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## Grottekartlegging med og uten DistoX

Cave surveying with and without DistoX

The author has visited the BCRA Cave Technology Symposium 2009 in Wales. He starts his article with a list of speakers and subjects from the Saturday meeting and then presents a Norwegian version of his own speech, here with the title "Cave surveying with and without DistoX."

After a short introduction, covering the analogue way of cave surveying, including a modification for Suunto compasses, he gets to the main issue: The DistoX from Beat Heeb and the possibilities it has in combination with cave surveying programs on PDA's. The DistoX, which is a modification of Disto A3, has:

- Built in three axis compass and clinometer, activated by the same pushbutton as the distance meter.
- Bluetooth transfer of data
- The ability to store up to 4000 readings.

The DistoX must be thoroughly calibrated, and this must be repeated at every change of batteries. The calibration must take place somewhere completely free of magnetic disturbance. It is very sensitive for magnetic fields in its surroundings.

In small loops its accuracy has been proved to less than 0,4%.

The A3 is no longer in store at most Leica dealers, and must be bought over the Internet.

The use of an all in one digital instrument with a visible beam increases the number of possible stations tremendously. The surveyor no longer needs to put his head on every station. The only essential thing is that there must be free sight between stations. The accuracy of the surveys will tend to be more dependent on how accurate stations are marked, and hit with the beam, rather than how precise readings are taken.

Currently there are two different programs that can accept data from the DistoX: Auriga, written mainly by Luc Le Blanc and PocketTopo, written by Beat Heeb. The two, being somewhat different, both comply with most needs of any cave surveyor. The main differences are that Auriga has loop closure and PocketTopo supports sketching of details.

The new all digital process should result in better and not at least more surveys. It is still to find the simplest way from cave to complete survey. The first challenge to be undertaken is writing receiving programs that are able to use the data and sketches, and that allow for dynamic changes. Simple imports and exports are matters of course. However, the author claims that the DistoX or a similar instrument will be part of all future cave surveying, as we know the term.

He also proposes some specifications for future cave surveying laser units:

- When aiming, the beam has to blink or be of a different colour
- Preset or adjustable delay on pushbutton
- White numbers in the display
- No unnecessary functions (Pythagoras, etc)
- Adjustable reference point, front, rear or tripod attachment
- Three axis compass and clinometer
- Bluetooth, data output format as the DistoX
- Saving possibilities
- Robust, water- and shock proof
- Smal and compact
- Internal calibration
- Room for standard batteries with high capacity (AA), and a recommendation of type with a stabile magnetic field
- Adjustable units.

The last paragraph covers a short trip to Ogof Ffynnon Ddu to test the DistoX as well as the Shetland Attack Pony and a set of analogue instruments. This is also the order of the sets when a comparison of loop errors is done. One other DistoX had a change of batteries half way through the loop without recalibrating. This loop had an error of 3.3 %, and shows the necessity of calibrating after each battery change.