GG2508: Dr Ed Schofield

# Making observations and measurements in the field

(inc. intro. to Portfolio Task 3)

# Why undertake fieldwork?

- Enables the jump between what is abstract (e.g. in textbooks) and what is real
- Allows direct observation and measurement (primary data/info collection) of processes and patterns in the physical/natural world
- Allows new knowledge to be developed
- Enables existing knowledge and theories to be tested
- Offers opportunities for training in, and to gain experience with, different methods, techniques and equipment

# Fieldwork design

Influenced by considerations of scale in relation to the research questions.

- Spatial – at what size (area) does the process operate or the phenomenon occur?

- Temporal – over what length of time, and at what rate, does the process operate and the dependent components respond?

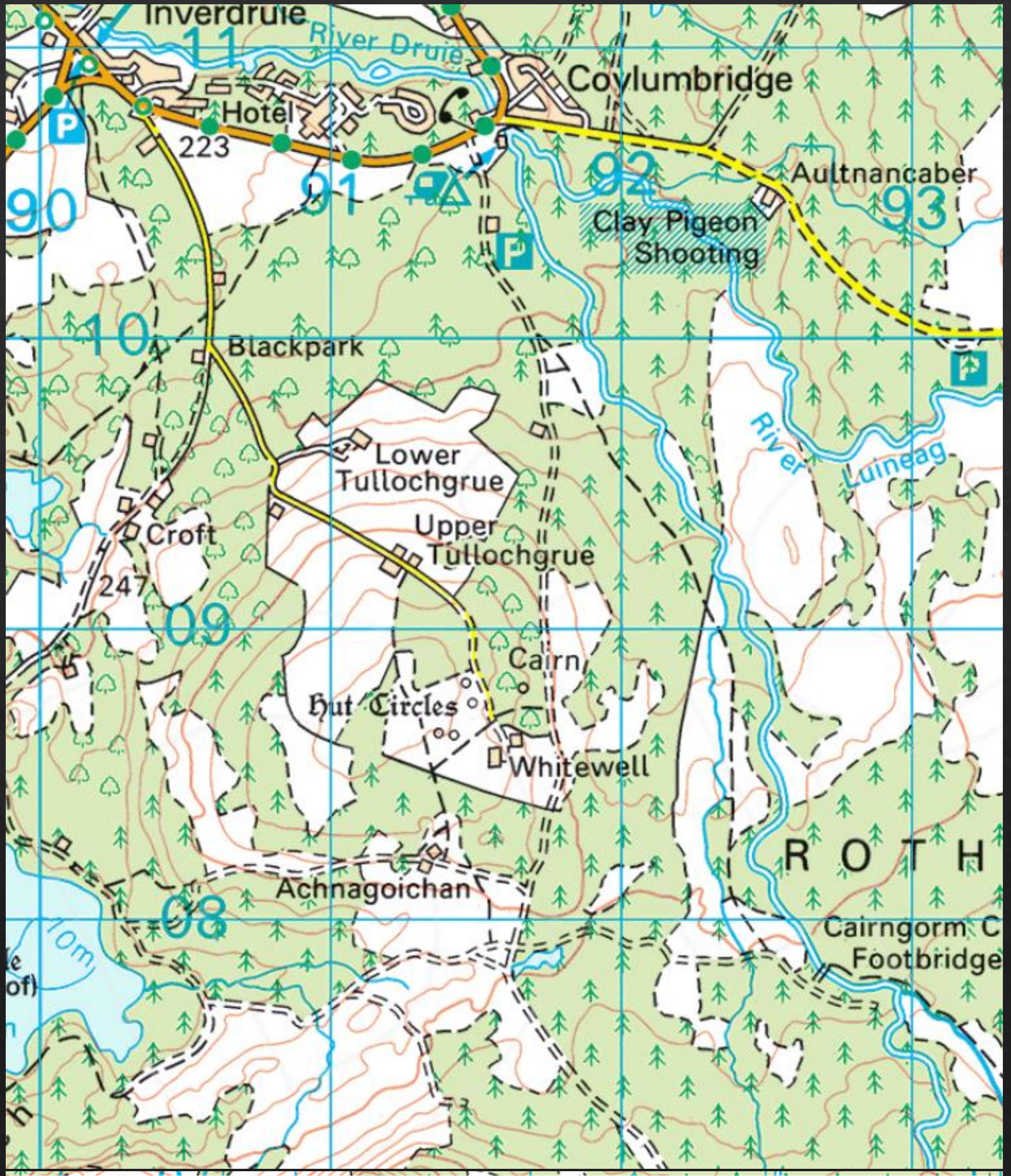
e.g. river discharge gauging may require measurements over short or long timescales, and at different catchment scales, dependent upon RQs

