Dealing with Diamicts

A practical guide for amateurs

(amateur does not mean unprofessional)

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Please do not record this lecture

Warning – contains graphic images


Diamict
Glacial Till
Boulder Clay
Or “pebbly silt”

- Planning
- Standardisation
- equipment
- Fieldwork
- “Laboratory” work
- Other techniques
- Data comparison
- Publishing
- Interpretation

Geological fieldwork techniques course notes
http://www.hullgeolsoc.co.uk/geoclfwk.htm

Planning -

Plan your fieldwork – dates, tides, locations, access, *safety*, purpose &c.

What techniques can you realistically use in the field and in your home laboratory?

What equipment have you got available?

Do you need to buy more equipment? Is it within your budget?

Standardisation -

Set your standards according to your equipment
(if possible choose standard standards)

Define your standards
Write your Standard Operating Procedures
Never change them

Be consistent – apply same method and standards to every bit of data

Trust your own observations.
Try to ignore previous publications – the author did not see what you can see.
Avoid bias in you work – conscious or unconscious.
Don’t ignore things you can’t identify or understand.
Have an open mind – don’t try to make the data fit your conclusions

Fieldwork equipment –

Notebook and pencil in a clear plastic bag
Clipboard and logging sheets, hand lens.
Tape measures and scale card. *Range pole*
Camera, *colour card, binoculars, tripod*.
Munsell Colour Chart
Trowel, hammer and clean sample bags.
Indelible marker pen and paper.
Metre square (home made) and tent peg.
Clinometer, compass and knitting needle
Map, *GPS, theodolite, drone*

Home laboratory equipment

Storage and catalogue book
Magnifying glass
Binocular microscope
Sieves (professional quality if you can afford them)
Lots of tap water
filter paper (e.g. coffee filters) and funnel
Drying trays (e.g. old Fray Bentos pie tins)
Weighing scales as accurate as you can afford
and with tare facility
Cylinders or empty large pop bottles.

Collect too much data
Collect too many samples
Collect the biggest samples you can carry
Because if you have to go back it may not be the same

You can always throw the extra away later if not needed or used.

Always avoid contamination
Never change a sample number

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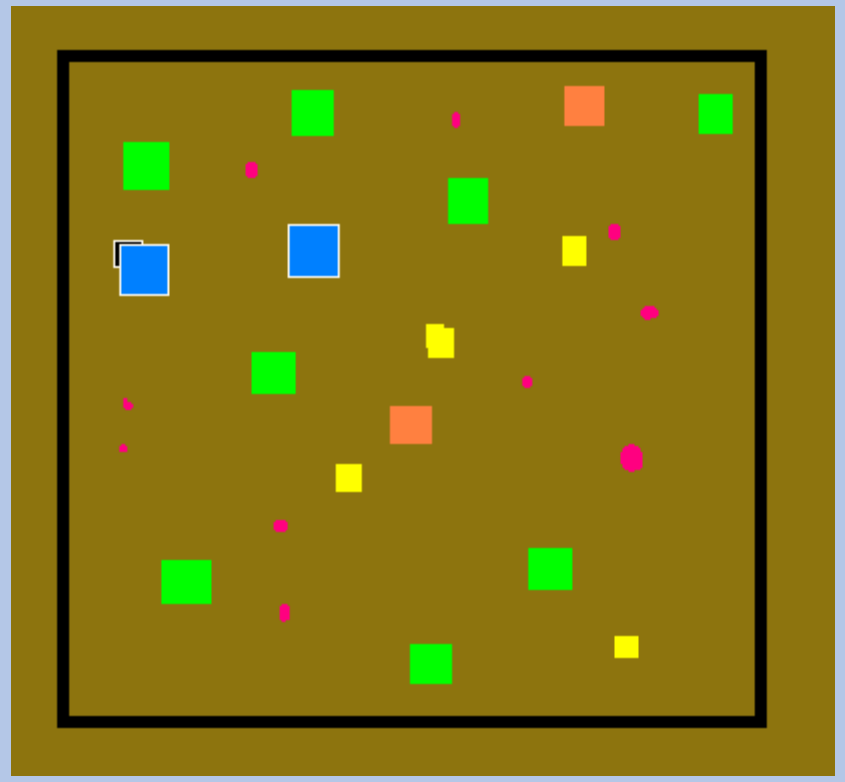
Fieldwork

Logging the exposures –

1. Define the beds
2. Define the base of each bed (the top is the base of the next bed)
3. Record the contact
4. Measure the average thickness
5. Note any changes in thickness
6. What colour is it?
7. What is the texture – grain size, roundness, sorting, clast support
8. Record the common clasts with approximate percentages
9. Record any clast orientation
10. Record any glacitectonics (structures, folds, faults &c.)



