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Inquiry into the importance of Antarctica to Australia's national interests

To the committee,

Thank you for the opportunity to provide a submission on the importance of Antarctica to Australia's national interests. I provide this submission in my personal capacity as an Antarctic researcher.

I have worked in Antarctic science since 2004, firstly as an ice core scientist with the British Antarctic Survey, and since 2011 as an academic at the Australian National University. I am currently Deputy Director of the Australian Centre for Excellence in Antarctic Science, one of the major Antarctic research initiatives funded through the Australian Research Council. I am also chair of the Academy of Science's National Committee for Antarctic Research, and through that role am a member of the Australian Antarctic Science Council and Australia's delegate to the Scientific Committee for Antarctic Research. I have completed five ice drilling expeditions to Antarctica, with four of these as part of the Australian Antarctic Program. Most recently I led the ice drilling component of the Denman Terrestrial Campaign during the 2023/24 Antarctic field season.

Science is the foundation to delivering Australia's national interests in Antarctica. It provides the evidence to guide critical policy decisions for Australia on greenhouse gas emission reductions to limit further climate changes and avoid climate tipping points, on what adaptation responses will be needed to make our country and our region resilient to climate changes and sea level rise that are now unavoidable, and on what actions are needed to conserve the unique and economically valuable ecosystems of Antarctica and the Southern Ocean. Science builds our international reputation and influence, including through the Antarctic Treaty System, and maintains Australia's territorial claim in Antarctica.

The Denman Terrestrial Campaign, that I was recently part of, is a powerful example of the multiple ways in which science is core to achieving Australia's national interests in Antarctica. This was the largest and most ambitious field program that has ever been undertaken in the Australian Antarctic Program. This campaign is also pivotal to demonstrating the future needs and challenges for Australia's national interests in Antarctica, as follows:

Critical science targeting regions of concern. The time-critical issues originating from Antarctica for Australia, our region and the world demand that our scientific efforts in Antarctic and the Southern Ocean are focused on the highest priority strategic science. The Denman Terrestrial Campaign, and

the planned Denman Marine Voyage on *Nuyina*, are designed around the urgent need to understand the vulnerabilities of Denman Glacier. Denman Glacier was recently discovered to be sitting on ground that is around 3.5km below sea level, making it the deepest known glacier on Earth. This sets up a potentially very unstable glacier configuration that could destabilise rapidly and contribute around 1.5 metres to global sea level rise. But there is very little that is known about this region of Antarctica, and so the Denman Terrestrial Campaign and Denman Marine Voyage were designed by the Australian Antarctic research community to gather the information that we need to improve predictability of the risks that will emerge from this region in a warming climate. This is the type of coordinated, high priority science model that will be needed to achieve the Australian Antarctic Science Decadal Plan that is currently under development following wide consultation with the Australian Antarctic research community.

Remote Antarctic science capabilities. Achieving the highest priority science in Antarctica will frequently require intense, campaign style scientific efforts that are remote to Australia's established bases in Antarctica and the Southern Ocean. For example, the Denman Terrestrial Campaign involved a team of up to 45 people camping for two months in a region around 450 kilometres from Casey Station. Australia's new overland traverse capability will make it possible to conduct science campaigns in remote inland locations of Australia's Antarctic Territory. Similarly, Australia's new ice breaker *Nuyina* was designed to be a world-class scientific vessel that is also able to serve as a floating station to give scientific access to remote parts of Australia's Antarctic Territory. The Denman Marine Voyage – if it goes ahead as planned in 2024/25 – will be the first dedicated scientific use of *Nuyina*. Future planning aims to see *Nuyina* conducting remote scientific expeditions to Heard Island and to Enderby Land – areas that have not been visited by the Australian Antarctic Program for a very long time. However, there are significant competing demands on *Nuyina* being used to resupply Australia's Antarctic bases which are making it difficult for the scientific capabilities of *Nuyina* to be utilised. With the changing needs of Antarctic science towards remote campaigns it needs to be considered if maintaining Australia's large and complex Antarctic bases at their current size best serves Australia's national interests in Antarctica, and if a separate resupply vessel is needed to allow *Nuyina* to be available to carry out science.

