



The exploration of Subglacial Lake Ellsworth, West Antarctica

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Over 140 liquid water lakes have been identified beneath the ice sheets of Antarctica. They were discovered by British glaciologists in the 1970s using ice penetrating radar to map the bed surface underneath the Antarctic ice sheet. In a number of places, they measured the base reflector to be unusually flat, smooth and bright. Such reflections can only come from the ice water interface of a subglacial lake. The largest and most well known of these lakes is the 250 km long Lake Vostok. The majority of Antarctic subglacial lakes are much smaller, having lengths of around 10 km. All subglacial lakes are located beneath ice in excess of 3 km thick, and are likely to have water depths of the order of 10s-100s of metres. Subglacial lakes are therefore significant bodies of water, isolated from the atmosphere for, possibly, millions of years. Subglacial lakes research is underpinned by the hypothesis that they contain microbial life. Because their habitat is extreme and ancient, these microbes may be unusual and unique. To date, no direct measurements have been made in any subglacial lake. Such work is, however, the only way to identify and understand life in these extreme environments. Instruments developed for the exploration of subglacial lakes are analogous to those needed to identify life in extra terrestrial bodies for three reasons. (1) Life in subglacial lakes is likely to be sparse, and so identification of this life will be a significant challenge for instruments developed. (2) The instruments must operate remotely and feed information back to a distant receiver. (3) The equipment must be miniaturised and fitted into a 15-cm diameter cylinder (to allow it to pass down an ice borehole). The Scientific Committee on Antarctic Research (SCAR) set up a 'group of specialists' in 1999 to "consider and recommend mechanisms for the international coordination of a subglacial lake exploration programme". They noted that the large size of Lake Vostok means that it will take decades to be characterised to a meaningful

degree. A smaller subglacial lake could, however, be measured to an accurate level by a single dedicated field season. A UK-led proposal exists to survey a 10 km long lake in West Antarctica, named subglacial Lake Ellsworth. In a few years time, after Lake Ellsworth has been surveyed, it will be a prime candidate for *in situ* measurement and sampling. It is hoped such work will reveal information on the microbes held in this unique and extreme environment, and will lead to future exploration programmes on other subglacial lakes and in similar environments on Earth and elsewhere in the solar system. Further information about the UK project to explore Subglacial Lake Ellsworth can be found of the following website: www.ggy.bris.ac.uk/ellsworth