

MARJEX CORE FRAME INSTRUCTIONS



Core Frames (aka “rocket launchers”) present structures in drill core in their original orientation so that they can be measured directly with a geologist’s compass in exactly the same way as they would be measured in a surface outcrop. This means that:

- The orientation of structures are known *as the core is being logged*
- The *relationship between structures* (vergence) can be determined
- *The sense of movement* on structures can be determined
- *The orientation of linear structure* (i.e. fold axes, bedding/cleavage intersections, orientation of elongate minerals and mineral aggregates, boudins etc.) can be measured¹.

A. Frame Setup

- Place the frame on a level table or box made of non-ferrous material (such as wood, plastic or aluminum). The frame should be able to be viewed from all directions, including from above. A 50cm square surface 60-80cms above the ground provides the ideal base.
- The table should be close to your core trays but at least 3m away from any large iron objects such as steel core racks or parked vehicles
- Raise the core support rack to the inclination of the hole at the down-hole depth of the structure to be measured. A range in hole inclinations of a degree or so can be ignored. Hold the support strut firmly in place with one hand while firmly pushing the sliding wedge below the base of the strut with the other.

¹ A core frame is the only tool available which can do that.

TIP: Sometimes the sliding wedge mechanism is not sufficient to hold the core rack at the set inclination angle. This can happen at angles of less than 40° especially where a long or heavy core piece is on the Frame. The solution is to drape a cloth bag, half-filled with 1-2 kg of fine sand, across the base of the Frame (see picture on last page). The bag will support the strut. It is a good idea to do this anyway as the sandbag also can protect the frame from any accidental knocks which might put the azimuth out of alignment. .

- Remove the compass from its slot at the back of the frame. Set the rotating bezel to the azimuth of the down-hole depth of the structure being measured (remember to allow for magnetic declination, if appropriate). Hole azimuth deviations of a degree or so can be ignored. Replace the compass into the frame, then rotate the whole frame until the red end (i.e. north) of the compass needle sits within the outline red arrow marked on the compass baseplate.
- To release the wedge, push the rack support forward.

The Frame will only need to be set up once for all structures to be measured within a down hole deviation range of 2° in the surveyed inclination or azimuth. In many, if not most, cases a single set up will serve for all structural measurement in that hole.

B. Core Setup

The larger the diameter of core, the easier it is to observe structure and to make accurate measurement.

For this reason, wherever possible, structural measurements should always be carried out on whole, not half, core.

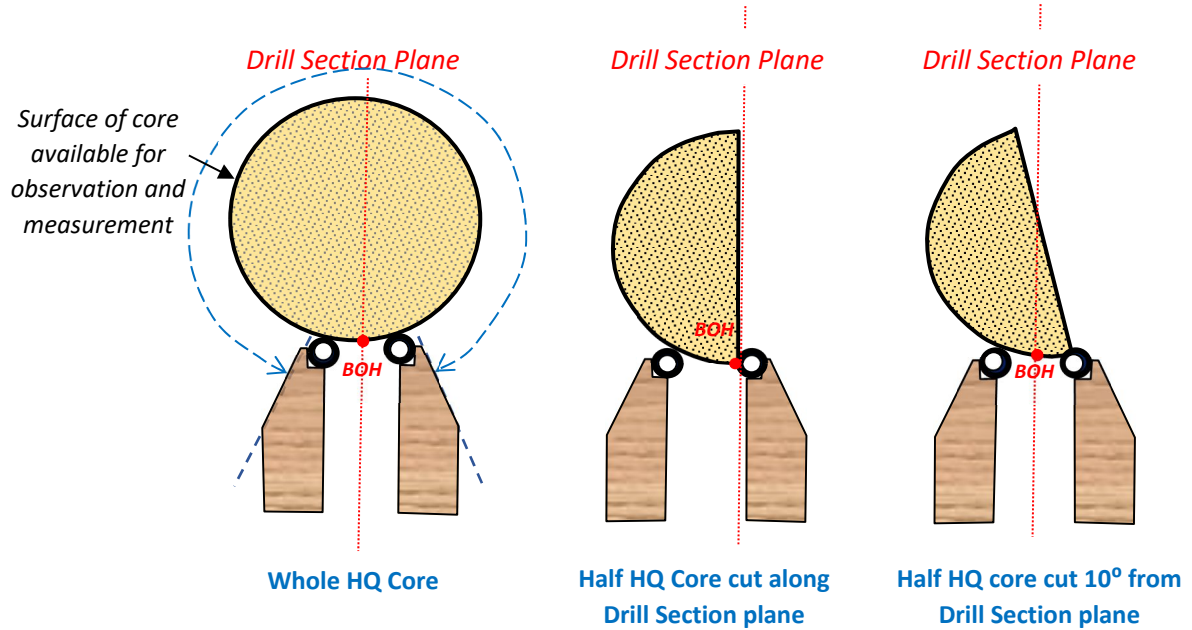
The Marjex Core Frame can accept core pieces from 10 to 50cm long and diameters from BQ to PQ². It can also accept sawn half-core provided the sawn surface is along the **Bottom Of Hole (BOH)** line marked along the core, or is within a few degrees of that line.

