As part of the DECC/Defra funded Met Office Hadley Centre Climate Programme, the Met Office conducts research on the Arctic region, both in terms of monitoring long-term changes and on improving weather and climate predictions through improved understanding and modelling of Arctic processes.

Reducing uncertainty in model projections of Arctic sea ice to inform policy decisions requires a combination of increased and better observations and an increased ability to better represent Arctic processes in climate models.

In response to the Committee’s specific questions on data gaps and mitigation and adaptation strategies, the Met Office suggests the following points be considered:

**Q5 Are there sufficient data on the Arctic to make informed policy decisions? If not, where are the gaps and how should they be remedied?**

Because of its hostile environment and the presence of sea ice, collection of environmental data in the Arctic presents particular challenges. Therefore, our knowledge of environmental change is more limited than for some other regions. Satellite monitoring provides an important tool to fill some of the gaps, but cannot always observe the near-polar region or in certain seasons. Some important data gaps could in principle be filled using existing or near-proven methods. These include:

- Ocean temperature and salinity (using ice-tethered profilers and autonomous underwater vehicles)
- Arctic clouds and aerosols (detailed process studies using terrestrial stations and ice camps)
- Methane emissions from terrestrial and marine sources (can be monitored using a network of high quality monitoring stations together with modern inversion methods)
- Improving the historical perspective by digitising old observations and interpreting ships’ logs. Cross-calibration of observations from different sources (e.g. ice thickness)
- Improving timeliness of availability of observations to inform near-term climate predictions

The UK’s efforts in these areas need to be well coordinated with international programmes, including the WMO’s Polar Prediction Programme and Polar Climate Predictability Initiative, and the upcoming ‘Year of Polar Prediction’ (2017-19).

**Q6 Are there climate change mitigation and adaptation strategies local to the Arctic that should be deployed or tested? What contribution can the UK make?**

Model projections suggest that further loss of summertime sea ice is likely, across the range of emissions scenarios considered by the Intergovernmental Panel on Climate Change. This implies that adaptation to the threats and opportunities of a changing Arctic environment will be essential. Recent studies with the Met Office’s seasonal prediction system suggest that it may be possible to predict late summer sea ice extent from conditions the preceding spring, with some confidence. If this capability is confirmed by further research it will allow more confident planning of marine operations for transport, resource exploitation and conservation. This is an area where UK science is world-leading.

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