Count the larger clasts in a 1 metre square
Or collect them for identification later

Beware contamination
- down wash from rain
- up wash from waves
- slumping

Beware bias
- don’t ignore the clasts you don’t recognise
- don’t ignore the boring ones

Sampling –

Avoid contamination –

- Clean the face of the exposure
- Clean your equipment
- Always use new clean sample bags
- Label carefully (inside the bag, outside the bag, and a second bag)
- Record it in your field notebook.
- Record it in your lab notebook when you get home

“Labwork”
(similar techniques to microfossils and nanofossils)

Sieving and picking
Settling and decanting

Link to Microfossils course notes
http://www.hullgeolsoc.co.uk/geocomic.htm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Clast counting -

Sample preparation in the lab (kitchen) –

- Dry the sample
- Save some for later
- Weigh it
- Wet sieve the sample
- Dry the residue
- Weigh it
- Dry sieve at various sizes
- Weigh them
- Do the stats

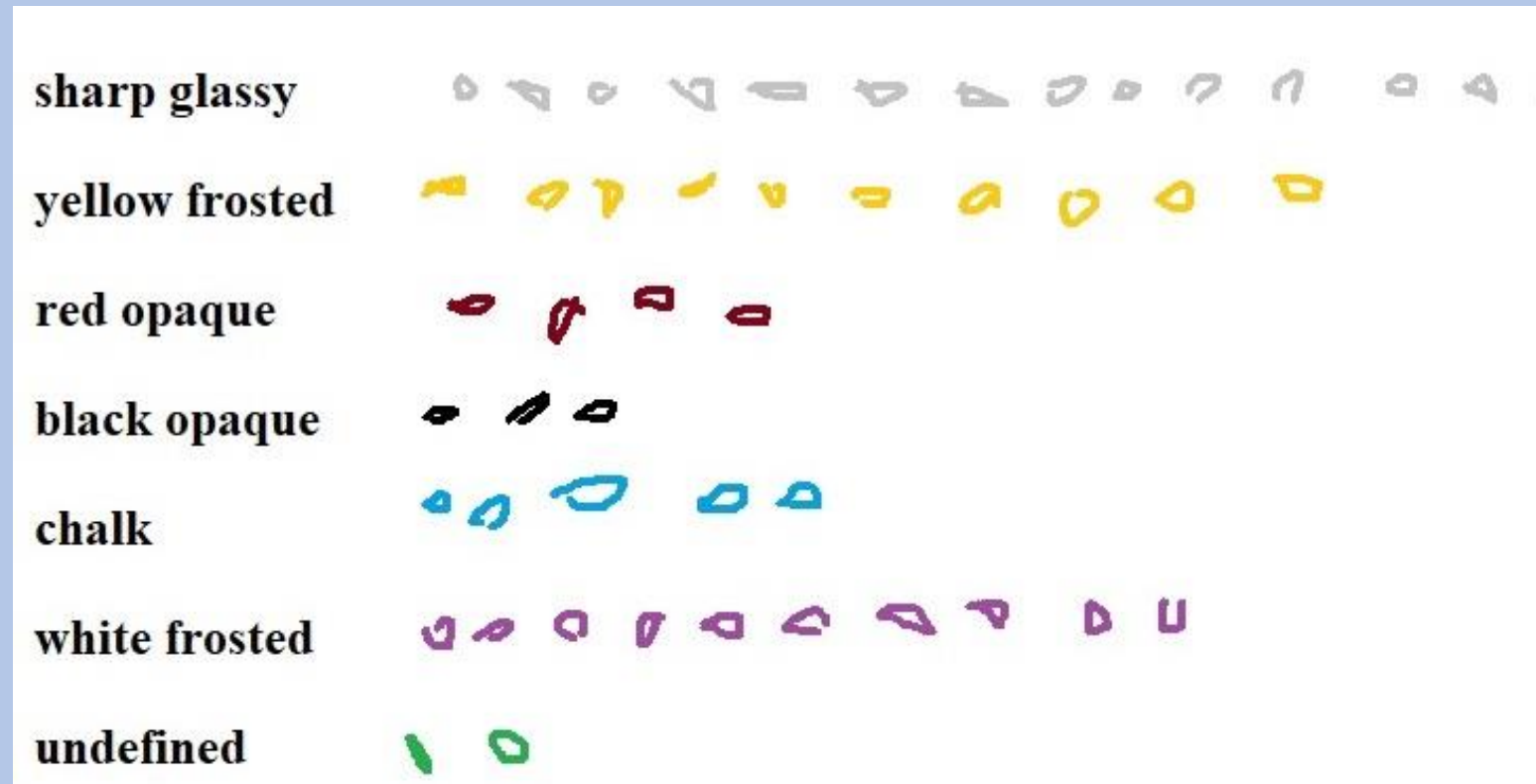
Sorting -

- Make yourself a “picking tray”