Proceed as follows:

- Fold down the core support baseplate. Place a piece of core on the rack with the **down direction** of the core pointing towards the ground. Note that for holes with negative inclination (virtually all holes drilled from surface) the down direction is the direction of drilling. For holes with a positive inclination (some underground holes) the down direction is the opposite of the drilling direction.
- Oriented core is conventionally marked with a BOH (Bottom Of Hole) line drawn along its length. The line marks the intersection of the original vertical plane (the plane of the drill section) with the core surface. Make sure this line faces down by viewing the core on the Frame from below, while rotating it about its long axis (see picture on last page).

² Although placing a 50cm length of PQ core on the Frame would not be advised.

SECTIONS ACROSS FRAME AND CORE



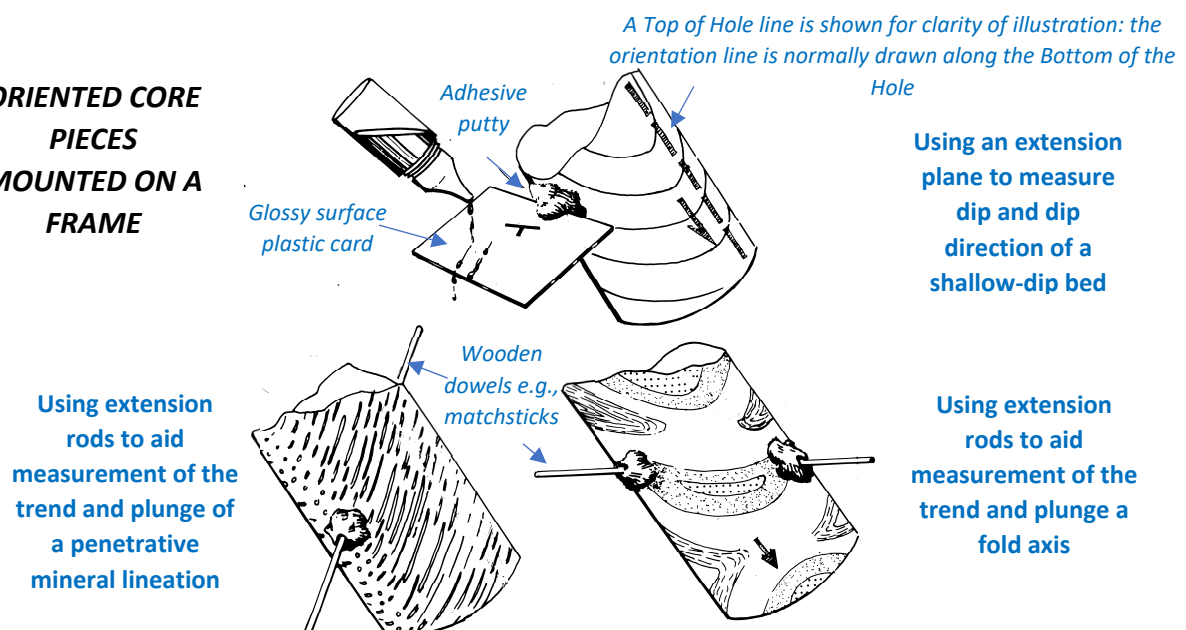
C. Measuring planar structure

Any planar structure (bedding, cleavage, joints, faults, veins etc.) cut by drill core appears as an elliptical trace on the cylindrical core surface. Where the plane is steep dipping or exposed as a the broken surface at the top of the core piece, it can be measured with sufficient accuracy by sighting with a geologist's compass (the Brunton is best for this).

TIP: if the structure is faint, trace its outline on the core with a yellow (yellow usually provides the best contrast) wax pencil before sighting on to it (see pictures on last page).

Determining an accurate strike direction for shallow-dipping planes (less than 45°) can be difficult, whether observed in outcrop or drill core. In this case, if an exact number is desired, use the following procedure (I got this idea from Bill Laing at James Cook University).

ORIENTED CORE PIECES MOUNTED ON A FRAME



- Using a blob of adhesive putty, attach a rectangle of glossy-surface plastic (about the size and shape of a credit card) to the planar structure to be measured. Tilt and rotate the card until it is parallel with the structure by sighting from several directions, including from above³ (see picture on last page).
- Allow a drop of water to run down the extension plane. The run of liquid defines the dip direction.

Tip: A small amount of dark food colour in the water will make the run of liquid easier to see.

- Measure the dip and dip direction of the extension plane with a geologist's compass in the usual way.

D. Measuring Linear structure

- Any linear structure cut by drill core will appear as two points on opposite sides of the core: one point where it enters the core and one where it exits.
- Attach small wooden dowells to the core surface at each end of the linear. Five-centimetre-lengths of bamboo meat skewers have been found ideal, but matchsticks will do almost as well. Tilt the two extension rods until they both lie on *a single straight line* when viewed from all angles, including from above.
- Measure the trend and plunge of the linear using a geologist's compass in the usual way⁴.