# Four basic approaches to field design in physical geography:

1. Sampling across space with independent controls

– elevation, latitude, distance from a common fixed point, geology, vegetation, soils, etc.

e.g. impacts of land use on river water quality; select a site/catchment where other factors impart less influence



2. Space-for-time substitution

Contemporary physical or biotic evidence of different ages is used to understand environmental change over time.

e.g. concept of succession (deglaciated foreland)

..though complicated by transient effects (e.g. disturbance) and inheritance effects (i.e. previous land-use history)

3. Long-term monitoring

- Sites selected for their natural state, or because of their land-use history
- Often centred around Research Stations in remote or difficult to access locations

4. Experimental design

- In settings where some natural variables can be manipulated, whilst others are controlled (at least to the greatest extent possible).

e.g. fenced vegetation plots to study the impacts of trampling and grazing

# Site selection and planning

Thoughtful planning and preparation are keys to successful fieldwork. Ask yourself:

1. Is the site suitable to answer my research questions?

- Make use of digital tools; satellite imagery (Google Earth); aerial photos; maps (Digimap); previous studies.

- Reconnaisance; photos and sketches

- Pilot study? (Proof-of-concept)

2. Is it feasible?

- Financial cost and time implications.
- Fieldwork may be seasonally- or weather-dependent (e.g. storm gauging; vegetation surveys).
- May require repeat visits to the site, or extended periods in the field.

3. Is it accessible?

- Physical obstacles; fieldsites can be in remote locations.

- Administrative obstacles: landowner/manager permissions; H&S considerations.

Other:

- Plan your sampling strategy (how many samples, where, at what spacing, etc.?)

- Pre-trip equipment check (+ redundancy)

- ‘Plan B’

## Follow-up reading:

Rayback, S.A. 2016. Making observations and measurements in the field. In: Clifford, C., Cope, M., Gillespie, T. & French, S. (eds) *Key Methods in Geography, 3rd edition.* London, SAGE Publications Ltd, pp. 325-335.

(or Turkington, A. 2010. pp. 220-229 in the 2nd edition)

# Portfolio Task 3

Links to skills in exploring and presenting quantitative data (Field, R. 2016. Chapter 32, pp. 550-580 in *Key Skills in Geography, 3rd edition*)

Graphical – including cartographic – display of data and information are of fundamental importance to geographical enquiry.

High-quality quantitative research can be performed without necessarily being a good mathematician, particularly with effective use of data visualization techniques (graphs, maps and tables).

Graphical display of results is often the best way of communicating information in elegant, concise and accurate way.