Diversity of the Australian Antarctic Program. The Australian Antarctic Program is made up of geographically distributed capabilities from across Australia. Delivering the program depends upon collaborations between multiple government bodies (including AAD, BoM, CSIRO, Geoscience Australia and the Australian Defence Force) and Australia's university sector. For example, there were 27 scientists who carried out field work during 2023/24 as part of the Denman Terrestrial Campaign, and all but three of these were university-based researchers who came from 9 Australian and 2 international universities. Leadership in Antarctic science from the university sector was essential to identifying the scientific priorities and designing and achieving the scientific work of the Denman Terrestrial Campaign. The Australian Antarctic Division was critical in providing the logistical capabilities, coordination and support staff required to make the science possible. The Denman Terrestrial Campaign is a clear example of how Australia's achievements in Antarctica depend upon bringing together extensive Antarctic expertise from across the country into a coordinated and collaborative Australian Antarctic Program.

Training of next generation Antarctic science leaders. Maintaining Australia's capabilities and international reputation in Antarctic science requires training and supporting the career

development of early career Antarctic researchers. This depends on Antarctic-focused research training within Australian universities, and for field-based sciences it also requires having sufficient 'beds'/'berths' for early career researchers to be included on Antarctic and Southern Ocean field programs. Where insufficient capacity for training is available then fieldwork can only be carried out by established researchers and their skills are unable to be passed on to the researchers who will be needed to lead Australia's Antarctic science in the future. One of the great successes of the Denman Terrestrial Campaign was that every effort was made to maximise the number of science places available. This meant that each sub-team involved an experienced Antarctic scientist working with early career researchers to achieve the science outcomes of the program, while also building future field-science capacity in the Australian Antarctic Program.

Science-centred culture. It has been broadly recognised that the Australian Antarctic Program and the Australian Antarctic Division have been hampered over recent years by serious cultural issues. My own observations of the Denman Terrestrial Campaign were that the culture in this field program was collaborative, adaptable and positive across all of the members of the deep field team. One of the aspects that I think contributed to this was that the Denman Terrestrial Campaign had a clear and urgent scientific purpose. Everyone who was part of making this program a success understood how their role was important to achieving the scientific outcomes. This shared mission, which had science at its focus, provided the basis for a strong positive culture. In continuing to work towards improving the culture of the Australian Antarctic Program it should be recognised that a shared, science-focused mission is powerful for driving positive cultural changes, as well as achieving Australia's other more direct interests in Antarctica.

The need for certainty in Antarctic science funding. Antarctic science is critical to Australia's national interests, but the remote and hostile environment where Antarctic fieldwork is carried out means that Antarctic science requires constant adaptability and is also expensive compared to other areas of science (though not in terms of other overlapping areas of Australia's national interests including sovereignty and defence). Current funding mechanisms do not well suit these needs. Delivery of Antarctic science would be improved if the Australian Antarctic Division had long-term certainty in funding for logistics and for science, and the ability to roll over funding between years when unavoidable obstacles in delivering the planned program arise. As an example, although the Denman Terrestrial Campaign was conceived and funded to the university sector in around 2020, the final go ahead of the 2023/24 field program was not confirmed by the Australian Antarctic Division until August 2023 – a mere 3 months before deployment. This meant that major decisions around staffing (including hiring and medical clearance of the field team) and program delivery were happening very late and represented a major risk to the success of the campaign. Similarly, significant investments and hiring are already having to be made in the university sector to prepare for the 2024/25 Denman Marine Voyage, but this voyage has not yet been able to be confirmed as going ahead by the Australian Antarctic Division. The Denman Terrestrial Campaign also demonstrated the value of competitive grant schemes in driving the vision and collaboration needed for ambitious Antarctic science. However, the terminating measures for funding to the current university-led Antarctic research centres means that there is significant uncertainty about how Australia's Antarctic science will be sustained beyond 2025. The majority of Australia's scientific capacity and leadership in Antarctic science is based in the university sector, but there is currently no mechanism available for planning or funding a

coordinated approach to harness this capacity and to best serve Australia's national interests by delivering ambitious and critical Antarctic science.

I hope that these perspectives from the 2023/24 Denman Terrestrial Campaign are useful to the committee in illustrating the remarkable strengths of the Australian Antarctic Program and its capacity to carry out critical science that supports Australia's national interests in Antarctica, as well as demonstrating some of the challenges that the Australian Antarctic Program faces as it looks to the future of Antarctic science.

Sincerely,

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Professor Nerilie Abram

The 2023/24 Denman Terrestrial Campaign field team. Photo: James Newlands

Bunger Hills field camp was the main hub for the 2023/24 Denman Terrestrial Campaign. Photo: Richard Jones