E. Vergences

Small vergence structures are readily observed in core but the information they can provide is only available when the core is oriented and mounted on a core frame.

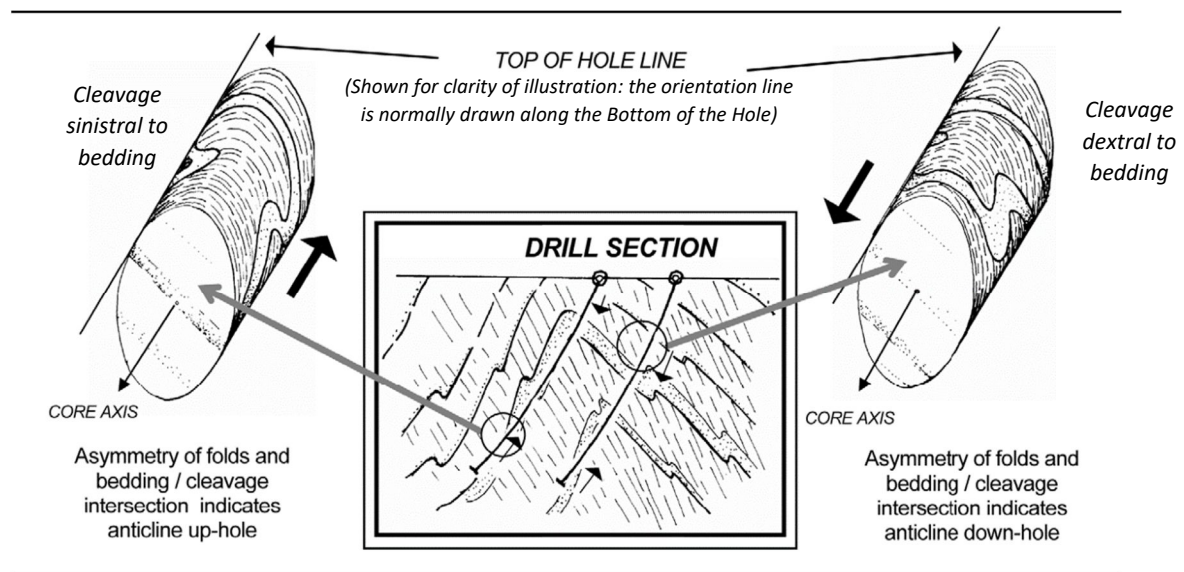
The interpretation of vergence structures depends on observation of sense-of-movement and bedding cleavage relationships, not measurement.

An example of their use is shown below.

For more on vergences see Marjoribanks (2010).

³ Over short distances the human eye is very good at judging the parallelism of planes and lines

⁴ The trend of a linear is measured by sighting down onto it with a compass. The slotted bar of the Brunton compass facilitates this measurement, but in any case, the frame needs to be mounted not too far off the ground.



An example of the use of vergence information in oriented drill holes

F. Further Reading

For a comprehensive coverage on structural logging of drill core, see

[Geological Methods in Mineral Exploration and Mining](#): R W Marjoribanks. Springer (2nd Ed. 2010)

[Structural Logging of Drill Core](#): R W Marjoribanks. Australian Institute of Geologists Handbook 5 (2nd Ed. 2002)

You can find much more about core orientation methods and measuring structure in oriented core in relevant technical articles at www.rogermarjoribanks.info/blog

G. Guarantee

The Core Frame is robust and should provide satisfactory service for many years. However it is not designed for rough handling or to be exposed to the elements for long periods of time. It should be treated with a degree of care as a scientific instrument.

If the frame has been used as designed but ceases to be useable within five years of purchase due to faulty manufacture, return it to me and I will be happy to repair it free of charge – or, if repair is not possible – to replace it with a new one

H. Affirmation

I would appreciate any feedback from your experiences in using the Marjex Core Frame as well as suggestions you might have for improving the design.

I would be happy to attempt to answer any general questions you have regarding structural logging of drill core.



Fold axes are marked with yellow pencil. These will be attachment points for extension rods. Along with matching rods on the opposite side of the axes, they enable the trend and plunge of the folds to be accurately measured.



Core frame setup with sandbag support for extra stability.

A Brunton is the most suitable compass for measuring structure in core.



Using adhesive putty to attach an extension plane for easy measurement of faint planar structure. Elastic band secures core.



Checking from below for correct positioning of the Bottom Of Hole orientation line. (In this pic a wooden core model showing bedding and an oblique cleavage is used).

Roger Marjoribanks PhD, FSEG, FAIG

Consultant structural and economic geologist

4/34 Saunders Steet, Como, Western Australia, 6152

E: marjex@ozemail.com.au

M: +61 435 601 977

W: www.rogermarjoribanks.info