**As geographers, we need to be able to extract and summarise patterns and trends from such visual sources.**

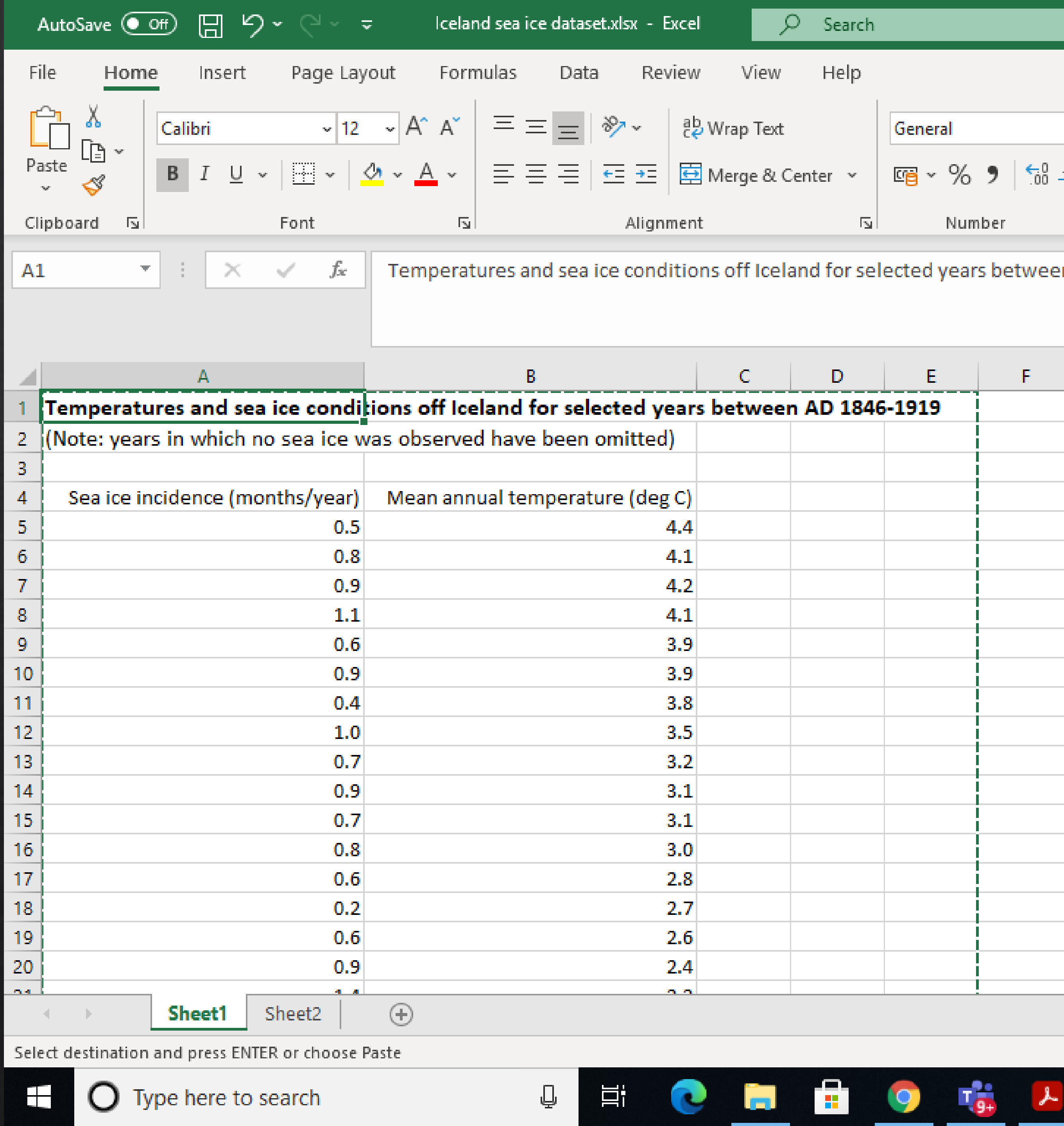
# Arctic sea ice, 2016; minimum extent of perennial ice

**Sea ice** is frozen sea water that floats on the ocean surface; influences ocean circulation, weather and regional climate.

Currently monitored using **remote platforms** and sensors (satellites), but previously through **direct observation** and other – often fragmentary – **documentary sources** (e.g. whaler's diaries).

Past incidence of sea ice can also be reconstructed using **proxies**, e.g. geochemistry of ice cores.

**Table 1:** Mean annual temperature for Iceland from two weather stations for AD 1846-1919, matched against the observed period for which there was sea ice (number of months per year). Full dataset on MyAberdeen.




**Temperatures and sea ice conditions off Iceland for selected years between AD 1846-1919**

(Note: years in which no sea ice was observed have been omitted)

| Sea ice incidence (months/year) | Mean annual temperature (deg C) |
|---|---|
| 0.5 | 4.4 |
| 0.8 | 4.1 |
| 0.9 | 4.2 |
| 1.1 | 4.1 |
| 0.6 | 3.9 |
| 0.9 | 3.9 |
| 0.4 | 3.8 |
| 1.0 | 3.5 |
| 0.7 | 3.2 |
| 0.9 | 3.1 |
| 0.7 | 3.1 |
| 0.8 | 3.0 |
| 0.6 | 2.8 |
| 0.2 | 2.7 |
| 0.6 | 2.6 |
| 0.9 | 2.4 |

Figure 1: **Sea ice conditions off Iceland over the last c. 1000 years.** 30-year running mean reflecting direct observations (c. AD 1600 forwards) and estimates from documentary sources (pre-AD 1600). Based upon data first presented by Bergthórsson in 1969.

