures taken of the oven surface with a 1m scale rule.
2. *In-situ* magnetic susceptibility measurements are taken and locations of measurements noted on the drawing.
3. Measurements of the strike and dip of the kiln surface are taken using a clinometer and notes made of any potential post-use/burial movement as indicated from archaeological excavations or *in-field* observations. Again, locations of measurements and observations are noted on the drawing.
4. Samples of unburnt source clay (material) are taken if available.
5. Gypsum-plaster is made up in sufficient quantity for all hand-samples from each feature and blobs of gypsum are placed over the entire area of the oven to be sampled.

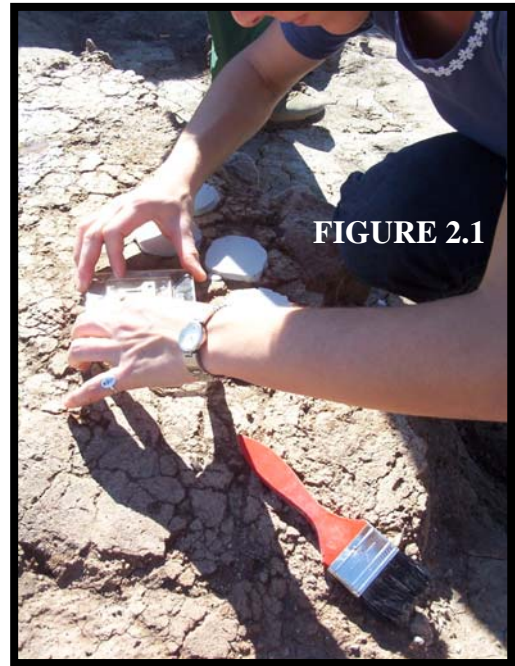


FIGURE 2.1

6. Before drying occurs the tops of the gypsum-plaster blobs are flattened with a square plexi-glass bubble-level (Figure 1.1) to make the surface completely flat and horizontal. The plexi-glass bubble-level is then slid off carefully before drying, so as not to disturb the surface of the gypsum-plaster. (NOTE: the base of the plexi-glass should be cleaned with water between each hand sample). This is repeated for all hand-samples from the same burnt feature (figure 2.1).



FIGURE 2.2

7. The same is done on any other burnt features to be sampled while the first sampled features gypsum-plaster markers dry and harden.
8. The location of the gypsum-plaster markers is noted on the drawing and the hand sample numbers written on each of the gypsum-plaster markers (Figure 1.2).
9. Firstly a magnetic compass is used to mark the direction of NORTH on the gypsum marker using a red pen (Figure 1.2). A box is used to lift the compass away from the burnt feature and therefore reduce any anomalous effects (Figure 2.2).
10. Secondly, a sun compass is used to draw a second line in blue pen crossing the magnetic bearing line and the time subsequently noted (Figure 2.3 & 2.4).
11. The sample material is then removed from the archaeological feature with the gypsum marker in place and wrapped for transport.



FIGURE 2.3



FIGURE 2.4

3. Laboratory Procedure

1. The hand-samples are first consolidated using water glass (if needed) using a vacuum pump infiltration chamber and samples left to dry (Figure 3.1).
2. The gypsum plaster markers of the hand samples are then aligned along a square grid on plexi-glass and initially secured with a small amount of gypsum plaster (Figure 3.2).
3. A square, thicker plexi-glass wall is fitted around the base plate and hand-sample (Figure 3.3).
4. This is subsequently filled with gypsum plaster until the hand-sample is coated and then left to dry (Figure 3.4a & b).
5. The gypsum plaster block containing the hand-sample is removed from the plex-glass and orientation lines to north are copied over the base of the gypsum-plaster block (Figure 3.5).
6. the gypsum-plaster block and contained hand-sample are then carefully cut into 2cm² sub-sample cubes, making sure that the north orientation is retained. Each cube is marked with sub-sample number (in Cyrillic) and north mark, transcribed from the main hand-sample (Figure 3.6).
7. The collection is ready for laboratory work (Figure 3.7).