- Pick clasts from selected size using magnifying glass and tweezers
- Or microscope and fine paint brush
- Don’t be biased
- Classify and count the clasts
- Don’t ignore the ones you cannot identify
- Perhaps tape them to a piece of card?

Set your own definitions if you cannot identify the minerals e.g.

- Dark opaque
- Yellow translucent frosted
- Chalk
- Sandstone
- Volcanic
- White translucent rounded
- Glassy clear sharp
- Red magnetic

	Sample HESS27	
	grams	Percent
TOTAL DRY WEIGTH	1064	
SMALLEST **	708	66.604
SMALLEST SIEVE	122	11.477
2ND SIEVE	86	8.0903
3RD SIEVE	45	4.2333
OVER 1 CM	102	9.5955
TOTAL DRY WEIGTH	1063	
note ** washed down the drain		



Sample number Hess27 - 2-4 mm sieve

Useful sizes –

- 2um or less is Clay
- 63um is Silt
- 1-2 mm is coarse sand
- 2-4 mm is a granule
- 4 – 64mm is a pebble

To separate out the clay you can use a settling or decanting method.

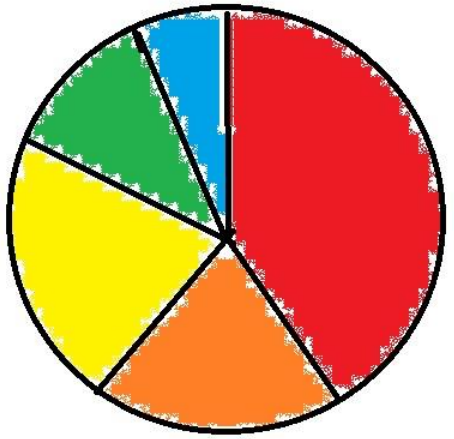
- Take a known weight of sample and shake it up with water
- Successively decant of the water
- After 6 hours the clay fraction is still in the water

- Or use a centrifuge.