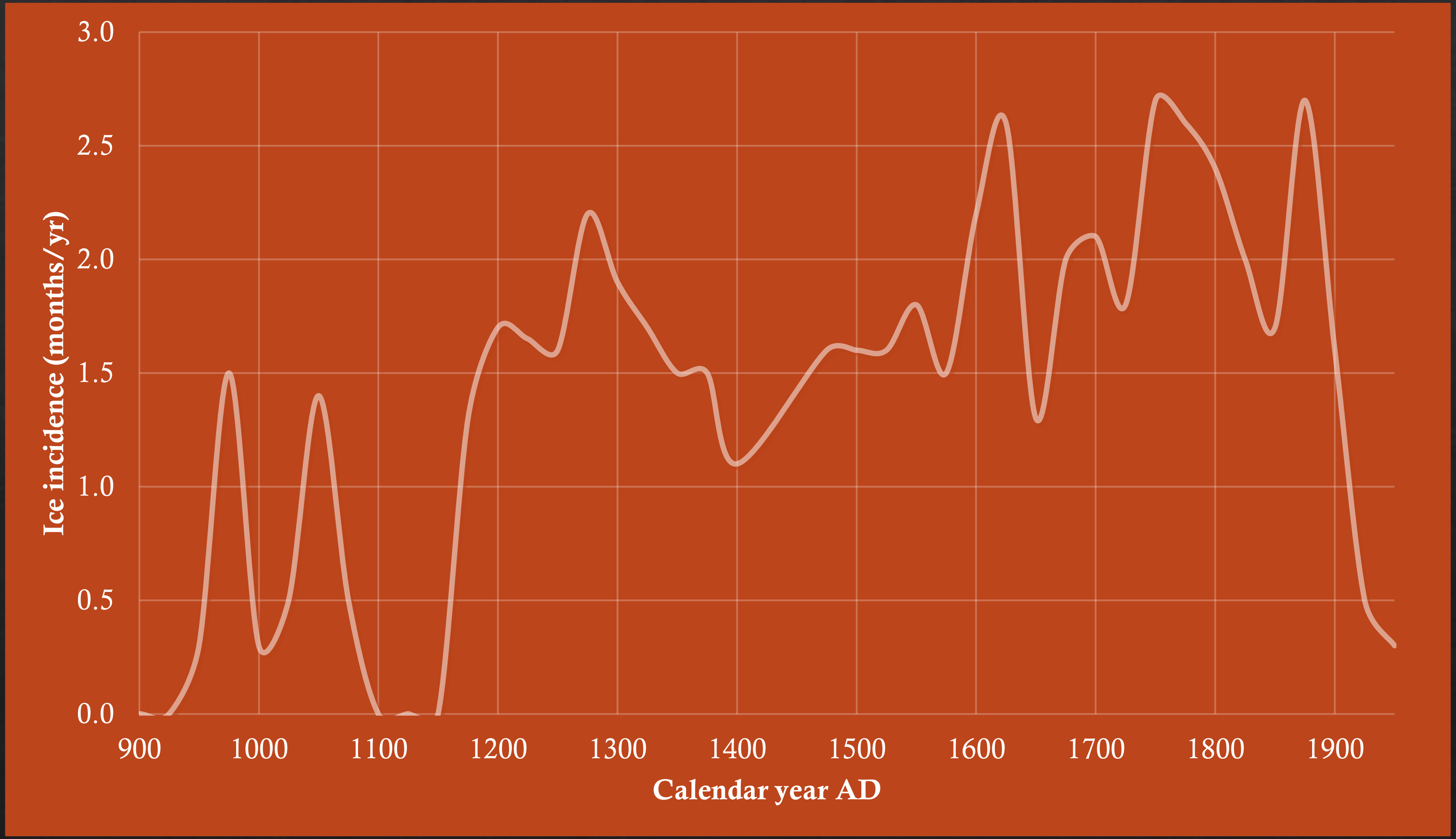


Figure 2: A proxy record for **sea ice** in the North Atlantic Ocean over the last millennium derived from the excess chloride ($Cl^-$) recorded in the GISP2 ice core (Source: Dugmore et al. 2007).

Top graph (narrow line); 5-year running mean of deviations from the mean.

Bottom graph (emboldened line); cumulative deviation from the mean.

