



Meeting notice

Making weather and climate measurements in difficult places

Scott Polar Research Institute, Cambridge CB2 1ER - Wednesday 5 October 2022

Weather and climate observations in remote or inaccessible locations are repeatedly fraught with difficulties, whether on our home planet or other planets in our Solar System. Achieving reliable measurements in such difficult locations often stretch existing measurement methods and technologies well beyond normal operating limits. This meeting will examine how such measurements are made, considering five particularly difficult and forbidding environments in turn.

Meeting Chair – Dr Stephen Burt, University of Reading

- 1300 **Welcome and introduction:**
 Making weather and climate measurements in difficult places
- 1310 **Atmospheric measurements over Arctic sea ice**
 Professor Ian M. Brooks, University of Leeds
- 1345 **The UK’s changing mountain climate as observed by**
 Met Office high-level weather stations
 Mike Kendon, Met Office National Climate Information Centre, Exeter
- 1420 **The challenges of collecting meteorological data in Antarctica**
 Steve Colwell, British Antarctic Survey, Cambridge
- 1445 Refreshment break
- 1515 **Instrumentation challenges at high altitudes: Unique observations from Mt Everest**
 Richard McKay, Campbell Scientific Ltd
- 1550 **Too cold, too hot or just right? Meteorological measurements on Mars and Venus**
 Colin F Wilson, European Space Agency / Oxford University
- 1630 Closing remarks
- 1640 Meeting close
- The Scott Polar Research Institute will remain open until 1800 exclusively for**
 attendees to visit the exhibition. Please note it is not open to the public on Wednesdays.

Session abstracts are given overleaf. This ‘face-to-face’ meeting will be held at the Scott Polar Research Institute, Cambridge (please note it will *not* be streamed online). The Institute, which was established in 1920 as part of the University of Cambridge, is a centre of excellence in the study of the Arctic and Antarctic. and houses the world’s premier Polar Library, extensive archival, photographic and object collections of international importance on the history of polar exploration, and a Polar Museum with displays of both the history and contemporary significance of the Arctic and Antarctic and their surrounding seas.

A location map and details on how to reach the Institute by public transport or by car can be found at <https://www.spri.cam.ac.uk/contacts/directions/>. Cambridge is easily accessible by road, and is only 45 minutes by train from London (SPRI is 10 minutes' walk from Cambridge station). There is no car parking at the Museum; visitors are encouraged to make use of the Cambridge Park and Ride facilities as parking within Cambridge is limited and can be expensive.

Registration for this meeting is through the RMetS website: <https://www.rmets.org/event/making-weather-and-climate-measurements-difficult-places>. There is no charge for attending, or for entrance to the exhibition.

SESSION ABSTRACTS

<i>Speaker and title</i>	<i>Abstract</i>
Atmospheric measurements over Arctic sea ice Professor Ian M. Brooks <i>Institute for Climate & Atmospheric Science, School of Earth & Environment, University of Leeds</i>	The climate of the Arctic is changing rapidly, warming up to four times faster than the rest of the world. While models broadly represent the enhanced warming, they fail to accurately reproduce all the observed features, and show greater variability between models than at lower latitudes. This suggests a failure to properly represent physical processes, and maybe missing processes, within the models. Known problems are the representation of clouds, and turbulent surface fluxes over sea ice. Addressing these model failing requires detailed in situ process measurements in a remote and very harsh environment. This talk will look at some of the measurements made in recent field campaigns - notably the year-long MOSAiC project - and the challenges faced in undertaking them.
The UK's changing mountain climate as observed by Met Office high-level weather stations Mike Kendon <i>Met Office NCIC, Exeter</i>	<p>The Met Office National Climate Information Centre (NCIC) are responsible for monitoring the UK's climate, including its mountains. A small network of high-level stations provide observations representative of mountain conditions which could not be provided by nearby low-level stations. These stations use special non-standard equipment, since the instruments normally present at a standard Met Office low-level weather station would quickly fail in the hostile upland environment.</p> <p>In this talk I will provide a brief overview of the equipment used at these stations, discuss their importance for climate monitoring and show a few example observations from these stations – some of which may be surprising. Finally, I will discuss what these observations tell us about the changing nature of the UK's mountain climate. Some photographs of mountains are guaranteed.</p>
The challenges of collecting meteorological data in Antarctica Steve Colwell <i>British Antarctic Survey, Cambridge</i>	Antarctica is the coldest, driest, windiest and highest continent on Earth. It is about fifty times the size of the UK and is almost completely covered in ice. In places the ice sheet is over 4 km thick, and the lowest temperature ever recorded at the surface was -89.2 °C at Vostok station. The highest gust ever recorded in Antarctica was 173 knots (89 m/s) at Dumont d'Urville station. This presentation will look at the technical, logistical and physical challenges faced when installing and maintaining meteorological equipment on this beautiful but hostile continent.

Instrumentation challenges at high altitudes: Unique observations from Mt Everest

Richard McKay
*Senior Product Manager,
Campbell Scientific Ltd*

In 2019, five automatic weather stations, including the two highest weather stations on Earth (8430 m and 7945 m AMSL) were installed on Mt Everest. The National Geographic and Rolex Perpetual Planet Everest Expedition team achieved the most comprehensive single scientific expedition on record to this iconic landmark. The presentation will discuss some of the specific challenges the team faced in choosing suitable equipment along with the unique issues to reach and install the sites at such extreme altitudes.

Too cold, too hot or just right? Meteorological measurements on Mars and Venus

Colin F Wilson
*European Space Agency /
Oxford University*

Meteorological measurements have been taken both at Mars and at Venus. Mars meteorological stations face low temperatures (down to -100 °C) and pressures (5-8 mbar) and windblown dust and sand; the longest of these records now approaches 10 Earth years in duration. Venus landers face high temperatures (475 °C) and pressures (90 atm), and a challenging chemical environment; none have lasted more than two hours. Balloons in the clouds of Venus can enjoy more benign environmental conditions with temperatures and pressures in the 0–60 °C and 0.3 – 0.7 bar ranges respectively – but have to contend with sulphuric acid cloud droplets and limited balloon lifetimes. This presentation will review past and present Mars and Venus meteorological instrumentation and prospects for the future.