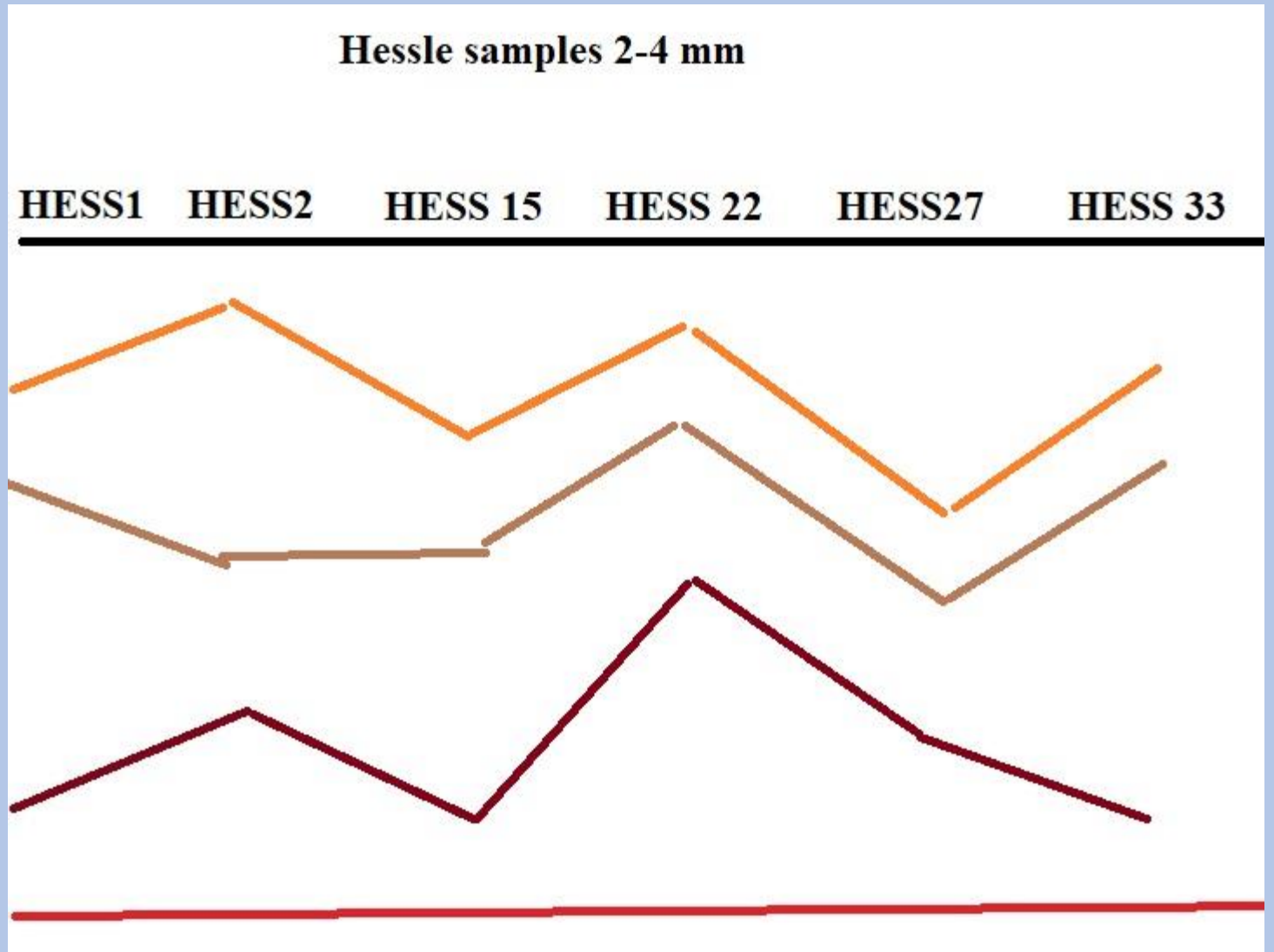
Other techniques
(probably outside your reach- need to pay someone to do them)

Till microstructure analysis
  making a large thin section
  examining small scale structures

Heavy liquid separation
DNA analysis of organic remains
Optically Stimulated Luminescence
Carbon Dating of organic remains
Amino Acid analysis
X-ray Fluorescence
Inductively Coupled Plasma Emission Spectroscopy
Nanofossils e.g. dinoflagellates



Display the results graphically



Writing up and publishing –

An introduction and aims
Designate your methods and standards
Describe the sections you measures including graphic logs
Analyse your data
Display it graphically
Make database available
Discussion – could you have done it better & suggestions for future
Conclusion if you reach one
Acknowledgement and thanks

Link to writing a report - http://www.hullgeolsoc.co.uk/scipap.htm

Conclusions and Interpretation.

Your work is important and valid even if you don’t reach a conclusion.
Why not publish your methods and data as you progress the research?
Other scientists can interpret it later and compare your data with theirs.
Too much research never gets published because the author does not reach a conclusion or gets a “negative result”!

Interpretations can be wrong or over simplified.
For example “Lobsters ate belemnites for their breakfast”
in the Speeton Clay display at Hull Museums.