Your Name (last, first)______________________  Student Number__________  

Arctic Change 2015 – Homework 1   Due 11:30am Monday 6th April 2015 / 40
- Fill in Name (Last, first) and student number at the top of all pages, and staple pages together.
- Space indicates expected length of answer. HANDWRITE your answers, show your workings, use SI units, and do your best to make your paper clear and easy to read. Although you may discuss the questions with others, complete the homework on your own.
Motivation for this homework:
– to establish our learning goals (what do YOU want out of this course?).
– to reinforce key points from the lectures, and to encourage quantitative thinking.

/1pt  Question 0: What do we all want out of this.
1a) What motivated you to take this course?

1b) Name any particular topics you would like to see covered.

/5pt  Question 1 - Map questions, learning place names, understanding latitudes and longitudes
1a) To be able to follow the class, you will need to know where places are. On the map below, mark:
1) the Eurasian Basin  2) the Canadian Basin  3) Fram Strait
4) the Canadian Archipelago  5) the Bering Strait  6) the Denmark Strait
7) the Beaufort Sea  8) the Chukchi Sea  9) the East Siberian Sea
10) the Barents Sea  11) the Greenland Sea  12) Baffin Bay
13) the Lomonosov Ridge  14) the Alpha Mendeleev Ridge  15) Norway (mainland)
16) Longyearbyen (in Svalbard)  17) Greenland  18) Barrow (in Alaska)
19) Wrangel Island  20) St Anna Trough

Topography schematic – depth contours every 1000m
1b) What is the latitude and longitude of the center of the Fram Strait? (Quote the answer to the nearest 5 degrees of latitude and the nearest 10 degrees of longitude.)

1c) What is the latitude and longitude of the center of the Bering Strait? (Quote the answer to the nearest 5 degrees of latitude and the nearest 10 degrees of longitude.)

1d) Work out if the Fram Strait is north or south of the Bering Strait

... and by how many kilometers? Give your answer to the nearest 100km.

(Hint: 1 degree of latitude is 60 nautical miles, which is 111km).

1f) In what country is the most northern point of land in the Arctic? What is its latitude and longitude? (Quote the answer to the nearest 5 degrees of latitude and the nearest 10 degrees of longitude.)

1g) List the countries bordering on the Arctic Ocean.

1h) Using the following depth ranges (ranges may be used more than once):
   i) mostly about 50m deep,  ii) mostly shallower than 200m,  iii) mostly between ~ 200 and 400m deep,
   iv) mostly between ~ 2000m and ~ 4000m deep,  v) mostly deeper than 4000m;
   complete the following sentences:
   The Eurasian Basin is ___________________
   The Barents Sea is ___________________
   The Chukchi Sea is ___________________
   The Canadian Basin is ___________________
   The Bering Strait is ___________________
   The Siberian Shelf seas are ________________

1i) Delete (*) as appropriate to make the following four sentences correct:
   The deep Arctic Ocean is deeper/shallower* than the deep Pacific Ocean.
   The Arctic Ocean is less than 5%/ about 10% / about 20% / about 50%* of the world ocean area.
   About 10%/20%/50%/80%* of the Arctic Ocean is made up of shelf seas.
   About 10%/20%/50%/80%* of the other oceans of the world are made up of shelf seas.
Question 2 – Arctic Atmospheres – to reinforce understanding of key concepts

/2pt 2a) From the figures given in lectures, the polar vortex is (* delete as appropriate)
- generally north of / about the same latitude as / generally south of * the Bering Strait
- generally north of / about the same latitude as / generally south of * the Fram Strait
- generally north of / about the same latitude as / generally south of * Seattle

/2pt 2b) Explain what a cold air outbreak is, and what can cause it.

/3pt 2c) Describe the factors that promote destruction of ozone. Highlight the main man-made influences.

/3pt 2d) Why is the ozone hole smaller in the Arctic than in the Antarctic?

2e) The following schematic represents isobars (lines of constant pressure) in the Arctic.

/2pt - Mark with arrows which way the winds blow around this high pressure system in the Arctic?
- is this clockwise or anticlockwise?

/2pt 2f) Compare pts A and B. Which has the strongest wind and why?

/2pt 2g) How (and why) would your answers to 2e and 2f change if this was in Antarctica?

/4pts 2h) Explain (briefly) what the Arctic Oscillation is.
Question 3 (FOR THOSE TAKING THE CLASS AT 3 CREDITS)

Only those taking the class at the 3-credit level need complete Question 3.

Choose one following 2 papers:

http://www.nature.com/ncomms/2014/140902/ncomms5646/full/ncomms5646.html

http://www.nature.com/nature/journal/v478/n7370/full/nature10556.html

For the paper of your choice, prepare (in your own words) a ~ half page (~ 500word) summary of the main findings of the paper. This summary may be handwritten or typed.

Suggestions on how to tackle this assignment:
- Start by reading the abstracts of both papers. Pick the one which interests you the most.
- For that paper:
  - Re-read the abstract, then read the introduction and the summary/discussion at the end of the paper.
  - Then reflect on the main message of the paper (reread the abstract to be sure you have extracted the main points), and consider what other information you require to believe the results.
  - Return then to the full paper and read parts/all of the rest of it to give you the information you require. Note, we are not expecting you necessarily to understand or follow all the details – all that is necessary is to broadly understand the approach and methods of the paper.
  - Make notes on the above, and then, putting the paper aside, draft a paragraph (in your own words) of the main message of the paper.
  - Finally return to the paper, and review and improve your draft.

Question 4 (OPTIONAL FOR EVERYONE) No grade, just for curiosity.

It has been said that at the start of the 1914 Battle of the Falkland Islands (in the southern hemisphere) UK ships, being used to working in the northern hemisphere, initially missed their targets because of a miscorrection for the Coriolis force.

Stating all your assumptions, work out if this seems likely.