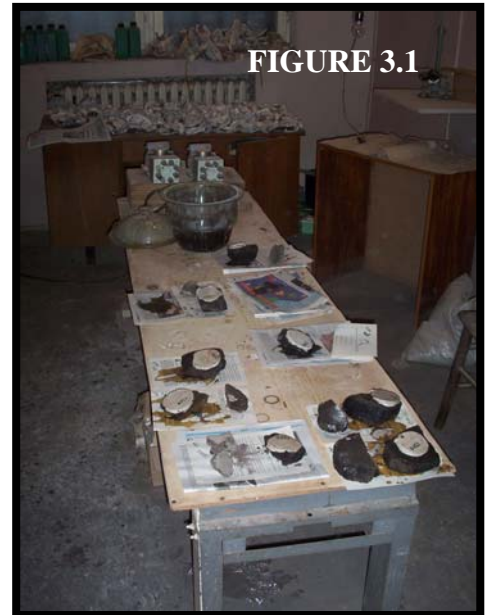


FIGURE 3.1

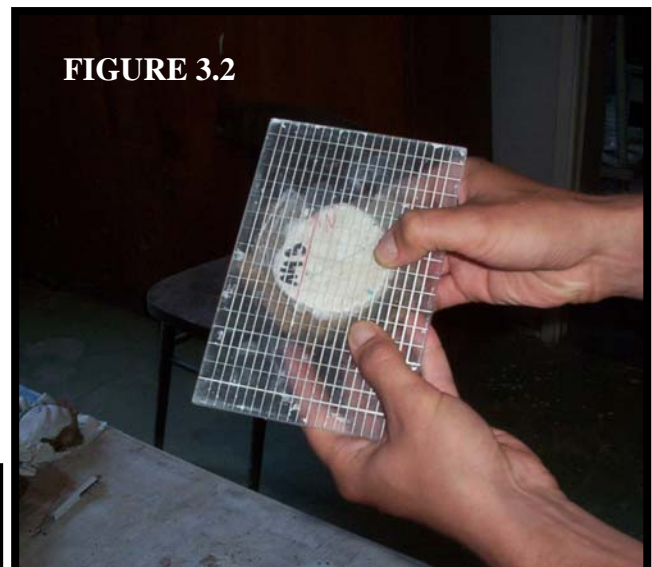


FIGURE 3.2

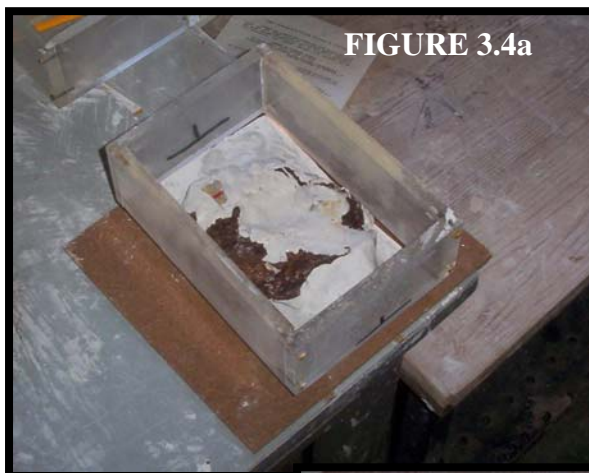


FIGURE 3.4a

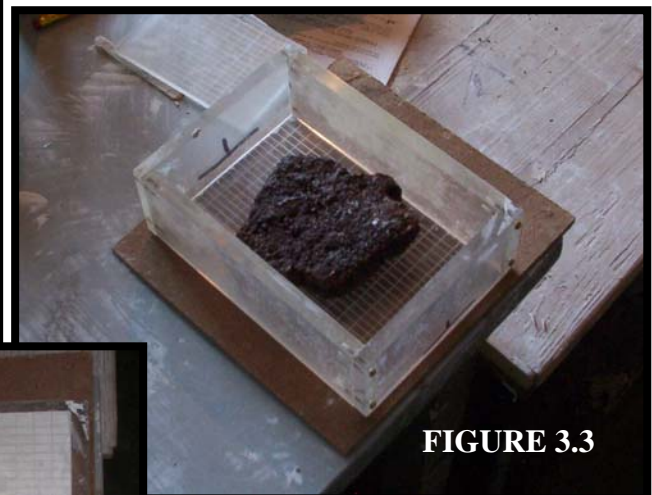


FIGURE 3.3

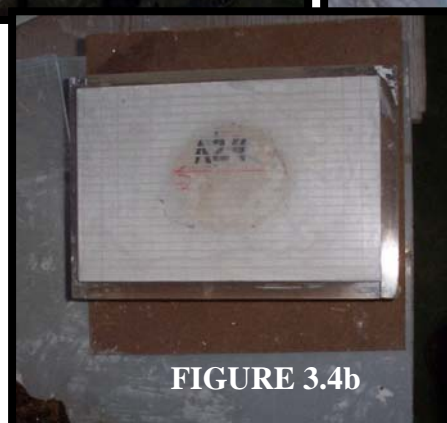


FIGURE 3.4b



FIGURE 3.5



FIGURE 3.6



FIGURE 3.7

4. Standard Laboratory Tests

- Frequency dependent magnetic susceptibility
- Viscosity test
- Anisotropy of Magnetic Susceptibility
- Lowrie-Fuller tests with Alternating field demagnetisation of NRM
- 3-IRM tests
- SIRM tests
- Classic Thellier
- High temperature magnetic susceptibility