

## Documenting Matienzo Caves by Surveying

### Introduction

As well as being explored, written about, photographed and possibly videoed, Matienzo caves should be surveyed. These processes document the caves and, as well as being important parts of speleology, are necessary to produce feedback to the permit authorities. Surveying a cave not only discovers the length and depth but also displays passage trends and other underground features.

### Survey processes

Data Collection Traditionally with compass, clinometer, tape measure (or laser), (waterproof) paper notebook and pencil or, more recently, with a DistoX to collect distance, bearing and inclination, and a PDA to immediately process the data and allow drawing in passage detail underground. See *Underground Surveying – data collection* for more detail.

Data Processing The collected data is stored and processed in a PC using Survex. The output is a survey centre line for viewing on-screen or printing out. Data that has been written down on paper must be typed in. Data in the PDA is exported to a PC and further processed to produce the centre line. See *Matienzo Cave Data Entry & Processing Guide – part 1* for more detail.

Final survey production If the data has been collected on paper, the passage outline and details are hand-drawn around a centre line printout and the sketch is scanned to produce a jpeg. The drawing from the PDA is exported as a dxf file.

The drawing file is then imported into a drawing application, eg *Corel Draw* or *Inkscape* and a neat version of the survey drawn up with a legend and annotations. The published survey (for reports and on the web site) is usually exported as a pdf file. See *Inkscape – Matienzo Caves surveys* for some detail about how to use *Inkscape*.

### Magnetic, True and Grid North

The compass bearing is aligned along the earth's magnetic field with the magnetic north pole moving over the years. The angle between this N pole and True North is the magnetic declination and, around Matienzo, this angle has reduced from about 7 degrees in 1974 to 1.5 degrees in 2013.

The magnetic declination taken from the NOAA website will change bearings to the True North grid. In order to align the cave centre lines to ETRS89 grid north, 0.4 degrees should be subtracted from the magnetic declination, eg for Easter 2015, NOAA has the magnetic declination at Matienzo being 1.18 degrees but a value of 0.78 should be used to align with the ETRS89 grid.

All older Survex files have been altered (through December 2013) to incorporate the magnetic declinations found on the NOAA site (from all previous years and expeditions) and include the 0.4 degrees required to align with the ETRS89 grid. (In previous years the European 1979 grid was used to align with Spanish maps; now it's the ETRS89 grid.)

**From now on, the magnetic declination statement in Survex should be 0.4 degrees less than the value read from the NOAA web site. Centre lines and surveys will be then aligned to the ETRS89 grid. If a survey is required to be aligned to True North, the centre line scan or dxf file can be rotated 0.4 degrees to the east before drawing starts.**

The compass rose on each drawn up survey should be annotated "Ng" and the legend for each cave survey should include the line

*This cave survey is aligned to the ETRS89 grid which is 0.4 degrees to the west of True North.*

The background to the changes that have occurred to all the Survex files can be found in the document *Magnetic Declination*. The Survex template has also been adjusted to produce a centre line on the ETRS89 grid.

*Juan Corrin 10/2/2014, 9/6/2014, 14/1/2015*