

# STUDENT SHEET 7a

## Using snow and ice data from the Arctic Ocean



*Photo credit: Martin Hartley*

Every evening, Pen Hadow attempted to take up to 46 snow and ice thickness measurements.

Because the ice and snow thickness is variable he had to take several readings in different places to make sure he hadn't accidentally picked a spot that was unusually thick or thin.

Each day Pen aimed to drill 10 holes through the ice. In order to measure the ice thickness from each hole he lowered a special tape measure down through it that locked to the bottom of the ice. He would then pull it tight and read off the measurement. This was undertaken along a transect line every 20m.

Pen used a specially made hand drill which, when connected together becomes 5.2metres long. On a few occasions however the ice was in excess of this leaving us with a figure of 5.2m+.

He was working in conditions as low as  $-40^{\circ}\text{C}$  (a fridge freezer goes down to around  $-15^{\circ}\text{C}$ ) and the work was physically very hard. At the beginning of the expedition it was almost always too exhausting to drill all 10 holes and on most days he drilled between 3 and 8.

Pen also measured snow thickness every 4m along the same transect line, which is much easier to do. He would stick a long ruler into the snow until he felt it against the ice at the bottom, at which point he'd read off the results.

The total amount of time for all 46 measurements to be taken was on average between 3-4 hours.

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## *continued*

### Reading the data

The chart below shows how the data from a single day can be used to create a visual profile of the snow and ice.

At the end of a typical day, Pen aimed to take measurements at 46 positions along a 200m transect. Some of the data is incomplete because of the difficult conditions which the team were working in.

To make a complete profile for a set of daily or monthly data you will need to use mathematical methods known as 'interpolation' and 'extrapolation'.

'Interpolation' means looking at the data you have and trying to fill in the gaps between known data points, based on the patterns you can observe.

'Extrapolation' means looking at the data you have and trying to work out what comes next, based on the patterns you observe.

### Instructions to complete Data Graphs

To complete your own snow and ice profiles on either Student Sheet 7c or Student Sheet 7e:

- Mark the points for the snow and ice depth that you know using a 'x'
- Use interpolation and extrapolation to add points for the other positions or days using a 'o'
- Draw a line connecting the snow depth points
- Draw a line connecting the ice depth points
- Shade and label the four separate areas in different colours: air, snow, ice, water

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