

Science for Environment Policy

Research stations in Antarctica could be affecting magnetic fields

A new aerial survey is the first to assess the possible impact of a research station in Antarctica on magnetic fields. Estimations indicated that the station generated a magnetic field that extends up to 650 metres from the station with a peak strength of 2800 nanotesla (nT) within 100 metres from the station on the ground. This may have implications for organisms in Antarctica that are negatively affected by magnetic fields, but further research is needed to investigate this.

Protection of the environment is an essential premise of the Antarctic Treaty¹. As such, there is a scientific community of 53 active research stations operating in Antarctica to study the environment as well as evaluating and monitoring human impacts on the environment and associated ecosystems. However, the presence and actions of the research community itself can affect the fragile environment. One of the less considered impacts of Antarctic research is the change in magnetic fields caused by the communication and energy production devices of the scientific stations and their facilities. Previous studies have indicated changes in magnetic fields can have an impact on plants, animals and humans. For example, they could affect blood flow, the activity of the pineal gland (which regulates wake/sleep functions and seasonal patterns) and the control of pain in humans and animals.

The study is the first to evaluate the significance of the possible impact of a research station on magnetic fields in Antarctica. The station's magnetic field was measured from a helicopter at 320 metres from the ground to allow data to be rapidly collected and a large area of ground to be covered in a short amount of time. This does mean the magnetic field was not measured at the ground, but ground level values could be estimated from these aerial measurements. The magnetic field of the research station could be distinguished from the natural 'background' magnetic field found in Antarctica since the former has a much shorter wavelength.

The magnetic field generated on the ground by the station was estimated to demonstrate a peak strength of 2800nT that occurred within 100 metres from the station on the ground. The field extended up to 650 metres from the station with a minimum strength of 1nT. At a higher distance from the ground, about 100 metres above, the electromagnetic field dropped to below 100nT.

This magnetic field could be attributed to the station itself and the oil tanks that supply the station. Its strength is about 4% of the geomagnetic field that exists in this area naturally, and is comparable to the fields produced by highly magnetised rocks. Nevertheless, magnetic fields of this strength will still lead to some changes in living organisms, particularly certain biochemical reactions, such as those in the liver.

Although current research shows that serious health effects do not occur at the strength of magnetic field measured in this study, it could be that relatively weak magnetic fields have more serious effects at longer time exposures, which are likely to occur around a research station.

The research is the first step towards a more comprehensive assessment of the impact of electromagnetic radiation from Antarctic research stations. The next steps will involve identifying the main activities and sources at the station that contribute to the electromagnetic field, which would include an assessment of the field strength in and around the various installations by direct measurements.



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1. See: www.antarctica.ac.uk/about_antarctica/geopolitical/treaty/