

MODULE 10: HOW IS THE UNITED KINGDOM'S PRECIPITATION CHANGING PAST, PRESENT AND PREDICTIONS FOR THE FUTURE?

ANSWER SHEET

The influx of melt - water into the North Atlantic from the Greenland Ice sheet is expected to cause a weakening of the Atlantic Ocean Circulation and thus reduce the moderating effect of the North Atlantic Drift on the climate of the UK and Western Europe.

Current projections indicate that this relative cooling will not be sufficient to counter act or reverse the warming trend, but act to partially offset the overall warming (Christensen *et al.*, 2007). There is, however, considerable uncertainty regarding the rate at which the Greenland Ice sheet is expected to melt over the coming decades, as well uncertainty in the response of the ocean circulation to this freshwater influx which contribute to uncertainty in the future UK climate.

- The North Atlantic Oscillation currently exerts a strong influence on the amount of rainfall in winter in the UK. There is currently no consensus between climate models with regards to projected future changes in the NAO.
- The coastal regions of the UK may be vulnerable to sea - level rise. Sea - level in this region is projected by climate models to rise by the following levels by the 2090s, relative to 1980 - 1999 sea - level:
 - 0.13 to 0.48m under SRES B1
 - 0.16 to 0.58m under SRES A1B
 - 0.18 to 0.61m under SRES A2

In the UK, the net observed and projected rise in sea - level is influenced by changes in the absolute elevation of the land mass. The increases in absolute sea level are partially offset by gradual increase in land elevation in the North of the UK and enhanced by gradual decrease in land elevation in the south (for further details see The UKCIP02 Scientific report - Hulme *et al.*, 2002).

For further information on climate projections for the UK see the UKCIP02 scientific report (Hume *et al.*, 2002) and Christensen *et al.* (2007) IPCC Working Group I

Report: '*The Physical Science Basis*', Chapter 11 (*Regional Climate projections*):

Sections 11.3 (*Europe and the Mediterranean*). For further information on observed climate and trends in the UK see Jenkins *et al.* (2007).

An interactive activity can be found at <http://www.geographyteachingtoday.org.uk/images/activities/sealevelriserisk.html> which shows the areas of the world which are most at risk from rising sea levels.

ACTIVITY ONE

There is no evidence of long - term trends in annual rainfall. Seasonally, records indicate a slight decrease in summer rainfall of 2.6mm (3.5%) per decade, and slight increases in winter and autumn of 1.5mm (1.5%) per decade but these trends are not statistically significant. A 'Heavy' event is defined as a daily rainfall total which exceeds the threshold that is exceeded on 5% of rainy days in current the climate of that region and season. The proportion of annual rainfall that falls in 'heavy' events has increased by 1.4% per decade since 1960.

ACTIVITY TWO

1. Models project an overall increase in mean annual rainfall in the UK. The greatest changes will be in the autumn and winter (SON and DJF) and a decrease in rainfall in the summer.
2. The range of projections by the 2060's is 2-8mm per month and -2 –11 mm per month by the 2090's.