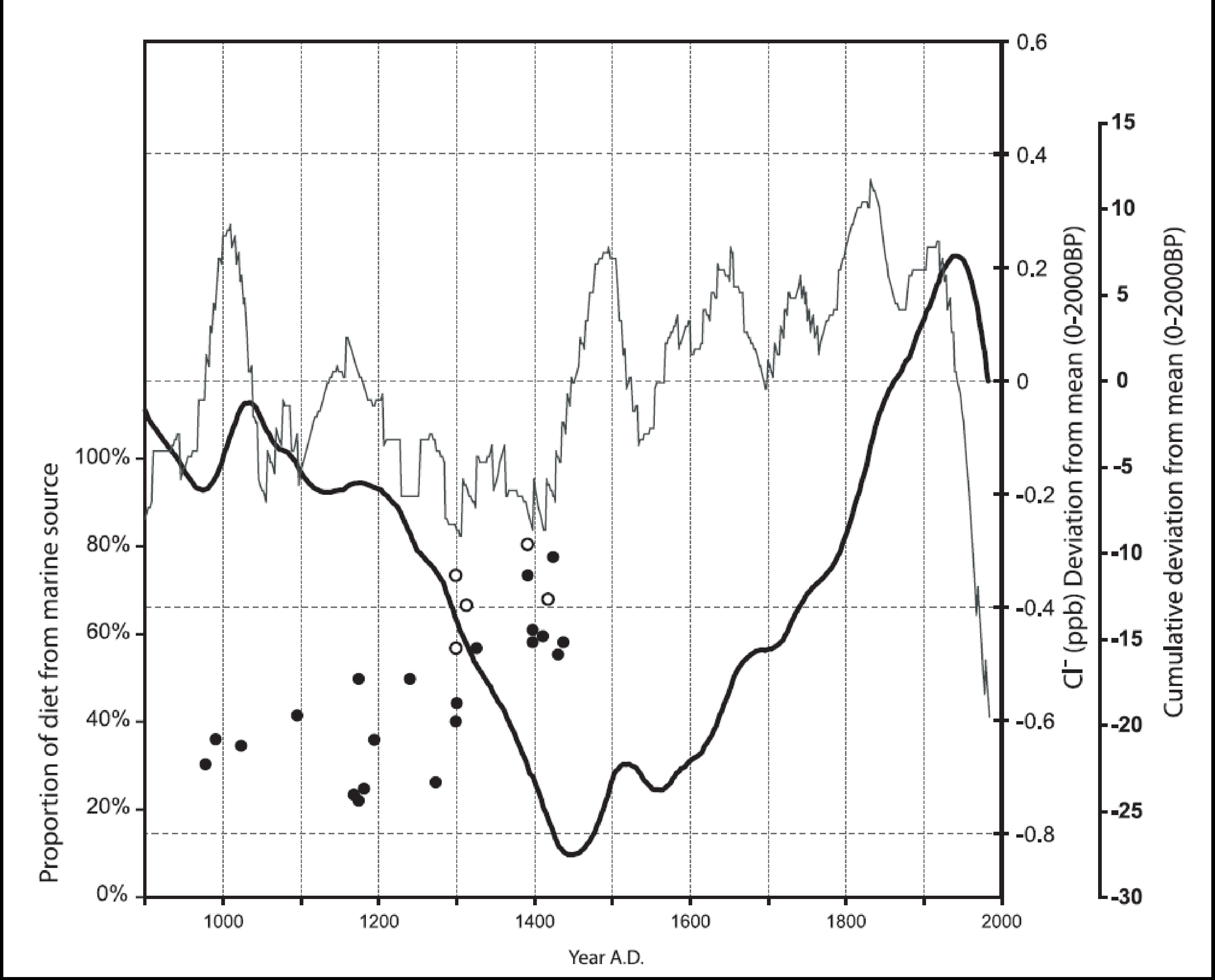
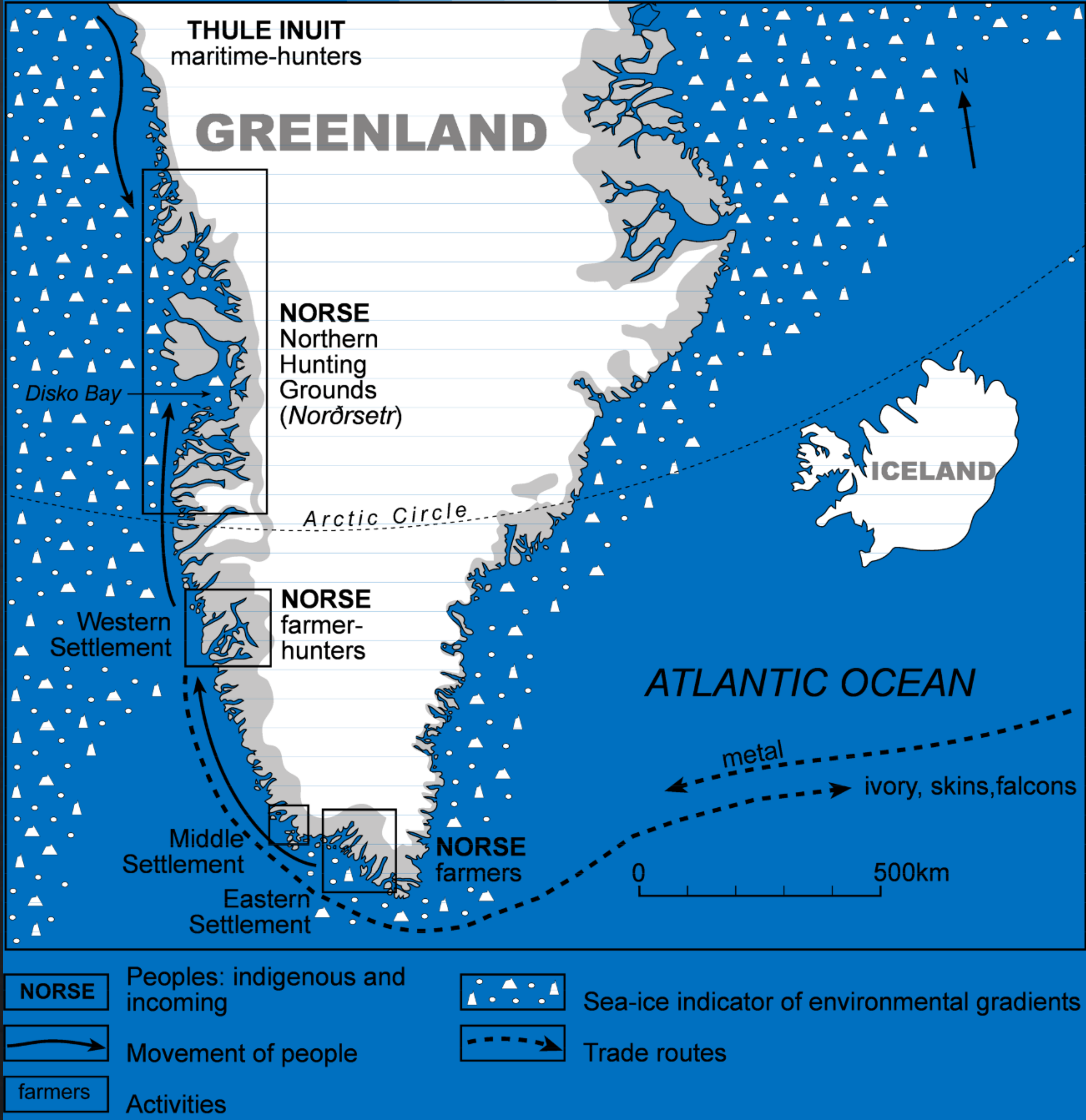


Figure 3: Changing sea ice conditions were something that the Norse settlers had to contend with around Iceland and Greenland.

Impacted hunting, trade and navigation.

Dates of settlement (*landnám*):
Iceland c. AD 870
Greenland c. AD 1000

Date of abandonment:
Greenland c. AD 1450



# What you need to do for Portfolio Task 3…

Using the dataset and visual materials provided to you:

- Plot a scattergraph (adding a 'trendline' – linear regression) demonstrating the relationship between incidence of sea ice off Iceland and air temperature. Predict/estimate what the air temperature was at the time of the settlement (AD 1000) and abandonment (AD 1450) of Greenland. (2 marks)

- Describe how sea ice and air temperatures have changed in the North Atlantic region over the last 1000 years, and comment upon how this is likely to have affected ease of navigation/passage by boat across this part of the ocean. (4 marks)

Further information provided in the handout on MyAberdeen.
<u>Deadline:</u> 12:00 (midday) on Thursday 4 March 2021.