

Cloud radar -- predicting the weather more accurately

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The weather. It's the one topic of conversation that unites Britain – umbrella or sun cream? Now scientists at the Science and Technology Facilities Council have developed a system that measures the individual layers of cloud above us which will make answering the all-important weather questions much easier in future. The Cloud Radar will not only allow forecasters to predict the weather more precisely, the information gathered will also enable aircraft pilots to judge more accurately whether it is safe to take off and land in diverse weather conditions, offering a powerful safety capability for civil airports and military air bases.

Developed over 10 years by researchers and engineers at the STFC Rutherford Appleton Laboratory, in collaboration with the Met Office, the Cloud Radar can take a complete and accurate profile of cloud or fog up to 5 miles overhead. Operating at 94 GHz, 50 times higher in frequency than most mobile phones, the radar measures the cloud base height, its thickness, density and internal structure as well as providing similar information on cloud layers at higher altitudes.

The earliest version of the cloud radar was built to demonstrate that a low power system operating at high frequency could compete with more common radar types. It was built from the spare components of a radar altimeter designed to operate on a satellite, so that it used small, low-power components in contrast to previous cloud radars that use expensive pulsed sources which consume many times more power and have limited lifetimes.

Brian Moyna, Senior Systems Engineer at STFC said: "In a nutshell, our Cloud Radar takes a slice of cloud and provides a complete and accurate vertical profile. Compared to conventional pulsed radar instruments, this radar is a low power, high sensitivity, portable instrument that uses all solid state components for lower cost and increased reliability."

The Met Office has just purchased a Cloud Radar which is being trialled at sites around Britain. Additionally, a Cloud Radar has also been acquired by the University of Marburg in Germany.

The radar consists of a millimetre-wave frequency source that continuously emits a low power signal in the vertical direction that is frequency modulated. A signal is returned, mainly due to what is known as 'back-scattering' from water droplets and ice crystals in the atmosphere. This signal is picked up by a receiver and converted to a microwave signal, which is then digitised, analysed and a real-time image of the returned signal intensity versus altitude is displayed for the user.

The new Cloud Radar is the result of several hundred thousands of pounds of investment into the Space Science & Technology Department at STFC with proof of concept funding from CLIK, STFC's wholly-owned technology exploitation company, along with the Met Office.

Tim Bestwick, Chief Executive of CLIK said "This is an exciting example of how fundamental scientific research can result in such useful and practical applications, in this case, with more accurate weather forecasting and the potential to make our skies a safer place."

Source: Science and Technology Facilities Council

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